

Perception of Facial Profile Esthetics by Iranian Dental Patients, Dentists, and Orthodontists

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Abstract

Background and Aim: Several studies have compared the orthodontists', dentists', and dental patients' opinions with regard to facial profile esthetics; however, the Iranian population has been limitedly researched in this respect. Our aim was to determine the differences in the esthetic preferences of Iranian patients, dentists, and orthodontists with regard to facial profile esthetics.

Materials and Methods: In this cross-sectional study, ideal facial profiles for both genders were chosen, and nine anteroposterior combinations for each sex were obtained using the Dolphin imaging software program. 132 individuals (44 subjects per group) were asked to rank the facial profiles from 1 to 9 (the least and most attractive facial profiles, respectively). Kruskal-Wallis and Mann-U-Whitney tests were utilized to compare the results.

Results: The facial profile with a retrusive maxilla/protrusive mandible was ranked as the worst profile by orthodontists, dentists, and patients (males: 1.25, 1.52, and 1.45, respectively, $P=0.128$; females: 1.89, 1.84, and 1.59, respectively, $P=0.745$). The orthodontists and dentists rated the ideal facial profile as the best profile (males: 7.98 and 7.80, respectively, $P=0.033$; females: 8.05 and 8.02, respectively, $P=0.008$); however, the patients chose the retrusive mandible as the most attractive facial profile (males: 7.82, $P=0.043$; females: 7.89, $P=0.009$).

Conclusion: Clinicians must consider the patient's idea about the ideal facial profile that he/she wants to achieve at the end of the treatment. Based on the results of this study, the Iranian patients prefer a more convex facial profile, which can be considered as an important factor in treatment planning.

Key Words: Dental Esthetics, Perception, Orthodontists, Dentists, Patients

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Introduction

Malocclusion adversely affects the facial appearance and forces the patients to seek orthodontic treatments. In the modern society, physical and facial attractiveness have a direct relationship with self-confidence, and the psychological and social aspects of personal life

are prevailed by the appearance. Accordingly, improving the facial appearance is one of the most basic motivations for seeking orthodontic treatments [1,2]. The patients' esthetic self-perception is one of the main objectives which convinces them to refer to dentists [3,4]. Esthetics is one of the three major goals in

orthodontics, and the evaluation of soft tissues including the facial profile is an important part of diagnosis and treatment planning [5]. Facial profile analysis is of such paramount importance in treatment planning that it has been called "poor man's cephalometric analysis" [6]. Sena et al [7] have shown that individuals with more attractive facial profiles have a higher chance to be hired for a job position. Occasionally, orthodontists and dentists ignore the patients' perception of esthetics, and this leads to dissatisfaction with the treatment outcome since the patients' esthetic perception may be different from that of the clinicians'. Hence, clinicians must consider the opinions of patients about esthetics and must discuss the controversies to provide a satisfactory treatment plan.

Beauty is a subjective concept, and the perception with regard to the fact that which face is beautiful can be influenced by ethnicity and culture as well as individual opinion [8,9]. Maganzini et al [10] found that Chinese laypersons determined a bidental retrusive facial profile to be as attractive as the ideal facial profile. Mantzikos [9] showed that Japanese laypersons ranked the orthognathic profile as the best profile and the mandibular prognathic profile as the worst facial profile. Lew et al [11] achieved the same results after studying a sample of Asian teenagers. Farrow et al [8] showed that black Americans preferred a straighter facial profile which was more protrusive than the White standards. In a study on African-Americans, Polk et al [12] confirmed the findings suggested by Farrow et al [8].

Several studies have investigated the differences between the opinions of clinicians and laypersons with regard to the facial profile. Spyropoulos and Halazonetis [13] showed that facial attractiveness is influenced by the soft tissue outline. They also showed that the profile outline influences the orthodontists' opinions more than the laypersons' opinion, despite the good agreement between them [13]. Sena et al [7] suggested that the anteroposterior position of the mandible has a great impact on facial profile attractiveness; however, they found a few significant differences among the perceptions of orthodontists, surgeons, visual artists, and laypersons. Cochrane et al [14] found a significant difference in esthetic perception among

clinicians, dental students, and laypersons. In the study by Soh et al [15], all dental professionals, dental students, and laypersons ranked the facial profile with a protrusive mandible as the least attractive profile in both genders, whereas with regard to the most attractive facial profile, the ideal profile by dental students and bimaxillary retrusion by the two other groups were placed at the most attractive end of the ranking scale. Cox and van der Linden [16] did not find any significant statistical differences between the two groups of orthodontists and laypersons in their opinions about facial profiles.

Several methods have been previously utilized to evaluate facial profile attractiveness including silhouettes [17], full-face and profile photographic transparencies [18], self-drawings of facial profiles [19], and patients' standardized facial photographs [20]. Recently, the proposed methods have changed to photograph modification using a computer software including warping the scanned images of treated patients [13], digital image morphing [21], etc. In this study, we utilized the Dolphin imaging software program (version 11.5, Dolphin Imaging & Management Solutions, Chatsworth, CA, USA) similar to the method applied by Maple et al [22] and Soh et al [15]; however, they chose six White adults and two Chinese individuals with a class I facial profile, respectively, whereas we took our model photograph from the "Contemporary Treatment of Dentofacial Deformity" textbook [23].

The patients' perception of esthetics is of great interest for clinicians and can ease the communication between clinicians and patients. Therefore, we aimed to determine the esthetic preferences of an Iranian population with regard to the facial profile. We also compared the perception of facial profile esthetics among Iranian dental patients, dentists, and orthodontists.

Materials and Methods

The sample size was determined based on comparing the facial profile ranks among several job categories by using the fixed effect analysis of variance (ANOVA) formula [24]. By assuming an alpha (type I) error of 0.05 and a statistical power of 0.90 and after assessing three job categories and performing a pilot study, the final sample size was

determined to be 44 subjects per group.

In this cross-sectional study, a sample of 132 individuals equally distributed in three groups (44 participants per group) of patients, dentists, and orthodontists, was recruited from an Iranian community. The patients were selected from among the individuals referring to the department of orthodontics of Hamadan University of Medical Sciences for orthodontic treatments. Table 1 describes the characteristics of the participants.

Image alteration:

Ideal male and female facial profiles, obtained from the "Contemporary Treatment of Dentofacial Deformity" textbook [23], were scanned and imported to the Dolphin imaging software program. Several normal lateral cephalograms were evaluated for superimposition on the facial profiles, and finally, two of them which were more consistent with the profiles were scanned and transmitted to the mentioned software program. Each facial profile image was linked to the corresponding cephalometric radiograph. It is worth mentioning that the soft tissues reflected the hard tissue movements according to the Dolphin software's programmed ratios. Afterwards, the facial profile images were digitally manipulated in the anteroposterior plane with no changes in the vertical plane. The alterations were made with 5mm forward (+) and backward (-) displacements of the maxilla and mandible, which produced nine combinations for each sex (Figures 1 and 2) as follows: 0/0 mm (ideal facial profile; M7 and F5), +5/0 mm (protrusive maxilla; M8 and F6), -5/0

mm (retrusive maxilla; M4 and F1), 0/+5 mm (protrusive mandible; M1 and F2), 0/-5 mm (retrusive mandible; M2 and F9), +5/+5 mm (bimaxillary protrusion; M5 and F4), -5/-5 mm (bimaxillary retrusion; M3 and F8), +5/-5 mm (protrusive maxilla/retrusive mandible; M6 and F3), -5/+5 mm (protrusive mandible/retrusive maxilla; M9 and F7). This amount of displacement appeared to be sufficiently discernible and differentiable by the raters, especially the patients.

Data collection:

When all the facial profile images were generated, they were printed on glossy photo papers in an image size of 6-8 inches. One of the authors (H.R.) collected the data from July 2015 to March 2016 by using a questionnaire. The participants (raters) were given a short presentation and were asked to rank the nine facial profiles of each sex in the questionnaire on a scale of 1 (the least attractive) to 9 (the most attractive) at a single session without any repetition of the rankings. The nine facial profiles of each sex were placed side-by-side on a table for assessment at a single session.

Statistical analysis:

All statistical analyses were carried out using Statistical Package for the Social Sciences (SPSS) software program (version 22, IBM Co., Chicago, IL, USA). The scores given by the three groups were compared according to Kruskal-Wallis test, while pairwise comparisons were made according to Mann-U-Whitney test. The statistical significance was set at $P < 0.05$.

Table 1. Demographics categorized by the groups

Group	Number of subjects	Age (years)		Sex	
		Mean (\pm SD)	Range	Male N (%)	Female N (%)
Orthodontists	44	42.2 (10.2)	26-69	34 (77.3)	10 (22.7)
Dentists	44	39.3 (10.8)	24-78	28 (63.6)	16 (36.4)
Patients	44	32.4 (9.5)	19-58	25 (56.8)	19 (43.2)
Total	132	38.0 (10.9)	19-78	87 (65.9)	45 (34.1)

SD=Standard Deviation

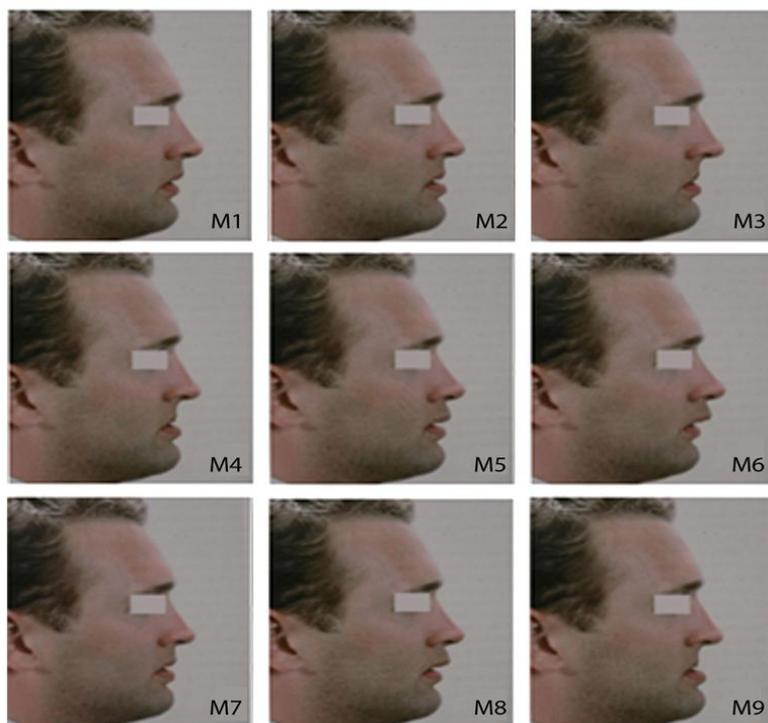


Figure 1. Male facial profiles: M1, protrusive mandible; M2, retrusive mandible; M3, bimaxillary retrusion; M4, retrusive maxilla; M5, bimaxillary protrusion; M6, protrusive maxilla/retrusive mandible; M7, ideal profile; M8, protrusive maxilla; M9, protrusive mandible/retrusive maxilla

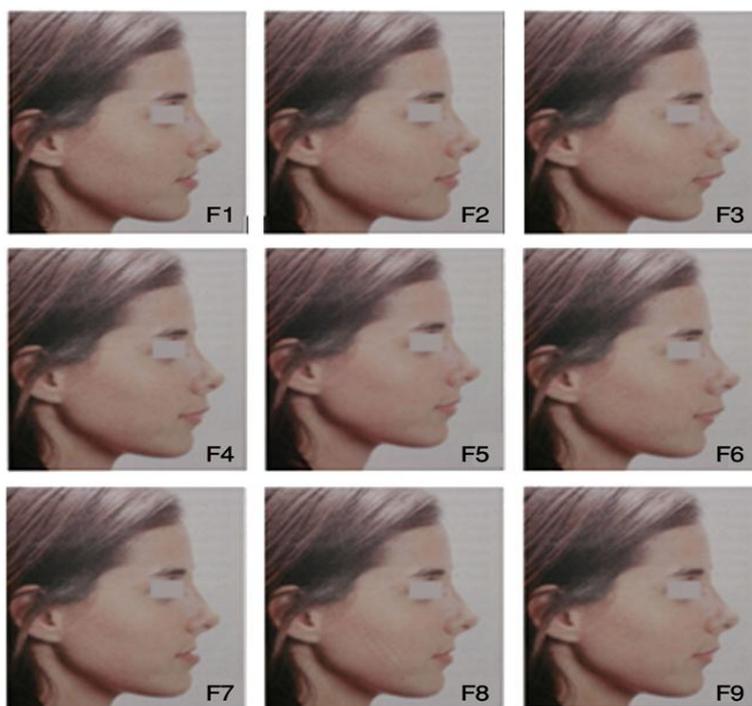


Figure 2. Female facial profiles: F1, retrusive maxilla; F2, protrusive mandible; F3, protrusive maxilla/retrusive mandible; F4, bimaxillary protrusion; F5, ideal profile; F6, protrusive maxilla; F7, protrusive mandible/retrusive maxilla; F8, bimaxillary retrusion; F9, retrusive mandible

Results

The demographics of the participants are shown in Table 1. Of the 132 participants, 65.9% were males, and the mean (\pm standard deviation) age of the participants was 38.0 (10.9) years. The mean ranking scores provided by the orthodontists, dentists, and patients with regard to the facial profiles are shown in Table 2.

Of the male facial profiles, the profile with a protrusive mandible and retrusive maxilla (M9) was ranked as the least attractive by the three groups; however, no such agreement was detected with regard to the most attractive facial profile. The orthodontists and dentists chose the ideal profile (M7) as the most attractive profile, whereas the retrusive mandible (M2) was ranked as the best facial profile by the patients. No Significant differences were noted in the rankings of a protrusive mandible (M1), bimaxillary retrusion (M3), bimaxillary protrusion (M5), and protrusive mandible/retrusive maxilla (M9), which means that from the esthetics standpoint, the three groups considered these profiles to be similarly attractive. Significant differences were found in the ranking scores of the retrusive mandible (M2), retrusive maxilla (M4), protrusive maxilla/retrusive mandible (M6) ($P<0.001$), ideal profile (M7), and protrusive maxilla (M8) ($P<0.001$). As shown in Table 3, pairwise comparisons demonstrated that the orthodontists and dentists ranked M6 less attractive compared to the patients' opinions ($P<0.001$); the ranking given by the patients was more than one score higher than that given by the orthodontists and dentists. In contrast to M6, the orthodontists and dentists ranked M8 more attractive than did the patients ($P<0.001$); the patients ranked this profile at about half the score given by the orthodontists and more than one score lower than that provided by the dentists. Despite the fact that the orthodontists ranked both the mentioned profiles higher compared to the dentists, the difference was significant only with regard to M8 ($P=0.008$). Another finding was that the dentists ranked M4 more attractive compared to the orthodontists' opinions ($P=0.006$). With respect to the least attractive facial profile (M9), Kruskal-Wallis test showed no significant differences among the patients', dentists', and orthodontists' opinions. In terms of the most attractive profile in

the orthodontists' and dentists' opinions (M7), only the orthodontists ranked this facial profile significantly higher compared to the patients' opinions ($P<0.05$), whereas the score given by the patients with regard to M2 was significantly higher than the score given by the dentists ($P<0.05$).

Considering the female facial profiles, surprisingly, the results were the same as those for the male facial profiles. The protrusive mandible/retrusive maxilla (F7) was ranked as the least attractive facial profile by all the groups; however, there was no such agreement with regard to the most attractive facial profile. The orthodontists and dentists chose the ideal profile (F5) as the most attractive profile, whereas the retrusive mandible (F9) was ranked as the best facial profile by the patients. There were no significant differences in the ranking scores of the protrusive maxilla/retrusive mandible (F3), bimaxillary protrusion (F4), and protrusive mandible/retrusive maxilla (F7); again, this means that the three groups considered these facial profiles similar from the viewpoint of esthetics. Significant differences were found in the ranking scores of the retrusive maxilla (F1), protrusive mandible (F2), ideal profile (F5), protrusive maxilla (F6), bimaxillary retrusion (F8), and retrusive mandible (F9). Pairwise comparisons showed that the orthodontists and dentists ranked F1 lower compared to the patients ($P=0.002$ and 0.010 , respectively), while the orthodontists ranked F6 at about one score higher compared to the score given by the patients ($P=0.001$). As with the most attractive facial profile, there were no significant differences with respect to the least attractive profile (F7) among the three groups of raters according to Kruskal-Wallis test. The most attractive facial profile chosen by the orthodontists and dentists (F5) was scored significantly higher than that chosen by the patients ($P=0.004$ and 0.017 , respectively). The orthodontists and dentists scored F9 (the most attractive facial profile ranked by the patients) significantly lower than did the patients ($P=0.004$ and 0.022 , respectively). In terms of the intra-rater reliability, 25% of the subjects (11 individuals per group) were asked to rank the facial profiles four weeks later, and the Kappa score was used to assess the intra-rater agreement with regard to each facial profile. As

Table 2. Means and standard deviations (SD) of the ranking scores of male and female facial profiles given by the orthodontists, dentists, and patients (Kruskal-Wallis test)

Photograph	Orthodontists	Dentists	Patients	P-value
	(n=44)	(n=44)	(n=44)	
	Mean (±SD)	Mean (±SD)	Mean (±SD)	
Male				
M1 (protrusive mandible)	6.98 (1.44)	7.43 (1.32)	7.41 (1.25)	0.239
M2 (retrusive mandible)	7.43 (1.25)	7.20 (1.19)	7.82 (1.13)	0.043*
M3 (bimaxillary retrusion)	4.20 (1.36)	3.93 (0.87)	4.30 (1.00)	0.226
M4 (retrusive maxilla)	2.70 (1.05)	3.73 (1.74)	3.11 (1.02)	0.008
M5 (bimaxillary protrusion)	6.84 (1.41)	6.89 (1.47)	6.93 (1.58)	0.922
M6 (protrusive maxilla/retrusive mandible)	2.93 (1.09)	2.57 (1.23)	4.23 (1.51)	<0.001*
M7 (ideal profile)	7.98 (0.98)	7.80 (1.09)	7.34 (1.26)	0.033*
M8 (protrusive maxilla)	4.68 (1.70)	3.84 (1.99)	2.39 (1.28)	<0.001*
M9 (protrusive mandible/retrusive maxilla)	1.25 (0.58)	1.52 (0.93)	1.45 (0.59)	0.128
Female				
F1 (retrusive maxilla)	3.70 (1.53)	3.64 (1.75)	4.59 (1.47)	0.005*
F2 (protrusive mandible)	6.00 (1.83)	6.93 (1.37)	6.59 (1.44)	0.030*
F3 (protrusive maxilla/retrusive mandible)	2.57 (1.45)	3.05 (1.64)	2.82 (1.21)	0.205
F4 (bimaxillary protrusion)	5.14 (1.68)	4.36 (1.37)	4.43 (1.62)	0.059
F5 (ideal profile)	8.05 (1.48)	8.02 (1.17)	7.30 (1.62)	0.008*
F6 (protrusive maxilla)	3.55 (1.39)	3.02 (1.19)	2.66 (1.48)	0.003*
F7 (protrusive mandible/retrusive maxilla)	1.89 (1.76)	1.84 (1.24)	1.59 (0.73)	0.745
F8 (bimaxillary retrusion)	7.14 (1.36)	6.43 (1.55)	7.14 (1.46)	0.028*
F9 (retrusive mandible)	7.00 (1.57)	7.68 (1.44)	7.89 (1.26)	0.009*

* Statistically significant (P<0.05)

Table 3. Pairwise comparisons of the facial profiles (Mann-U-Whitney test)

Photograph	P-value		
	Orthodontists and Dentists	Orthodontists and Patients	Dentists and Patients
Male			
M2 (retrusive mandible)	0.381	0.129	0.012*
M4 (retrusive maxilla)	0.006	0.032*	0.081
M6 (protrusive maxilla/retrusive mandible)	0.075	<0.001*	<0.001*
M7 (ideal profile)	0.464	0.012*	0.071
M8 (protrusive maxilla)	0.008	<0.001*	<0.001*
Female			
F1 (retrusive maxilla)	0.755	0.010*	0.002*
F2 (protrusive mandible)	0.010*	0.192	0.129
F5 (ideal profile)	0.540	0.004*	0.017*
F6 (protrusive maxilla)	0.050	0.001*	0.089
F8 (bimaxillary retrusion)	0.014*	0.956	0.030*
F9 (retrusive mandible)	0.022*	0.004*	0.526

*Statistically significant (P<0.05)

shown in Table 4, there was a good agreement with regard to most of the variables, a perfect agreement with regard to M9 and F7 (the least attractive facial profiles for males and females, respectively) ranked by the orthodontists and dentists, and also with regard to F5 (the most attractive facial profile for females) and F3 (female facial profile with a protrusive maxilla and retrusive mandible) scored by the dentists. Overall, the opinions of the dentists and orthodontists were more reliable than those of the patients.

Discussion

In contrast to similar studies [10,15,21,25,26], in this study, we took a step forward and chose the ideal facial profile introduced by the abovementioned textbook [23] as the reference instead of a class I facial profile. In addition, we used digital color photographs. We thought that the hair and skin colors would have no influence on esthetic perceptions because all the images would be compared under identical conditions. Thus, we generated color images, the same as the original images in the abovementioned textbook [23]. Furthermore, color photographs are more realistic and facilitate the decision making especially for the patients [22,27]. According to Shelly et al [28], facial profile outlines or silhouettes would eliminate some of the distracting subjective variables. This might be valid when investigating the effect of treatment on the facial profiles; however, for evaluation of the perception of facial attractiveness, it is necessary to consider the whole face. In contrast to the other studies that investigated facial preferences, we recruited dental patients instead of laypersons because patients are more critical and sensitive than laypersons with respect to facial esthetics as suggested by Naini et al [29]. Adult patients were included in the study instead of teenagers because of a recent increasing interest of adults in seeking orthodontic treatments and the fact that the final result of the teenagers' treatment is judged by their parents. It is worth mentioning that we manipulated both jaws simultaneously instead of manipulating one jaw since we face the simultaneous discrepancy of both jaws more commonly in the clinic; therefore, we gained two more combinations in comparison to similar studies [15,21] (protrusive mandible/

retrusive maxilla and protrusive maxilla/retrusive mandible). The facial profiles were produced without extreme sagittal changes to develop more realistic soft tissue profiles. The arrangement order of the images was different between the sets of male and female profiles to lower the risk of pattern recognition error during observation.

The primary aim of our study was to evaluate the opinion of a group of Iranian individuals including orthodontists, dentists, and patients and to compare their preferences of facial esthetics to find a response to these substantial questions: 1. Does the reciprocity between the influence of media on patients and that of education on dentists and orthodontists make differences in the esthetic perception of the Iranian population with regard to facial profiles or the patients think like clinicians? 2. Which facial profile, either male or female, is the most attractive for the Iranians? 3. Does the education affect the orthodontists' and dentists' ideas about the facial profile? 4. Which treatment may be better in borderline cases: camouflage versus orthognathic surgery? and many other questions which we tried our best to answer.

The most attractive facial profile for both genders, ranked by the orthodontists and dentists, was the ideal profile as we expected. This simply shows that the Iranian professionals, affected by their education, prefer the ideal profiles illustrated in the "Contemporary Treatment of Dentofacial Deformity" textbook [23]. This is in agreement with the findings of a study by Sawant and Mani [30] which showed that orthodontists and other dental specialists found an improvement in facial profile attractiveness in class II patients after treatment with the twin block appliance. However, the patients preferred male and female facial profiles with a retrusive mandible (M2 and F9). Nevertheless, the facial profile with a retrusive mandible was the second most attractive profile for both genders in the orthodontists' opinion; however, the dentists ranked it as the second most attractive facial profile in females and as the third most attractive facial profile in males. Furthermore, the patients scored the ideal facial profile as the third favorable profile for males and as the second favorable profile for females. Overall, it could be concluded that both the ideal profile and the profile with a retrusive mandible

Table 4. Intra-rater reliability according to the Kappa scores

Photograph	Kappa score		
	Orthodontists	Dentists	Patients
Male			
M1 (protrusive mandible)	0.855	0.459	0.241
M2 (retrusive mandible)	0.588	0.389	0.305
M3 (bimaxillary retrusion)	0.500	0.686	0.577
M4 (retrusive maxilla)	0.283	0.421	0.831
M5 (bimaxillary protrusion)	0.556	0.612	0.206
M6 (protrusive maxilla/retrusive mandible)	0.241	0.602	0.267
M7 (ideal profile)	0.855	0.718	0.064
M8 (protrusive maxilla)	0.593	0.175	0.761
M9 (protrusive mandible/retrusive maxilla)	1.000	1.000	0.756
Female			
F1 (retrusive maxilla)	0.206	0.758	0.444
F2 (protrusive mandible)	0.761	0.439	0.444
F3 (protrusive maxilla/retrusive mandible)	0.676	1.000	0.532
F4 (bimaxillary protrusion)	0.258	0.663	0.649
F5 (ideal profile)	0.792	1.000	0.537
F6 (protrusive maxilla)	0.560	0.625	0.421
F7 (protrusive mandible/retrusive maxilla)	1.000	1.000	0.554
F8 (bimaxillary retrusion)	0.542	0.179	0.427
F9 (retrusive mandible)	0.598	0.780	0.267

are the most favorable facial profiles among the Iranian individuals. This is in contrast to the results of the studies by Soh et al [15,25,26] and Mantzikos [9] which found that straight facial profiles (normal and bimaxillary retrusion) are the most preferred profiles among a group of Chinese evaluators, and also in contrast to the results of the studies by Turkkahraman and Gökalp [31] and Thareja et al [21] which showed that the orthognathic profile is the most attractive facial profile among Turkish and Indian raters, respectively.

As to the least attractive facial profiles for both genders, all the three groups gave the lowest score to the most concave facial profile (protrusive mandible/retrusive maxilla; M9 and F7). This is in agreement with the results obtained by Soh et al [15,25,26], Mantzikos [9], Maganzini et al [10] (Chinese participants), Trehan et al [32] (Indian raters), and Jarungidanan and Sorathesn [33] (Thai people), which ranked the concave facial profile with a mandibular prognathism as the worst profile. Considering the scores of the facial profiles with a protrusive mandible/retrusive maxilla, it is noticeable that the profile with a retrusive maxilla was ranked lower than a protrusive mandible, and

interestingly, in the other extreme profile (protrusive maxilla/retrusive mandible), a protrusive maxilla was ranked lower than a retrusive mandible. This means that the position of the maxilla is more critical in all the groups so that M9 and F7 were given the lowest scores. This is in disagreement with the findings of the study by Soh et al [15] which stated that the position of the mandible is more critical in the evaluation of facial profiles. It is obvious that the variations of both maxilla and mandible, which aggravate the profile concavity and convexity, result in a lower score; however, this is not true for maxillary protrusion/normal mandible, which was ranked less attractive for females by the dentists, and less attractive for both genders by the patients compared to the profile with a retrusive mandible. It can be judged that patients are so interested in a retrusive mandible that they prefer it even in combination with a protrusive maxilla; the dentists gave similar scores to these two facial profiles with negligible differences.

Considering the differences among the raters' opinions, we should only consider the cases with significant statistical differences in treatment planning. For example, with regard to the males

with a protrusive maxilla (M8), the orthodontists gave a higher score than did the dentists, and the dentists, in turn, gave a higher score than did the patients. With regard to females, the orthodontists again gave a higher score than did the dentists. Therefore, orthognathic surgery may be more appropriate for the patients with a protrusive maxilla. In contrast, since a retrusive mandible was the most preferred profile by the patients, we can consider a camouflage treatment for the patients with a retrusive mandible instead of orthognathic surgery. The females with a retrusive maxilla (F1) were ranked more attractive by the patients compared to the orthodontists and dentists' opinions; therefore, a camouflage treatment can be planned for class III females with a retrusive maxilla according to the same rationale. Another prepossessing difference is the higher score given by the patients to the protrusive maxilla/retrusive mandible in males (M6), which shows the preference of the most convex profile for men. The last worth-discussing significant statistical differences are related to the females with bimaxillary protrusion (F4) and bimaxillary retrusion (F8); the orthodontists gave a higher score than did the dentists and patients, while the orthodontists and patients gave a higher score than did the dentists, respectively. However, all the raters were more tolerant of females with bimaxillary retrusion than of females with bimaxillary protrusion and males with bimaxillary retrusion. On the other hand, all the raters were more tolerant of males with bimaxillary protrusion than of males with bimaxillary retrusion and females with bimaxillary protrusion. This finding was different from those of Soh et al [15] and Coleman et al [34] who suggested that the females with bimaxillary protrusion were better perceived than the males with this facial profile. This could suggest a treatment plan involving extraction for borderline cases of bimaxillary protrusion in females and a non-extraction treatment plan for males. All the participants were more tolerant of males with a protrusive mandible than of females with a protrusive mandible, which seems normal. In males, however, the dentists and patients were more tolerant of a retrusive mandible than of a protrusive mandible, which contradicts the psychological ideas claiming that a well-developed

mandible is associated with more attractiveness in men [35]. With regard to females, all the groups were more tolerant of a retrusive mandible than of a protrusive mandible, which is in concordance with our expectations. We didn't alter facial profiles vertically; of course, many surgical-orthodontic treatment plans would correct vertical skeletal discrepancies independent of the patients' chief complaint. Accordingly, we recommend alterations in the vertical dimension to be considered independently in future studies.

Conclusion

The conclusions obtained from our study are as follows:

1. In both genders, the orthodontists and dentists rated the ideal facial profile as the most attractive profile, whereas the patients rated the profile with a retrusive mandible as the most attractive profile.
2. In both genders, the least attractive facial profile, ranked by all the groups, was the most concave profile (retrusive maxilla/protrusive mandible).

It seems that if we consider the esthetic perception of the Iranian population during treatment planning, we should attempt to achieve a profile more convex than the ideal profile in the textbook in both genders.

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