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Original Article

Preference for different lip positions in a Turkish population

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Abstract

Aim: This study evaluated the preferences for different lip positions among dental students, dentists, laypersons, and patients.
Methodology: Average female and male silhouette profiles were constructed from published soft tissue data for the Turkish population. The lips in each average profile were protruded or retruded in 2 mm increments with respect to Ricketts' E-line. Five images were created from the average profile and arranged randomly. Then, 54 dental students, 55 dentists, 46 laypersons, and 60 orthodontic patients were asked to rate each silhouette profile from 1 (least attractive) to 10 (most attractive). The independent t-test was used to analyze the effect of gender on preference and one-way analysis of variance was used to determine whether there were differences among the groups.
Results: The dentists favored profile 'a' (+2 mm protruded), while the other groups favored profile 'e' (average profile) in both sexes. Profile 'd' was the least favored profile, except in the dentists group. For the dental students, profile 'd' was the least favored of the male profiles and 'c' was the least favored of the female profiles. There were significant differences among the groups when assessing male profiles 'a', 'c' ($p<0.01$), and 'b' ($p<0.05$).
Conclusions: The average profile image was favoured and the image that showed slight (+2 mm) lip protrusion was preferred second. All rater groups tolerated changes of ±2 mm with respect to the average lip position.

Keywords: Orthodontics, aesthetics, lip position, preference

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Introduction

The desire to improve dentofacial esthetics is the primary motivation for patients seeking orthodontic care, regardless of structural or functional considerations (1). Orthodontic treatment can influence facial esthetics in several ways, including well-aligned teeth, an attractive smile, and a pleasing facial profile. The position of the lips can profoundly alter the choice of treatment (2, 3). Moreover, the orthodontic treatment plan can also alter the lip position (4). As Margaret Hungerford wrote, "beauty

lies in the eyes of the beholder" (5). There appears to be great variation in the perception of beauty among individuals, communities, and countries (6). Finally, but most importantly, treatment planning must be an interactive process. No longer can the doctor decide in a paternalistic way what is best for a patient. Both ethically and practically, patients must be involved in the decision-making process. Furthermore, with increasing internationalization, it is conceivable that the future orthodontic community will consist of orthodontists, patients, and their significant others of different races or ethnicities in many countries of the world (7, 8). Therefore, it will be important for orthodontists to become more aware of the preferences for facial esthetics of various groups.

The evaluation of well-balanced faces using silhouettes has been conducted in various populations; however, there are no reports of studies of profiles evaluated by a Turkish population (9, 10). To avoid subjective considerations, facial silhouettes are chosen for rating the profile, rather than facial photos.

Ricketts described his 'esthetic plane', which extended from the tip of the nose to the tip of the chin, and claimed that it was a convenient reference line for the analysis of lip position (11). We selected the E-line for assessing lip position because it is used the most frequently both clinically and in previous research (12).

This study evaluated the preferences of dentists, dental students, laypersons, and patients for different lip positions.

Materials and Methods

This study was approved by the Ethics Committee of Yüzüncü Yıl University. A facial profile silhouette image was created using Adobe Photoshop CC (Adobe Systems, San Jose, CA, USA). The image was manipulated using the same software to construct an "ideal" facial profile image based on proportions and linear and angular soft tissue measurements (13, 14).

Table 1. Soft and hard tissue landmarks used in the study

Landmark		Explanation
Trichion	Tr	The point where the hairline meets the midpoint of the forehead
Glabella	G'	The most anterior point on the soft tissue forehead
Nasal tip point	Pn	The most anterior point on the sagittal surface of the nose
Subnasale	Sn	The point where the nasal septum and upper lip meet in the midsagittal plane
Labrale superius	Ls	The most anterior point on the upper lip
Stomion	Stm	The median point of the oral slit when the lips are closed.
Labrale inferius	Li	The most anterior point on the lower lip
B-point		The point of greatest concavity in the midline of the lip between the labrale inferius (Li) and soft tissue pogonion (Pog)
Soft tissue pogonion	Pg'	The most anterior point on the soft tissue chin
Menton	Me'	The most inferior point of the soft tissue of the chin

Profile image manipulation

To assess lip preferences in each profile, the average profile was modified from the subnasale to the soft tissue B-point by displacing the upper and lower lips horizontally in 2 mm increments from Ricketts' E-plane (−4 mm, −2 mm, average, +2 mm, and +4 mm). For evaluation, the five silhouettes were arranged randomly.

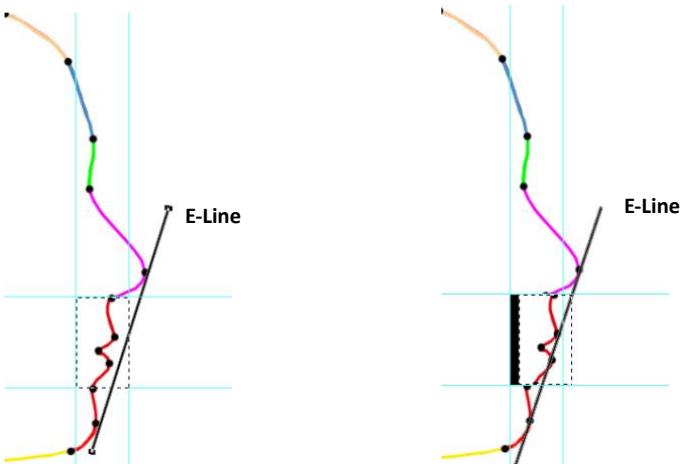
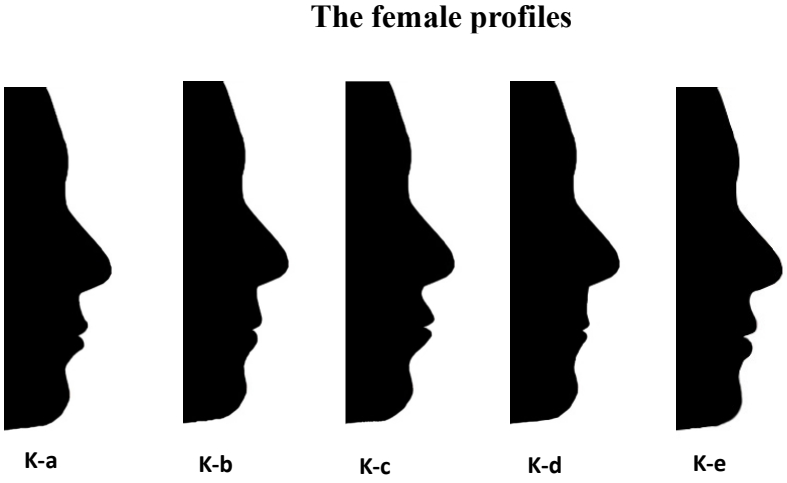


Figure 1. Demonstration of lip movement

The letters K and E were used to indicate female and male images, respectively. Each observer was given a questionnaire and asked to rate each image in terms of lip attractiveness using a scale of 1–10, with 1 representing the least attractive and 10 the most attractive.

Table 2. The five profiles

Profile	Definition
a	Average profile with 2 mm lip protrusion
b	Average profile with 2 mm lip retrusion
c	Average profile with 4 mm lip protrusion
d	Average profile with 4 mm lip retrusion
e	Average profile



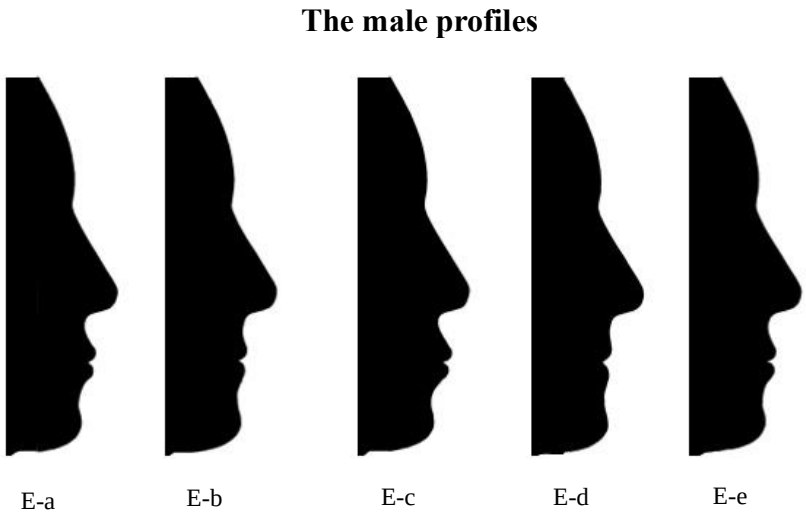


Figure 2. The series of five profiles rated by dental students, dentists, laypersons, and orthodontic patients

The study enrolled 215 subjects divided into four groups comprising 54 dental students, 55 dentists, 46 laypersons, and 60 orthodontic patients.

Statistical Analysis

The statistical package SPSS ver. 21.0 (IBM, Armonk, NY, USA) was used for the analyses. Data are presented as the means and standard deviations. The independent t-test used to analyze the effect of gender and one-way analysis of variance was used to determine differences among the four groups. The probability level for statistical significance was set at p=0.05. Fifty subjects repeated the analysis after a 2-week interval. The panel's kappa score was 0.73, indicating good consistency.

Results

Profiles 'e' (average profile) and 'a' (2 mm protruded lip position with respect to the average) were the most favored profiles. Profiles 'c' (lips protruded 4 mm with respect to the average) and 'd' (lips retruded 4 mm with respect to the average) were the least favored images (Table 3).

Table 3. Mean scores for the male and female profiles

	Female profile	Male profile
a	6.91±2.60	7.04±2.79
b	6.14±2.57	6.41±2.75
c	4.36±2.59	5.42±2.82
d	4.02±2.50	4.29±2.67
e	7.03±2.67	7.80±2.39

Effect of sex

The statistical analysis of pooled data found no significant differences between the female and male subjects when assessing different lip positions (Tables 4 and 5).

Table 4. Comparison of the mean scores for the male profiles based on the gender of the raters

Male profile	Females	Males	P
a	6.99±2.70	7.12±2,76	P>0.05
b	6.37±2.60	6.6±2.81	P>0.05
c	5.84±2.67	5.17±2.85	P>0.05
d	4.57±2.68	4.12±2.61	P>0.05
e	7.67±2.36	8.16±2.27	P>0.05

Table 5. Comparison of the mean scores for the male profiles based on the gender of the raters

Female profile	Females	Males	P
a	6.88±2.49	6.97±2.79	P>0.05
b	6.20±2.45	5.87±2.70	P>0.05
c	4.58±2.52	4.38±2.79	P>0.05
d	4.06±2.36	3.90±2.57	P>0.05
e	7.02±2.51	7.18±2.77	P>0.05

The lip position preferences of all raters are shown in Tables 6 and 7. According to the dentists, the most favored male and female profile was profile 'a'. Orthodontic patients favored profiles 'a' and 'e' in both sexes nearly equally. There were significant differences among the groups when assessing male profiles 'a', 'c' ($p<0.01$), and 'b' ($p<0.05$). According to dental students, the least favored male profile was 'd', while the least favored female profile was 'c'. This contradicts the other groups' preferences (Tables 6-7).

Table 6. Comparison of the mean scores of the four groups for the male profiles

Male profile	Dental students n=54	Dentists n=55	Laypersons n=46	Orthodontic patients n=60	P	Significance between
a	6.67±2.68	7.82±2.55	6.61±3.05	7.65±2.58	**	A and Ba, A and D
b	5.94±2.70	7.16±2.52	5.52±2.63	6.17±2.90	*	B and C
c	4.69±2.79	6.60±2.77	4.76±2.40	5.50±2.89	**	A and B
d	4.35±2.72	4.45±2.71	4.72±2.68	3.75±2.55	NS	
e	8.30±1.81	7.20±2.85	7.91±2.05	7.80±2.57	NS	

a A, dental students; B, dentists; C, laypersons; D, orthodontic patients
*p<0.05; ** p<0.01; NS, Non-significant

Table 7. Comparison of mean scores of the four groups for the female profiles

Female profile	Dental students n=54	Dentists n=55	Laypersons n=46	Orthodontic patients n=60	P	Significance between
a	6.56±2.89	7.13±2.59	7.07±2.14	7.33±2.66	NS	
b	6.09±2.55	6.16±2.60	5.61±2.65	6.57±2.48	NS	
c	3.94±2.44	4.67±2.77	4.20±2.43	4.58±2.65	NS	
d	4.48±2.56	3.36±2.37	4.72±2.06	3.67±2.70	*	B and C
e	7.20±2.62	6.24±2.92	6.89±2.55	7.35±2.49	NS	

a A, dental students; B, dentists; C, laypersons; D, orthodontic patients
*p<0.05; ** p<0.01; NS, Non-significant

Discussion

Esthetic standards are subjective and may vary over time (15). Studies have produced divergent results depending on the region, culture, gender, age, and ethnic background of the participants (16, 17). To date, no study has evaluated the anteroposterior lip position preferences in silhouette profiles among a Turkish population.

Lip positioning as a result of premolar extractions for orthodontic treatment affects the overall facial balance. Hence, the lip evaluation before orthodontic treatment is very important. Lip position is often assessed using Ricketts E-line, which evaluates the projection of the lips relative to the tips of the nose and chin. Two-dimensional facial profile silhouettes are routinely used to assess the perceptions of facial profile attractiveness (18, 19). Therefore, silhouettes were used in this study instead of photographs to evaluate the profile. Using silhouette images eliminated all extrinsic and intrinsic distracting variables, such as hairstyle, make-up, and skin texture, which could influence an evaluator's esthetic score rating (20).

It has been shown that raters can perceive a 2 mm change (21). Therefore, lip position was altered in 2 mm increments in our study. Orthodontic treatment can affect lip position by 1~4 mm (4, 22), so the lip positions were retruded or protruded to 4 mm.

Foster (23), Lines et al. (24), and Czarnecki et al. (25) also used silhouette profiles with altered lip positions from that of the ideal facial profile for each sex. They reported that significantly more retruded profiles were preferred for males than for females. In comparison, we found that the raters preferred protruded lip positions over retruded lip positions.

Auger and Turley assessed fashion magazines published during the 1900s and found that the perceptions of the ideal female facial profile have changed throughout the 20th century (26). Nguyen and Turley examined fashion magazine photographs of male models from various publications over the last 65 years and found that the perceptions of the male model profile changed significantly with time, especially the region of the lips (27). There has been a trend towards increasing lip protrusion, lip curl, and vermilion display. In our study, we found that average or 2 mm protruded profiles were assessed as more attractive than the other profiles. These findings are consistent with studies that demonstrated an inclination toward lip protrusion (24,25). The 4 mm protruded lip profile was considered less attractive than the 2 mm protruded one.

Türkkahraman et al. examined facial profile preferences among various layers of the Turkish population, and found that in the orthognathic profile, fuller, protrusive lips were liked in females, while retrusive lips with a prominent nose and chin were liked in males (28). Those authors recommended that female borderline cases be treated without extraction, whereas extraction treatment can be used in male borderline cases. By contrast, in our study, protrusive lips were preferred for both sexes over retrusive lips.

The evaluation of the differences among the groups showed that their preferences were generally similar. All of them regarded the average profile as the best and the most retruded profile as the worst. This finding supports the large effect of 'average' on the perception of attractiveness (29).

In determining the range of tolerance for alterations in lip position, it was found that all groups tolerated 2 mm from the ideal lip position and least tolerated the 4 mm retruded lip position. This finding is important in cases involving the extraction of four premolars, which can cause the lips to retract 3-4 mm

(4). To avoid problems with lip position, orthodontists should discuss this with the patient as part of facial treatment planning. Giddon asserted that orthodontists must establish esthetic goals that correspond to the public's standards at that time (30).

Bishara et al. investigated facial and dental changes in adulthood and reported that the relative changes in the position of the lips, compared with the nose and chin position, caused the lips to appear more retrusive at 46 years of age than at 25 years for both male and female profiles (31). These findings must be considered with preferences of patients while treating border line cases.

Conclusions

The image that represents the average lip position relative to the E-line was favored and the image that represents slight (+2 mm) lip protrusion was preferred second. All rater groups tolerated changes in the ideal lip position of ±2 mm. The profiles that retruded or protruded 4 mm were least favored. In light of these findings, extraction can be recommended in patients with protrusive lips, while in cases with retrusive lips orthodontic treatment without extraction is recommended.

Ethical Approval: Ethics committee approval was received for this study from Yüzüncü Yıl University (No:2015/10).

Peer-review: Externally peer-reviewed.

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