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Behavioral determinants of dental and facial esthetic self-perception among an academic population: a cross-sectional study



Ana Cristina Mafla^{1,2*}, Mauricio Herrera-López³, Juliana Estefanía Salas-Burbano⁴, Camilo Andrés Guerrero-Dávila⁴, Diana Paola Insuasty-Fuertes⁴, Juan Sebastián Bustos-López⁴ and Falk Schwendicke⁵

Abstract

Background Facial attractiveness is a relevant feature in many societies, and self-perceived attraction has been shown to affect a wide range of aspects in human lives, including quality of life. The present study assessed the mediating effects of behavioral determinants on self-reported dental and facial esthetics in an academic population.

Methods A cross-sectional observational study on 1,232 students from Universidad Cooperativa de Colombia, Pasto, Colombia was conducted. Socio-demographic variables such as age, sex, residency, place of birth, living zone, socioeconomic status, and type of faculty (Dentistry, Medicine, Nursing, Engineering and Law) were included. Moreover, clinical characteristics related to oral rehabilitations of anterior teeth (composites and crowns) were recorded. Behavioral determinants such as self-esteem, self-compassion, social achievements, and social anxiety were evaluated through Rosenberg's Self-Esteem Scale (RSE), Self-compassion Scale (SCS), Social Achievement Goal Scale (SAG) and Social Anxiety Questionnaire for Adults (SAQ-A30). The Orofacial Esthetic Scale (OES) was employed to determine self-rated dental and facial esthetics. A paper-and-pencil self-administered survey was utilized. Descriptive statistics (frequencies, means and standard deviations) were calculated to determine the levels of personal factors. Structural Equation Modeling (SEM) was performed with robust unweighted least squares estimation method to assess the mediating effects of the behavioral variables on dental and facial esthetics. Analyses were conducted using SPSS 28.0 and EQS 6.2 statistical package. Statistical significance was set at *P* < 0.05.

Results The sample comprised 496 (40.3%) males and 736 (59.7%) females. 1,068 (86.7%) participants were 18–25 years old, and 164 (13.3%) > 25 years old. The mean and standard deviations (*SD*) of scales were: RSE = 24.24, *SD* ± 1.91; SCS = 3.16, *SD* ± 0.54; SAG = 32.55, *SD* ± 7.97; SAQ-A30 = 74.61, *SD* ± 21.33; and OES = 58.12, *SD* ± 13.12. SEM found self-compassion (β = 0.38, *P* = 0.03), social goals achievement (β = 0.34, *P* = 0.02) and self-esteem (β = 0.25, *P* = 0.02) had moderate and direct effects on dental and facial esthetics, while social anxiety (β = -0.19, *P* = 0.02) displayed a moderate indirect effect.

*Correspondence: Ana Cristina Mafla ana.mafla@campusucc.edu.co

Full list of author information is available at the end of the article



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Conclusions Behavioral factors predicted dental and facial esthetics self-perception in college students. Clinicians and educators should be aware of the identified effects which may, in turn, affect overall quality of life of patients and students.

Keywords Beauty, Behavior, Young adult, Students, Structural equation modeling

Background

Beauty is defined as "the quality or aggregate of qualities in a person or thing that gives pleasure to the senses" [1]. While are differences regarding beauty and esthetics among individuals [2], certain facial features have been confirmed to, by large, be associated with facial esthetics and attractiveness [3]. These include age, the size of the eyes and lips, the evenness of skin tone regardless of what that tone might be [4]. A confounder for perception of esthetics are cultural learning and social environment [5]. Today's population is overexposed to exceptionally esthetic faces and individuals, oftentimes via social media, and comparisons against unrealistic and unnatural esthetics may induce anxiety [6] about "physical imperfections", in some cases leading to body dysmorphic disorder [7]. Consequently, phenomena as appearance anxiety have emerged [8], influencing an individual's overall personality to an extent that is unmanageable. Self-perception on facial characteristics has been found to be influenced by social and demographic aspects, but also other determinants [9, 10] and generally body appreciation has positive relationships with self-esteem, selfcompassion and life satisfaction [11].

The influence of behavioral determinants such as self-esteem, self-compassion, social anxiety, competence and desirability, on dental and facial attractiveness is, however, not well established. Self-esteem has been understood as the extent to which the qualities and attributes encompassed within an individual's self-concept are perceived as favorable [12]. Self-compassion is rooted in Buddhist philosophy, involving a nonjudgmental attitude towards one's shortcomings and mistakes. It has been proposed that while selfcriticism can result in negative emotions, self-compassion may enhance well-being by shielding individuals from the adverse emotional consequences of their perceived failures [13]. Social anxiety refers to a dread of social scenarios where embarrassment could arise (such as initiating conversation, meeting new people, or dating), or where there's a chance of receiving negative judgments from others (like being perceived as unintelligent, vulnerable, or anxious). Social anxiety encompasses concerns about one's social status, role, and conduct [14]. More than that, competence is the capacity to regulate one's existence, manage particular challenges adeptly, and enact alterations to one's conduct and surroundings, rather than merely adapting to circumstances as they exist [15], whereas desirability is the degree to which an individual or something (such as a characteristic, quality, or similar attribute) is esteemed or regarded as valuable within a community or social setting [16].

Beauty has been correlated with feelings of happiness, trustworthiness, economic advantage, and confidence [17] all of which contribute to life satisfaction and quality of life. Moreover, body image, encompassing aspects like body shape, weight, and other features (facial attractiveness), remains a significant concern owing to societal expectations regarding appearance. While the intensity of this concern varies across cultures, its impact on mental and physical well-being is universally recognized. Negative body perception correlates with conditions such as depression and compromised psychosocial well-being, and in Latin countries with low self-esteem [18].

Face and teeth as part of the physical appearance may be in the lens of beauty image standards demanded by society or visually-driven culture leading to mental health problems, especially in young people. Exploring the effects of behavioral determinants on facial and dental perception is important because personal factors may boost the people well-being leading to accept themselves for who they are. Providing insights into the role of those behavioral determinants on this perception would promote unique challenges to dental professionals, through reporting evidence to design multi-disciplinary interventions and counseling. The present study aimed to assess the mediating effects of behavioral determinants such as self-esteem, self-compassion, social competence and social anxiety on dental and facial esthetic self-perception in a Colombian college students' population.

Methods

Settings, study design and sample

A cross-sectional study was designed to determine the effects of behavioral determinants on dental and facial self-perception in 1,232 participants at Universidad Cooperativa de Colombia, from Pasto, Colombia. Data collection was obtained between March and November 2022. We included voluntary students, male and female, \geq 18 years-old, who did not have any physical impediment that prevented them to answer the questionnaire and who were not receiving any psychiatric medication in the survey period. No restriction was set

for participants having received orthodontic therapy in the past.

Sociodemographic and dental characteristics

The sociodemographic features including age (measured as continuous variable and classified as 18-25 years old and >25 years old); biological sex (classified as male and female according to World Health Organization [19]) place of birth (coded as Pasto/capital, and other place); residency (catalogued as Pasto/capital, and other place); living zone (coded as rural and urban); socioeconomic status classified in two groups as low (low-low, low), and middle (middle-low, middle) and high (middle-high, high) according to Pasto Mayor's Office Decree 0392/October 16, 1996 [20], and faculty (coded as Dentistry, Medicine, Nursing, Engineering, Law). In addition, some aspects related to oral rehabilitations of anterior teeth which could affect esthetics were inquired, such as the presence of fillings or crowns.

Instruments and procedures Orofacial esthetic scale (OES) [21]

In general, self-perception of beauty has been measured through different instruments such the Body Satisfaction Scale [22], the Body Appreciation Scale [23], or the Stunkard Scale [24]. In terms of assessing self-perceived dental and facial esthetics, the Orofacial Esthetic Scale (OES) has been developed to assess different esthetic components [21] with good psychometric properties [25]. The OES has been translated into different languages [26-30] and validated in general populations [31]. In the present study, a validated Spanish version of the OES was used [32], consisting of items between 1 and 7 that assess levels of satisfaction with the appearance of dental and facial components such as face, facial profile, mouth, rows of teeth, tooth shape/form, tooth color and gum, and item 8 that evaluates overall happiness with orofacial esthetics. A numeric rating scale is used to assess for each item (from 0:"very dissatisfied" to 10: "very satisfied"). The scale utilizes 7 items on dental and facial components (0-70), and one item on overall orofacial esthetics (0-10), resulting in a maximal score of 80; a higher score indicates high satisfaction. Permission to use the scale was provided by the developers of the scale.

Rosenberg self-esteem scale (RSE) [33]

The Rosenberg Self-Esteem Scale (RSE) is a 10-item scale that reflects people' physical self-image, accomplishments, capabilities, and values, as well as the ways in which others view and respond to an individual [12]. It was developed to measure the self-esteem of high school students [34] but has been used in different

groups including adults. It has been translated and validated in different languages and has showed good psychometric properties [35, 36]. The RSE uses a fourpoint Likert scale, which runs from 0: "strongly disagree", 1: "disagree", 2: "agree" and 3: "strongly agree" in half of the items and vice versa in the other half. The maximum sum score is 30; the higher the score, the higher the self-esteem. A Spanish version validated in a Colombian population was used in this study [37]. Permission to use the scale has been granted by the author.

Self-compassion scale (SCS) [38]

Self-compassion represents compassion turned inward and refers to how we relate to ourselves in instances of perceived failure, inadequacy, or personal suffering. It has three components, with a positive and negative pole, that represent "self-kindness vs self-judgment", "a sense of common humanity vs isolation", and "mindfulness vs over-identification" [39]. It involves 26-items via six components including self-kindness, self-judgment, common humanity, isolation, mindfulness and over-identification. It employs a five-point response scale ranging from 1 ("almost never") to 5 ("almost always"). The scale has reverse score items (1 = 5, 2 = 4,3=3, 4=2, 5=1) for self-judgment, isolation, and over-identification. To obtain a total self-compassion score, we calculated the mean of each subscale, and then the average of the six subscales means. A low score is considered as 0.0-2.49, a moderate as 2.5-3.5 and high between 3.51 and 5.0. The instrument has reported adequate psychometric properties [40] in other languages [41]. A shorter 12-item version has been developed, too [42] and both the original and the short version have been validated in Spanish [43]. The present study used the short Spanish version. Permission to use the scale has been granted by the original authors of the scale and also by the authors of the Spanish version.

Social achievement goal scale (SAG) [44]

According to Ryan and Shim [45], individuals have different orientations toward developing or demonstrating social competence, and achievement goals are important elements of social motivation. The Social Achievement Goal Scale (SGS) is an 18-item instrument with three subscales. It assesses developing social competence (7 items); the relevance of social desirability and gaining positive judgments from others (5 items); and the relevance of being socially desirable and avoiding negative judgment from others (5 items). A five-point Likert scale that ranges from 1 ("not at all true for me") to 5 = ("very true for me") is utilized. The higher the score, the higher social achievement goals. We employed a Spanish version for this study which has exhibited good psychometric properties in a Colombian sample [46]. Permission to use this version of the scale has been granted.

Social anxiety questionnaire for adults (SAQ-A30) [47]

Social phobia is defined as a long-term fear of embarrassment or negative evaluation while engaged in social interaction or public performance. Meetings or interactions with strangers, attending social gatherings, formal presentations and those requiring assertive behavior are commonly feared by individuals with this disorder [48]. The Social Anxiety Questionnaire for Adults SAQ-A) using 30 items (SAQ-A30) has been designed to measure specific and/or generalized social phobia/anxiety in \geq 18 adults. It consists of five dimensions, each with six items. Those dimensions involve speaking in public/talking with people in authority, interaction with the opposite sex, assertive expression of annoyance, disgust or displeasure, criticism and embarrassment, and interactions with strangers. Each dimension has its own cut-off score to determine more detailed information about the type of social fears a person has [49]. The SAQ-A30 has been showed good psychometric properties in various languages [50] and populations [51]. In this study, the SAQ-A30 Colombian version was used, which has demonstrated to be a valid and reliable measurement tool [52]. Permission to use this scale has been granted by the authors.

Procedures

After obtaining an approval from the academic affairs office at Universidad Cooperativa de Colombia, Pasto, Colombia, four researchers completed a calibration process. A paper-and-pencil self-administered approach survey was utilized. First, the questionnaire including the different instruments was filled out by the researchers. The estimated time needed was between 15 and 30 min. Second, the researchers designed a script that included a brief explanation of the study, a paragraph to encourage students to read carefully and complete all questions. Third, researchers requested by e-mail and in person all schedules of the students from the different faculties to determine when to apply the survey. When providing the survey, a brief explanation about the study was given, then the questionnaire and the consent form were delivered. All participants were encouraged to ask questions if they did not understand these documents. If students did not attend class on the survey day, a revisit was scheduled once.

Statistical analysis

A descriptive analysis was performed and independent $\chi 2$, U Mann Whitney and Kruskal-Wallis tests were employed to compare subgroups. 25 questionnaires (2%) had missing data in some items and a multivariate imputation was used for these [53]. Reliability measures were estimated for OES (1–8 items) (α coefficient = 0.93), RSE (α coefficient = 0.89), SCS (α coefficient = 0.69), SAG (α coefficient = 0.81), SAQ-A30 (α coefficient = 0.94) scales previously.

To assess associations, structural equation modeling (SEM) was performed with robust unweighted least squares (ULS) estimation method [54] and using polychoric correlations [55]. Indices such as χ^2 de Satorra-Bentler $(\chi 2^{S-B})$ [56], chi-square divided by degrees of freedom (χ^2 /gl \leq 3), comparative fit index (CFI) (\geq 0.90), the non-normed fit index (NNFI \ge 0.90), the root mean square error of approximation (RMSEA \leq 0.08), and the standardized root mean residual (SRMR ≤ 0.08) [57] were used to assess the model fit. Additionally, the coefficient of determination (R^2) was estimated to examine how well the interaction among independent variables predicted the outcome. These analyses were conducted using S.P.S.S version 28.0 (IBM, Armonk, USA) and the Structural Equation Modeling Software - Eq. 6.2 statistical package [58]. Statistical significance was set at P < 0.05.

Results

Students' characteristics

The sample comprised 1,232 participants; 496 (40.3%) males and 736 (59.7%) females. 1,068 (86.7%) participants were 18–25 years old, and 164 (13.3%) > 25 years old; 734 (59.6%) were born in Pasto (capital city) and 498 (40.4%) in other places; 1,144 (92.9%) lived in Pasto (capital city) and 88 (7.1%) in other places. 99 (8.0%) lived in rural areas and 1,133 in urban areas; 735 (59.7%) belonged to a low socioeconomic status (SES) and 497 (40.3%) to a middle/high SES; 270 (21.9%) were registered in the dental faculty, 256 (20.8%) in medical faculty, 290 (23.5%) in nursing faculty, 176 (14.3%) in engineering faculties and 240 (19.5%) in law faculty. 487 (39.5%) had restorations (composites) in their anterior teeth.

Tables 1, 2, 3, 4 and 5 show the means and standard deviations of dental and facial esthetic self-perception, self-esteem, self-compassion, social goals achievement and social anxiety. Age had nearly no impact on the behavioral factors except for self-compassion which was higher in > 25 years old (mean = 3.25, $SD \pm 0.52$) than in 18–25 years old (mean = 3.15, $SD \pm 0.54$) (P = 0.004)). Females showed significantly higher social anxiety (mean = 77.18, $SD \pm 21.40$) than males (mean = 70.79, $SD \pm 20.66$) (P < 0.001). Students who

Variable		n	Total Sam (n = 1,232)	ple)		Total Sam (n = 1,232)	ple	
			OES mean = 50.62, SD ± 11.44			OES mean = 58.12, SD ± 13.12		
			1–7 items			1–8 items		
			mean	SD±	<i>P</i> -value	mean	SD±	P-value
Age					0.651 ^a			0.703 ^a
	18–25 years old	1,068	50.66	11.40		58.16	13.07	
	> 25 years old	164	50.33	11.68		57.82	13.50	
Sex					0.464 ^a			0.525 ^a
	Male	496	50.28	11.59		57.77	13.31	
	Females	736	50.85	11.33		58.35	13.00	
Place of bi	irth				0.659 ^a			0.588 ^a
	Pasto (capital city)	734	50.54	11.33		58.00	13.03	
	Other place	498	50.73	11.60		58.30	13.26	
Residency	,				0.258 ^a			0.287 ^a
	Pasto (capital city)	1144	50.50	11.46		57.99	13.15	
	Other place	88	52.11	11.01		59.80	12.65	
Zone					0.251 ^a			0.331 ^a
	Rural	99	49.33	11.75		56.85	13.49	
	Urban	1133	50.73	11.41		58.23	13.09	
Socioecor	nomic status				< 0.001 ^a			< 0.001 ^a
	Low	735	49.10	11.58		56.37	13.29	
	Middle/High	497	52.87	10.84		60.70	12.43	
School					< 0.001 ^b			< 0.001 ^b
	Dentistry	270	55.98	10.42		64.41	11.69	
	Medicine	256	53.00	10.87		60.75	12.54	
	Nursing	290	46.96	11.35		53.90	13.15	
	Engineering	176	46.34	11.41		53.24	13.22	
	Law	240	49.60	10.24		56.91	11.63	

Table 1	Means and stand	ard deviations (SD) of	^e Orofacial esthetic scale	e (OES) by s	sociodemographic characteristics
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SD = standard deviation; level of significance derived from Mann-Whitney^a and Kruskal-Wallis^b

were born in other places showed slightly more selfcompassion (mean = 3.21, $SD \pm 0.54$) than those born in Pasto (capital city) (mean = 3.13, $SD \pm 0.53$) (P = 0.049). Neither residency nor living zone nearly had a significant impact.

Participants who belonged to a low SES showed lower dental and facial esthetic self-perception (mean = 56.37, $SD \pm 13.29$) than middle/high SES participants (mean = 60.70, $SD \pm 12.43$) (P < 0.001). Similarly, low-income students showed lower self-esteem (mean = 24.12, $SD \pm 1.96$) than middle/high SES students (mean = 24.40, $SD \pm 1.83$) (P = 0.003). The type of school had a significant effect, while the magnitude of this effect was limited.

For estimating the structural equation model (SEM), OES items between 1 and 7 were used, as item 8 (overall, how do you feel about your face, your mouth and your teeth?) presented in the analysis of items (in the mirror matrix) collinearity with item 6 (rho = 0.973; P = 0.002) and item 7 (rho = 0.981; P < 0.001), indicating that they tend to measure the same aspect of the construct suggesting this item removal. Additionally, after performing the confirmatory factor analysis, item 8 showed a low loading factor ($\lambda = 0.135$; P < 0.001) and a high measurement error (e = 0.972), which support the last recommendation. The SEM is shown in Fig. 1. The fit of the model was optimal ($\chi 2^{S-B} =$ 8438.141; $\chi 2^{S-B}$ /(2469) = 3.417; P < 0.001; NNFI = 0.902; CFI = 0.911; RMSEA = 0.057 (90% CI [0.056, 0.058]); SRMR = 0.065). Self-compassion ($\beta = 0.38$, P = 0.03), social goals achievement ($\beta = 0.34$, P = 0.02) and selfesteem ($\beta = 0.25$, P = 0.02) showed a moderate direct effect, while social anxiety ($\beta = -0.19$, P = 0.02) displayed a moderate indirect effect on dental and facial esthetic self-perception. The determination coefficient (R^2) was 0.24 which means that 24% of this self-perception was explained by these personal factors.

Discussion

Based on our findings, there was a moderate influence of behavioral factors on dental and facial selfperception in college students. Notably, dental and facial self-perception but also the behavioral determinants significantly differed among the different subgroups, with socioeconomic status being a relevant confounder of esthetics and self-esteem, for example.

Variable		Total S (n = 1,2 RSE me SD ± 1.	P-value		
		n	mean	SD±	
Age					0.212 ^a
	18–25 years old	1,068	24.26	1.93	
	>25years old	164	24.06	1.78	
Sex					0.829 ^a
	Male	496	24.21	1.96	
	Females	736	24.25	1.88	
Place of birt	h				0.132 ^a
	Pasto (capital city)	734	24.29	1.91	
	Other place	498	24.15	1.91	
Residency					0.446 ^a
	Pasto (capital city)	1144	24.22	1.91	
	Other place	88	24.42	1.88	
Zone					0.211ª
	Rural	99	24.06	1.95	
	Urban	1133	24.25	1.91	
Socioecono	mic status				0.003 ^a
	Low	735	24.12	1.96	
	Middle/High	497	24.40	1.83	
School					0.005 ^b
	Dentistry	270	24.03	1.94	
	Medicine	256	24.34	1.81	
	Nursing	290	24.09	2.09	
	Engineering	176	24.39	1.76	
	Law	240	24.42	1.84	

Table 2	Means and	standard d	eviations	(SD) of Rose	enberg Self-
Esteem so	<i>cale (RSE</i>) by	sociodemo	ographic c	haracteristi	ics

 Table 3
 Means and standard deviations (SD) of Self-compassion

 scale (SCS) by sociodemographic characteristics

Variable		$\frac{10 \text{ tal S}}{(n = 1,2)}$ SCS means $\frac{\text{SD} \pm 0.2}{(n = 1,2)}$	<i>P</i> -value		
		n	mean	$SD\pm$	
Age					0.004 ^a
	18–25 years old	1,068	3.15	0.54	
	>25years old	164	3.25	0.52	
Sex					$< 0.001^{a}$
	Male	496	3.23	0.53	
	Females	736	3.12	0.54	
Place of birt	th				0.049 ^a
	Pasto (capital city)	734	3.13	0.53	
	Other place	498	3.21	0.54	
Residency					0.702 ^a
	Pasto (capital city)	1,144	3.16	0.54	
	Other place	88	3.18	0.57	
Zone					0.524 ^a
	Rural	99	3.10	0.56	
	Urban	1,133	3.17	0.54	
Socioeconc	omic status				0.358 ^a
	Low	735	3.17	0.50	
	Middle/High	497	3.15	0.59	
School					< 0.001 ^b
	Dentistry	270	3.27	0.62	
	Medicine	256	3.11	0.57	
	Nursing	290	3.13	0.48	
	Engineering	176	3.11	0.44	
	Law	240	3.17	5.20	

 $\mathit{SD}\!=\!\mathsf{standard}$ deviation; level of significance derived from Mann-Whitney^a and Kruskal-Wallis^b

 $\mathit{SD}\,{=}\,standard$ deviation; level of significance derived from Mann-Whitneya and Kruskal-Wallis^b

Moreover, being student at a specific school (medicine, nursing) affected certain behavioral traits (like social anxiety) and also directly impacted on self-perception. Our findings require discussion in light of the available evidence.

Firstly, the association between behavioral factors and SES is well established. A recent meta-analysis demonstrated that individuals who belonged to a higher SES reported higher levels of self-esteem, too, particularly in adults (in children and elderly, this effect was less obvious) [59]. SES was also found to significantly predict body image self-consciousness [60].

Secondly, our study found students from dental and medical school reporting an increased self-perception of orofacial esthetics, but also self-esteem and social achievement goals. The available evidence suggests that professional status is associated with self-esteem, too. In a longitudinal multilevel study, it was shown that self-esteem was positively associated with career decision-making self-efficacy [61]. Moreover, in relation to social competence, dental and medical students may be subject to an increased level of social interactions and may need to work effectively not only with their peers but also with the wider health team and patients. Thirdly, we also found these subgroups to differ when it came to their level of anxiety. Women, nursing and medical students had higher levels of social anxiety. It may be that different past exposure to psychosocial stressors and a possible increased biologic and/or psychologic vulnerability toward anxiety may contribute to the higher levels of anxiety in women [62–63]. Other data generally indicate that medical students show relatively high prevalences of social anxiety [64–65].

Fourthly, the performed SEM determined that behavioral factors had a moderate effect on dental and facial self-perception, mainly mediated via social anxiety. Further studies should also consider aspects like social pressure and its effects on face and dental perceptions [66] as well as the wider societal impact (media, peers, and parents) which is known to shape the sociocultural perceptiveness for various stressors [67]. Moreover, individuals with high appearance

Variable		Total S	P-value		
		(n = 1,2			
		SAG=	32.55, SD	±7.97	-
		n	mean	SD±	
Age					0.306 ^a
	18–25 years old	1,068	32.44	7.87	
	> 25 years old	164	33.30	8.63	
Sex					0.138 ^a
	Male	496	32.93	8.16	
	Females	736	32.30	7.84	
Place of birt	:h				0.906 ^a
	Pasto (capital city)	734	32.67	8.43	
	Other place	498	32.39	7.25	
Residency					0.385 ^a
	Pasto (capital city)	1,144	32.50	8.05	
	Other place	88	33.27	6.88	
Zone					0.826 ^a
	Rural	99	32.95	7.83	
	Urban	1,133	32.52	7.99	
Socioecono	omic status				0.104 ^a
	Low	735	32.14	7.41	
	Middle/High	497	33.16	8.71	
School					0.012 ^b
	Dentistry	270	33.09	7.87	
	Medicine	256	33.74	8.00	
	Nursing	290	32.21	7.29	
	Engineering	176	31.49	7.89	
	Law	240	31.89	8.74	

Table 4 Means and standard deviations (SD) of Social

 achievement goal scale (SAG) by sociodemographic characteristics

SD = standard deviation; level of significance derived from Mann-Whitney^a and Kruskal-Wallis^b

anxiety are also at higher risk of social anxiety [68], factor that had an indirect effect in the model.

The understanding of how young population perceive their dental and facial characteristics is important, not only from the research perspective but also from clinical practice. Based on our findings, clinicians (and educators) should be aware of the various factors influencing self-esteem and self-appearance, as this, in turn, may affect overall quality of life of patients and students. Medical societies should actively take up the identified stressors when screening patients, and any discussion prior to esthetic interventions should consider the identified aspects, as well as culture characteristics [69]. If needed to increase self-appearance, the medical profession, including dentists, is called to action to first follow the principle of "do no harm", i.e. seek interventions as less invasive as possible to increase esthetics, but also to provide counselling where appropriate and needed.

Some limitations of the present study should be mentioned. First, the present investigation is crosssectional in its nature, where cause-effect relationships
 Table 5
 Means and standard deviations (SD) of Social anxiety questionnaire for adults (SAQ-A30) by sociodemographic characteristics

Variable		Total S (n = 1,2 SAQ-A SD±2	P-value		
		n	mean	SD±	-
Age					0.180 ^a
	18–25 years old	1,068	74.91	21.27	
	>25years old	164	72.60	21.62	
Sex					< 0.001 ^a
	Male	496	70.79	20.66	
	Females	736	77.18	21.40	
Place of birt	:h				0.448 ^a
	Pasto (capital city)	734	74.38	21.60	
	Other place	498	74.94	20.93	
Residency					0.090 ^a
	Pasto (capital city)	1,144	74.29	21.42	
	Other place	88	78.62	19.73	
Zone					0.311 ^a
	Rural	99	76.86	20.18	
	Urban	1,133	74.41	21.42	
Socioecono	mic status				0.138 ^a
	Low	735	75.25	20.77	
	Middle/High	497	73.65	22.11	
School					< 0.001 ^b
	Dentistry	270	73.59	22.52	
	Medicine	256	79.79	21.87	
	Nursing	290	78.72	20.38	
	Engineering	176	68.90	15.89	
	Law	240	69.43	21.75	

SD = standard deviation; level of significance derived from Mann-Whitney^a and Kruskal-Wallis^b

cannot be examined with certainty. Second, selfperception of dental and facial characteristics as well as evaluation personal factor evaluation may be subject to social-desirability bias. Social pressure should be further explored in future studies related to facial and dental self-perception. Third, sampling was nonprobabilistic, with the sampling frame being a certain municipality in Colombia. While this may, to some degree, limit generalizability (e.g. to higher-income countries), we nevertheless assume that our insights remain valid, with limits, for other populations.

Conclusions

Behavioral factors affected dental and facial self-perception in college students. Healthcare professionals and educators should recognize of the identified associations, as those can potentially impact the overall well-being of both patients and students.



Fig. 1 Latent variables of personal factors SEM of dental and facial esthetic self-perception. Note. RSE (Rosenberg Self-Esteem Scale), SCS (Self-compassion Scale), SAG (Social Achievement Goal Scale), SAQ-A30 (Social Anxiety Questionnaire for Adults), and OES (Orofacial Esthetic Scale). *P < 0.05

Abbreviations

- OES Orofacial Esthetic Scale
- RSE Rosenberg Self-Esteem Scale
- SAG Social Achievement Goal Scale
- SAQ-A30 Social Anxiety Questionnaire for Adults
- SCS Self-compassion Scale

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Author contributions

Ana Cristina Mafla: conceptualization, methodology, data curation, formal analysis, writing the manuscript, project administration, supervision, and funding acquisition. Mauricio Herrera-López: conceptualization, methodology, formal analysis, writing the manuscript and review. Juliana Estefania Salas-Burbano, Camilo Andrés Guerrero-Dávila, Diana Paola Insuasty-Fuertes and Juan Sebastián Bustos-López: data collection, data curation, and writing the manuscript. Falk Schwendicke: conceptualization, methodology, writing the manuscript and review. All authors read and approved the final manuscript.

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Data availability

The dataset used and analyzed during the current study is available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The Bioethics Committee at Universidad Cooperativa de Colombia approved the study (BIO341, 2022). All students signed an informed consent form to participate. The study reporting is in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement [70], and the Helsinki Declaration [71].

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

 ¹Facultad de Odontología, Universidad Cooperativa de Colombia, Calle 18 No. 45-150, Pasto, Colombia
 ²Escuela Internacional de Doctorado, King Juan Carlos University, Calle Tulipán s/n. 28933 Móstoles, Madrid, España
 ³Department of Psychology, Universidad de Nariño, Calle 18 No. 50-02, Ciudadela Universitaria Torobajo, Pasto, Colombia
 ⁴Sapientiae Students Research Group, School of Dentistry, Universidad Cooperativa de Colombia, Calle 18 No. 45-150, Pasto, Colombia
 ⁵Department of Conservative Dentistry and Periodontology, Ludwig-Maximilians- Universität– München, Goethestr 72, 80336 München, Bavaria, Germany

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