Smile Attractiveness: Perspectives of Dental and Non-Professional Students

Gülümseme Çekiciliği: Diş Hekimliği Öğrencileri ve Meslek Dışı Öğrencilerin Perspektifi

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ABSTRACT

Objective: The aim of this study is to investigate the perception of smile attractiveness among dental students and non-professional students, with the aim of drawing attention to their views on smiling.

Methods: Frontal smile photographs of a female who underwent orthodontic treatment were modified to create 12 new smile photographs, and these smiles were evaluated by two different groups in terms of buccal corridor width, midline deviation, smile arc, and occlusal cant. Overall, 256 evaluators from two groups (Group 1=dental students, Group 2=non-professional students) rated these modified photographs of different smiles of the same individual for attractiveness using a visual analog scale (VAS).

Results: In both groups, the unmodified reference photo had the highest attractiveness score. Dental students and non-professionals significantly differ in perceiving midline shifts ($P <.05$), except 5 mm midline deviation. In the evaluations of the smile arc, there was a significant difference in the non-consonant smile arc scores ($P = .015$) between the groups, and the consonant smile arc was the most attractive in both groups. No significant difference was observed between the groups in evaluating buccal dark corridor widths. Scores for photographs assessing occlusal cant indicated a significant difference between groups, except for the 10-degree occlusal cant.

Conclusion: Dental and non-professionals students exhibit variations in their abilities to recognize specific aesthetic nuances and assess the attractiveness of smiles.

 Keywords: Smile attractiveness, dental students, non-professionals, visual analog scale

ÖZ

Amaç: Bu çalışmanın amacı diş hekimliği öğrencileri ve profesyonel olmayan öğrencilerin gülümseme çekiciliği algısını araştırarak gülümsemeye ilişkin görüşlerine dikkat çekmektir.

Yöntemler: Ortodontik tedavi gören bir kadının cephe gülümseme fotoğrafları değiştirilerek 12 yeni gülümseme fotoğrafı oluşturuldu ve bu gülümsemeler bukkal koridor genişliği, orta hat sapması, gülümseme arkı ve oklüzal düzlem eğimi açısından iki farklı grup tarafından değerlendirildi. Genel olarak, iki gruptan 256 değerlendirici, görsel analog skala (VAS) kullanarak aynı kişinin farklı gülümsemelerinin değiştirilmiş bu fotoğraflarını çekicilik açısından derecelendirdi.

Bulgular: Her iki grupta da, değiştirilmemiş referans fotoğrafı en yüksek çekicilik puanına sahipti. Diş hekimliği öğrencileri ile profesyonel olmayanlar arasında, orta hat kaymalarını algılamada (5 mm'lik orta hat sapması hariç) önemli ölçüde farklılık gözlendi ($P <,05$). Gülümseme arkı değerlendirmelerinde, gruplar arasında anlamlı bir fark bulunurken ($P=,015$), her iki grupta da uyumlu gülümseme arkı en çekici olanıydı. Bukkal karanlık koridor genişlikleri değerlendirmesinde, meslek grupları arasında anlamlı bir fark gözlenmedi. Oklüzal eğimi değerlendiren fotoğrafların skorları, 10 derecelik oklüzal eğim haricinde, gruplar arasında anlamlı bir farklılık olduğunu gösterdi.

Sonuç: Diş hekimliği öğrencileri ve profesyonel olmayan öğrenciler, belirli estetik nüansları tanıma ve gülümsemelerin çekiciliğini değerlendirmede farklılıklar sergilerler.

Anahtar Kelimeler: Gülümseme estetiği, diş hekimliği öğrencisi, profesyonel olmayan, görsel analog skala

INTRODUCTION

Facial aesthetics and attractiveness refer to interest in or appreciation of beauty.[1] Dentofacial appearance and facial attractiveness are seen as important elements affecting the social interaction of the individual. Langlois et al.'s meta-analysis suggests that, for both children and adults, attractive individuals tend to receive more positive feedback, exhibit higher academic achievements and consequently tend to be more self-confident than their less attractive counterparts.[2] Studies have emphasized that attractiveness is an integral part of the body and that one of the most important elements of this is the face, and that the mouth-tooth area is an important part of the face.[2,3]

Smile attractiveness and facial attractiveness appear to be strongly interconnected. During social interaction, attention is often directed to the speaker's mouth area and eyes.[4] The mouth serves as a focal point for communication due to its central position in the human face. The smile, which is crucial element in facial

expressions, significantly contributes to the overall appearance. Smiling is a very important physical action for humans, as it affects people's perceived attractiveness and therefore plays an important role in social interaction. Studies conducted with smile photographs have also shown that individuals with an attractive smile are attributed to higher intellectual and social abilities by others.[5]

An aesthetic smile is the result of the relationship between different smile components and is a set of principles that ensures the balance between teeth and soft tissues.[6] These components include the size and shape of the teeth, buccal corridor width, gingival visibility, smile arc, harmony of the dental midline and facial midline, occlusal plane slope, presence of diastema, and color of the teeth.[6-8] While the effect of each component on smile aesthetics can be evaluated separately, all components should be evaluated together to create integrity and the final aesthetic effect should be revealed.

The fact that dental aesthetics affect both facial and social attractiveness is one of the major concerns of individuals today, and concerns about smile aesthetics are the main reason why patients turn to orthodontic or various prosthetic treatments. Historically, orthodontic treatments primarily aimed at correcting functional issues such as malocclusion and improper bite. However, as society's perception of beauty evolved, so did the goals of orthodontic treatments. The huge demand for aesthetic dental treatments is attributed to social media, whose influence on young adults is particularly evident.[9] Modern advances have introduced more aesthetically pleasing options such as clear aligners and ceramic brackets, which cater to the growing demand for treatments that provide both functional benefits and improved aesthetic outcomes. The influence of social media, the increased desire to look beautiful, and changing aesthetic standards have led patients to scrutinize their smiles more critically, prompting them to seek aesthetic treatments with more specific features.[10] In studies by Kiyak[11] examining the effects of orthodontic treatment on quality of life, it was reported that the primary motivation for patients seeking orthodontic intervention was to enhance the aesthetic appearance of their teeth and improve their chances of social acceptance, with no focus on functional improvement or general health enhancement. This shift in focus from merely correcting dental issues to enhancing overall facial aesthetics reflects a broader change in cultural and social attitudes towards beauty and self-presentation.

Additionally, it is crucial to comprehend the similarities and differences in the knowledge and perceptions of dental professionals and dental students regarding smile aesthetics and those of patients, aiming to establish a balance between the two factors. The General Assembly of the European Dental Education Association and the North American Dental Education Association have defined the basic and supporting competencies that students who graduate from dentistry must obtain to begin practicing dentistry. These include the ability to determine a patient's aesthetic needs and the extent to which these needs or wishes can be met.[12,13] The reason for adding this competency to the basic criteria is the fact that aesthetic dentistry is rapidly developing as a dynamic field of dental health and the demand, especially for cosmetic procedures, is constantly increasing. Nowadays, due to the high interest in social media networks and the frequent use of smile photographs, it is among the main goals of dentists to provide patients with the ideal smile aesthetics they want in line with the demands of the patients. For this reason, it is necessary to define well how an ideal and attractive smile is perceived by dentists, dentist candidates and society. Therefore, when planning treatment, it is extremely important to understand the threshold at which society deems acceptable in terms of smile aesthetics.

This research aims to investigate how the attractiveness of a smile is perceived by dentistry students and non-professionals, and to draw attention to these individuals' views on smiling. Additionally, understanding how dentists, dental students, and the public perceive an ideal and attractive smile is a critical when planning treatment. This information may be useful to dentists who design treatments that meet their patients' preferences and to researchers who develop new treatments and procedures that meet the aesthetic preferences of their target audience. The aim of this study was to better understand this balance and contribute to achieving better results in smile aesthetics by providing more information on this subject.

METHODS

The study protocol was approved by the Nuh Naci Yazgan University Scientific Research and Publication Ethics Committee with acceptance Date: 23.10.2023, number 2023/009-002. A total of 256 students studying at Nuh Naci Yazgan University, aged between 18 and 35 years, including 128 dentistry students and 128 students from other departments (engineering, economics and administrative sciences), participated in this cross-sectional study. Dentistry term 4 students were included in the study because they had more detailed information about smile aesthetics.

Based on the literature, a survey was prepared consisting of two separate sections, where demographic data and different photographs were scored in terms of attractiveness. The survey was created using Google forms and delivered to participants via social media channels. The data of 16 people who did not score some photographs or assigned the same scores to all photographs were excluded from the study. Data obtained from 240 participants were used for statistical analyses.

Among the registration photographs routinely taken at the end of treatment from patients treated at Nuh Naci Yazgan University Faculty of Dentistry Department of Orthodontics, 5 photographs were selected from among the extra-oral smile photographs of female patients who did not have any noticeable elements such as asymmetry or scars on the face. These photos were shown to 4 orthodontists and they were asked to choose the photo they thought reflected the general facial features of our society. The most preferred photo was used as the reference photo in our study. The images used in the survey were prepared by modifying the reference photograph in Adobe Photoshop CS6 (Adobe Systems Inc., San Jose, CA). The modified photographs were grouped into subsets representing a different smile feature. In all subsets, the reference smile photograph was used as a negative control. The modified features were: (1) buccal dark corridors, (2) dental midline, (3) occlusal cant, (4) smile arc (Figure 1-4).
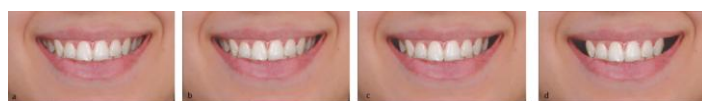
Figure 1. Manipulation of buccal corridor: (a) extra wide (0% buccal corridor), (b) wide (5% buccal corridor), (c) medium (10% buccal corridor), (d) narrow (20% buccal corridor)

Figure 2. Manipulation of maxillary dental midline: (a) no deviation, (b) 1 mm deviation, (c) 3 mm deviation, (d) 5 mm deviation
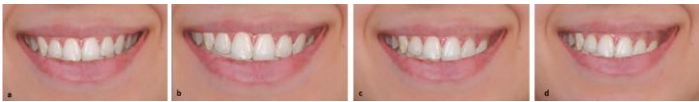
Figure 3. Manipulation of occlusal plane cant: (a) no occlusal plane cant, (b) 1° occlusal plane cant, (c) 5° occlusal plane cant, (d) 10° occlusal plane cant

Figure 4. Manipulation of smile arc: (a) consonant smile arc, (b) flat smile arc, (c) non-consonat (reverse) smile arc

In the reference intraoral frontal photograph, the buccolingual positions of the right and left side canine, premolar and molar regions were moved symmetrically and the buccal corridor widths were changed (Table 1) As the width of the dental arch increases, the buccal corridor will decrease, resulting in wide smiles. Buccal corridors of 4 different sizes were created: extra wide (0% buccal corridor), wide (5% buccal corridor), medium (10% buccal corridor), narrow (20% buccal corridor) (Table 1) (Figure 1). For upper midline evaluation, the reference intraoral frontal photograph was gradually shifted by 1 mm, 3 mm and 5 mm towards the right side of the patient, and 3 new photographs were created (Table 1) (Figure 2). To evaluate the occlusal plane cant, the reference intraoral frontal photograph was gradually tilted 1, 5 and 10 degrees so that the left side of the patient hangs down, and 3 new photographs were created (Table 1) (Figure 3). Finally, for the evaluation of the smile arc, the reference photograph was used for the consonant smile arc. To create a flat smile arc and a non-consonant smile arc, 2 new photographs were created by changing the reference photograph (Table 1) (Figure 4). Determination of subjective attractiveness scores for each smile was made using a visual analogue scale (VAS). (0: least attractive, 10: most attractive) Participants were asked to score all images between 0 and 10 in terms of attractiveness. Values above 5 were considered attractive and values below 5 were considered unattractive.[14]

Table 1. Description of smile features evaluated for attractiveness

Smile Feature	Description
Midline deviation	The assessment of the discrepancy between the upper dental midline and the facial midline (established by the vertical line at the glabella along the interpupillary distance) has been conducted in millimeters.[13]
Smile arc	It is classified according to the relationship of the smile arc to the lower lip and is divided into 3 groups: consonant (the line passing through the incisal edges of the maxillary incisors, canines, and premolar cusp tips being parallel to the lower lip), flat (the line passing through the tips of the maxillary incisal edges, canines and premolars is not parallel to the lower lip line),and non-consonant (the line passing through the incisal edges, canine and premolar cusp tips had a reverse curve relative the lower lip).[10]
Buccal coridor	The value obtained by dividing the difference between the visible maxillary dental width and the inner commissural width by the inner commissural width was considered as the buccal corridor width. The value was reported as a percentage.[26]
Occlusal cant	The interpupillary line was used as a reference, and based on this reference, different images were obtained from the frontal intraoral photo with varying upper occlusal plane cants: with a 1º cant, with a 5º cant and with a 10º cant.[29]

Statistical Analyzes

IBM SPSS 20 (IBM SPSS Corp., Armonk, NY, USA) program was used to analyze the data obtained from the study. In the Kolmogorov-Smirnov test, it was seen that the attractiveness scores obtained from the photographs did not comply with the normal distribution (P <.05).

Descriptive statistics (frequency) and Kruskal-Wallis test was conducted to identify differences among attractiveness scores. To pinpoint the specific group contributing to the observed variance, a post-hoc test employing the Bonferroni-corrected Mann-Whitney U test was performed. Throughout all evaluations, a significance level of $P<.05$ was deemed statistically significant.

To assess the reliability of evaluators in the evaluation of smiles, 20 randomly selected raters from each group were asked to re-rate the same images one week after their initial assessments. In order to determine the reliability of the evaluators, intra-class correlation coefficients were computed. The correlation coefficients ranged between 0.77 and 0.89. The sample size was calculated using a power analysis conducted with G*Power software (version 3.1.9.2). The analysis was based on detecting a medium effect size (d = 0.5) with a power of 0.80 and an alpha level of 0.05. The calculation of the sample size showed that it was necessary to have 102 subjects in each group.

RESULTS

Table 2 presents the means and standard deviations of scores for each groups, along with statistically significant differences in evaluative groups regarding the perception of smile attractiveness. All photographs, including the reference image, received higher scores from non-professional students compared to dental students.

For midline shift, there are statistically significant differences between dental students and non-professional students, except for the photograph in which the midline is shifted by 5 mm ($P<.05$) (Table 2). In this category, the reference photo (the photo in which the midline is compatible with the face) received the highest attractiveness score in both groups.

Table 2. Attractiveness scores mean and significance of two groups by overall raters.

Variable	Dental Students		Non-Professional Students		Test Statistics	P
	Mean (SD)	Median (min-max)	Mean (SD)	Median (min-max)		
Midline (ideal)	7.6 (1.57)	8 (3 - 10)	8.13 (1.91)	8 (1 - 10)	8454	0.005*
Midline (1 mm)	5.23 (1.67)	5 (1 - 9)	6.67 (1.78)	7 (1 - 10)	10152.50	<0.001*
Midline (3 mm)	3.77 (1.63)	4 (1 - 7)	5.23 (2.04)	5 (1 - 10)	9852	<0.001*
Midline (5 mm)	2.91 (1.46)	3 (1 - 7)	4.15 (3.21)	3 (1 - 8)	7923	0.072
Consonant Smile arch	8.83 (1.18)	9 (5 - 10)	7.93 (2.54)	8 (1 - 10)	6182	0.107
Flat smile arch	6.79 (2.21)	7 (1 - 10)	6.39 (2.29)	7 (1 - 8)	6179	0.117
Non-consonant(reverse) smile arch	3.51 (2.04)	4 (1 - 6)	4.09 (1.87)	3 (1 - 6)	5728.50	0.015*
Buccal Coridor (%0)	7.52 (1.66)	8 (3 - 10)	7.71 (2.14)	8 (2 - 10)	7733	0.154
Buccal coridor (%5)	7.21 (1.75)	7 (2 - 10)	6.77 (2.06)	7 (1 - 10)	6185.50	0.121
Buccal coridor (%10)	5.79 (1.99)	6 (1 - 10)	6.22 (2.5)	6 (1 - 10)	7487.50	0.343
Buccal coridor (%20)	2.94 (1.4)	3 (1 - 7)	3.68 (2.4)	4 (1 - 9)	7924.50	0.072
No occlusal cant	7.94 (1.56)	8 (3 - 10)	8.73 (1.93)	10 (4 - 10)	9563	<0.001*
Occlusal cant (1°)	5 (1.78)	5 (1 - 9)	5.89 (2.54)	7 (1 - 10)	9232	<0.001*
Occlusal cant (5°)	3.75 (1.45)	4 (1 - 8)	4.4 (1.8)	4 (1 - 9)	8697.50	0.001*
Occlusal cant (10°)	2.35 (1.39)	2 (1 - 6)	2.38 (1.69)	2 (1 - 7)	6625.50	0.466

A higher score implies a more attractive smile
* Mean it is significant (P<.05)

While there is a statistically significant difference in non-consonant smile scores between the two groups in photographs where the smile arc is evaluated, there is no significant difference in consonant and flat smile scores. In this category, the photo with the consonant smile arc received the highest attractiveness scores in both groups (Table 2).

There is no significant difference between the groups in the scores in which buccal dark corridor widths are evaluated (Table 2).

Among the photograph scores in which occlusal cant is evaluated, there is a significant difference between the groups, except for the 10-degree where the occlusal cant is highest (Table 1).

DISCUSSION

Dental students, as future dentists, should be able to identify patients' demands and needs, possess the ability to make clinical decisions regarding dental aesthetics, and accurately assess the timing for intervention or referral. Additionally, understanding that perceptions of smile aesthetics between lay individuals and dental professionals may potentially differ is crucial when determining treatment goals. The literature contains limited information on dental students' perception of smile aesthetics compared to lay individuals.[13,15-20] In a few of these studies, students related to health sciences such as pharmacy students[16] were used as lay students, while in some of these studies, only dental students were used and there is no information about the grade of dental students.[16] In our current study on smile aesthetics, students from many different faculties (engineering, economic and administrative sciences, architecture) other than the field of health sciences were preferred, as it is thought to provide more objective data for the non-professional student category, which is thought to be more comprehensive and objective in this respect, but as far as we know, there is no other study that evaluates 4 different smile parameters at the same time. Therefore, our study represents an early step in evaluating the aesthetic understanding of future dentists and lay people. While 4th and 5th year students can be considered as dental professionals, 1st and 2nd year students can be considered as secular persons in order to examine how the perception of smile aesthetics has changed during these years.[13] Therefore, 4th dental students were included in our study. Understanding the perceptual differences between patients and professionals is essential for meeting the aesthetic needs and expectations of the patient.[13]

In this study, a frontal extraoral photograph capturing only the lower half of the face during the spontaneous smile of a 23-year-old woman with completed orthodontic treatment and ideal aligned teeth was utilized. The upper half of the face was not included in the reference photograph, as it could potentially influence evaluators' perceptions of attractiveness.[13]

In our study, overall, dental students consistently assigned more stringent ratings to modified photographs, deeming them significantly less attractive compared to the ideal smile when compared to other students. These findings indicate that dental students are more sensitive to aesthetic factors influencing smiles and exhibit less tolerance in evaluating certain aspects of smiles compared to non-dental students. Similar results have been obtained in various studies assessing the perception of non-professionals and dental professionals.[7,14-16,20]

Midline Deviation

Facial symmetry and the alignment of the face and dental midline are of critical importance for an aesthetic smile. Additionally, while there is no consensus in the literature on what constitutes an acceptable amount of midline deviations, there is a general agreement that a slight midline deviation may go unnoticed by the general population and has a negligible impact on smile aesthetics.[13,15,21] In the study conducted by Cracel-Nogueira and Pinho[14], they compared the aesthetic perception of smile components among non-professionals, dental students, and dentists and found that all groups perceived attractiveness differently. Professionals, compared to laypeople, tended to be stricter when evaluating smile characteristics, which is similar to our study. In a study by Pinho et al.[15], orthodontists found midline discrepancies up to 1 mm acceptable, while for laypersons, this value was 4 mm. Another study by Omar and Tai[16] reported that dental students were more sensitive to midline shifts compared to pharmacy students, with both groups being sensitive to a 2 mm midline shift. According to Cardash et al.[22], the threshold value for midline discrepancy is ≥2 mm. Sadrhaghighi et al.[17] could not establish an acceptability threshold for midline deviations among dental students, attributing it to the complexity of the subject and the insufficient knowledge of dental students in this regard.

A review study indicated that, on average, orthodontists could detect midline deviations greater than 2.2 mm, while lay individuals could only detect midline deviations greater than 3 mm. The findings of our study are in line with this result.[21] In our study, dental students found midline deviations up to 1 mm acceptable. However, for midline deviations of 3 mm and 5 mm, attractiveness scores significantly decreased, surpassing acceptable limits. Similar to dental students, non-professional students also exhibited a decrease in attractiveness scores with increasing midline deviation. However, unlike dental students, non-professional students did not find a 3 mm midline deviation acceptable, and a 5 mm deviation was deemed unacceptable. Dental students were able to perceive and reflect even small midline deviations in their scores, finding all smiles with midline deviations less attractive compared to non-professional students.

There is a general consensus in the field of smile aesthetics that minor midline deviations are often not noticed by the general population, and such imperfections do not have a significant impact on patients.[21] It has been concluded that unless the maxillary midline deviation is noticeable in everyday life and triggers aesthetic concerns, it can be left without intervention when it is of inconspicuous dimensions.

Smile Arc

The smile arc is the relationship between the curves formed by the incisal edges of the upper incisors and canines during a smile and the curve of the lower lip. In the optimal condition defined as a consonant smile arc, these two curves coincide or are parallel. Cases where the curve passing through the incisal edges flattens and is inclined in the opposite direction to the curve of the lower lip are defined as a nonconsonant smile arc.[6]

The smile arch is a crucial feature in terms of smile aesthetics because it is related to the visible edge of the anterior maxillary teeth and this feature is of great interest. A consonant smile arc has been reported to make individuals appear younger, happier, and more attractive.[8,23] The findings of this study are consistent with this assertion. Both non-professional and dental students evaluated the consonant smile arc as the most attractive and considered the nonconsonant smile arc as the least attractive and aesthetically unacceptable. In a study by Pham et al.[23], similar to our study, both laypersons and dentists found the consonant smile arc the most attractive and the reverse smile arc the least attractive, with no significant differences between professional and gender groups. In our study, while there was a significant difference only between nonconsonant smile arcs among groups, the trends of both groups were similar. In a study by Wang et al.[24], it was reported that there was no significant difference between parallel and non-parallel smiles. This may be attributed to the use of images from different individuals in their study, introducing various factors that could influence attractiveness and lacking a specific standardization. Achieving an attractive and youthful smile is closely related to the vertical positioning of the upper incisors, and proper planning in accordance with this aspect is crucial when creating a treatment plan.[8]

Buccal Corridor

In the literature, there is still no consensus on the ideal buccal corridor width that should be present in an attractive smile. On one hand, comments suggest that the ideal buccal corridor width ranges from 2% to 19% of the face[25], while some researchers have reported that buccal corridor width is not a critical issue for assessing smile aesthetics.[26]

Upon reviewing existing studies, the general consensus is that both professionals and lay peoples prefer and find wider smiles more attractive, with both groups exhibiting similar tendencies in this category.[1,25] In a systematic review conducted by Parrini et al.[27] in 2016, which examined 16 articles investigating the impact of buccal corridors on smile aesthetics, the majority of the studies indicated that wide buccal corridors resulted in unaesthetic outcomes.

In our study, both dental students and non-professional students considered buccal corridor width unacceptable when it exceeded 10%, leading to a decrease in scores below 5. Both groups gave the highest scores to the reference photograph, and there was no significant difference between the groups in terms of buccal corridor width preference. Both groups exhibited a similar preference for wide smiles, aligning with the general literature.[16,20] Similarly, in the study by Ioi et al.[28], both orthodontists and dental students generally preferred wide smiles over medium or narrow smiles. Both groups found smiles with buccal corridor width less than 10% pleasing, while they did not find smiles with buccal corridor width exceeding 15% attractive. The study team noted that although orthodontists were considered professionals and dental students as laypersons, both groups had similar tendencies in evaluating buccal corridor preferences. However, dental students were slightly more inclined to prefer a wider smile compared to orthodontists.[28] Consistent with this study, our research also demonstrated that a 10% difference in buccal corridor variation (10% to 20%) had a clinically significant impact on smile aesthetics preference. It can be interpreted that the buccal corridor exceeding 10% is perceived as less attractive between narrow smiles and that this range can be considered as a threshold when evaluating the buccal corridors between more and less attractive smiles.

In a study evaluating the aesthetic perceptions of smiles among dental students, art students, and laypersons, it was generally shown that dental students, art students, and non-professionals did not prefer smiles with minimal or excessive buccal corridors for both male and female subjects.[18] In contrast to the general literature and our findings, this study revealed that non-professional individuals preferred less buccal corridor width compared to dental and art students. However, it's important to note that this study used full-face photographs, which may introduce bias in smile evaluation as it adds other facial components and complicates the assessment. Including more of the facial perspective or environmental context may make a difference in the evaluation.[25]

Occlusal Cant

Occlusal plane cant is a feature that must be examined in the evaluation of smile aesthetics. It defines the vertical position of teeth when the left and right sides are different, characterized by an upward or downward rotation in the transverse plane from one side to the other. This cant is most evident during smiling.[29]

Occlusal plane cants between 0 to 3 degrees are considered normal and can be observed in healthy individuals without being noticeable by laypersons.[30] However, Kokich and colleagues found that laypersons did not perceive such asymmetry until it reached a 4º inclination.[7]

In a study by Olivares et al.[29], both orthodontists and general dentists, as well as laypersons, considered a 2-degree occlusal plane cant as acceptable. The results of this study indicate that all evaluators (orthodontists, general dentists, and laypersons) are sensitive to a 4º occlusal cant. These findings suggest that laypersons and general dentists find occlusal plane cant more acceptable compared to orthodontists. In a study by Aldhorae et al.[20], they reported that the perception of occlusal plane cant was similar among dental students and laypersons, and an increase in occlusal plane cant decreased attractiveness scores. According to our study, although both groups found a 2-degree occlusal plane cant acceptable, attractiveness scores significantly decreased with the presence of a 1-degree cant compared to images without an occlusal cant. Cants above 2 degrees were considered unacceptable by both groups. Our results support differences in the perception of occlusal plane cant, indicating that the degree of cant is more influential than the observers' level of experience and profession.[30] However, Olivares et al.[29] also suggest that, despite similar trends between the two groups, significant differences between groups indicate that professional experience affects the perception of occlusal plane cant. In conclusion, while the profession of evaluators generally does not affect smile attractiveness when there is a canting occlusal plane, it has led to differences in scores.

Although the same reference photograph was used to evaluate different smile features in the survey, significant differences were found between two groups for two features (midline deviation and occlusal cant), while no significant differences were observed for the other two features (buccal corridor and smile arc). Participants were shown the reference photograph again at each stage of the evaluation of each smile criterion. Had the reference photograph been shown only once initially, it is likely that a single result would have been obtained. However, by repeatedly presenting the reference photograph as if it were a new image each time, participants may have perceived it differently each time, possibly focusing on different aspects that they had not previously noticed. This variability is likely to have contributed to the observed differences. Furthermore, despite the statistical differences between the groups in their ratings of the reference photo, the smile photo that was judged to be the most attractive was consistently used as the reference photo by both groups. When considered internally within each group, this aspect demonstrates consistency.

Limitations

In our study, digitally modified photographs were used to ensure standardization. Studies employing digitally modified smiling photographs often yield results suggesting that modified images tend to influence attractiveness perception for certain smile criteria. However, the use of digitally unaltered natural smiling photographs has been noted not to affect attractiveness perception for some criteria, such as the smile arc.[21] The limitation of our study can be considered as the potential inability of digitally modified photographs to fully reflect natural smiles.

CONCLUSIONS

There are differences in the abilities to perceive specific aesthetic variations and attractiveness perceptions between dental students and non-professionals. Non-professionals tend to be more flexible in their perceptions of smile aesthetics compared to dental students. Dental students, particularly, have shown greater sensitivity to changes in midline discrepancies and occlusal plane inclination. The higher and more discerning perceptions of dental students in distinguishing minor differences are attributed to their education and training. As their knowledge and experience increase, they will likely enhance their ability to discern aesthetic variations. The components constituting smile attractiveness are crucial factors that must be considered in aesthetic treatment planning, emphasizing the necessity to take these criteria into account.

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