

Chapter

From the Orthodontic Smile to the Perfect Smile: A New Categorization

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Abstract

The facial symmetry from an esthetic standpoint is crucial. However, there are not much research that examine the malocclusion issue or the significance of the mouth and smile in the mental representation of the face. In this study, 151 kids and teenagers, both genders, aged 8 to 24, were asked to sketch two self-portraits of their mouths or smiles—before (and during) the usage of the orthodontic appliance. Participants seek therapy mostly for functional problems rather than cosmetic ones. The findings of this study provide insight into the significance of the mouth and smile for an individual's sense of self and psychological well, where the maximization of the mental representation of the orthodontic smile emerges as a new categorization of the *perfect smile*.

Keywords: orthodontic smile, esthetic smile, mental representation, drawing content analysis

1. Introduction

It is still of great scientific curiosity to comprehend the significance and self-image that a smile psychologically conveys in people's daily lives [1–3]. It is essential that the smile contribute to the facial harmony. There aren't many empirical studies, nevertheless, that consider both the issue of malocclusion and the significance of the mouth and mouth in the mental representation of the self-image of the face. The face is the area of the body where actions and expressions are concentrated and can either internalize or externalize feelings and emotions [4]. Since a large portion of the person's affection is communicated at this level during interactions and bonds with others, the expression on the face is pragmatic. Among these sayings. Among these expressions is the smile, the first psychic organizer and a crucial element in the development of one's own self-image, is one of these expressions [5]. In fact, the ability to understand a patient's facial expression through non-verbal language is crucial in the therapeutic environment of dental medicine since the gift of compassion communicated through a smile is difficult to measure empirically [6].

In a clinical environment, the “art of the smile” resides in the dentist's capability to fete the positive beauty rudiments in each case and to produce a strategy that enhances

the attributes that fall outside the parameters of the prevailing esthetic conception [7]. A panoply of logical principles regarding the “smile” order need to come incorporated in the field of dental medicine orthodontics [8], to gain enhanced clinical results. Nonetheless, in the conception of esthetics is underscored a private perception of the beauty conception operated by the subject [9], in which the harmony of the smile plays an important part in the perception of the beauty of the face [10].

The smile is seen as a fundamental cognitive-affective ability and a trait in the development of a person’s personality, from birth to the conclusion of the life trajectory, according to Freitas-Magalhães [11]. Four different types of smiles have been identified by Freitas-Magalhães the broad smile, the neutral smile, the superior smile, and the closed smile. The superior grin and the closed smile appear to be most associated with inter-psychosocial relationships from an empirical standpoint. The broad smile and the neutral smile, on the other hand, are not seen as loving since they represent the extremes of the smiling spectrum. The wide smile reveals the dental arch in the upper and lower jaws, whilst the neutral smile conceals all facial emotions. The superior smile described by Freitas-Magalhães [11] appears to be equivalent to the smile arc described by Sarver [12] as a type of smile defined by the “relationship of the curvature of the incisal edges of the maxillary incisors and canines to the curvature of the lower lip in the posed smile.” While in a nonconsonant smile, the maxillary incisal are line is flatter than the curvature of the lower lip, according to Sarver [12], an ideal smile arc “has the maxillary incisal edge curvature parallel to the curvature of the lower lip”. According to Sabri [13], the balance between eight factors that make up the perfect smile should not be viewed as rigorous criteria, but rather as esthetic guidelines to aid orthodontists in treating specific individuals. Additional authors have offered definitions of the ideal and discordant smile [7, 12–15]. A younger-appearing smile is one in which the central incisors are longer than the lateral incisors, resulting in a larger interincisal space, while an older-appearing smile is one in which the top incisal edge looks straight during the smile. In the field of orthodontics, esthetic considerations and the attractiveness of the smile are crucial because they appear to motivate treatment more effectively than functional considerations [16, 17]. Nevertheless, the functional factor for orthodontic treatment motivation outweighed the esthetic factor, according to an empirical study [3] done at the Egas Moniz-Lisbon University Clinic by Do Rosário Dias et al. Indeed, in spite of the multitudinous references set up in the literature review that highlight the significance of the functional and biomechanical determinants of malocclusion as a distinguishing diagnosis, there’s still a lack of empirical studies that combine the case of malocclusion to the subject’s self- image perception of the face in terms of the existent’s psychosocial environment [18, 19], insofar as the orthodontic treatment leads to notorious changes in the subject’s intrapsychic experience.

The current chapter fills in this information vacuum by attempting to explain the significance of the self-perception of the mouth and grin in both the individual’s mental representation of his or her own self-image and perception of the face as well as in his or her wellbeing. Additionally, this research has helped define the orthodontic smile as a novel categorization linked to a beautiful, functional smile.

2. Subjects and methods

A descriptive and exploratory empirical study was conducted to get access to how the individual’s mouth and smile are seen in their own minds. The methodological

approach used a combination of quantitative and qualitative criteria to analyze the content of a group of patient drawings. The participants of the sample accurately recognized how the task (centered on the teeth) was being carried out, which indicates that just one person drew the category teeth with the orthodontic device fitted (**Figure 1**) [1–3].

The convenience sample included 151 children and teenagers, aged 8 to 24, who had undergone orthodontic treatment at the Egas Moniz University Clinic in Portugal for a period ranging from 6 months to 1 year. The following questions guided patients in creating two self-portraits of their smiles and mouths: (1) “What was your mouth like before you had the orthodontic appliance?” (Moment 1-[M1]); and (2) “How do you think your mouth will be when you remove the orthodontic appliance?” (Moment 2-[M2]). In addition, all participants answered a socio-demographic inquiry and provided a written answer to the question: “Why do you use an orthodontic appliance?” According to the selected sample, 302 valid drawings were collected and analyzed, half representing M1 and half representing M2. A qualitative content grid for the analysis of the 302 drawings was originally designed to study the pictorial representations found in the sample, with four categories: (1) “smile,” (2) “drawing of the figure (3) “appearance,” and (4) “teeth.” To further detail the content analysis, 10 subcategories were created: (1) “absence of teeth,” (2) “teeth without detail,” (3) “fractured teeth,” (4) “teeth with diastema,” (5) “crowded teeth,” (6) “crooked teeth,” (7) “teeth in saw,” (8) “misplaced teeth,” (9) “teeth with spacing” and (10) “gingival deformation” (**Table 1**). Other subcategories were created such as “size”, “contours/limits”, “opening of the mouth”, “lips”, and “jaw”.

It has been noted that research projects in the field of health sciences’ studies frequently follow the methodological guidelines of using drawings as a graphical instrument for qualitative research goals [16, 20]. Patients were instructed to depict only the mouth/smile in their drawings as a criterion for objectivity, concentrating the smile as the subject of empirical study [3, 17].

Following the theoretical presumptions of Sawyer et al. [21] and Pikunas [22], the data were statistically analyzed, and the sample was broken down into four groups of children and teenagers: “children” (8–12 years); “preteens” (13–14 years); “adolescents” (15–17 years); and “emerging adults” (18–24 years) (**Table 2**).

The statistic treatment of the descriptive data was analyzed using the software SPSS–Statistical Package for the Social Sciences IBM SPSS Statistics, version 23 for Windows, Lisbon, Portugal.

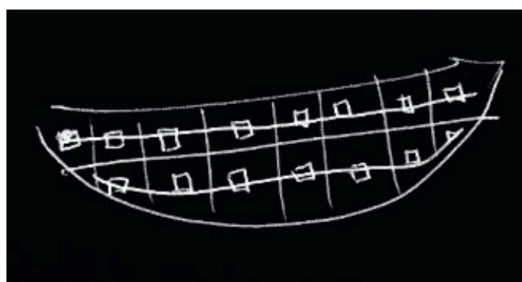


Figure 1.
Drawing of the teeth from a patient with orthodontic appliance.

	Children		Preteens		Adolescents		Emerging adults	
	M1	M2	M1	M2	M1	M2	M1	M2
Absence of teeth	0	0	0	0	0	2.3	8.6	14.3
Teeth without details	57.9	60.5	72.7	84.8	43.2	61.4	60	54.3
Fractured teeth	7.9	0	6.1	0	0	2.3	8.6	0
Teeth with diastema	10.5	0	24.2	6.1	27.3	0	8.6	0
Crowded teeth	55.3	2.6	45.5	0	40.9	6.8	40	0
Crooked teeth	89.5	21.1	84.8	9.1	88.6	20.5	88.6	20
In saw teeth	23.7	18.4	18.2	6.1	22.7	13.6	25.7	11.4
Misplaced teeth	89.5	21.1	90.9	18.2	95.5	15.9	88.6	14.3
Teeth with spacing	26.3	5.3	36.4	6.1	36.4	9.1	40	8.6
Gingival deformation	2.6	0	6.1	0	4.5	2.3	2.9	0

Table 1. Frequency of the subcategories found in participants' drawings before (M1) and after (M2) use of an orthodontic appliance (%).

	Male, n (%)	Female, n (%)	Total, n (%)
Children (8–12 years)	22 (29.3)	16 (21.3)	38 (25.3)
Preteens (13–14 years)	12 (16)	21 (28)	33 (22)
Adolescents (15–17 years)	25 (33.3)	19 (25.3)	44 (29.3)
Emerging adults (18–24 years)	16 (21.3)	19 (25.3)	35 (23.3)
Total sample (8–24 years)	75 (100)	75 (100)	150 (100)

Table 2. Frequency according to gender in all age groups (%).

3. Results and discussion

By comparing the self-portraits of patients' mouths and smiles before and after the placement of the orthodontic appliance, it was possible to understand the impact of the orthodontic appliance on the mental representation of the individual's self-image, particularly that of the mouth and smile (**Figure 2**).

The findings point to variations in the mental representations of the mouth and the smile, namely in the drawings made before (**M1**) and after (**M2**) the usage of the orthodontic device, as well as in the expressiveness and expression of emotions in these two situations. The results of the content analysis of the written responses to the question "Why do you use an orthodontic appliance?" show that the primary motivation for using an orthodontic appliance is thought to be related to the functional well-being of the oral cavity. A total of 103 written responses (68.67%) were collected. The content analysis of drawings in **M2** appears to support this, showing the presence of a wide smile (**M2** = 86.1%) and a sense of well-being (**Figure 3**). This places emphasis on the broad smile, which is seen to be the closest to the idea of happiness [12].

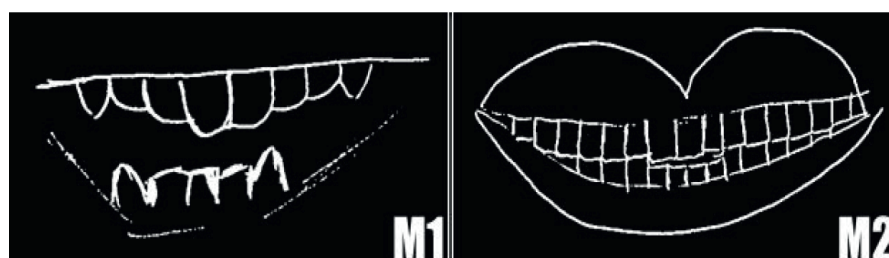


Figure 2. Self-portraits drawn before (M1) and after (M2) the placement of an orthodontic appliance.

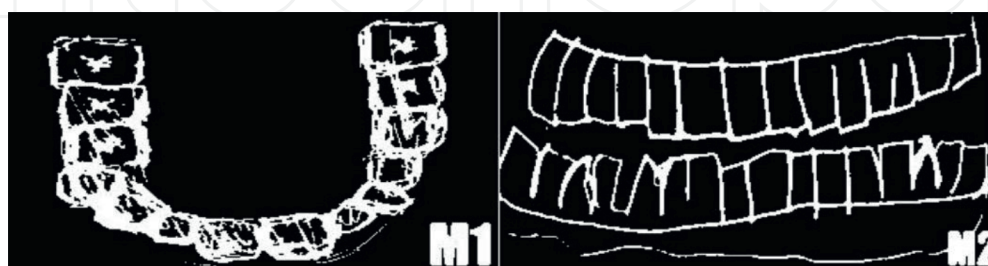


Figure 3. Drawings of a patient which illustrates dental arcades converted to jaws and absence of lips in M1 and M2.

The findings also show alterations in how people see their own mouths after using the orthodontic appliance (M2), as evidenced by more involved drawings, drawings that are more comprehensive and detailed, and drawings that have straighter mouths and better-aligned teeth. This fact may indicate that patients may have clinically induced discourse regarding the orthodontic smile given the time of the questionnaire in the treatment pathway (6 M - 1Y).

When comparing M1 and M2, Table 1 reveals three characteristics that show changes in the mental image of the mouth and smile both before and after the orthodontic device was positioned: crowded teeth, which were noticeable before the orthodontic equipment was used but completely disappeared after; crooked teeth, which are described in (M1); and misplaced teeth, which are also described in (ibidem). Apart from emerging adults, where there were no discernible changes, different scores were obtained in M1 and M2 for the graphical depiction of the category with a diastema. From M1 to M2, there was a noticeable decrease in dental spacing across all age groups. A normal distribution was discovered in all age groups according to gender, per the statistical analysis carried out (Table 2), which appears to be consistent with the results of Rodrigues et al. [23].

In reference to the written response to the inquiry: “Why do you use an orthodontic appliance? Correction of crooked teeth (68.7%), followed by the closure of interdental gaps (12.7%), and malocclusion (12.7%), was the most important response across all age groups. Participants were least likely (0.7%) to cite improving breathing or loving braces (Table 3).

Overall, results point that the improvement of *oral health* is another justification for the use of the orthodontic appliance (9.3%), surpassing esthetic motivations such as to be *good looking* (8.7%) or to have *beautiful teeth* (7.3%). The findings indicate that the improvement of oral health (9.5%) is a more compelling reason to utilize an orthodontic appliance than cosmetic factors like having beautiful teeth (7.3%) or being attractive (8.7%). However, the investigation uncovered a few unique characteristics for each age group: The desire to have the ideal smile surfaced as a significant

	Children	Preteens	Adolescents	Emerging adults	Total (%)
Correction of crooked teeth	73.7	63.6	79.5	54.3	68.7
Interdental spaces	15.8	18.2	4.5	14.3	12.7
Correction of malocclusion	15.8	9.1	9.1	17.1	12.7
To have the perfect smile	5.3	15.2	2.3	22.9	10.7
Oral health	13.2	3	9.1	11.4	9.3
To be good looking	2.6	12.1	4.5	17.1	8.7
Beautiful teeth	15.8	6.1	0	8.6	7.3
Well-being	0	3	4.5	0	2
Improve self-esteem	0	0	2.3	2.9	1.3
Muscle pain	0	0	0	5.7	1.3
Improve breathing	2.6	0	0	0	0.7
Enjoying braces	0	0	0	2.9	0.7

Table 3.
Frequency of reasons to use an orthodontic appliance in all age groups (%).

issue for preteens (15.2%) and emerging adults (22.9%), but not as much for teenagers (2.3%), who appear to be less motivated by the esthetic motive for the ideal smile. Only emerging adults have acknowledged it as an incentive for improving physical difficulties, such as muscular soreness (5.7%), since it is uncomfortable. The findings also imply that in the children's age group, the primary justifications for using orthodontic appliances are connected to the treatment of crooked teeth (73.7%), poor occlusion (15.8%), interdental gaps (15.8%), and to have attractive teeth (15.8%). Braces were not highlighted for reasons like increased self-confidence, wellbeing, relief from muscular soreness, or enjoyment in this age range. In the preteen age group, straightening crooked teeth appears to be the primary motivation for using an orthodontic appliance (63.6%), followed by closing gaps between teeth (18.2%), achieving the ideal smile (6.1%), and being attractive (12.1%). In this age group, no mention was made of the categories of improved self-esteem, reduced muscle pain, better breathing, or enjoyment of braces. The repair of crooked teeth is once again the category most frequently cited as the primary justification for orthodontic treatment in the teenage age group, followed by poor occlusion (9.1%) and oral health (9.1%). Adolescents seldom bring up the topics of having perfect teeth, dealing with muscular discomfort, improving their respiration, or loving braces as being pertinent. Finally, the rising adult age group likewise cites the repair of crooked teeth as the primary reason for receiving orthodontic treatment (54.3%), followed by the desire to have the ideal smile (22.9%), poor occlusion (17.1%), and excellent looks (17.1%). In this age range, there was no mention of better breathing or wellbeing.

The results also show that the smile category (**Figure 3**) is primarily illustrated by the teeth category (in terms of dental arcades) in contrast to the lips subcategory's absence (**M1** = 70.9%; **M2** = 70.8%), with an exaggeration of the upper and lower dental arch. This shows that people are worried about the condition of their teeth, which are viewed as clinical objects and make up the dental arches.

Drawings in **M2** with more prominent labial commissures regarding the lips and complete visualizations of the top and lower dental arches demonstrate a reduction in the pictorial depiction of the partially open mouth, as shown by the appearance category's openness of the mouth subcategory. The drawing and teeth of the figure category categories (**Figure 2**) support this idea since both have more visible teeth.

Additionally, more detailed drawings were submitted in the smile category in **M2** compared to **M1**: These findings go against other findings of the two studies conducted by Gonçalves and Torres at the University Clinic Egas Moniz-Portugal, which highlighted the esthetic element and the pursuit of the "perfect smile" as the driving forces behind orthodontic treatment among patients. According to research by Dias et al. [1], children utilize orthodontic appliances mostly to address crooked and malocclusion teeth and interdental gaps, with adolescent patients being the only ones who care about having a flawless smile. The percentage of the upper and lower lips that are visually represented by the participants in the lip's subcategory has increased from **M1** to **M2** by 2.7%. Additionally, there was a notable increase in the representation of normal lips (**M1** = 16.5%, **M2** = 21.9%), which was offset by a drop in the number of thin lips (**M1** = 4%, **M2** = 2.6%) and thick lips (**M1** = 6%, **M2** = 2%).

The category with the most noticeable alterations between **M1** and **M2** is teeth. Indeed, the fragmented, diastema, crooked, straight, and well-positioned category show the most notable alterations. Additionally, the straight and cracked divisions (**Figure 4**). Drawings of shattered teeth (**M1** = 5.3%, **M2** = 0.7%) and crooked teeth (**M1** = 88.1%, **M2** = 17.9%) show a much lower percentage in **M2**.

As a representation of reinvented smiles following the use of the orthodontic appliance, there is a significant percentage decrease from **M1** to **M2** in the subcategories of teeth with diastema (**M1** = 17.9%, **M2** = 1.3%), crooked teeth (**M1** = 45.7%, **M2** = 2.6%), and well-positioned (**M1** = 91.4%, **M2** = 17.2%) (**Figure 5**).

In the current study, we discovered that age appeared to be a preponderant factor affecting subjects' perceptions of the esthetics of the smile, which seems to be consistent with the viewpoint of several authors, despite gender having no effect on



Figure 4.
Decrease in predominance of fractured and crooked teeth illustrated by the drawing from different Patients in M2.



Figure 5.
Drawing from different Patients which illustrates badly positioned teeth with visible diastemas in M1.

results [23–27]. The correction of misaligned teeth, diastemas, and fractures are the main reasons for orthodontic treatment, according to results regarding participants' mental representations of their mouths and smiles before (M1) and after (M2) using orthodontic appliances. Drawings reveal that M1's smile was depicted by longer anterior incisors, which created a line that dipped in the middle and rose in the corners. In contrast, M2's smile was depicted by straight upper incisal edges and all teeth had the same vertical dimension. These factors support those mentioned by Goldstein [20] in relation to the younger-appearing smile and the older-appearing smile, respectively, distinguishing smiles based on age. According to the current study, the smile changes from appearing older in M1 to appearing younger in M2 after treatment (Figure 6).

Diastemas may be seen in drawings in M1 (Figure 5) but not in M2 across all age groups, as shown by Table 1. The exception to this rule is preteens. According to this line of reasoning, Rodrigues et al. [28] hypothesized that for children and adults, the presence of diastemas harmed the esthetic look and had a detrimental effect on how the smile develops. Almeida et al. [27] believe, on the other hand, that diastemas in children have a natural connotation, are present in deciduous teeth, and disappear naturally or with the help of a straightforward intervention.

Despite this paradox, children in the current study consistently depict the mouth and smile in M2 without any diastemas (Figure 7), which is consistent with the finding of Almeida et al. [29].

Additionally, the superior smile as described by Freitas-Magalhães [11] appears to be the same as the representation of the smile arc in M2 as described by Sarver [7]. Most age groups in M1 exhibit the dental part fractures depicted in drawings (Figure 8), with emerging adults making up most of this subcategory (8.6%).

In general, the categories of crooked teeth rectification, malocclusion correction, and interdental gaps outline the primary motivating elements that decide the practical usage of an orthodontic device.

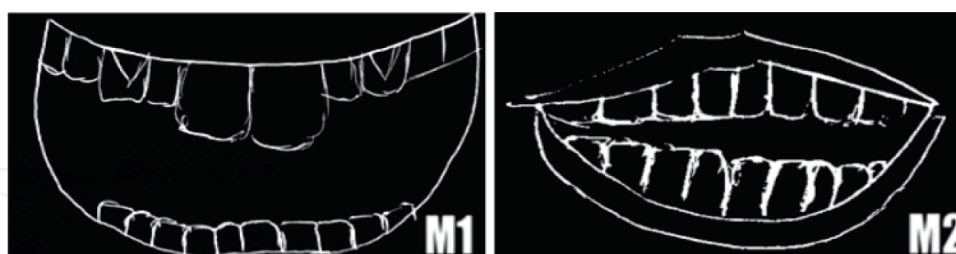


Figure 6.
Younger-appearing smiles (M1) and older-appearing smile (M2).



Figure 7.
Presence of diastema in M1 and absence of diastema in M2.

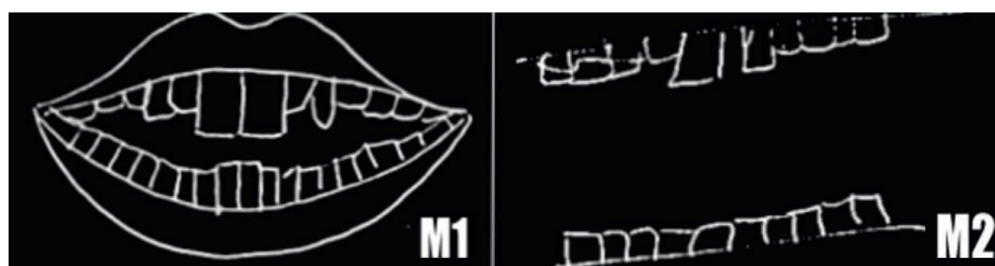


Figure 8.
The fractures of dental parts, mostly drawn in M1.

According to the literature study, the appearance of the smile and the subject's self-esteem are secondary determinants of psychosocial factors that support the use of an orthodontic device, with the degree of malocclusion serving as the primary predictor. According to some authors, malocclusions [2, 25–27, 30] appear to have a greater psychosocial impact than other parameters, indicating that subjects appear to be more concerned with the position of their teeth within the dental arch than with the esthetics of their smile [31].

According to the results of the current study, children and preteens typically seek orthodontic treatment to straighten their teeth. Additionally, missing teeth and a more pronounced anterior irregularity of the upper jaw are linked to children's and teenagers' unhappiness with their dental appearance. The survey also discovered that none of the participants in the adolescent age range cited the value of having attractive teeth as a justification for using an orthodontic device. These findings, however, appear to be at odds with those of Bica et al. [32], who found that many patients cited improving their facial appearance as a reason for seeking orthodontic treatment. Elias et al. reported similar findings, [33] adding that, depending on the characteristics of the age group examined, oral health and esthetics predominated in the self-image of the face.

Therefore, our findings support the notion that, in addition to structural and functional considerations, orthodontic treatment in emerging adults may also be motivated by oral health and esthetics.

Emerging adults listed orthodontic treatment as a factor for straightening teeth, having the perfect smile, correcting malocclusion, and being attractive, in that order of importance, while dispensing with health and breathing improvement as categorical determinants. These results are consistent with Delalibera et al., [34] which linked orthodontic treatment with emerging adults' interpersonal interactions and concluded that people's perceptions of dentofacial abnormalities could influence how well they fit in with society. Accordingly, teenagers (2.3%) and emerging adults (2.9%) cite the enhancement of self-esteem as the driving force for the usage of an orthodontic device, which may raise questions about the relationship between oral cavity esthetics and self-esteem, as suggested by Basha et al. [35]. The most common justification for receiving orthodontic treatment across all age groups was to straighten out crooked teeth.

4. Conclusion

The esthetic harmony that the smile offers is crucial for patients since having a beautiful face increases one's acceptability in their psychosocial environment.

It should be noted that when subjects underwent orthodontic treatment, they appeared to associate the smile category with the social display of a look with perfectly healthy teeth—the so-called “orthodontic smile”—in blatant contrast to the idea that the ideal smile from an esthetics point of view was less important for the use of an orthodontic appliance than the good functioning of the oral cavity. Therefore, the orthodontic smile—in the sense of a sound, functional smile—was more significant than the ideal esthetic smile.

These findings add to our understanding of the role that the mouth and smile play in a person’s sense of self and psychological health, and they suggest that a perfect smile may be defined in new ways by enlarging our mental image of an orthodontic smile.

Therefore, we suggest the orthodontic smile as a new category for smiles used in orthodontic settings, considering the socially acceptable exhibition of excellent teeth.

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Conflict of interest


The authors declare no conflict of interest.

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References

- [1] Dias MR, Ferreira A, Pires M, Alves V, Delgado A. Orthodontic smile: A new categorization of the perfect smile. *European Journal of General Dentistry*. 2020;**9**:129-133. DOI: 10.4103/ejgd.ejgd_157_20
- [2] Dias MR, Ferreira A, Alves V, Delgado A. The mental representation of the smile before and after orthodontic treatment. In: Anand A, editor. *Highlights on Medicine and Medical Research*. 1st ed. 2021. pp. 1-9. DOI: 10.9734/bpi/hmmr/v5
- [3] Dias MR, Nabem L, Monteiro A, Ferreira A, Alves V, Delgado A. When the silence speaks: The smile. *Journal of Biosciences and Medicines*. 2018;**6**:13-20
- [4] Dias MR, Duque AF. Mens Sana in Corpore Sano: The concept of health and illness in childhood. IFPE—21st Annual Interdisciplinary Conference. *Psychoanalysis: Not the Same Old Song and Dance? Conference Program/Abstract Membership Directory*; 29-31 October 2010, Nashville, Tennessee. 2010. p. 10
- [5] Ekman P, Davidson RJ, Friesen WV. The Duchenne smile: Emotional expression and brain physiology: II. *Journal of Personality and Social Psychology*. 1990;**58**(2):342-353. DOI: 10.1037/0022-3514.58.2.342
- [6] Mendes JJ, Dias MR, Neves AC, Ferreira A, Maia P, Silva N, et al. The language of silence in the therapeutic setting of dental medicine. In: *2 Congresso Internacional do CiiEM-Research and Innovation in Human & Health Science*. Monte da Caparica, Portugal: Egas Moniz, School of Health & Science. 2017
- [7] Sarver DM, Ackerman MB. Dynamic smile visualization and quantification: Part 1. Evolution of the concept and dynamic records for smile capture. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2003;**124**:4-12
- [8] Singh P, Sharma J. Principles of smile analysis in orthodontics- A clinical overview. *Health Renaissance*. 2011;**9**:35-39
- [9] Dávila F. El arte em la medicina: las proporciones divinas. *Revista de divulgación científica y tecnológica de la Universidade Autónoma de Nuevo León*. 2004;**7**:150-156
- [10] Bolívar L, Mariaca B. La Sonrisa y sus dimensiones. *Revista Facultad de Odontología Universidade de Antioquia*. 2012;**23**:353-365
- [11] Freitas-Magalhães A. *A Psicologia do Sorriso Humano*. Portugal: Edições Universidade Fernando Pessoa; 2009
- [12] Freitas-Magalhães A. Expressão facial: O efeito do sorriso na percepção psicológica da afetividade. *Revista da Faculdade de Ciências Humanas e Sociais da Universidade Fernando Pessoa*. 2007;**4**:276-284
- [13] Sabri R. Orthodontic objectives in orthognatic surgery. State of the art today. *World Journal of Orthodontics*. 2006;**7**:177-191
- [14] Tjan AH, Miller GD, The JG. Some aesthetic factors in a smile. *Journal of Prosthetic Dentistry*. 1984;**51**:24-28
- [15] Miller CJ. The smile line as a guide to anterior esthetics. *Dental Clinics of North America*. 1989;**33**:157-164
- [16] Janson G, Branco NC, Morais JF, Freitas MR. Smile attractiveness in patients with Class II division 1

- subdivision malocclusion treated with different tooth extraction protocols. *European Journal of Orthodontics*. 2014;**36**:1-8
- [17] Machado AW. 10 commandments of smile esthetics. *Dental Press Journal of Orthodontics*. 2015;**19**:136-157
- [18] Gonçalves S. O tratamento ortodôntico e a sua influência na auto-imagem do rosto do sujeito. [Ph.D. dissertation] Instituto Superior de Ciências da Saúde Egas Moniz, Monte da Caparica. 2011
- [19] Torres J. A influência do género na adolescência em dentisteria operatória. [Ph.D. dissertation] Instituto Superior de Ciências da Saúde Egas Moniz, Monte da Caparica. 2011
- [20] Goldstein RE. Change your smile. In: *Discover how a New Smile Can Transform your Life*. Chicago: Quintessence Publishing; 2009
- [21] Sawyer MD, Susan M, Azzopardi P, Wickremarathne MD, Patton MD. The age of adolescence. *Lancet Criança Saúde Adolesc*. 2018;**2**:223-228
- [22] Pikunas J. *Desenvolvimento Humano. Uma Ciência Emergente*. São Paulo: McGraw-Hill; 1979
- [23] Mohktar HA, Abuljadayel LW, Al-Ali RM, Yousef M. The perception of smile attractiveness among Saudi population. *Clinical, Cosmetic and Investigational Dentistry*. 2015;**7**:17-23
- [24] Tuzgiray YB, Kaya B. Factors affecting smile esthetics. *Turkish Journal of Orthodontics*. 2013;**26**:58-64
- [25] Pithon MM, Bastos GW, Miranda NS, Sampaio T, Ribeiro TP, Nascimento LE, et al. Esthetic perception of black spaces between maxillary central incisors by different age groups. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2013;**143**:371-375
- [26] Lacerda-Santos R, Pereira TB, Pithon MM. Esthetic perception of the buccal corridor in different facial types by laypersons of different ages. *Bioscience Journal*. 2015;**31**:1283-1290
- [27] Gerritsen AE, Sarita P, Witter DJ, Kreulen CM, Mulder J, Creugers NH. Esthetic perception of missing teeth among a group of Tanzanian adults. *The International Journal of Prosthodontics*. 2008;**21**:169-173
- [28] Rodrigues Cde D, Magnani R, Machado MS, Oliveira OB. The perception of smile attractiveness. *The Angle Orthodontist*. 2009;**79**:634-639
- [29] Almeida A, Leite I, Melaço C, Marques L. Dissatisfaction with dentofacial appearance and the normative need for orthodontic treatment: Determinants factors. *Dental Press Journal of Orthodontics*. 2014;**19**:120-126
- [30] Lukez A, Pavlic A, Trinajstic Zrinski M, Spalj S. The unique contribution of elements of smile aesthetics to psychosocial well-being. *Journal of Oral Rehabilitation*. 2015;**42**:275-281
- [31] Peres KG, Traebert ESA, Marcenes W. Differences between self-perception and normative criteria in the identification of malocclusions. *Revista de Saúde Pública*. 2002;**36**:230-236
- [32] Bica I, Cunha M, Costa J, Rodrigues V, Neves D, Albuquerque I, et al. Body Perception and satisfaction in adolescents and the relationship to their oral health. *Millenium*. 2011;**40**:115-131

[33] Elias MS, Cano MA, Junior W, Ferriani M. The importance of oral health for adolescents from different social strata in the city of Riberirão Preto. *Revista Latino-Americana de Enfermagem*. 2001;**9**:88-95

[34] Delalibera H, Da Silva M, Pascotto R, Terada H, Terrada R. Aesthetic evaluation of patients undergoing orthodontic treatment. *Acta Scientiarum Health Sciences*. 2010;**32**:93-100

[35] Basha S, Mohamed RN, Swamy HS, Parameshwarappa P. Untreated gross dental malocclusion in adolescents: Psychological impact and effect on academic performance in school. *Oral Health & Preventive Dentistry*. 2016;**14**:63-69