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RESEARCH ARTICLE

THE EFFECT OF SOFT TISSUE STRUCTURE ON THE PSYCHOSOCIAL IMPACT OF DENTAL AESTHETICS IN WOMEN AND MEN

Duygu Aktaş Ülker[1], Serap Titiz Yurdakal[2]

[1] İzmir Provincial Health Directorate Alsancak Oral and Dental Health Center, Department Of Orthodontics, Izmir, Turkey
[2] Dokuz Eylül University, Faculty of Dentistry, Department of Orthodontics, Izmir, Turkey

ORCID: D.A.Ü. 0000-0003-0958-0593; S.T.Y. 0000-0002-4999-8727

Corresponding author: Serap Titiz Yurdakal, **E-mail:** serap.titizyurdakal@deu.edu.tr
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ABSTRACT

Purpose: This study aimed to determine the impact of soft tissue structure on the psychosocial effects of malocclusions in women and men.
Material and Methods: The severity of malocclusion was determined in 84 individuals with a Class I skeletal pattern. The Psychosocial Impact of Dental Aesthetics Questionnaire was administered to determine the malocclusion perceptions of the patients. Arnett's soft tissue analysis was performed to determine the soft tissue structure. The difference between the sociodemographic factors and severity of malocclusion averages of men and women was statistically examined. Subsequently, the impact of Arnett's soft tissue analysis parameters on the Psychosocial Impact of Dental Aesthetics Questionnaire scores of each gender was evaluated.
Results: No statistically significant association was observed between women and men related to the sociodemographic factors and the severity of malocclusions. The number of Arnett's soft tissue analysis parameters affecting the Psychosocial Impact of Dental Aesthetics Questionnaire scores was higher in men than women. Women were more psychologically affected by malocclusions, while men were affected by soft tissue structure changes, and women were affected by dental factors.
Conclusion: Although the soft tissue structure did not affect the perception of malocclusions in women, women experienced a more severe psychological effect of malocclusion.

Keywords: esthetics, malocclusion, psychosocial, soft tissue, questionnaires.

INTRODUCTION

The harmony of hard and soft tissues in the orofacial system determines face aesthetics. Hard tissue movement due to orthodontic treatments or orthognathic surgery may affect the soft tissue structure, and the structure of the soft tissue may also affect treatment planning. Thus, soft tissue cephalometric analyses are as essential as hard tissue cephalometric analyses for orthodontic management, especially in complex cases. Arnett's soft tissue cephalometric analysis (STCA) is one of the most recent methods of measuring soft tissue structure, which evaluates the physical relationship between soft and hard skeletal tissues independent of the skull base (1).

In psychology and cognitive sciences, perception is defined as the process of receiving, interpreting, selecting, and organizing sensory information (2). According to Gestalt psychology, organisms tend to perceive elements in space by grouping objects according to their proximity (3). Thus, patients' perceptions of malocclusion may be affected by the

alignment of the teeth and anatomical variations in the surrounding soft tissue. According to our clinical observations, patients with thicker soft tissues seemed to have fewer aesthetic complaints related to malocclusions.

The practical implications of understanding the impact of STCA parameters on the psychosocial impact of malocclusions could significantly improve treatment outcomes and patient satisfaction in orthodontic practice. Therefore, it is essential to evaluate the patient's perception of malocclusion and the severity of malocclusion objectively. The Psychosocial Impact of Dental Aesthetics Questionnaire (PIDAQ) is a specific psychometric oral health-related quality of life scale that can determine the psychosocial impact of malocclusion on young adults with high reliability (4). To objectively assess the severity of malocclusions, the dental component of the Index of Orthodontic Treatment Need (IOTN) is frequently used (5). To the best of our knowledge, no study has assessed the effect of the STCA parameters on the psychosocial impact of malocclusions on women and men seeking orthodontic treatment. Therefore, this study aimed to determine the impact of the STCA parameters on the total and subscale PIDAQ scores of women and men with skeletal Class I malocclusion who accepted undergoing orthodontic treatment.

MATERIAL AND METHODS

Study Population

This prospective cohort study included 84 individuals (52 women and 32 men) between the ages of 16 and 30 who accepted undergoing orthodontic treatment at the Orthodontic Clinic of the Faculty of Dentistry of Uşak University.

Inclusion Criteria

The sample was selected according to the following inclusion criteria: aged 16 to 30 years, ANB value ranging between 0 and 4, skeletal Class I malocclusion without any craniofacial anomaly, no history of undergoing orthodontic treatment, and any systemic or mental illnesses.

Exclusion Criteria

The exclusion criteria were previous history of orthodontic or cosmetic procedures, systemic diseases, syndromes, cleft lip/palate, poor-quality cephalograms, history of trauma to the jaw and face, patients with skeletal malocclusions, patients younger than 16 years old and older than 30 years of age.

Sample Size

Since no previous study has examined the effect of STCA parameters on PIDAQ scores, Cohen's (1988) correlation test was performed with a moderate effect size of 0.5 (6). The sample size was calculated at a 95% confidence level using G. Power v. 3.1.9.2, and a minimum sample size of 84 was necessary for a theoretical power of 80%.

Determining the Severity of Malocclusions

Clinical examinations were performed by two trained investigators (D.A.U. and S.T.Y.) using the dental health component of the IOTN-DHC to determine the nature and severity of the malocclusion (5). The inter- and intra-rater reliability values were 0.86 (weighted kappa) and 0.92, respectively.

Determination of Perception of Orthodontic Malocclusions

The Turkish version of PIDAQ was administered to all patients (4). The Turkish version of PIDAQ comprises four subscales, divided according to one positive and three negative domains: aesthetic attitude (AA), which evaluates the aesthetic concerns of the patient (three items); psychological impact (PI), which evaluates the negative feelings regarding one's dental appearance (six items); social impact (SI), which identifies potential problems that may arise in social situations (eight items); and dental self-confidence (DSC), which assesses the impact of dental aesthetics on self-image (six items). A five-point Likert scale was used to record the responses. The responses ranged from 0 (not at all) to 4 (very strongly), with one positive and three negative domains. The items in the DSC were scored in reverse mode to ensure that the same direction of scoring was used for all questionnaire items, and a consistent measure of impact was obtained. Cronbach's alpha reliability analysis was applied to the total/subscale PIDAQ scores to evaluate the consistency and reliability of the questions in the questionnaire. Cronbach's alpha reliability analysis determined that the total/subscale PIDAQ scores were sufficiently reliable, with Cronbach's alpha reliability coefficients ranging between 0.756 and 0.942.

Soft Tissue Lateral Cephalometric Analysis

Cephalometric radiographs were acquired with the lips and head in a natural position (7). The first researcher (D.A.U.) performed STCA (Table 1) (1) at one-month intervals using AudaxCeph Advantage software (Audax d.o.o., Ljubljana, Slovenia). The variability between the first and second measurements was evaluated using the Pearson moment product correlation test. A high intraclass correlation coefficient (0.95) was obtained for the measurements.

Study Design

Firstly, the IOTN-DHC grades and sociodemographic data of women and men, including education level, residence, parental education level, average family income, and age, were compared in this study. Then, the impact of the STCA parameters on the total/subscale PIDAQ scores was determined for each gender.

Ethical Considerations

This prospective cohort study was approved by Uşak University Faculty of Medicine, Clinical Research Ethics Committee (Date: 06.01.2021, Approval Number: 05-05-10) and the study was conducted according to the principles of the Declaration of Helsinki. Every single individual who agreed to participate was informed of the research procedures, and written consent was obtained from all subjects. In the case of minors, their parents provided written consent.

Statistical Analysis

The normality of the data distribution was assessed using the Shapiro–Wilk test. The Mann–Whitney U test was used to compare the means of two independent groups with normally distributed data. Spearman's correlation was used to evaluate the relationship between continuous variables that were non-normally distributed. For categorical data analysis, Pearson's chi-square test was used when the sample size was sufficient, and Fisher's exact test was used when the sample size was not sufficient. All statistical analyses were performed using IBM SPSS 25 software. The significance level was set at $p < 0.05$.

Table 1. Definition of STCA parameters used in this study

Dental factors	
Overbite	The extent of vertical overlap of Mx1 over Md1
Overjet	The extent of horizontal overlap of Mx1 over Md1
Soft Tissue Structures	
ULT	Upper vermilion thickness
LLT	Lower vermilion thickness
Pog-Pog’	Soft tissue thickness at the pogonion
Me-Me’	Soft tissue thickness at the menton
NLA	Angle formed by the nasal base and the upper lip
ULA	The angle formed by the line passing through the Sn’ and upper lip anterior to the TVL
Facial Lengths	
N’-Me’	Vertical distance from N’ to Me’
Sn’-Me’	The distance between the Sn’ and menton
Sn’-ULI	Vertical distance from the Sn’ to the inferior border of the upper lip
LLS-Me’	Vertical distance from the superior border of the lower lip to Me’
ULI-Mx1	Distance from inferior border of the upper lip to Mx1
Sn’-Mx1	Distance from Sn’ to Mx1
Md1-Me’	Distance from the Md1 to Me’
TVL Projections	
A’-TVL	Horizontal distance from A’ to TVL.
ULA-TVL	Horizontal distance from ULA to TVL
Mx1-TVL	Distance from Mx1 to TVL.
Md1-TVL	Distance from Md1 to TVL
LLA-TVL	Horizontal distance from LLA to TVL
B’-TVL	Horizontal distance from B’ and TVL
Pog’-TVL	Distance from Pog’ to TVL.

Abbreviations: ULT, upper lip thickness; LLT, lower lip thickness; Pog-Pog’, soft tissue pogonion thickness; Me- Me’, soft tissue menton thickness; NLA, nasolabial angle; ULA, upper lip angle; N’-Me’, total face height; Sn’-Me’, lower face height; Sn’-ULI, upper lip length; LLS-Me’, lower lip length; ULI-MxI, Mx1 exposure; Sn’-MxI, maxillary height; Md1-Me', mandibular height; A’-TVL, soft tissue point A; ULA-TVL, upper lip anterior; Mx1-TVL, maxillary incisor 1; Md1-TVL, mandibular incisor 1; LLA-TVL, lower lip anterior; B’-TVL, soft tissue point B; Pog'-TVL, soft tissue pogonion.

RESULTS

Due to the lack of a sufficient sample size, IOTN grade 1 was combined with IOTN grade 2 and renamed "1 and 2." No statistically significant relationship was observed between men's and women's sociodemographic factors and IOTN grades (Table 2). No statistically significant difference was observed between the total/subscale PIDAQ scores of men and women (p>0.05), except for their PI scores (p>0.05); the PI of the existing malocclusion was more severe in women than that in men (p<0.05, Table 3).

Correlations Related to Women

A weak negative correlation was observed between the subscale AA scores and overbite, and a moderately negative correlation was observed between the subscale AA scores and maxillary exposure (Table 4). A moderately positive correlation was observed between the subscale SI scores and Mx1-TVL, while a weak positive correlation was observed between the subscale SI scores and Md1-TVL (Table 4).

Table 3. Comparison of the total and subscale PIDAQ scores of women and men

	Gender	Mean	SD	p
PIDAQ	Women	53.7885	18.45114	0.075
	Men	46.4063	17.84134	
DSC	Women	15.2885	5.33702	0.337
	Men	13.5938	5.95065	
SI	Women	10.5000	5.55719	0.107
	Men	8.5000	5.29150	
PI	Women	12.4423	2.43676	0.001*
	Men	9.5938	4.03900	
AA	Women	15.5577	7.36024	0.596
	Men	14.7188	6.41186	

*p<0.05. Mann Whitney U test. Abbreviations: PIDAQ, Psychosocial Impact of Dental Aesthetics questionnaire; AA, aesthetic attitude; PI, psychological impact; SI, social impact; DSC, dental self-consciousness.

Correlations Related to Men

A moderately negative correlation was observed between ULT and the subscale SI and AA scores, as well as PIDAQ scores. A strong negative correlation was observed between ULA and the subscale DSC and PIDAQ scores, and a moderately negative correlation was observed between ULA-TVL and the subscale DSC and PIDAQ scores. A moderately negative correlation was observed between the subscale SI scores and ULA.

Table 2. Comparison of the sociodemographic characteristics and IOTN-DHC grades of women and men

		Gender				
			Women	Men	Test Statistics	p
Age	≤ 19	%	67.9	32.1	2.207[1]	0.137
	≥ 20	%	51.6	48.4		
Education Level	High school	%	57.7	42.3	.283[1]	0.595
	University	%	63.8	36.2		
Mother's Educational Status	Primary education	%	60.6	39.4	1.119[2]	0.972
	Secondary education	%	61.5	38.5		
	High school	%	56.3	43.8		
	Bachelor	%	66.7	33.3		
	Master's degree	%	100.0	0.0		
Father's Educational Status	Primary education	%	68.4	31.6	1.310[1]	0.860
	Secondary education	%	65.0	35.0		
	High school	%	53.6	46.4		
	Bachelor	%	64.3	35.7		
	Master's degree	%	66.7	33.3		
Residence	Rural	%	70.0	30.0	1.171[1]	0.557
	Suburban	%	66.7	33.3		
	Urban	%	57.1	42.9		
Income status	1	%	63.2	36.8	.947[1]	0.890
	2	%	60.0	40.0		
	3	%	50.0	50.0		
	4	%	75.0	25.0		
IOTN-DHC Grades	1 and 2	%	9.6	12.5	2.352[2]	0.515
	3	%	25.0	12.5		
	4	%	57.7	62.5		
	5	%	7.7	12.5		

*p<0.05. [1]Pearson Ki Kare. [2]Fisher's Exact test. Abbreviations: IOTN; Index of Orthodontic Treatment Need; DHC, Dental Health Component.

Table 4. Relationship between the STCA parameters and the total and subscale PIDAQ scores of women

		PIDAQ	Rho	DSC	Rho	SI	Rho	PI	Rho	AA	Rho
Overjet	p	0.723	0.050	0.842	0.028	0.468	0.103	0.697	0.055	0.955	0.008
Overbite	p	0.154	-0.201	0.324	-0.140	0.311	-0.143	0.417	-0.115	**0.033***	**-0.297**
ULT	p	0.252	-0.162	0.271	-0.156	0.056	-0.267	0.915	-0.015	0.508	-0.094
LLT	p	0.201	-0.180	0.287	-0.150	0.054	-0.269	0.726	-0.050	0.252	-0.162
Pog-Pog'	p	0.577	0.079	0.355	0.131	0.947	-0.009	0.329	0.138	0.703	0.054
Me-Me'	p	0.547	-0.085	0.693	-0.056	0.243	-0.165	0.387	0.122	0.418	-0.115
NLA	p	0.473	0.102	0.425	0.113	0.538	-0.087	0.062	0.261	0.361	0.129
ULA	p	0.474	0.101	0.408	0.117	0.210	0.177	0.096	-0.233	0.400	0.119
N'-Me'	p	0.584	-0.078	0.822	-0.032	0.290	-0.150	0.467	-0.103	0.956	0.008
Sn'-Me'	p	0.668	0.061	0.864	0.024	0.877	0.022	0.344	0.134	0.529	0.089
Sn'-ULI	p	0.783	-0.039	0.824	0.032	0.393	-0.121	0.712	-0.053	0.908	0.016
LLS-Me'	p	0.698	-0.055	0.832	-0.030	0.384	-0.123	0.953	-0.008	0.931	0.012
ULI-MxI	p	0.057	-0.265	0.208	-0.177	0.225	-0.171	0.087	-0.240	**0.019***	**-0.324**
Sn'-MxI	p	0.443	-0.109	0.540	-0.087	0.515	-0.092	0.842	-0.028	0.477	-0.101
Md1-Me'	p	0.690	-0.057	0.932	0.012	0.247	-0.164	0.514	-0.093	0.973	0.005
A'-TVL	p	0.806	0.035	0.933	-0.012	0.209	0.177	0.660	-0.063	0.966	0.006
ULA-TVL	p	0.635	0.067	0.962	0.007	0.151	0.202	0.451	-0.107	0.684	0.058
Mx1-TVL	p	0.064	0.258	0.242	0.165	**0.002***	**0.419**	0.753	0.045	0.152	0.201
Md1-TVL	p	0.302	0.146	0.505	0.095	**0.031***	**0.299**	0.987	-0.002	0.561	0.082
LLA-TVL	p	0.473	0.102	0.568	0.081	0.173	0.192	0.786	-0.039	0.584	0.078
B'-TVL	p	0.680	0.059	0.402	0.119	0.497	0.096	0.792	-0.037	0.857	0.026
Pog'-TVL	p	0.673	0.060	0.345	0.134	0.739	0.047	0.981	0.003	0.763	0.043

*p <0.05. Bold data are statistically significant. Spearman correlation. Abbreviations: ULT, upper lip thickness; LLT, lower lip thickness; Pog-Pog', soft tissue pogonion thickness; Me-Me', soft tissue menton thickness; NLA, nasolabial angle; ULA, upper lip angle; N'-Me', total face height; Sn'-Me', lower face height; Sn'-ULI, upper lip length; LLS-Me', lower lip length; ULI-MxI, Mx1 exposure; Sn'-MxI, maxillary height; Md1-Me', mandibular height; A'-TVL, soft tissue point A; ULA-TVL, upper lip anterior; Mx1-TVL, maxillary incisor 1; Md1-TVL, mandibular incisor 1; LLA-TVL, lower lip anterior; B'-TVL, soft tissue point B; Pog'-TVL, soft tissue pogonion; PIDAQ, Psychosocial Impact of Dental Aesthetics Questionnaire; AA, aesthetic attitude; PI, psychological impact; SI, social impact; DSC, dental self-consciousness; STCA, soft tissue cephalometric analysis; TVL, true vertical line.

Table 5. Relationship between the STCA parameters and the total and subscale PIDAQ scores of men

		PIDAQ	Rho	DSC	Rho	SI	Rho	PI	Rho	AA	Rho
Overjet	p	0.853	0.034	0.161	0.254	0.399	-0.154	0.831	0.039	0.816	-0.043
Overbite	p	0.634	0.087	0.320	0.181	0.634	-0.088	0.528	0.116	0.968	0.007
ULT	p	**0.024***	**-0.399**	0.051	-0.348	**0.026***	**-0.392**	0.537	-0.113	**0.026***	**-0.393**
LLT	p	0.316	-0.183	0.384	-0.159	0.267	-0.202	0.851	-0.035	0.286	-0.195
Pog-Pog'	p	**0.047***	**-0.354**	**0.020***	**-0.408**	0.434	-0.143	0.647	-0.084	**0.030***	**-0.384**
Me-Me'	p	0.689	-0.074	0.846	-0.036	0.735	-0.062	0.328	0.179	0.122	-0.279
NLA	p	0.920	-0.018	0.585	0.100	0.619	-0.091	**0.035***	**-0.373***	0.601	-0.096
ULA	p	**0.001***	**-0.542**	**0.001***	**-0.540**	**0.017***	**-0.419**	0.432	-0.144	0.090	-0.305
N'-Me'	p	0.950	0.012	0.544	0.111	0.918	-0.019	0.825	-0.041	0.718	-0.067
Sn'-Me'	p	0.320	-0.182	0.828	0.040	0.528	-0.116	0.135	-0.270	0.248	-0.210
Sn'-ULI	p	0.192	-0.237	0.263	-0.204	0.765	-0.055	0.218	-0.224	0.205	-0.230
LLS-Me'	p	0.199	-0.233	0.488	-0.127	0.679	-0.076	0.167	-0.250	0.172	-0.247
ULI-MxI	p	0.151	0.260	0.246	0.211	0.180	0.243	0.475	0.131	0.205	0.230
Sn-MxI	p	0.888	0.026	0.356	0.169	0.848	0.035	0.522	-0.117	0.859	-0.033
Md1-Me'	p	**0.043***	**-0.360**	0.253	-0.208	0.304	-0.188	0.290	-0.193	**0.019***	**-0.412**
A'-TVL	p	0.754	0.058	0.855	-0.034	0.550	0.110	0.134	0.271	0.531	0.115
ULA-TVL	p	**0.004***	**-0.490**	**0.004***	**-0.491**	0.069	-0.326	0.236	-0.216	0.122	-0.279
Mx1-TVL	p	0.872	0.030	0.919	-0.019	0.448	0.139	0.855	-0.034	0.370	0.164
Md1-TVL	p	0.705	0.070	0.710	-0.068	0.226	0.220	0.921	-0.018	0.193	0.236
LLA-TVL	p	0.363	-0.166	0.057	-0.340	0.717	0.067	0.638	-0.087	0.873	-0.030
B'-TVL	p	0.510	-0.121	0.099	-0.297	0.499	0.124	0.252	-0.209	0.886	0.026
Pog'-TVL	p	0.061	-.399	**0.012***	**-0.440**	0.558	-.107	0.132	-0.272	0.223	-.222

*p < 0.05. Bold data are statistically significant. Spearman correlation. Abbreviations: ULT, upper lip thickness; LLT, lower lip thickness; Pog-Pog', soft tissue pogonion thickness; Me-Me', soft tissue menton thickness; NLA, nasolabial angle; ULA, upper lip angle; N'-Me', total face height; Sn'-Me', lower face height; Sn'-ULI, upper lip length; LLS-Me', lower lip length; ULI-MxI, Mx1 exposure; Sn'-MxI, maxillary height; Md1-Me', mandibular height; A'-TVL, soft tissue point A; ULA-TVL, upper lip anterior; Mx1-TVL, maxillary incisor 1; Md1-TVL, mandibular incisor 1; LLA-TVL, lower lip anterior; B'-TVL, soft tissue point B; Pog'-TVL, soft tissue pogonion; PIDAQ, Psychosocial Impact of Dental Aesthetics Questionnaire; AA, aesthetic attitude; PI, psychological impact; SI, social impact; DSC, dental self-consciousness; STCA, soft tissue cephalometric analysis; TVL, true vertical line.

between pog-pog' and the subscale AA and DSC scores, as well as PIDAQ scores. A moderately negative correlation was observed between Md1-Me' and the subscale AA and PIDAQ scores. A moderately negative correlation was observed between the subscale DSC scores and Pog'-TVL. A moderately negative correlation was observed between the subscale PI and NLA. The relevant data are presented in Table 5.

DISCUSSION

Sociodemographic factors, such as age, socioeconomic status, and the severity of malocclusion, can affect the psychosocial impact of malocclusions (8-12). In the present study, the IOTN-DHC grades and sociodemographic data of both men and women were similar, which facilitated the evaluation of the effect of gender on the relationship between STCA parameters and malocclusion perception. The financial aspect of orthodontic treatment may lead to an error in understanding the perception of malocclusion. At our clinic, the financial burden of treatment was a primary reason for rejecting orthodontic treatment; therefore, patients who rejected orthodontic treatment were not included as a control group. We aimed to enroll a similar number of men and women at the time of sample size calculation; however, the number of male and female participants could not be equalized. Since the two groups were homogeneous regarding the PIDAQ scores, IOTN grades, and sociodemographic data, it was determined that the differences between the sample sizes of the two groups would not affect the results.

IOTN has two separate components: IOTN-DHC, which assesses the objective need for treatment, and IOTN-AC, which assesses the aesthetic component of the perceived need for treatment (5). IOTN-AC is used to determine the need for orthodontic treatment when the IOTN-DHC grade of the patient is 3. The IOTN-AC score is evaluated by dental professionals in the original IOTN. However, previous studies have indicated that the scoring of IOTN-AC by orthodontists differs from that of laypeople (13-15). Moreover, some studies have shown that the IOTN-AC component may reduce the need for orthodontic treatment (15,16). Therefore, the IOTN-AC component was not used in this study.

According to the data obtained from this study, the anatomical features of the face that can be considered attractive (according to the literature) are less affected by the psychosocial impact of malocclusion. NLA plays an important role in the perception of facial profile attractiveness (17). Sinno et al. determined that a steeper NLA is ideal in North American men, whereas a wider NLA is suitable in Asian and Caucasian men (18). Consistent with these findings, in our study, the malocclusions' psychological effects were weaker in Caucasian men with a wider NLA. Many studies have stated that a profile with a protruding nose and chin and less protruding lips is considered suitable in men (19-24). However, some studies have reported that similar to the profile of women, fuller lips and a convex profile are considered more attractive in adolescents and young men due to the influence of fashion magazines (25,26). Consistent with these studies, DSC increased in adolescents and young men when the pogonion was positioned backward relative to TVL. Similarly, the negative effects of the existing malocclusions decreased in adolescents and young men when the values of ULT, ULA-TVL, and ULA increased. An increased displayed length of maxillary teeth at rest is characteristic of younger individuals (27). In line with this, the present study showed that increasing the value of Mx1 exposure reduced the aesthetic concern associated with malocclusion in women.

Although the severity of the malocclusion and the sociodemographic data of women and men were similar in the present study, the psychological effect of malocclusion was more severe in women. The fact that women are psychologically more affected by malocclusions may be due to the societal pressure applied on women for centuries to appear attractive (28); in contrast, men are not judged based on such aesthetic standards (29). Apart from societal pressure, the inherent differences between men and women may also cause the psychological effect of malocclusion to be more severe in women. Directing the perception formed by the sense of sight to a specific stimulus is known as selective attention, whereas directing it to more than one stimulus is known as split attention (30). Since women tend to place greater emphasis on facial appearance than men (31), combined with the lower number of stimuli affecting the face of women (only STCA parameters related to the positions of the teeth), they may experience increased selective attention, thereby amplifying the PI of malocclusion.

Contrary to our expectations, soft structures such as upper lip and pogonion thickness and projections of

the upper lip and pogonion only affected the PIDAQ scores of men. Indeed, men and women have a developmental discrepancy regarding their cognitive processing of faces. Men tend to gain spatial relations abilities by scanning a wider area (32-34) and integrating the internal and external facial features as a whole rather than as individual parts (35). Men's tendency to perceive the whole from a broader perspective may cause them to be affected by soft tissue structures when evaluating malocclusion. On the other hand, since women scan a narrower area, they are more likely to detect changes in the position of the teeth. Similarly, according to the data obtained in this study, changes in dental positions affected the SI of malocclusions and aesthetic anxiety in women only.

Limitations

This study has some limitations. Adolescent and young adult patients were included in the study; however, their characteristics did not reflect those of younger or older populations. Moreover, only the STCA parameters related to the lower third of the face were evaluated in the present study. Midface anomalies were not evaluated as they are seen more frequently in patients with skeletal problems. Therefore, the impact of the soft tissue structure of the midface on the psychosocial effect of malocclusion should be examined in patients with skeletal malocclusions. Lastly, soft tissue compensation might be different in different skeletal malocclusions. Thus, more extensive studies, including larger patient populations of different ages and with skeletal malocclusions, should be performed in the future.

CONCLUSION

In conclusion, the findings of this study suggest that the number of STCA parameters affecting the total and subscale PIDAQ scores was higher in men than in women. Soft structures, such as upper lip and pogonion thickness and projections of the upper lip and pogonion to the TVL, were found to affect men's subscale and total PIDAQ scores. In contrast, STCA parameters related to the positions of the teeth were found to affect the subscale PIDAQ score of women. Nevertheless, the psychological effect of malocclusion was found to be more severe in women.

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