

Impact of Instagram in the influence on esthetic perception in silhouettes through eye tracking and questionnaire

Impacto do Instagram na influência na percepção estética em silhuetas por meio do rastreamento ocular e questionário

Impacto de Instagram en la influencia en la percepción estética de siluetas através de eye tracking y cuestionario

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Abstract

This study evaluated the influence of the use of Instagram in the esthetic of silhouettes of individuals who underwent orthognathic surgery and rhinoplasty of four different models separated as preoperative, after orthognathic surgery, and after orthognathic rhinoplasty were standardized and edited using Photoshop. OGAMA software and EyeTribe hardware were used for eye tracking. The Qualtrics platform was used to apply the Brief Symptoms Inventory (BSI) questionnaires to assess psychological statuses and use of social media and to evaluate the attractiveness of each image through the visual analog scale (VAS). ANOVA, Kruskal–Wallis, and Pearson's correlation tests were used. Statistically significant differences for time to the first fixation in the lower third, and middle third for attractiveness were observed ($p < 0.05$). The VAS results were more attractive after orthognathic surgery and rhinoplasty. Pearson's correlation was performed between time spent on Instagram and VAS ($p < 0.0001$, $r = -0.212$); individuals who reported spending more time on Instagram gave lower attractiveness scores. In addition, VAS showed significance in relation to BSI global indices (general severity index [$p = 0.044$, $r = -0.078$], positive symptom total [$p = 0.024$, $r = -0.08$] and positive symptom distress index [$p = 0.025$, $r = -0.08$]), suggesting that individuals who scored better tended to assign higher scores to attractiveness. Individuals who reported spending more time on Instagram tended to rate the silhouettes'

attractiveness with lower scores, and individuals who spent more time on Instagram displayed a higher average level of distress.

Keywords: Eye tracking; Visual perception; Esthetics; Silhouettes.

Resumo

Este estudo avaliou a influência do uso do Instagram na estética de silhuetas de indivíduos submetidos à cirurgia ortognática e rinoplastia, separadas como pré-operatório, após cirurgia ortognática e após rinoplastia ortognática editadas no Photoshop. O software OGAMA e o hardware EyeTribe foram utilizados para o rastreamento ocular. O Qualtrics foi utilizado para os questionários Brief Sintomas Inventory (BSI) para avaliar o estado psicológico dos participantes e o uso de mídias sociais e avaliar a atratividade de cada imagem por meio da escala analógica visual (VAS). ANOVA, Kruskal-Wallis e testes de correlação de Pearson foram utilizados. Houveram diferenças para o tempo até a primeira fixação no terço inferior, terço médio e para atratividade ($p < 0,05$). Para a EVA foram mais atrativos após cirurgia ortognática e rinoplastia. A correlação de Pearson foi realizada entre o tempo gasto no Instagram e a EVA ($p < 0,0001$, $r = -0,212$); indivíduos com mais tempo no Instagram sinalizaram com pontuações mais baixas de atratividade. A VAS mostrou significância em relação aos índices globais do BSI (índice de gravidade geral [$p = 0,044$, $r = -0,078$], total de sintomas positivos [$p = 0,024$, $r = -0,08$] e índice de angústia de sintomas positivo [$p = 0,025$, $r = -0,08$]), sugerindo que os indivíduos que pontuaram melhor atribuíram pontuações mais altas à atratividade. Os indivíduos que relataram passar mais tempo no Instagram avaliaram a atratividade das silhuetas com pontuações mais baixas e os indivíduos com mais tempo no Instagram apresentaram nível de angústia mais elevado.

Palavras-chave: Rastreamento dos olhos; Percepção visual; Estética; Silhuetas.

Resumen

Este estudio evaluó la influencia del uso de Instagram en la evaluación estética de siluetas de individuos sometidos a cirugía ortognática y rinoplastia dividido como preoperatorias, después de la cirugía ortognática y después de la rinoplastia ortognática, editado en Photoshop. Para el seguimiento ocular se utilizó el software OGAMA y el hardware EyeTribe e lo Qualtrics para los cuestionarios del Inventario Breve de Síntomas (BSI) para evaluar el estado psicológico y el uso de las redes sociales y para evaluar el atractivo de cada imagen a través de la escala analógica visual (VAS). Se utilizaron las pruebas de correlación ANOVA, Kruskal-Wallis y Pearson. Se observaron diferencias para el tiempo hasta la primera fijación en el tercio inferior, tercio medio y para el atractivo ($p < 0,05$). Los resultados de la EVA fueron más atractivos después de la cirugía ortognática y la rinoplastia. Se realizó la correlación de Pearson entre el tiempo dedicado a Instagram y la EVA ($p < 0,0001$, $r = -0,212$). La EVA mostró significación en relación con los índices globales del BSI (índice de gravedad general [$p = 0,044$, $r = -0,078$], total de síntomas positivos [$p = 0,024$, $r = -0,08$] e índice de malestar de síntomas positivos [$p = 0,025$, $r = -0,08$]), e las personas que obtuvieron mejores puntajes tendieron a asignar puntajes más altos al atractivo. Las personas que informaron pasar más tiempo en Instagram tendieron a calificar el atractivo de las siluetas con puntajes más bajos, y las personas que pasaron más tiempo en Instagram tenían un nivel medio de angustia más alto.

Palabras clave: Registro visual; Percepción visual; Estética; Siluetas.

1. Introduction

Smartphones incorporate the use of different types of applications, many of them interactive and online, in which an individual can access others with the touch of a finger. As a result, online and site-access behavior provides extensive information about users. (Salehan & Negahban, 2013)

Due to the general population's ease of access to social networks through smartphones, studies have suggested that negative health consequences may result from smartphone use (Berryman et al., 2018) and may trigger, to the same degree, psychological disorders (Abi-Jaoude et al., 2020) This suggests an association between the misuse or prolonged use of social networks with anxiety and depression. (Matar Boumosleh & Jaalouk, 2017)

In a prospective study of teenage high school students, youth classified with an internet addiction were found to have a significantly higher risk of self-harm, suicidal behavior, or both when reassessed 1 year later. (Pan & Yeh, 2018) The excessive flow of information from social media is associated with negative effects on cognitive control, academic performance, and social-emotional functioning in youth. (Chen & Yan, 2016; Van Der Schuur et al., 2015)

The use of Instagram involves the exposure or time spent on a smartphone and the importance the individual attributes to the contents displayed in these media. (Berryman et al., 2018) It has been suggested that what most affects social networks is not actually what they understand themselves, but their self-perception toward others, a factor that is directly related to the degree

of satisfaction with their own appearance and psychological state .(Moulton et al., 2018) An individual's body image is typically influenced by sociocultural factors (Sarcu & Adamson, 2017) and the fear of being judged by others .(Van Der Schuur et al., 2015)

The increased use of social networks and the self-perception of users based on what they feel while using smartphone applications has led to the development of the Social Media Use Integration Scale (SMUIS) questionnaire, to assess the social behavior on social media with psychometric evidence in the young adult population .(Jenkins-Guarnieri et al., 2013)

In most cultures, facial appearance plays an important role in orthodontic treatment, orthognathic surgery, and cosmetic surgery.(Huang et al., 2019) Orthognathic surgery is able to improve esthetics and function, even in patients with the same cephalometric characteristics who have different nasal and soft tissue structures which may result in a wide alar base and modified tilt and shortening, in addition to a decreased nasolabial angle.(Schendel & Carlotti, 1991)

The degree of adverse nasal effects in 60% of cases may be preexisting or occur after orthognathic surgery; the alternative treatment is rhinoplasty, performed either concomitantly with orthognathic surgery or following orthognathic surgery.(Seah et al., 2012; Sun & Steinbacher, 2018) Once the patient opts for orthognathic surgery and rhinoplasty, this choice may directly affect their psychological state(Brucoli et al., 2019) and disparities may occur; therefore, assessment of the patient's profile is of paramount importance, because evaluation by laypersons may fail to notice any differences, particularly in frontal photographs. Thus, evaluation of profile esthetics is important for understanding facial attractiveness.(Huang et al., 2019)

The use of profile facial silhouettes improves assessments of facial contours, such as a prominent nose and chin.(Davidenko, 2007; Jiang et al., 2018) A previous study has shown that profile perceptions are correlated with psychological factors.(Rivera et al., 2000)

The use of eye tracking, which captures observations objectively, provides information about the distribution of attention on the image observed. As a result, gaze tracking has been widely used to assess facial perception, including in cases of facial deformities.(Guimaraes et al., 2022)

In view of the above findings, the present study aimed to evaluate the time of instagram usage in the attractiveness evaluation of the facial silhouettes of patients who had undergone orthognathic surgery and rhinoplasty. For the present study, the null hypothesis is that there is no difference in attractiveness perception of individuals on silhouette images during the initial, post-orthognathic, and final orthognathic and rhinoplasty periods regardless of instagram usage time.

2. Methodology

Ethical considerations

The study protocol was approved by the University's Ethics Committee (registration number: 2.235.302).

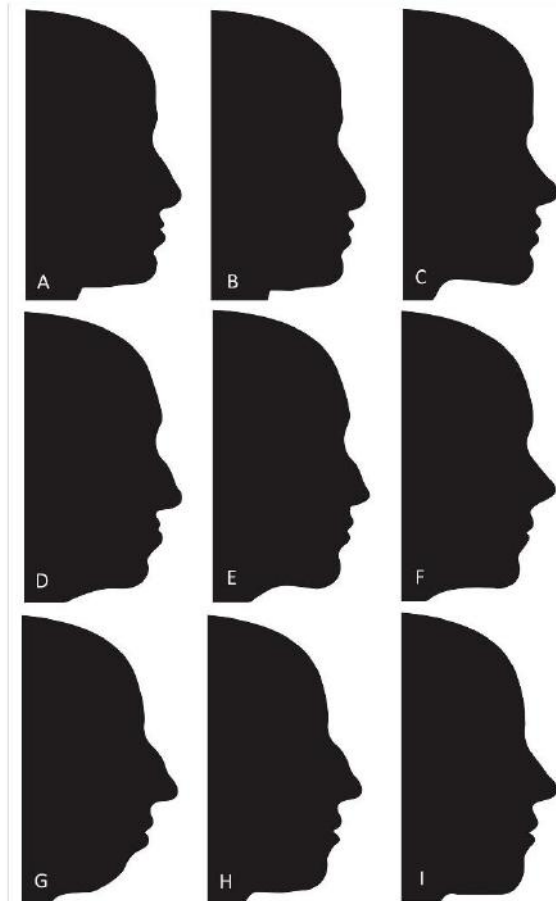
Photograph preparation

The facial silhouettes were based on photographs of individuals in a study by Sun and Steinbacher .(Sun & Steinbacher, 2018) Those individuals presented esthetic complaints related to the nose and lower third of the face. The photos of 4 models were taken in three distinct moments, initial, after orthognathic surgery and after rhinoplasty performed following orthognathic surgery, except for 1 model, whose rhinoplasty was performed at the same time as the orthognathic surgery.(Sun & Steinbacher, 2018) The model who had only 2 images was excluded from this study because it did not follow the same methodology.

The silhouette images of 3 different models were delimited and standardized for luminosity using Adobe Photoshop® (Adobe Systems Inc., San Jose, California, USA). The silhouettes produced have the following characteristics in the 3 different models: initial, before orthognathic surgery and rhinoplasty (Figure 1 A,D,G,), after orthognathic surgery and pre-rhinoplasty (Figure1 B,E,H), and the final photo after orthognathic surgery and rhinoplasty (Figure 1 C,F,I,).

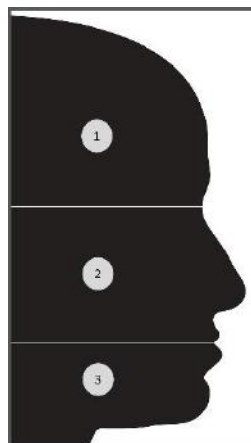
Areas of interest (AOIs) composed of upper, middle and lower thirds of the face (Figure 2) were established in the silhouettes with OGAMA[®] Open Gaze and Mouse Analyzer software version 5.0 (Freie Universität; Berlin, Germany) based on eye tracking for further statistical comparison. AOIs were not visible to the participants.

Figure 1. Facial silhouettes with 3 different models: Initial before orthognathic surgery and rhinoplasty (A,D,G), after orthognathic surgery and pre-rhinoplasty (B,E,H), and after orthognathic surgery and rhinoplasty (C,F,I).



Source: Authors.

Figure 2. Areas of interest divided into facial thirds: 1. Inferior; 2. Medium; 3. Superior.



Source: Authors.

Sample calculation

The sample-size calculation was based on the heterogeneous population of (omitted), ages 18 years and older, unbounded population, confidence level of 95% and margin of error of 13%; it was concluded that 60 participants would be needed for the study.

A total of 64 laypersons participants participated in the sample, including 28 males and 36 females ranging in age from 18 to 57 years, with a mean age of 32.9.

Data collected

Participants were included in the study based on the following inclusion criteria: normal neurological and/or visual perception; abstention from alcohol, medication or drugs that could interfere with cognitive abilities; >18 years of age; software calibration considered “perfect”; and having answered all questions on the questionnaire. Participants who did not meet all criteria were excluded. After applying the inclusion and exclusion criteria, 4 participants were excluded from the study due to incomplete questionnaire responses.

Data collection took place February 2–20, 2022, in cities located in the states of (omitted) and (omitted). Participants’ gaze tracks were assessed using The Eye Tribe Tracker[®] hardware (The Eye Tribe Aps; Copenhagen, Denmark) in conjunction with OGAMA[®] software.

After participants were assessed as fit, they were directed to a quiet room where a researcher was present. The participant was asked to sit on a chair positioned 60 cm away from a high-resolution Dell P2317 monitor (768 x 1366 pixels), oriented in an upright position to maintain true facial size proportions, with the eye-tracker positioned just below, as recommended by the manufacturer. A 9-point calibration was performed by the software. Participants viewed 10 silhouette images and one repeated image which was added to the series to perform the reliability test. Each image was visible for 5 seconds. (Kim et al., 2018) No details about the research were revealed to participants.

The results obtained from eye-tracking were evaluated based on the heat map, and quantitative data were obtained. The heat map is represented by a color scale, which ranges from green to red, with more red indicating a greater density of fixation.

Questionnaire

After the eye-tracking session, participants were asked to answer a questionnaire on an iPad, 8th generation (Apple Inc.; Los Altos, California, USA) with the Qualtrics[®] app (Qualtrics; Seattle, Washington, USA).

The first part of the questionnaire asked the participant to answer the following questions: 1) How much time do you spend on social media during the day? Up to 30 minutes; between 30 minutes and 1 hour; between 1 hour and 2 hours; between 2 hours and 3 hours; or more than 3 hours; and 2) How important is Instagram and how emotionally connected are you to the platform?

To assess the degree to which participants were emotionally connected to social media use, they completed the Social Media Use Integration Scale (SMUIS) (Jenkins-Guarnieri et al., 2013) with 10 items to assess the emotional value of social media in the participants’ lives. It uses a Likert scale, with values from 1 to 5, with 1 being “totally disagree”; 2 “partially disagree”; 3 “indifferent”; 4 “partially agree”; and 5 “I totally agree.”

In the second part of the questionnaire, participants answered the Brief Symptoms Inventory (BSI) to assess psychological status symptoms. The BSI questions are based on nine domains: somatization, obsession–compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. The applied questionnaire consisted of 53 questions. Items 11, 25, 39, and 52 were not considered in any of the dimensions but were included because they are clinically relevant.

In both questionnaires, the Likert scale was applied through a slide bar that evaluated the intensity of response with numbers—where 0 means that the participant totally disagrees; 1 partially disagrees; 2 is indifferent; 3 partially agrees; 4 strongly agrees—and the experience of the participants in the last seven days is evaluated. The scores were calculated and evaluated in the following dimensions:

Participants returned to viewing the silhouette images, one at a time and in a different order than previously viewed in the eye tracking assessment. For each image, the visual analogue scale (VAS) was used, with a score established between 0 and 100 using a digital bar. VAS scores closer to 0 indicated that the image was less attractive and scores closer to 100 indicated that the image was more attractive. The evaluation took approximately 8–12 minutes, including eye-tracking.

Statistical analysis

The results obtained from the eye-tracking assessment and the questionnaires were tabulated in Microsoft Excel software and analyzed in the Statistical Package for Social Sciences Software (SPSS) version 25 (SPSS Inc.; Chicago, Illinois, USA). The dependent variables were complete fixation time, time to first fixation and VAS scores. The independent variables were the areas of interest and the different silhouettes. Only the same models in the different times were considered for statistical differences.

The ANOVA test was applied to analyze statistically significant differences between the silhouettes when there was normal distribution and the Kruskal–Wallis test was performed when there was not a normal distribution in relation to the complete fixation time in the AOIs and VAS scores.

Levene’s homogeneity test was applied to identify heterogeneous or homogeneous distribution. The Tukey HSD (honestly significant difference) parametric multiple comparison test was performed for homogeneous variables, and the Games–Howell test was performed for heterogeneous variables. The significance level adopted was 5%.

The Kruskal–Wallis test was performed to identify statistically significant differences in the dependent variables. Pearson’s correlation test was used to assess the correlation between VAS scores and time spent on Instagram.

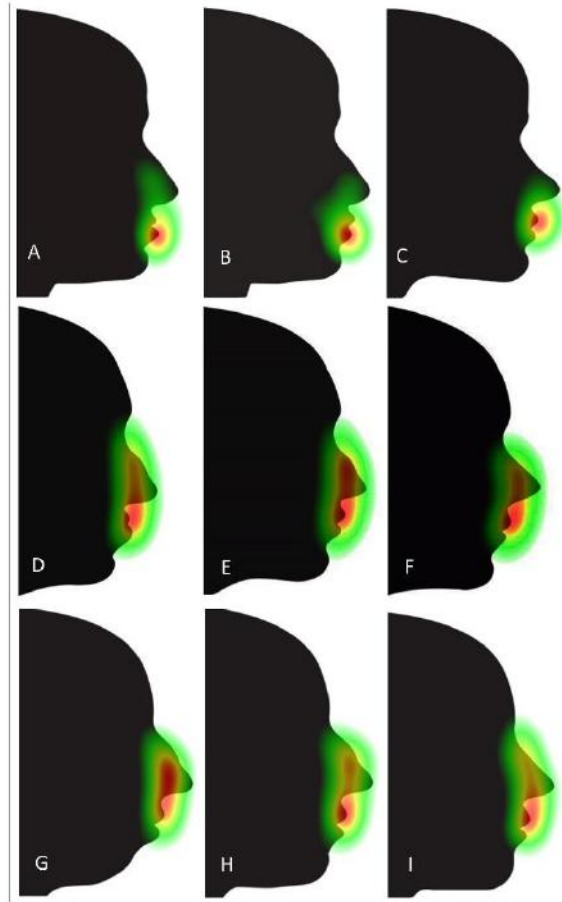
Reliability test

To test the reliability of the study, a repeat image was added, without the participants being notified and has assessed a second time with eye-tracking. The interclass correlation coefficient (ICC) showed a good reliability value of 0.6.

3. Results

The results presented with the heat map images show that laypeople tracked the middle third of the face with greatest intensity. When the chin problem was corrected by orthognathic surgery, there was greater perception in the nasal region (Figure 3E, H). In general, for the results presented after rhinoplasty, there was a lower density of fixation on the nose compared to that of the pre-rhinoplasty results (Figure 3C, F, I).

Figure 3. Silhouette heat maps. Initial before orthognathic surgery and rhinoplasty (A,D,G), after orthognathic surgery and pre-rhinoplasty (B,E,H), and after orthognathic surgery and rhinoplasty (C,F,I).



Source: Authors.

For results comparison, images Figure 1A, Figure 1B, and Figure 1C were named as 1A, 1B, and 1C, respectively. Figure 1D, Figure 1E, and Figure 1F were named as 2A, 2B, and 2C, respectively. Figure 1G, Figure 1H, and Figure 1I were named as 3A, 3B, and 3C. In the analysis of eye tracking, a statistical difference was observed only for the time until the first fixation on the lower third between 1A and 1C ($p = 0.008$) and in the middle third between 2A and 2C ($p = 0.014$). With regard to the comparison of the total fixation time, no statistically significant difference was observed between the AOIs ($p > 0.05$). In terms of VAS scores, there was a significant statistical difference between 2A and 2C ($p = 0.01$), 3A and 3B ($p = 0.004$), 3A and 3C ($p < 0.001$), and 3B and 3C ($p < 0.001$). In all images, silhouettes after orthognathic surgery and rhinoplasty received the highest attractiveness scores, although not all showed statistically significant differences (Table 1).

Table 1. Descriptive data and p-value using A. Kruskal–Wallis test and B. ANOVA test

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A. Complete fixation time at lower third				B. Complete fixation time at middle third				A. Complete fixation time at superior third				A. Time until 1 fixation in lower third				B. Time until 1 fixation in middle third				A. Time until 1 fixation in superior third				B. VAS										
	N	Mean	SD	p Value		N	Mean	SD	p Value		N	Mean	SD	p Value		N	Mean	SD	p Value		N	Mean	SD	p Value		N	Mean	SD	p Value					
1A	24	709.00	653.00		1A	38	1797.86	1125.43		1A	22	518.18	420.84		1A ^a	24	2414.79	967.67		1A	37	633.81	999.20		1A	22	1689.50	1659.62		1A ^a	60	46.05	26.05	
1B	30	1173.86	1110.83	0.250	1B	41	1616.41	1245.78	0.274	1B	21	951.57	827.75	0.356	1B ^{ab}	30	1066.93	1119.96	0.001	1B	41	856.97	1128.67	0.824	1B	21	1971.28	1538.21	0.281	1B ^b	60	47.06	25.43	p<0.001
1C	21	821.47	728.46		1C	40	1937.80	1318.97		1C	25	888.92	815.65		1C ^b	21	1272.14	1317.80		1C	40	606.22	805.25		1C	25	1377.76	1189.68		1C ^c	60	53.10	26.68	
2A	28	989.89	956.63		2A ^a	39	2080.41	1212.53		2A	16	692.68	442.53		2A	28	1265.64	1163.08		2A	39	918.28	1381.85		2A	16	1111.68	1441.32		2A ^b	60	35.46	26.63	
2B	21	1077.14	794.48	0.447	2B ^{ab}	41	1716.36	1189.94	0.014	2B	17	955.88	645.69	0.382	2B	21	1091.04	1351.03	0.807	2B	41	807.36	1115.74	0.162	2B	17	1107.00	1342.31	0.119	2B ^b	60	44.83	25.65	p<0.001
2C	19	759.36	504.17		2C ^b	43	2559.16	1337.88		2C	10	726.00	718.64		2C	19	1522.78	1689.75		2C	42	473.35	903.50		2C	10	2238.80	1756.28		2C ^c	60	53.51	24.86	
3A	22	717.45	656.60		3A	40	2363.12	1322.29		3A	9	443.88	383.38		3A	22	1815.31	1456.16		3A	40	521.15	993.83		3A	9	1961.00	1476.66		3A ^d	60	20.26	18.94	
3B	17	1178.88	1361.17	0.970	3B	36	2241.22	1199.84	0.262	3B	9	614.22	417.25	0.698	3B	17	1508.35	1645.36	0.939	3B	35	821.25	1204.88	0.679	3B	9	2461.22	1637.11	0.353	3B ^b	60	36.95	24.75	p<0.001
3C	15	1154.80	1055.17		3C	44	1961.29	1321.32		3C	15	643.53	555.14		3C	15	1209.53	1508.45		3C	44	495.09	691.28		3C	15	1756.13	1652.91		3C ^c	60	63.08	24.27	

60 PARTICIPANTS
 Different captions = statistical difference
 P<0.005 Statistical Difference
 n= Number of cases

Source: Authors.

Table 2. Descriptive data about Instagram usage.

Table 2. Descriptive data about instagram usage		
	Mean	SD
Feel disconnected if not in instagram	1.55	0.902
I would like all my friends use instagram	1.58	0.988
Disappointed if I could not use instagram	2.2	1.181
Bored if I can not log in on instagram	2.016	1.133
Prefer to cumunicate through instagram	1.60	0.987
Instagram has na important hole in my life	2.25	1.220
I like to verify instagram	2.71	1.318
I do not like instagram	2.25	1.546
Instagram is part of my routine	3.21	1.331
I respond to people's contend on instagram	2.60	1.36
60 participants		
Linkert scale - As higher the value, the greater the agreement with the sentence		

Source: Authors.

A Likert scale was used for the Instagram-usage questionnaire, with values closer to 5 indicating greater agreement with the sentence, and values closer to 1 indicating greater disagreement. The phrases that showed the greatest agreement were “I respond to people’s content on Instagram,” followed by “Instagram is part of my routine” and “I like to verify Instagram.” The phrases that showed less agreement were “I prefer to communicate on Instagram,” followed by “I would like all my friends to use Instagram.” The sentence that showed the least agreement was “I feel disconnected if I am not on Instagram” (Table 2).

Pearson’s correlation was performed between time spent on Instagram and VAS scores and showed a negative and significant correlation ($p < 0.001$, $r = -0.212$), suggesting that individuals who reported spending more time on Instagram tended to provide lower attractiveness scores. In addition, VAS scores and GSI ($p = 0.044$, $r = -0.078$), VAS scores and PST ($p = 0.024$, $r = -0.08$) and VAS scores and PSDI ($p = 0.025$, $r = -0.08$) showed significant negative correlations, suggesting that individuals who recorded higher scores on the psychological status questionnaire also tended to assign lower scores to attractiveness. In addition, Pearson’s correlation indicated an association between time spent on Instagram and PSDI ($p = 0.045$, $r = -0.251$) (Table 3). The descriptive data about psychological status may be found in Table 3.

Table 3. Pearson’s Correlation.

Table 3. Pearson Correlation		
	Pearson Correlation	P Value
A. VAS X Time spent on instagram	-0,212	p<0.001
B. VAS X GSI	-0,078	0.044
C. VAS X PST	-0,088	0.028
D. VAS X PSDI	0,087	0.025
E. Time spent on instagram x GSI	-,045	0.250
E. Time spent on instagram x PST	-,073	0.061
E. Time spent on instagram x PSDI	-,078	0.044
60 participants		
P<0.005 Statistical Difference		

Source: Authors.

4. Discussion

The aim of the present study was to evaluate whether the use of Instagram influenced the attractiveness evaluation, via gaze tracking and questionnaires. The null hypothesis was rejected because all preoperative silhouettes had lower attractiveness scores, with the highest scores obtained after rhinoplasty.

The use of Instagram or some other online social network is very high in their daily lives, (Hassan & Kapila, 2022) and that high proportions of young people appear to be addicted to their smartphones, (Cha & Seo, 2018; Matar Boumosleh & Jaalouk, 2017) but it is unclear whether such use may affect esthetic perception or how it might correlate with psychological status, even though some evidence has identified internet addiction as being associated with self-harm or suicidal behavior. (Marchant et al., 2017)

The perception of smile attractiveness after performing teeth care was higher than before, with periodontists and restorative dentistry being more critical than general practitioners, undergraduate students, and laypeople in evaluating the smiles. (Martins et al., 2021) For this study, results on perception of attractiveness were obtained from heat maps, VAS, time to first fixation, total fixation time in predetermined areas of interest, information about time of Instagram use, and the usage of the Instagram questionnaire from laypeople only. Orthodontists and oral and maxillofacial surgeons should be aware about the predictability of these results, since a patient who may need rhinoplasty after orthognathic surgery could have the procedure at the same time or directly after orthognathic surgery. (Rezaei et al., 2021) In the present study, preoperative silhouettes received worse attractiveness scores; whereas, the highest scores were obtained after rhinoplasty.

Orthognathic surgeries can influence nasal position or nasal esthetics that are correlated with a patient's complaint. (Seah et al., 2012) For the present study, the use of silhouettes was recommended because it eliminates esthetic variables that can influence the participant, such as hairstyle and color, facial asymmetries and makeup. (Maple et al., 2005)

Rhinoplasty performed after orthognathic surgery enables the soft tissue to stabilize and offers increased predictability of results, as the alar base stabilizes in its final position in the piriform aperture. (Sun & Steinbacher, 2018) However, there are also advantages in planning orthognathic surgery as concomitant with rhinoplasty, which leads to a single postoperative period with less discomfort and risk following anesthesia. (Seah et al., 2012) With regard to the perception of eye-tracking, a statistically significant difference was observed for the time until the first fixation in the lower third of the face between the pre-orthognathic (3A model 1) and post-orthognathic and rhinoplasty (3C model 1) images when laypersons observed the silhouettes. Finally, when comparing the total fixation time, there was no statistical difference between the AOIs.

With regard to the heat map results, the fixations occurred with greater intensity on the middle third of the face in both the preoperative and post-orthognathic surgery silhouettes, which presents a different result from that reported by Naini (Naini, Donaldson, McDonald, & Cobourne, 2012) who found less attention paid to the region of the eyes and nose, as well as that of studies that evaluated other facial deformities, in which greater attention was paid to the lower third of the face. Soft tissue change with increased nasal tilt is predictable to some degree and may be desirable for some patients. (Seah et al., 2012) In the results of the present study, the scores rose gradually, from the lowest to the highest preoperatively, after orthognathic surgery, and after rhinoplasty, respectively, in all silhouettes.

The SMUIS questionnaire used in the present study evaluated the integration of the use of Instagram in the daily lives of users, as well as their emotional connection to Instagram. (Jenkins-Guarnieri et al., 2013) The results with this questionnaire showed that the highest degrees of agreement were: "I don't like Instagram"; "Instagram is part of my routine"; and "I like to verify Instagram." Although the phrase "I respond to people's content on Instagram" is the most relevant, the other two phrases that follow with greater agreement raise concern about the quality of life of these users, as the constant use of Instagram over a long period of time can lead to depression and affect other aspects of psychological status, due to negative social comparisons. (Feinstein et al., 2013)

In the present study, individuals who reported spending more time on Instagram tended to give lower values to the attractiveness scores of the silhouettes. This indicates that the participants who reported more time on Instagram showed lower scores of the silhouettes. Some studies have explored the ways in which social media has influenced mental health (Berryman et al., 2018; Kim et al., 2018). However, the present study is a pioneer in its assessment of how time spent on Instagram influences the attractiveness affects the esthetic perception of participants when viewing cases of facial disharmony.

Some limitations in the study should be considered when interpreting the data. The present study presents results based on silhouettes; therefore, the results should be interpreted with caution, as esthetic evaluation involves several factors. In addition, the results of the questionnaires may not match the reality of the participant; however, validated questionnaires, and the application of the reliability tests, were used.

5. Conclusions

Individuals who reported spending more time on Instagram tended to rate the silhouettes' attractiveness with lower scores, and individuals who spent more time on Instagram displayed a higher average level of distress. It is suggested that further study be carried out with groups divided by gender, schooling, and with different age groups.

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