Original Article

Self-perception and self-recognition of facial profiles in adolescents referred to orthodontic treatment

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ABSTRACT

Objectives: To investigate self-recognition and self-perception among participants with straight, convex, and concave profiles.

Materials and Methods: This cross-sectional study was conducted using a questionnaire with questions about demographic information, self-perception of the facial profile, satisfaction with profile esthetics, expectations about profile changes after completing orthodontic treatment, motivational factors, and self-recognition. For the self-recognition question, profiles of the respondents were blackened and inserted into the questionnaire. Participants were categorized into three groups: those exhibiting a convex, straight, and concave profile.

Results: There was no statistically significant difference between the straight, concave, and convex profile groups regarding self-recognition and self-perception. Participants showed greater ability in self-recognition than self-perception of their soft-tissue profile ($P = .001$). Females showed higher capability in self-perception than males ($P = .001$).

Conclusions: Self-recognition and self-perception of the soft-tissue profile are not influenced by facial convexity. (*Angle Orthod*. 2024;94:672–677.)

KEY WORDS: Soft-tissue profile; Self-perception; Self-recognition

INTRODUCTION

Enhancing facial appearance is one of the major goals of orthodontic treatment.[1] Therefore, defining soft-tissue profile is an important concern,[2,3] especially in adolescents who are gradually more aware of their physical appearance.[4] Body self-recognition and perception have a significant impact on satisfaction with physical appearance. Body self-recognition is the ability to recognize one's own body parts as distinct from others.[5] Also, it is the capability of an individual to recognize themselves in the mirror or photographs.[6] Self-perception, on the other hand, includes the way individuals perceive and interpret their own behaviors, emotions, and attributes; it includes physical and psychological aspects.[7]

Previous studies used various tools to assess self-perception, mainly focusing on macro-esthetic profile perception.[4,8–11] However, evaluation of profile self-perception among orthodontic patients has not yet been fully investigated. When participants were required to select a profile that largely matched their own, the majority did not correctly perceive their own profile.[12–17]

The main factor that motivates patients to seek orthodontic treatment is the esthetics of their facial appearance. However, the understanding of how motivation influences self-perception remains undiscovered.[18–20] No previous study evaluated and compared self-perception (choosing the most similar profile to a participant's own among different types of profiles) and self-recognition (choosing the participant's profile among different types of profiles) among orthodontic patients. It is not known whether the self-perception among patients with various types of facial convexity differs.

This research aimed to investigate self-recognition and self-perception among participants with straight, convex, and concave profiles.

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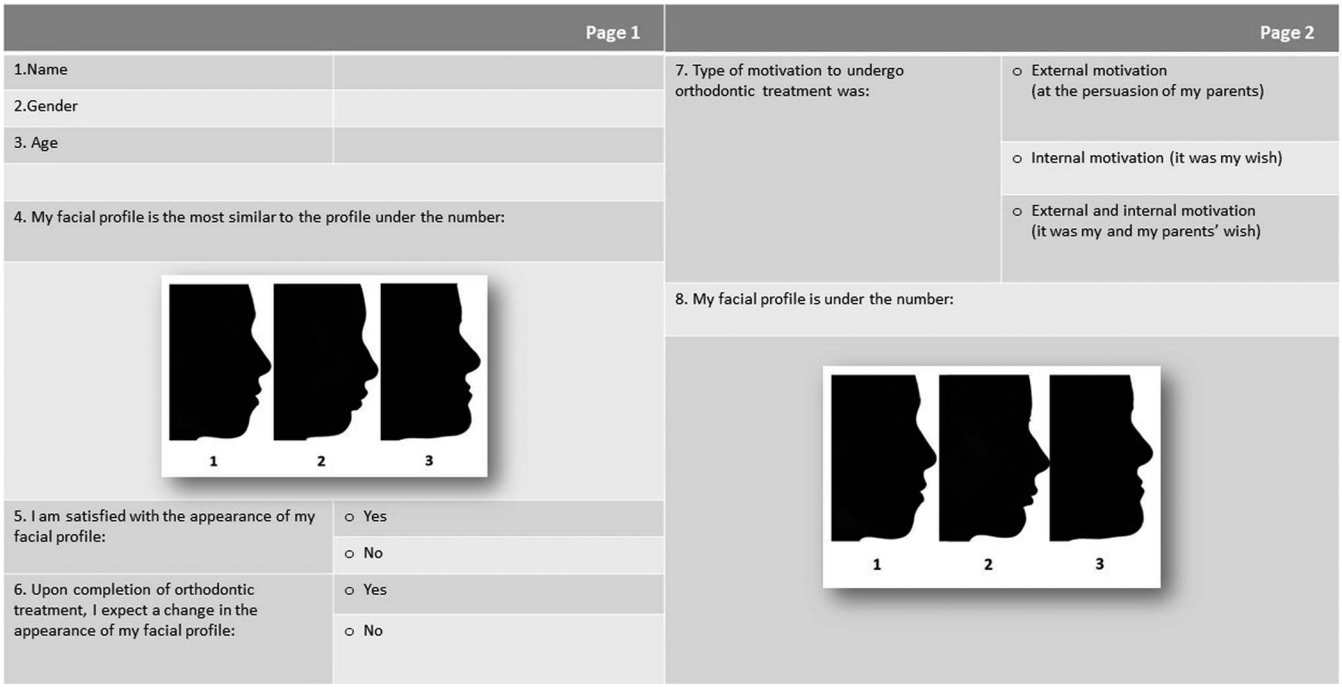

Figure 1. Participant questionnaire.

MATERIALS AND METHODS

Participants

From March 2023 to September 2023, 517 patients were referred for orthodontic treatment at the Department of Orthodontics, University Hospital Centre Zagreb, Croatia.

All participants underwent standard diagnostic procedures before orthodontic treatment, including analysis of intra- and extraoral photographs, gnathometric analysis in OrthoCAD (version 5.9, Align Technology, San Jose, CA, USA), and panoramic x-ray analysis. Captured lateral cephalograms (Cranex 3D, Soredex, Tuusula, Finland) were analyzed in AudaxCeph Advantage (version 5.2.0.3610) software. Inclusion criteria were: 12 to 17 years of age, permanent dentition, and willingness to participate in a study. Subjects with previous orthodontic treatment, craniofacial trauma, congenital anomalies, and orthognathic surgery were excluded. Participants were then categorized into three groups: those exhibiting a convex ($\leq$164°), straight (165°–175°), and concave profile ($\geq$176°). Participants (N = 30; 15 males and 15 females) were assigned to each group according to the value of their facial angle (G-Sn-Pg'), which was measured in the cephalometric software using the *DesignAngle* tool. Every consecutive patient upon arrival that wanted to participate in the study was allocated into one of the three groups until the sample was fulfilled. Additionally, participants were divided into two groups according to their age: group 1 (12–14 years) and group 2 (15–17 years).

Questionnaire

This cross-sectional study was conducted using a questionnaire with eight multiple-choice and open-ended questions. Questions were developed to evaluate how motivational factors, profile esthetic satisfaction, and treatment expectations affected self-perception and self-recognition. The pilot version of the questionnaire was given to 10 random patients at the Department of Orthodontics, University Hospital Centre Zagreb, Croatia. It consisted of the same eight questions; however, Q7 about motivational factors was slightly modified to be more understandable to the participant population. Hence, the final version of the questionnaire did not change much after pilot testing. The questionnaire was developed by two investigators. The final version consisted of questions about demographic information (Q1–Q3), self-perception of the facial profile (Q4), satisfaction of profile esthetics (Q5), expectations about profile changes after completing orthodontic treatment (Q6), motivational factors (Q7), and self-recognition (Q8) (Figure 1).

Standardized extraoral profile photographs were captured as mirror images using a Nikon digital camera D7500 (Nikon, Tokyo, Japan) securely stabilized on a tripod (Nikon full-size tripod, Nikon, Tokyo, Japan). All participants were placed in the exact same position, which was ensured using marking stickers on the floor. The photographic settings comprised an aperture f/7.1, ISO 2500, and shutter speed 1/100 second with automatic focus. Photographs were taken without using a flash. The distance between the camera and the subjects was

Table 1. Participant Demographic Data According to Facial Profile

Profile	Age Median (IQR)	Sex Female (N)	Sex Male (N)
Straight	15 (13–16)	15	15
Convex	15 (13–16)	15	15
Concave	16 (15–17)	15	15

180 cm. All photographs were taken from 10 to 12 AM using a natural light source combined with artificial lighting in the dental office.

For self-recognition (Q8), the facial profiles of the respondents were blackened using the "burn and dodging curve adjustment layers" option in Adobe Photoshop (Adobe Systems, San Jose, California) and inserted into the questionnaire. Participants completed the questionnaire without revisiting previous questions to ensure objectivity, especially in the self-recognition section, and to prevent influence on their responses. The study was approved by the Ethics Committee of the University Hospital Centre Zagreb, under the number 02/013 AG. All of the participants' parents signed informed consent forms to participate in the research.

Sample Size

Preliminary data were collected during a pilot study to assess the magnitude of the association between two categorical variables of interest: profile type and self-perception or self-recognition. From this initial dataset, the observed effect size, quantified as Cramer's V (a measure suitable for a chi-squared test), was calculated to be approximately 0.374. This value indicated a moderate strength of association according to Cohen's benchmarks for effect sizes. The study required a sample size of 69 to conduct a chi-square test aimed at detecting an appropriate effect size, with an alpha of 0.05 and a power of 0.8.

Statistical Analysis

Statistical analysis was carried out with IBM SPSS Statistics software, version 29.0.1.0 (IBM, New York, USA). To assess the normality of the cephalometric measurements, QQ plots, Shapiro-Wilk test, skewness, and kurtosis were utilized. Since all the parameters exhibited normal distribution, their descriptive statistics were represented using the mean and standard deviation. For categorical data, the chi-squared test, McNemar's and Fisher's exact test were employed. Logistic regression was utilized to assess the impact of facial profile and sex on the accuracy of patient self-perception. A P value threshold of 0.05 was set to determine significance.

RESULTS

Demographic data are shown in Table 1, while cephalometric measurements of patients are presented in Table 2. There was no statistically significant difference among the profile groups regarding Q4 ($P = .099$) and Q8 ($P = .329$) (Table 3).

Generally, participants answered Q8 (self-recognition) with a significantly higher number of correct responses compared to Q4 (self-perception; $P = .001$). The majority of participants with a straight profile (86.7%) were satisfied with their facial characteristics, including those exhibiting a convex profile (83.3%; Q5). There was a statistically significant difference among the three groups of participants according to satisfaction with their profile appearance ($P = .029$), with concave profile participants being the least satisfied (60%). Additionally, a greater majority of them (80%) expected to have changes in the appearance of their facial profile after orthodontic treatment when compared to the other two groups (Q6, $P = .005$).

Participants with internal motivation to undergo orthodontic treatment showed greater body self-recognition ability than those with external motivation (Q8, $P = .041$), but no differences were found in body self-perception abilities (Q4, $P = .078$) (Table 4). In terms of choosing the blackened silhouette that best matched their profile (Q4) as well as their blackened silhouette (Q8), females provided a significantly greater number of correct answers than males ($P = .001$; $P = .038$; Table 5). Between younger and older groups of participants, there was no statistically significant difference in answering Q4 ($P = .299$) and Q8 ($P = .249$).

Logistic regression analysis was conducted to evaluate how well patients could correctly identify their facial profile based on two predictor variables: facial profile type and sex. The model summary indicated that the

Table 2. Participant Cephalometric Characteristics According to Facial Profile

	G-Sn-Pg Mean ± SD	SNA Mean ± SD	SNB Mean ± SD	ANB Mean ± SD	Y-AXIS Mean ± SD	Saddle Angle Mean ± SD
Profile						
Straight	169.73 ± 3.07	83.33 ± 4.72	81.22 ± 3.58	2.12 ± 2.70	63.97 ± 3.23.	122.08 ± 5.99
Convex	160.90 ± 1.60	82.65 ± 3.79	77.44 ± 4.05	5.21 ± 1.32	66.43 ± 4.05	124.41 ± 3.66
Concave	175.67 ± 4.07	79.62 ± 3.51	81.55 ± 3.42	−1.95 ± 3.27	64.29 ± 4.21	121.98 ± 5.88

Table 3. Self-Perception and Self-Recognition of Participants According to Facial Profile

	Self-Perception/ Question 4		Self-Recognition/ Question 8	
	Wrong	Correct	Wrong	Correct
Profile				
Straight				
N	10	20	6	24
%	33.3%	66.7%	20.0%	80.0%
Convex				
N	16	14	10	20
%	53.3%	46.7%	33.3%	66.7%
Concave				
N	18	12	11	19
%	60.0%	40.0%	36.7%	63.3%
Total				
N	44	46	27	63
%	48.9%	51.1%	30.0%	70.0%
P value		.099		.329

* Chi-squared test.

logistic regression model was statistically significant, $\chi^2(3) = 107.677$, $P < .001$. The model explained 17.3% (Cox & Snell R Square) to 23.0% (Nagelkerke R Square) of the variance. Examination of the individual predictors within the model revealed that facial profile type was a significant predictor ($P < .001$). Straight profile was found to be a significant predictor of correct self-perception, (odds ratio: 3.57, 95% confidence interval [CI; 1.134, 11.270], $P = .030$) indicating that patients with this profile type had 3.57 times greater self-perception of facial profile (Q4) compared to the concave profile group. However, the impact of convex profile was not significant. Sex was also a significant predictor, with females being approximately 4.9 times more likely to correctly identify their facial profile than males (95% CI [1.939, 12.429], $P < .001$).

Table 4. Self-Perception and Self-Recognition of Participants According to Motivational Factors

	Self-Perception/ Question 4		Self-Recognition/ Question 8	
	Wrong	Correct	Wrong	Correct
Motivation				
External				
N	8	3	5	6
%	72.7%	27.3%	45.5%	54.5%
Internal				
N	5	12	1	16
%	29.4%	70.6%	5.9%	94.1%
External + Internal				
N	31	31	21	41
%	50.0%	50.0%	33.9%	66.1%
Total				
N	44	46	27	63
%	48.9%	51.1%	30.0%	70.0%
P value		*.078		**.041

* Chi-squared; ** Fisher's exact test.

Table 5. Self-Perception and Self-Recognition of Participants According to Sex

	Self-Perception/ Question 4		Self-Recognition/ Question 8	
	Wrong	Correct	Wrong	Correct
Gender				
Female				
N	14	31	9	36
%	31.1%	68.9%	20.0%	80.0%
Male				
N	30	15	18	27
%	66.7%	33.3%	40.0%	60.0%
Total				
N	44	46	27	63
%	48.9%	51.1%	30.0%	70.0%
P value		.001		.038

* Chi-squared test.

DISCUSSION

This research aimed to investigate whether there were differences in self-recognition and self-perception among participants with straight, convex and concave profiles. The results indicated that there was no statistically significant difference in self-perception and self-recognition among profile groups. Those findings were in agreement with a study by Çokakoğlu et al.,[9] which reported that self-perception of facial and dental appearance did not significantly differ among participants with various facial convexities. Additionally, Wang et al.[11] concluded that self-perception of lower anterior facial height was not influenced by facial type. Results of the current study showed that participants could identify themselves more easily when they were presented with their own blackened profile image (self-recognition) than when they had to select the one of the three profile silhouettes that most resembled their own profile (self-perception).

People may be able to identify and recognize themselves more easily when they have a visual representation of themselves, such as in a photograph or in the mirror. This visual feedback provides a clear reference point for them to identify their own profile characteristics. Conversely, mental self-images of one's appearance are part of self-perception. Those mental images can be very correct and exact; however, these self-perceptions are mostly inaccurate.[21] So, when a participant had to choose a profile that was most similar to theirs, it could be assumed that they relied on their mental self-image. People typically observe themselves in the mirror from the front, leading to unfamiliarity with their profile. As a result, they recognize themselves

well from the front but struggled with self-recognition from the side. Also, there was a statistically significant difference in satisfaction with their own facial profile appearance between participants with a concave profile compared to those with straight or convex profiles. In total, 40% of concave profile subjects declared that they were not satisfied. Volpato et al.[10] did not find a significant difference in satisfaction among patients with different facial profiles. Since the concave group of participants was the least satisfied with their own profile esthetics, it was not surprising that they had the greatest expectations for changing their profile after the orthodontic treatment. The findings of the present study were supported by the results of Al Taki[3] and Gerzanic et al.[22] On the other hand, Phillips et al.[23] reported that patients with convex profiles tended to be the least pleased with their own profiles among all others.

The present study found that patients with straight profiles had a 3.57 times higher self-perception than those with concave profiles. Between males and females, females were significantly better at self-perception (Q4) and self-recognition (Q8) than males. The current results were consistent with those of previous studies,[13,17] which demonstrated that behavioral differences between sexes existed even in early infancy.[24,25] When women are distressed, they are trying to find the cause within themselves, while men tend to search for external reasons.[13] Hence, women are more self-oriented than males, which could explain present results.

Finally, the current findings indicated that there was no significant difference in self-perception (Q4) and self-recognition (Q8) between age groups, which is in agreement with Wang et al.[11] However, the older group showed slightly better self-recognition than the younger group. Varatharaju et al.[17] reported that patients older than 15 years of age were better at recognizing their own profile images than younger subjects. Additionally, they stated that maturity was a strong predictor of facial profile self-recognition.[17]

Another aim of the present study was to evaluate whether the type of motivation to undergo orthodontic treatment affected an individual's ability to identify their own profile characteristics. Findings suggested that participants exhibiting internal motivation had a higher success rate in accurately identifying their profile silhouette compared to participants with external motivation. Smile attractiveness and the desire to improve one's facial appearance are some of the main internal motivating factors for undergoing orthodontic treatment.[20,26–28] Sergl and Zentner[29] found that two-thirds of patients seeking orthodontic treatment were concerned about poor esthetics of their profile, and one-third of them felt distressed about that. These results imply that internally motivated patients are more self-aware of how their facial structures appear than those who undergo orthodontic treatment at the urging of others.

Cultural factors, such as the media, may affect self-perception because they create unrealistic beauty ideals, according to the literature. Consequently, they create more negative body self-image perception.[30] Also, children from households with lower socioeconomic status typically have more unfavorable self-perceptions, which are often related to lower academic achievement.[31] Personality is also associated with self-perception. Big 5 personality dimensions such as neuroticism and conscientiousness affect how people perceive themselves.[32]

The limitations of this study include the age range of the participants as well as sample recruitment, since it may limit the generalization of the results. This cross-sectional study did not account for changes over time in self-perception, satisfaction, and motivation. Future longitudinal studies are, therefore, recommended to provide a more comprehensive understanding of self-perception and self-recognition throughout, and after, orthodontic treatment. Finally, future research should include cultural, socioeconomic, or environmental factors that might influence self-perception and satisfaction with facial characteristics.

CONCLUSIONS

- A statistically significant difference in self-perception and self-recognition among subjects with different facial convexities was not found.
- Participants showed a greater ability to recognize themselves when presented with their own blackened profile image than when trying to identify a profile most similar to their own.
- Females and participants with internal motivation to undergo orthodontic treatment showed higher ability in self-recognition.

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