



ORIGINAL ARTICLE

The Effect of Educational Status on the Perception of Social and Spontaneous Smiles

Furkan Dindaroğlu¹, Merve Karabıyıkoglu Özmutlu², Erdal Işıksal³

¹Department of Orthodontics, Ege University School of Dentistry, İzmir, Turkey

²Eskişehir Oral and Dental Health Hospital, Eskişehir, Turkey

³Private Practice, İzmir, Turkey

ABSTRACT

Objective: The aim of the present study was to evaluate the effect of educational status on the perception of smile esthetics considering social and spontaneous smile patterns.

Methods: The present study was conducted on 110 subjects with differing educational status. Of 110 subjects with a mean age of 39.4 years, 30 were primary school graduates, 30 were high school graduates, and 50 had a university or higher educational level. Four different black and white natural social and spontaneous smiling images, captured from a video recording of a 25-year-old female, were prepared displaying the full-face and oral area. A 10-cm visual analog scale (VAS) was used to evaluate the smile esthetics.

Results: There were significant differences in the social and spontaneous smiles in a subjective assessment of the smile esthetics in full-face and oral views between participants having a different educational status ($p>0.05$). Compared with the other groups, the participants in the primary school graduate group gave higher esthetic scores in all the image groups. In terms of esthetic perception, this group was followed by high school graduates and participants with a university or higher level of education. In the four image groups, there was a significant difference between the primary school graduates and participants with a university or higher level of education ($p<0.05$).

Conclusion: Educational status is a sociodemographic factor that can affect the perception of smile esthetics. The esthetic scores both in social and spontaneous smile decrease with increasing education level, and the most remarkable difference exists between primary school graduates and those with university or higher level of education.

Keywords: Educational status, social smile, spontaneous smile

INTRODUCTION

The disturbances in smile esthetics are the most important factors prompting patients to seek orthodontic therapy.¹ In fact, increasing esthetic requirements in the present day have led to a soft tissue paradigm shift. With such a paradigm shift, the orthodontic diagnosis and treatment planning have been particularly built on the positive and negative characteristics of the facial soft tissues.² In addition, treatments are planned under the guidance of reproducible facial functions and the success of treatment is assessed. In the literature, there are arguments suggesting the use of a resting position³, social smile⁴, and spontaneous smile⁵ in these assessments. The most remarkable difference between a social and spontaneous smile is the diversity of muscles being activated while functioning.⁶ In addition, a spontaneous smile possibly only occurs with a certain affection. Therefore, the use of videographic methods has been suggested to generate an accurate spontaneous smile.⁷

The full-face perspective mimics a view normally encountered in contrast to the lower-face and oral views. The wider perspective could dilute or de-emphasize attention to the characteristics of the smile.⁸ In addition, the integrity of the smile with the other components of the face may affect complete appreciation of the person in social life. Flores-Mir et al.⁹ indicated that compared with oral views, anterior dental occlusion was less important for esthetics in full-face images. Individuals with a malocclusion may camouflage an unattractive oral area by

other facial features. Havens et al.¹⁰ showed that full-face views of a malocclusion were more attractive than oral views alone. Shaw et al.¹¹ argued that overall facial attractiveness was more important than dental esthetics in an overall facial esthetic appreciation.

Although it is possible to use static images to generate a social smile, the valid method in generating a spontaneous smile is the use of dynamic recordings.¹² According to van der Geld et al.,⁵ the videographic method allows the generation of an accurate and reproducible spontaneous smile and can be incorporated into the process of treatment planning.

There are many patients with different ages, genders, and ethnic features, all of which demand orthodontic therapy. This diversity has led to researchers to evaluate the possible effects of these variables on the perception of smile esthetics. For example, the width of the buccal corridor was one of the primary smile parameters that was investigated in individuals with different ethnical backgrounds.¹³ Different ideas have been presented regarding the effect of gender in the perception of smile esthetics.^{8,9,14} However, most studies have reported that gender has no effect on the perception. On the other hand, perceptual differences between clinicians and patients are also part of this esthetic assessment process.¹⁵ There are few studies regarding the effects of educational status, one of the sociodemographic variables, on the perception of smile esthetics.

The aim of the present study was therefore to evaluate the differences in the perception of smile esthetics in face and oral area images between individuals with differing educational status. This assessment was performed on both social and spontaneous smile images. This study hypothesizes that the education level has no effect on the perception of smile esthetics.

METHODS

The study included 110 Caucasian participants with a mean age of 39.4 years ranging from 28.2 to 50.4 years. For an effect size of 1 at a 0.05 significance level, there could be more than 90% power with a sample size of 30 in each group.⁹ These 110 subjects consisted of people of three different educational status, in which 30 were primary school graduates, 30 were high school graduates, and 50 had a university or higher educational level. Descriptive statistics related to the age of the groups are presented in Table 1.

Written informed consent was obtained from all individual participants included in this study.

Picture Material

The video recording as the experimental material to be displayed to the participants at different education level was selected among smile video records in the archive of the Department of Orthodontics at Ege University, Faculty of Dentistry. The video recording used in the study was of a 25-year-old Caucasian female subject, who did not have scar or significant skin spots on the face or significant facial asymmetry with a skeletal class

Table 1. Descriptive statistics of the participants with different levels of education

Educational Status	Gender (n)	Minimum	Maximum	Mean	SD
Primary School Graduate	Male (15)	29.2	50.4	39.3	7.4
	Female (15)	31.5	49.2	37.6	6.9
High School Graduate	Male (15)	28.7	46.5	40.1	8.2
	Female (15)	28.2	48.4	37.1	7.1
University or Higher Graduate	Male (25)	30.3	50.1	42.2	8.5
	Female (25)	29.5	49.8	38.3	7.6

SD: standard deviation

I (ANB=2.4°) and who had normal vertical growth pattern (Sn-GoGn=32.6°, FMA=26°), who did not have facial malformation or syndromes or widespread moles or red spots and who did not have severe crowding at the inferior and superior arc, and who did not have fractured tooth, discoloration, or restored tooth within the smile arc.

For the video recording, the camera was placed 1 meter away from the subject and the camera objective was positioned at the mouth level and perpendicular to the vertical plane of the subject. Attention was paid to ensure that the subject's head was in a natural position before capturing the smile images. In order to generate a social smile, an investigator instructed the subject with the command "Can you give a large smile to expose your teeth." During recording of the spontaneous smile, the subject was asked to articulate funny words to generate a spontaneous smile. After 2 min duration of recording, the record was transferred to the computer. A total of 200 images were captured from the streaming video tracks (100 images for the social smile, 100 images for the spontaneous smile). The most natural social and spontaneous smile images were selected and numbered. The images were converted to black and white and the morphological areas, except for the forehead, zygomas, and gonion, were removed in order to reduce the gender effect as much as possible.

The social smile and spontaneous smile images of the face were printed on a photo paper in the size of an average human face. Facial images for the two smile types were cut and prepared into a size of 3x5 inch cardboards. Thereby, pure oral views of a social smile and spontaneous smile were obtained (Figure 1, 2).

In order to avoid the bias of interaction and transmission during subjective assessment, the display order of the images was changed for each participant. Each image was displayed to the participants for the duration of 15 seconds. A 10-cm visual analog scale (VAS) was used to evaluate the smile esthetics. A score of 0 indicated the least attractive image and a score of 10 indicated the most attractive image.

Statistical Analysis

The statistical analysis was performed using the Statistical Package for the Social Sciences version 19.0 software package (IBM SPSS Statistics; Armonk, NY, USA). Repeated Measures ANOVA and Bonferroni post hoc analysis were used to compare the VAS scores

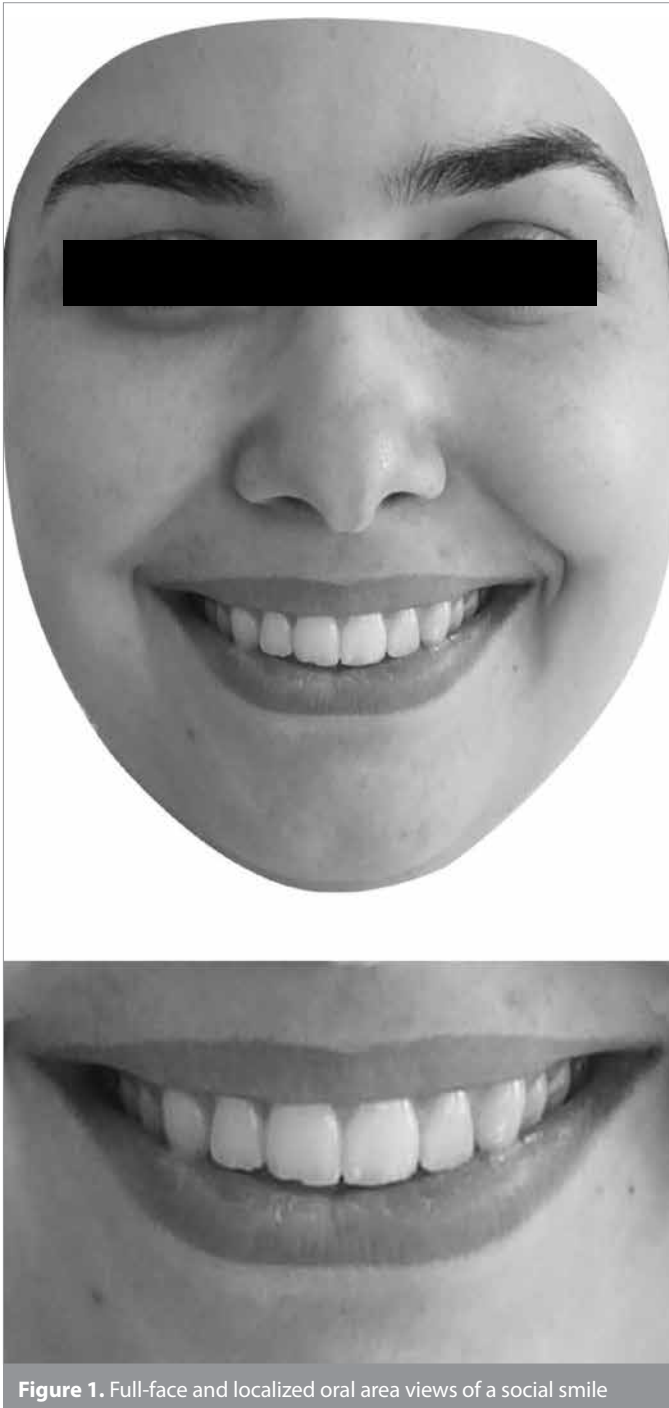


Figure 1. Full-face and localized oral area views of a social smile



Figure 2. Full-face and localized oral area views of a spontaneous smile

for the oral views and the full-face images of the social and spontaneous smiles between the groups, which were stratified according to education level. After grouping the images as social smiles and spontaneous smiles, the same analysis method was used to compare the social and spontaneous smile images between the education groups. Oral views and full-face images in the same education group were compared using the Paired Samples t test. The level of statistical significance was set at $p < 0.05$.

RESULTS

There were significant differences in the assessment of the full-face images and oral views of the social and spontaneous smiles

between participants with different educational status. The participants in the primary school graduate group gave higher esthetic scores in all image groups compared to the other groups. This group was followed by high school graduates and university graduates in terms of esthetic perception. In the four image groups, there were significant differences between the primary school graduate group and university graduate group ($p < 0.05$) (Table 2).

When oral views and full-face images were compared, the difference in esthetic perception was not statistically different between the participants ($p > 0.05$). The difference between the full-face and oral view scores of the spontaneous smile was only significant in participants with a university or higher education ($p < 0.001$). The

Table 2. Comparison of mean VAS scores of different image groups between different levels of education

Image Groups	Educational Status		Mean Difference (95% CI)	p
Social Smile - Local	1	2	0.70 (-0.17, 1.57)	0.139
		3	1.47 (0.69, 2.24)	<0.001***
	2	3	0.77 (-0.01, 1.54)	0.054
Social Smile - Face	1	2	0.47 (-0.42, 1.35)	0.425
		3	1.13 (0.32, 1.91)	0.003**
	2	3	0.65 (-0.15, 1.44)	0.132
Spontaneous Smile - Local	1	2	0.73 (-0.27, 1.73)	0.193
		3	1.55 (0.65, 2.44)	<0.001***
	2	3	0.81 (-0.08, 1.71)	0.082
Spontaneous Smile - Face	1	2	1.03 (0.01, 2.55)	0.047*
		3	2.03 (1.11, 2.94)	<0.001***
	2	3	0.99 (0.08, 1.91)	0.030*

CI: confidence interval; 1: primary school graduate; 2: high school graduate; 3: university or higher graduate; *p<0.05, **p<0.01, ***p<0.001

Table 3. Comparison of VAS scores between full-face view and local view of the smiles within education groups

Educational Status	Image pairs	Mean difference (95% CI)	p
Primary School Graduate	Social smile face vs. local	0.43 (-0.21, 1.07)	0.177
	Spontaneous smile face vs. local	0.30 (-0.33, 0.93)	0.337
High School Graduate	Social smile face vs. local	0.20 (-0.40, 0.80)	0.501
	Spontaneous smile face vs. local	0.45 (-0.10, 1.13)	0.164
University or Higher Graduate	Social smile face vs. local	0.08 (0.29, 0.47)	0.663
	Spontaneous smile face vs. local	0.78 (0.46, 1.10)	<0.001***

CI: confidence interval; ***p<0.001

Table 4. Comparison of VAS scores between education groups by grouping the face and local views of the smiles

Image Groups	Educational Status		Mean Difference (95% CI)	p
Social Smile (Face+ Local)	1	2	1.16 (-0.32, 2.66)	0.156
		3	2.58 (1.25, 3.91)	<0.001***
	2	3	1.41 (0.08, 2.71)	0.035*
Spontaneous Smile (Face + Local)	1	2	1.77 (-0.04, 3.58)	0.057
		3	3.57 (1.95, 5.19)	<0.001***
	2	3	1.80 (-3.43, -0.19)	0.025*

CI: confidence interval; 1: primary school graduate; 2: high school graduate; 3: university or higher graduate *p<0.05, **p<0.01, ***p<0.001

difference between the local and full-face esthetic perception scores of the social smile was not significantly different in the three education groups (p>0.05) (Table 3). The social and spontaneous smile image groups were created by gathering all the full-face image and oral views. In the social smile group, esthetic perception decreased with increasing education level. There was significant differences between the primary school and university or higher graduate groups (p<0.001) and between the high school and university or higher graduate groups (p=0.035). A similar finding was also observed in the spontaneous smile images (p<0.001 and p=0.025, respectively) (Table 4).

DISCUSSION

The present study comparatively evaluated how full-face images and oral views of social and spontaneous smiles were perceived by participants with different educational status. There were significant differences in the perception of social and spontaneous smiles between individuals in the different education groups. The aesthetic scores of the subjects decreased in conjunction with the increasing education level. The most striking difference was observed between the primary school graduates and those having a university or higher education.

Although factors such as ethnic differences and gender influence have been investigated for their effect on smile esthetics, there are only a limited number of studies that have evaluated the effects of sociodemographic factors. However, possible differences in esthetic perception of individuals with similar anomalies but different ethnic origin and gender should be taken into account by clinicians and incorporated into treatment planning. A similar notion is also applicable to educational status. Do increases in social interaction in parallel to education level and differences in the occupational environment modulate the esthetic perception of individuals? In other words, can the same smile be rated differently depending on the observer's education level? Various studies have investigated the effects of education level on the perception of facial and dental esthetics.^{9,16-18} In these studies, subjects with a higher level of education were highly satisfied of the color of their teeth when compared to subjects with a lower level of education.¹⁶ It is known that self-confidence increases with increasing education level.¹⁹ Improved self-confidence was suggested to be the result of increased satisfaction with self-images. In addition, some have suggested a non-significant correlation between dental images of a person and their education level.¹⁶ According to Türkahraman and Gökalp¹⁷, subjects in the primary school group were not as good as university graduates in detecting skeletal abnormalities. According to researchers, the quality of esthetics factors affecting attractiveness increased with increasing education level. In the perception of smiles, Flores-Mir et al.⁹ evaluated smile esthetics using local and full-face images as in the present study, and they reported that educational status had no effect on esthetic perception. Beside, educational status was found to have no effect on esthetic perception in a study that evaluated different axial midline shifts in smile esthetics.²⁰ Dunn et al.¹⁸ used local smile images and found no relationship between education level and esthetic perception. The present study, however, found that education level might influence the perception of smile esthetics. Other studies evaluated only one smile pattern and some of these studies did not discriminate full-face or local images. In the present study, we evaluated social and spontaneous smile patterns separately, and one a remarkable finding was that esthetic scores decreased with increasing education level. The lowest scores given to the images were rated by university graduates, while the highest scores were rated by primary school graduates. This finding indicates a decreasing admiration with an increasing education level. This result is applicable to both the full-face images and oral views. The most salient difference was observed between primary school graduates and university graduates and even reached statistical significance. There was no difference between primary school and high school graduates in term of the scores in the local or full-face images. However, it is remarkable that university or higher graduates attributed higher scores to oral images of a spontaneous smile compared to facial images of the same smiles. This finding suggests that higher facial muscle activation during a spontaneous smile may have negatively influenced the smile assessment. The results of the present study can be regarded as a cause of the relationship previously reported to exist between the education level and self-confidence.

As mentioned at the beginning of the manuscript, when a smile is evaluated in a larger perspective, the efficiency of some smile

parameters may become attenuated within this large perspective. For instance, Springer et al.⁸ conducted a study on the full-face and found a low reliability of the buccal corridor margins. The high reliability previously noted by Ker et al.²¹ and Parekh et al.²² was attributed to the fact that these authors used local images rather than full-face images. They reported that attention to the variables that could be deemed significant in the smile may have been disrupted. According to the researchers, the perspective made little difference in the ratings of the esthetic variables for the smile. In general, the display of smile patterns using a full-face or local images did not cause clinically significant differences in esthetic perception.

The effect of gender on esthetic perception was not the main focus of the present study. There are other studies that report no difference in perception between males and females; however, black and white images were printed in the present study and the areas other than the mouth were removed, and particular attention was also paid to balance the male subjects with female subjects. The use of images prepared from both genders is deemed appropriate in order to avoid differences in perception between males and females having the same or different education level.

The present study evaluated smile esthetics by including subjects with various levels of education. The conduction of studies evaluating various sociodemographic variables in esthetics perception of social and spontaneous smiles could pave the way for the development of more patient-oriented treatment programs by providing insights into the differences in esthetic perception. This will give the opportunity to establish more effective communication with patients in diagnosis and in treatment planning.

CONCLUSION

The educational status of an individual is a sociodemographic factor that could affect the perception of smile esthetics. Attractiveness scores of social and spontaneous smiles decreased with increasing education level, and the most remarkable difference was observed between primary school graduates and those with a university or higher education. Because of the fact that patients may have different perceptions/expectations depending on their educational status, this factor seems to be an important factor to be considered while informing patients before treatment and setting treatment goals.

Ethics Committee Approval: Authors declared that the research was conducted according to the principles of the World Medical Association Declaration of Helsinki "Ethical Principles for Medical Research Involving Human Subjects", (amended in October 2013).

Informed Consent: Written informed consent was obtained from all individual participants included in the study.

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