

# Perception of Dental Students, Dentists and Patients on the Esthetics of Gingival Recession

Migueli Durigon<sup>1</sup>, Amália Pletsch<sup>2</sup>, Jamil Awad Shibli<sup>3</sup> and Micheline Sandini Trentin<sup>1,3</sup>

<sup>1</sup>Post-Graduate Program in Dentistry; <sup>2</sup>Graduate Program in Dentistry, Dental School, University of Passo Fundo, Passo Fundo, RS, Brazil; <sup>3</sup>Department of Periodontology and Oral Implantology, Dental Research Division, University of Guarulhos, Guarulhos, SP, Brazil.

## Abstract

**Background:** This cross-sectional study verified the self-perception of different observers on gingival recession.

**Methods:** Areas of gingival recession were digitally modified using software simulating different clinical conditions in the esthetic area. A total of 180 individuals (60 dentists, 60 patients, and 60 dental students) participated in this study. From an original photograph of the smile of a volunteer, five cases of gingival recession (GR), including unilateral recession (lateral incisor and canine), bilateral recession (lateral incisor and canine), and generalized recession in upper anterior teeth, were intentionally created with Adobe Photoshop 2015™ image-editing software. The participants analyzed the photographs with scores of 1 (very pleasant), 2 (pleasant), and 3 (unpleasant). The data were evaluated using Student's *t*-test and ANOVA with Tukey's post hoc test at  $p < 0.05$ .

**Results:** Unilateral recession was considered more esthetically pleasing when compared to bilateral recession, showing a significant difference for all groups ( $p < 0.05$ ). Patients considered generalized recession and bilateral recession of upper canines less esthetic ( $p < 0.05$ ).

**Conclusion:** Within the limits of this study, it could be concluded that dentists have better visual perception when compared to dental students, who in turn were more perceptive than patients.

**Key words:** *Gingival recession, esthetics, perception*

## Introduction

Physical attractiveness is a matter of judgment in our current culture. The face and the smile are major facial characteristics by which attractiveness is judged by ourselves and others (Ioi *et al.*, 2010).

A harmonious and pleasant smile highlights facial beauty and attractiveness, and contributes directly to individual self-esteem. Therefore, patients seek dental care for esthetic purposes, general image improvement, social acceptance, and biological benefits (Mokhtar *et al.*, 2015). The definition of esthetics is quite subjective when related to beauty and

harmony, as well as psychological, cultural, age, and time factors; it also varies from one person to another. Regarding dental esthetics, patient satisfaction should be reached, aiming above all to recover function along with esthetics (Ioi *et al.*, 2010). The esthetic set between gingival margin and teeth is extensively discussed in the scientific literature (Chander *et al.*, 2012; Crawford *et al.*, 2012; Talic *et al.*, 2013).

Many patients evaluate oral health and treatment outcomes according to smile attractiveness and the esthetic changes observed (Mokhtar *et al.*, 2015). It has been advocated, for example, that changes in symmetry make teeth less attractive as perceived by patients and dental professionals (Ioi *et al.*, 2010). It has been suggested that one of the main factors contributing to the perception of esthetics is the position of gingival tissues in the upper arch. These esthetic aspects should be considered for both teeth and periodontal tissues, aiming to achieve the most attractive smile (Crawford *et al.*, 2012, Muskopf *et al.*, 2013).

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Correspondence to: Micheline Sandini Trentin, Silva Jardim, 391/1301 - Passo Fundo/RS, Dental School, University of Passo Fundo, Brazil, CEP: 99010-240. E-mail: tmicheline@upf.br

An important point to consider is that an esthetically harmonious smile for the dentist may not be perceived the same way by the patient, or vice-versa (Pinho *et al.*, 2007; An *et al.*, 2014). Recent studies showed that dentists are more discerning in assessing esthetics and the harmony of teeth and gingiva (Mahshid *et al.*, 2004; Pannossion and Clock, 2004; Sharma and Sharma, 2012).

Gingival recession is a condition that negatively affects dentogingival esthetics, especially in patients with high smile line (gingival display >3 mm). This condition may induce dentin sensitivity, root caries, and negatively interferes with smile esthetics (Khalid *et al.*, 2015). The main causes of localized or generalized gingival recession include traumatic tooth brushing, established periodontitis, abnormal arch position, orthodontic therapy, and thin bone biotype of the patient. It is a very common clinical condition among the population, with a prevalence of 51.6% with measurement sites equivalent to  $\geq 3$  mm (Dutra *et al.*, 2011; Miller, 1985). Periodontal plastic surgery is often used to treat such clinical conditions (Khalid *et al.*, 2015; Choudhari *et al.*, 2015; Chatterjee *et al.*, 2015).

Changes in periodontium shape, gingival height, presence of localized or generalized recession, and uneven gingival tissues may contribute to the perception of smile beauty. In this sense, identifying factors related to smile esthetics is crucial because it may influence appearance, attractiveness, and even the perception of one's personality (Talic *et al.*, 2013).

This study aimed to identify the perception of distinct populations on periodontal conditions related to the gingival margin (recession conditions), and among them, to identify the more esthetic or anti-esthetic conditions within the individual concepts of visual perception of each participant.

## Methods

The study was approved by the Research Ethics Committee of the University of Passo Fundo under the Certificate of Presentation for Ethical Consideration (CAAE) number 42462414.8.0000.5342. All volunteers signed a free informed consent form. For this cross-sectional design, a dental student was selected as the model: female, 24 years old, with a broad smile and harmonious dentogingival characteristics.

A frontal photograph of the smile was taken with a professional digital camera, (Nikon D 3200 macro lens), and five different gingival changes (recessions) were created from this original photograph with Adobe Photoshop CC 2015™ image-editing software. Gingival recessions of 2 mm in upper anterior dental elements were replaced as follows: gingival recession of upper left canine, bilateral gingival recession of upper canines, gingival recession of upper left lateral incisor, bilateral gingival recession of upper lateral incisors, and generalized recession in upper anterior teeth.

Photographs of the patient's smile were printed at 10 x 15 cm, closest to reality, and randomly displayed in an album. The final sample size included 180 individuals divided into 3 subgroups (60 dentists, 60 patients, and 60 dental students).

Individual interviews were set with dentists, students, and patients participating in the study (Table 1). All the participants had the same time for photograph assessments and dynamics, and the following scores were assigned: 1 (very pleasant), 2 (pleasant), and 3 (unpleasant). At the end of each individual assessment, a grade from one to ten was assigned to conclude which would be the most harmonious smile among the conditions analyzed, identified as absence of GR, generalized anterior GR, unilateral GR of upper canine, bilateral GR of upper canines, unilateral GR of upper lateral incisors, and bilateral GR of upper lateral incisors.

**Table 1.** Description of the sample: dentists, patients and dental students

Group	Subgroup	Collection locale
Dentists	Clinical dentists	Particular offices
	Periodontists	Particular offices
	Specialists in dentistry	Particular offices
	Orthodontists	Particular offices
Patients	Patients served in FD	FD - UPF
	Popular Clinics	Clinic Brasil -Passo Fundo/RS
	Particular offices BHU	Particular offices BHU de Ibiaçá/RS and Passo Fundo/RS
Academic dentistry	II level FD - UPF	FD Clinics - UPF
	VIII level FD - UPF	FD Clinics - UPF

FD, Faculty of Dentistry; UPF, University of Passo Fundo; RS, Rio Grande do Sul - Brazil; BHU, Basic Health Unit

## Statistical analysis

Data were analyzed through mean and standard deviation for each clinical situation, as well as Student's *t*-test. Moreover, ANOVA with Tukey's post hoc test was used for data interpretation. Questionnaire data were analyzed by SPSS statistical package 23 (SPSS Inc., Chicago, IL, USA). A significance value of 5% was used for statistical analysis ( $p < 0.05$ ). The determination of the power of each test was performed with the G Power 3.1 software.

## Results

All study groups considered unilateral recessions more pleasant than bilateral recessions of canines (C) and lateral incisors (LI). There were significant differences among the three groups ( $p < 0.05$ ), as presented in Table 2. Dentists and patients considered unilateral gingival recession of LI more esthetic when compared to the unilateral gingival recession of canines ( $p < 0.05$ ). On the other hand, there was no statistical difference between both gingival recessions in the group of students ( $p > 0.05$ ). All groups considered bilateral recessions of LI more esthetic when compared to the bilateral recessions of canines, with significant difference ( $p < 0.05$ ) by Student's *t*-test and power test of 0.81.

The group of patients considered generalized recession of anterior teeth more pleasant than the bilateral recession of canines ( $p < 0.05$ ). The groups of dentists and dental students assigned nearly the same scores, and no significant differences were found in these groups ( $p > 0.05$ ). All groups considered the photograph with no gingival recession (Figure 1E) more esthetic when compared to the unilateral recession of LI; however, patients

were less perceptive in verifying this characteristic. There was no significant difference in the group of patients ( $p > 0.05$ ; power test: 0.81; Table 2).

Table 3 shows that the evaluators considered Figure 1E more esthetic, followed by Figure 1F. The most disharmonious smiles were the ones shown in Figures 1D and 1C, respectively.

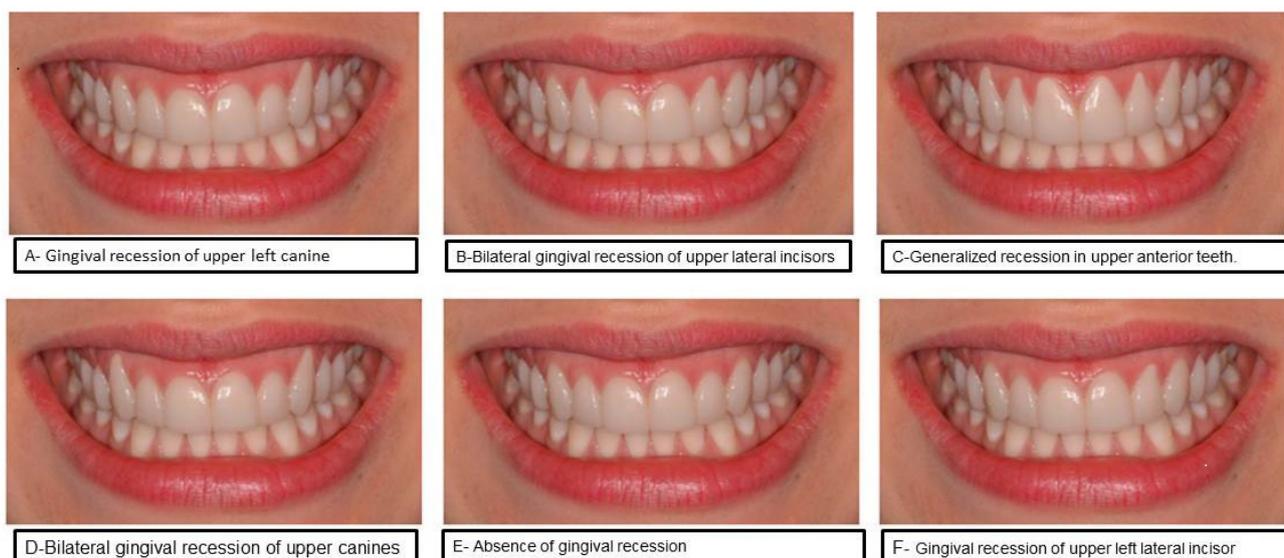


Figure 1: Smiles for the analyses of gingival recessions.

Table 2. Comparison (by score of 1 - 3 where 1 was most pleasant and 3 least pleasant) of the gingival recession (GR) conditions of the study.

	Dentists	Patients	Dental students
Unilateral canines	2.43 ± 0.59*	2.23 ± 0.70	1.87 ± 0.65
Bilateral canines	2.83 ± 0.46	2.78 ± 0.45*	2.75 ± 0.47*
Unilateral lateral incisors	2.03 ± 0.55*	1.37 ± 0.58*	1.82 ± 0.58
Bilateral canines	2.55 ± 0.56*	2.13 ± 0.67*	2.25 ± 0.63*
Generalized GR	2.85 ± 0.44	2.57 ± 0.65*	2.75 ± 0.52
Absence of GR	1.48 ± 0.62*	1.27 ± 0.48	1.28 ± 0.55*

\*Statistically significant intragroup difference ( $p < 0.05$ ) when compared with absence of GR. Student's t-test; power = 0.81.

Table 3. Assessment of the most pleasant smile regarding the presence or absence of gingival recessions, on a scale of 1 - 10 from least to most pleasant.

	Dentists	Patients	Dental students
Figure 1E	8.68 ± 1.05	9.15 ± 1.08	8.85 ± 1.18
Figure 1F	7.98 ± 1.02*	9.00 ± 1.18	8.27 ± 1.04*
Figure 1B	7.10 ± 0.99*	7.70 ± 1.06*	7.57 ± 1.03*
Figure 1A	7.70 ± 1.11*	7.65 ± 1.08*	7.93 ± 0.99*
Figure 1D	6.13 ± 1.85*	6.18 ± 1.39*	6.03 ± 1.27*
Figure 1C	5.63 ± 1.36*	6.53 ± 1.48*	5.98 ± 1.35*

\*Statistically different from absence of gingival recessions (Figure 1E) by Tukey's test; power = 0.81.

## Discussion

Dentogingival esthetics represents an inspiring part of orofacial therapy, considering that gingival recession is a challenging condition for gingival esthetics and teeth harmony (Chatterjee *et al.*, 2015). One of the most common esthetic complaints is gingival recession, which causes esthetic defects and hypersensitivity (Wagner *et al.*, 2016; Rocha *et al.*, 2011).

Dental professionals play an important role in establishing esthetic standards (Garber and Salama, 1996, Forster *et al.*, 2013) and it is of great interest to know how future dental professionals evaluate different esthetic situations.

The definition of an esthetically unpleasant situation is often associated with dentist perception and not with patient perception. The present study compared the perception of smile esthetics among dental students, dentists, and patients. Usually, only dentists observe small gingival recessions from 1 to 2 mm, and patients hardly notice these changes (Crawford *et al.*, 2012; Musskopf *et al.*, 2013).

The present study evaluated the esthetic perception of five different gingival alterations (recessions) for 180 individuals, including 60 dentists, 60 dental students, and 60 patients. Previous cross-sectional studies investigated the perception of dentogingival esthetics of the upper arch, but exclusively among dental students (Rocha *et al.*, 2011; Musskopf *et al.*, 2013).

In this study, we used a scale of 1 - 3 to evaluate the perception of the study participants on the photos to facilitate data coding for observers. To avoid ambiguity of responses and also to reduce the number of choices that could confuse the researchers, it was decided to use reduced codes: very pleasant, pleasant and unpleasant. Other studies investigated the same issue by using the Visual Analogue Scale (VAS) system (Rocha *et al.*, 2011; Crawford *et al.*, 2012; Kumar *et al.*, 2012).

This study evaluated the perception of dentists, patients and dental students on recessions intentionally modified with Adobe Photoshop CC 2015™ image-editing software. Studies similar to ours have been reported by Crawford *et al.* (2012) Kumar *et al.* (2012), Musskopf *et al.* (2013), and Talic *et al.* (2013). Previous studies evaluated only the perception of dental students (Rocha *et al.*, 2011). According to Aroca *et al.* (2013), more than 50% of their study population had one or more sites of gingival recession of  $\geq 1$  mm, which were observed in patients with either good or poor oral hygiene.

The results of the present study showed that all study groups considered unilateral recession more pleasant than bilateral recession of canines (C) and bilateral recessions of lateral incisors (LI). There were no significant differences among the study groups regarding the absence of recessions, in agreement with previous reports (Crawford *et al.*, 2012; Musskopf *et al.*, 2013).

A recent study by Rocha *et al.* (2011) found no statistical differences regarding the perception of localized and generalized gingival recession, which agrees with our results,

where dentists and dental students reported almost the same scores for both conditions. The group of patients in the present study reported bilateral recession of canines as unpleasant more frequently than the other study groups. A possible explanation is that generalized GR, despite having a larger area of periodontal defect than localized GR, presents symmetry, which is a major characteristic when assessing dentogingival esthetics.

Similar findings were observed in the present study, considering that dentists and dental students observed significant differences between the absence of GR and unilateral recession of LI, but patients did not perceive these cases the same way.

A slight recession in upper lateral incisors (LI) did not negatively interfere with individual esthetics according to the study participants, as the group of patients did not notice it. The participants assigned the smile with no gingival recessions as the most esthetic and harmonious one, as earlier reported (Crawford *et al.*, 2012; Musskopf *et al.*, 2013). Dentists and dental students considered generalized recession more disharmonious, but the group of patients did not perceive it the same way, according to the study by Musskopf *et al.* (2013).

However, in the study by Musskopf *et al.* (2013) patients reported that the bilateral recession of lateral incisors was the most anti-esthetic condition, unlike our findings where patients found no significant differences between unilateral and bilateral recessions of LI. This may be justified by the fact that the smile image model of our study is more “harmonious” and the recession in the LI is smaller than that of the clinical case mentioned previously. In the latter study, the LI was more evident in the dental arch, and the canines presented with slight distalization and giroversion, causing the LI recession to be more evident than the canine recession.

In this study, the patients considered bilateral recession of upper canines most disharmonious. In contrast, all study groups considered unilateral recessions more harmonious than bilateral recessions ( $p < 0.05$ ), which may be justified by the fact that upper canines are bulkier, with more prominent gingival zeniths when compared to the lateral incisors. Dentists and patients noticed an aspect of “exaggerated tooth” interfering negatively with the dentogingival aspect in the presence of gingival recession.

A limitation of this study is that the sample analyzed is local and it is difficult to extrapolate these results to other locations and countries, mainly due to differences among cultures, races and esthetic design. Therefore, it is important that dental students, dentists, and patients analyze dentofacial esthetics.

Thus, there may be contradicting results from studies using the same methodology (Musskopf *et al.*, 2013), as visual perception often depends on culture and sense of facial/tooth esthetic, as well as anatomy, size, and position of teeth in the dental arch. Dentists are more meticulous when analyzing dentogingival conditions than dental students and patients.

## Conclusion

Dentists presented better visual perception of dentogingival esthetics when compared to dental students, who in turn were more visually perceptive than patients.

Patients did not notice a unilateral recession of LI, and dentists and dental students considered generalized recession more disharmonious, but the group of patients did not perceive it the same way.

Thus, further studies should be performed to confirm the results of the present study.

## Conflict of interest

The authors claim no conflict of interest. The study was performed with no external funding

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