

## Original Investigation

# Effect of Facial Rejuvenation Surgery on Perceived Attractiveness, Femininity, and Personality

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**IMPORTANCE** To date, the conversation about facial rejuvenation surgery has focused on one goal: youthfulness. However, human beings are judged throughout life based on many other characteristics and personal qualities conveyed by their faces. The term *facial profiling* has been used to describe this act of determining personality attributes through visual observation.

**OBJECTIVES** To introduce the concept of facial profiling to the surgical literature and to evaluate and quantify the changes in personality perception that occur with facial rejuvenation surgery.

**DESIGN, SETTING, AND PARTICIPANTS** This study was a retrospective evaluation of preoperative and postoperative photographs of 30 white female patients who underwent facial rejuvenation surgery between January 1, 2009, and December 31, 2013. Procedures included rhytidectomy (face-lift), upper blepharoplasty, lower blepharoplasty, eyebrow-lift, neck-lift, and/or chin implant. The 60 photographs (30 preoperative and 30 postoperative) of these patients were split into 6 groups, each with 5 preoperative and 5 postoperative photographs. The same patient's preoperative and postoperative photographs were not included in any single group to avoid any recall bias. At least 24 individuals rated each photograph for 6 personality traits (aggressiveness, extroversion, likeability, trustworthiness, risk seeking, and social skills), as well as for attractiveness and femininity. The raters were blinded as to the intent of the study.

**MAIN OUTCOMES AND MEASURES** Ratings of personality traits, attractiveness, and femininity.

**RESULTS** Of the 8 traits that were evaluated, analysis revealed 4 traits with statistically significant improvements when comparing preoperative and postoperative scores: likeability (+0.36,  $P < .01$ ), social skills (+0.38,  $P = .01$ ), attractiveness (+0.36,  $P = .01$ ), and femininity (+0.39,  $P = .02$ ). Improvement in scores for perceived trustworthiness (+0.22,  $P = .06$ ), aggressiveness (−0.14,  $P = .32$ ), extroversion (+0.19,  $P = .14$ ), and risk seeking (+0.10,  $P = .27$ ) did not demonstrate statistically significant changes.

**CONCLUSIONS AND RELEVANCE** Facial plastic surgery changes the perception of patients by those around them. Traditionally, these interventions have focused on improvements in youthful appearance, but this study illuminates the other dimensions of a patient's facial profile that are influenced by facial rejuvenation surgery. The data in this sample population demonstrate an increase in the perception of likeability, social skills, attractiveness, and femininity. To our knowledge, this is the first study in the surgical literature to evaluate these broader outcome measures after facial rejuvenation surgery.

**LEVEL OF EVIDENCE** NA.

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The face is storied much beyond that of its age. Social scientists have identified some of the traits discernible from the face, including likeability, social skills, extroversion, trustworthiness, aggressiveness, and risk-seeking behavior.<sup>1</sup> While the relationship between facial features and personality perception has been well studied in the behavioral science and computer science fields, the conversation is notably lacking from the surgical literature. The purpose of this study is to evaluate and quantify the changes in personality perception that occur with facial rejuvenation surgery.

Researchers have looked at the face as an object of study because it can be very influential on a person's overall well-being.<sup>1-3</sup> The study of personality traits divides these traits into 2 categories: valence and dominance. Valence (ie, warmth or aura) describes the perception of an individual's intent for good or ill. Dominance (ie, competence) refers to the likelihood that a person will carry out his or her intentions.<sup>4-8</sup> These 2 universal dimensions account for 82% of the variance in perceptions of everyday social behaviors. Studies have shown that valence is more important to survival than dominance.<sup>4,9</sup> In other words, the ability to classify another person as either good or ill willed may be more important for survival than the ability to determine the likelihood that that person will carry out his or her intentions.

While emotional observations are conveyed by dynamic expressions, personality trait inferences are drawn from an individual's neutral expressions. It seems that facial cues used to make personality judgments are most likely an extension of the emotion(s) associated with that individual's resting expression.<sup>10-13</sup> Although there is little evidence that these inferences accurately reflect the actual personality of the observed face, it is not surprising that subtle changes in neutral facial appearances are powerful enough to alter judgments of personality.<sup>3-5,14-16</sup>

It is our hypothesis that facial rejuvenation surgery, much like computer modeling of an individual's photograph, will result in changes in personality perception. The purpose of this study was to evaluate and quantify these changes.

## Methods

After obtaining approval from the Georgetown University Medical Center Institutional Review Board, a medical record review was conducted of all white female patients undergoing facial rejuvenation by the 2 study surgeons (M.J.R. and S.P.D.) between January 1, 2009, and December 31, 2013. Only patients with preoperative and postoperative photographs demonstrating well-matched neutral facial expressions were included. Written consent had been obtained from all patients for the use of their photographs for research purposes. This resulted in 60 photographs (30 preoperative and 30 postoperative) that were used to create 6 sets of 10 photographs, with each set containing 5 preoperative and 5 postoperative photographs. Preoperative and postoperative photographs of the same patient were not included in any given photograph set in order to prevent any potential recall bias or direct compari-

son. Six online surveys were created using the sets of 10 photographs. Each of the 6 surveys was sent to at least 50 lay people, and at least 24 responses were received for each survey (overall response rate, 50.9%). The electronic survey included informed consent for the participants. Survey responses were gathered using the web-based survey tool Survey Monkey.

Respondents were asked to rate their perception of each of the pictured individuals' personality traits (aggressiveness, extroversion, likeability, trustworthiness, risk seeking, and social skills), attractiveness, and femininity. These specific parameters were selected based on traits previously identified as having valid reliability.<sup>14,15</sup> Answers were gathered using a 7-point Likert scale. Response choices were listed as strongly disagree, moderately disagree, disagree a little, neutral, agree a little, moderately agree, and strongly agree. The participants were blinded to the intent of the study and excluded physicians, other clinicians, and health care workers with experience in facial analysis and/or facial plastic surgery. A paired 2-tailed *t* test was used to evaluate the comprehensive data comparing preoperative and postoperative ratings for all patients. An unpaired *t* test was used to evaluate the data on each patient.

## Results

Overall, we had a 50.9% response rate (173 of 340 surveys), which is consistent with published benchmark averages and trends.<sup>17</sup> Scores for perceived femininity (+0.39, *P* = .02), social skills (+0.38, *P* = .01), attractiveness (+0.36, *P* = .01), and likeability (+0.36, *P* < .01) showed statistically significant improvements when evaluating all facial rejuvenation procedures together (upper blepharoplasty, lower blepharoplasty, brow-lift, rhytidectomy [face-lift], and/or neck-lift). Improvement in perceived trustworthiness (+0.22, *P* = .06), aggressiveness (-0.14, *P* = .32), extroversion (+0.19, *P* = .14), and risk-seeking (+0.10, *P* = .27) traits were not statistically significantly different between the preoperative and postoperative groups (Table 1). Not all of the group findings were generalizable to each patient. The patient in Figure 1 demonstrates the expected improvements in femininity (+0.69, *P* = .01) and attractiveness (+0.53, *P* = .03) after facial rejuvenation surgery, but she also had a statistically different perception of risk seeking (+0.96, *P* < .01) and trustworthiness (-0.46, *P* = .01) (Table 1).

When the analysis was performed on a procedure-specific basis, face-lift (Table 2) and lower blepharoplasty (Table 3) were the 2 procedures to show statistically significant changes in ratings. For face-lift procedures (done alone or in conjunction with other facial rejuvenation procedures), the same 4 traits of femininity (+0.47, *P* = .02), social skills (+0.42, *P* = .02), attractiveness (+0.41, *P* = .01), and likeability (+0.41, *P* = .01) were perceived as having positive changes. Figure 2 depicts a patient who underwent a face-lift and lower blepharoplasty and showed a trend toward improvement in these 4 traits, although her individual data did not show statistically significant changes (Table 2).

Table 1. Ratings for Patients Undergoing All Facial Rejuvenation Surgical Procedures

Patients	Rating		Net Rating Change	P Value
	Preoperative	Postoperative		
<b>All Patients (N = 30)</b>				
Aggressiveness	4.15	4.01	-0.14	.32
Extroversion	4.10	4.29	0.19	.14
Likeability	4.18	4.54	0.36	<.01
Risk seeking	3.88	3.98	0.10	.27
Social skills	4.23	4.61	0.38	.01
Trustworthiness	4.22	4.44	0.22	.06
Attractiveness	3.77	4.13	0.36	.01
Femininity	4.16	4.55	0.39	.02
<b>Patient in Figure 1</b>				
Aggressiveness	3.30	3.96	0.66	.08
Extroversion	5.13	5.08	-0.05	.85
Likeability	5.52	5.08	-0.44	.06
Risk seeking	3.83	4.79	0.96	<.01
Social skills	5.61	5.17	-0.44	.07
Trustworthiness	4.96	4.50	-0.46	.01
Attractiveness	5.26	5.79	0.53	.03
Femininity	5.48	6.17	0.69	.01

Figure 1. Preoperative and Postoperative Photographs of a Patient With Perceived Personality Changes After Comprehensive Facial Rejuvenation



A, Preoperative photograph.  
 B, Postoperative photograph. Upper blepharoplasty, lower blepharoplasty, face-lift, brow-lift, and chin implant were performed on this patient. Statistically significant changes were noted in scores for femininity (+0.69,  $P = .01$ ), attractiveness (+0.53,  $P = .03$ ), risk seeking (+0.96,  $P < .01$ ), and trustworthiness (-0.46,  $P = .01$ ).

For lower blepharoplasty, the positive change on perception of each of these 4 traits was even greater than for face-lift, with increased scores for femininity (+0.85,  $P < .01$ ), attractiveness (+0.66,  $P < .01$ ), social skills (+0.55,  $P = .03$ ), and likeability (+0.46,  $P = .04$ ). The patient in Figure 3 underwent upper and lower blepharoplasty and demonstrates significant rating increases in femininity (+1.17,  $P < .01$ ), attractiveness (+0.90,  $P < .01$ ), social skills (+0.66,  $P < .01$ ), and extroversion (+0.60,  $P = .01$ ) (Table 3).

Attempts were made to examine the data more closely to determine if there was an identifiable factor that may have yielded less favorable results. Unpaired  $t$  tests were performed for several different variables, including patient age at the time of surgery, preoperative attractiveness scores, the number of surgical procedures the patient underwent, and the surgeon performing the operation(s). None of these variables showed any statistically significant differences.

**Table 2. Ratings for Patients Undergoing Face-lift**

Patients	Rating		Net Rating Change	P Value
	Preoperative	Postoperative		
<b>All Patients (N = 22)</b>				
Aggressiveness	4.14	3.86	-0.28	.09
Extroversion	4.03	4.28	0.25	.12
Likeability	4.21	4.62	0.41	.01
Risk seeking	3.83	3.94	0.11	.37
Social skills	4.25	4.67	0.42	.02
Trustworthiness	4.26	4.51	0.25	.08
Attractiveness	3.84	4.25	0.41	.01
Femininity	4.23	4.70	0.47	.02
<b>Patient in Figure 2</b>				
Aggressiveness	3.63	3.40	-0.23	.59
Extroversion	4.81	4.84	0.03	.95
Likeability	5.22	5.44	0.22	.36
Risk seeking	4.00	4.29	0.29	.45
Social skills	5.27	5.48	0.21	.43
Trustworthiness	5.15	5.00	-0.15	.62
Attractiveness	3.93	4.60	0.67	.09
Femininity	4.70	5.16	0.46	.22

**Table 3. Ratings for Patients Undergoing Lower Blepharoplasty**

Patients	Rating		Net Rating Change	P Value
	Preoperative	Postoperative		
<b>All Patients (N = 13)</b>				
Aggressiveness	4.30	3.98	-0.32	.23
Extroversion	3.93	4.20	0.27	.27
Likeability	3.99	4.45	0.46	.04
Risk seeking	3.76	3.91	0.15	.38
Social skills	3.98	4.53	0.55	.03
Trustworthiness	4.05	4.39	0.34	.10
Attractiveness	3.56	4.22	0.66	<.01
Femininity	3.82	4.67	0.85	<.01
<b>Patient in Figure 3</b>				
Aggressiveness	4.15	4.65	0.50	.10
Extroversion	4.24	4.84	0.60	.01
Likeability	4.47	4.55	0.08	.77
Risk seeking	3.82	4.30	0.48	.08
Social skills	4.24	4.90	0.66	<.01
Trustworthiness	4.44	4.65	0.21	.43
Attractiveness	3.26	4.16	0.90	<.01
Femininity	3.63	4.80	1.17	<.01

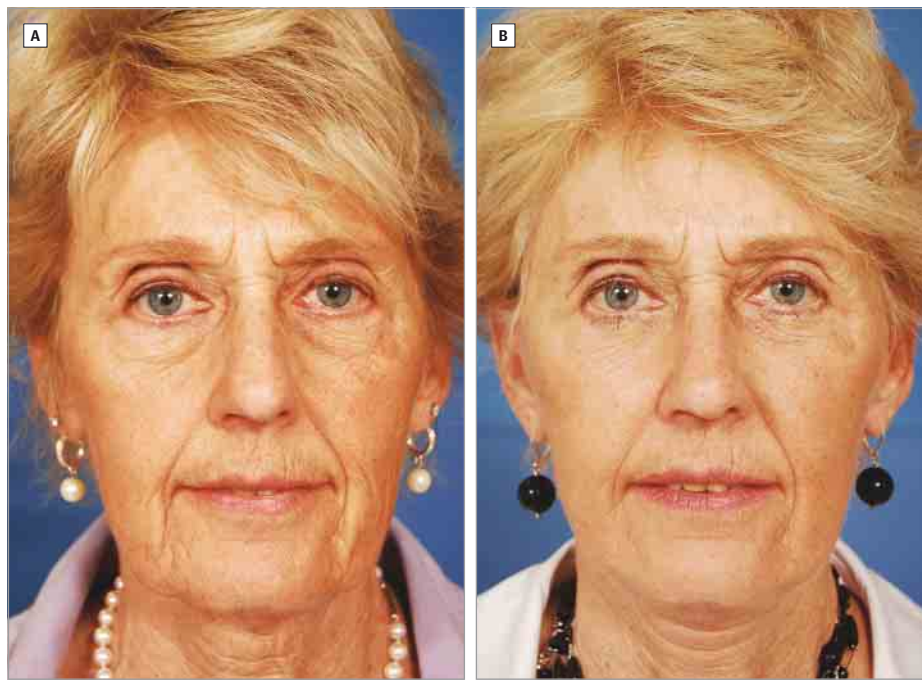
## Discussion

Attractiveness is a complex phenomenon that has been studied by social scientists for many years. It has been defined to include a combination of perceived intelligence, knowledge, morality, likeability, and desirability as either a friend or physical partner.<sup>5,18,19</sup> To date, the conversation about attractiveness as it relates to facial rejuvenation surgery has focused primarily on the trait of youthfulness, which is only one element of a much larger

picture.<sup>20,21</sup> We attempt to broaden the discussion about beauty by examining the more nuanced changes in facial personality profiling that occur when a patient undergoes a surgical intervention. In our sample of 30 white female patients undergoing facial rejuvenation surgery, the traits of likeability, social skills, attractiveness, and femininity were all favorably affected. Changes in scores for trustworthiness also approached significance.

The eyes and mouth have been identified as key triggers for the emotional response and judgment of an observer.<sup>14,18,21</sup> For example, the corner of the mouth is the diagnostic region for both

Figure 2. Preoperative and Postoperative Photographs of a Patient With Perceived Personality Changes After Face-lift and Lower Blepharoplasty



A, Preoperative photograph.  
B, Postoperative photograph. This patient showed a trend toward perceived increases in attractiveness (score change, +0.67,  $P = .09$ ), femininity (+0.46,  $P = .22$ ), risk seeking (+0.29,  $P = .45$ ), likeability (+0.22,  $P = .36$ ), and social skills (+0.21,  $P = .43$ ), although changes in her individual scores were not statistically significant.

Figure 3. Preoperative and Postoperative Photographs of a Patient With Perceived Personality Changes After Upper and Lower Blepharoplasty



A, Preoperative photograph.  
B, Postoperative photograph. This patient underwent upper and lower blepharoplasty. She demonstrated statistically significant improvements in scores for femininity (+1.17,  $P < .01$ ), attractiveness (+0.90,  $P < .01$ ), social skills (+0.66,  $P < .01$ ), and extroversion (+0.60,  $P = .01$ ).

happy and surprised expressions and plays an important role in the perception of personality traits, such as extroversion.<sup>6</sup> A subtle upturn of the mouth and fullness in the cheeks can make a person look more intelligent and socially skilled.<sup>14,18</sup> This appearance may explain why patients undergoing a face-lift procedure, which may subtly affect the position of the oral commissure, are found

to be significantly more likeable and socially skilled postoperatively. The eyes are highly diagnostic for attractiveness as well as for trustworthiness,<sup>22</sup> which may explain why, in our patient population, patients undergoing lower blepharoplasty were found to be significantly more attractive and feminine and had a trend toward improved trustworthiness as well.

Not all patients experienced a positive change in the perception of their personality traits, femininity, and attractiveness postoperatively. While there was no identifiable variable that was shown to convey worse outcomes in this small patient sample, clearly more research is needed in this area.

There are several limitations to this study. All patients were white women in order to eliminate sex and racial biases, but this demographic restriction limits the applicability of the data. In addition, most patients underwent more than one procedure, making it difficult to draw conclusions from procedure-specific data. The patients in this study group also agreed to have their photographs used for research purposes, which may create a selection bias. While there was strong statistical significance to the data, a larger patient population would be desirable for more conclusive findings. Last, there may have been personality differences among the raters, which could have influenced their perception of the photographs.<sup>23</sup>

## Conclusions

The comprehensive evaluation and treatment of the patient who undergoes facial rejuvenation requires a broader understanding of the many changes in perception that are likely to occur with surgical intervention. The face is not defined by youth alone. There are many more nuanced and personal elements that must be considered, such as the changes in femininity, attractiveness, likeability, and social skills seen in this patient cohort. While this study demonstrates that there are clearly changes to an individual's perception that occur beyond perceived youth, more studies are needed to discern the specifics of how each surgical procedure may affect the perception of these traits. As we gain more specific knowledge about these changes in perception, we will be able to improve outcomes for our patients.

### ARTICLE INFORMATION

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*Study concept and design:* Reilly, Tomsic.

*Acquisition, analysis, or interpretation of data:* All authors.

*Drafting of the manuscript:* Reilly, Tomsic.

*Critical revision of the manuscript for important intellectual content:* All authors.

*Statistical analysis:* Reilly, Tomsic, Fernandez.

*Administrative, technical, or material support:* Davison.

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