Assessing Demographic Differences in Patient-Perceived Improvement in Facial Appearance and Quality of Life Following Rhinoplasty

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Abstract

Background: As rhinoplasty patient demographics evolve, surgeons must consider the impact of demographics on patient satisfaction.
Objectives: The objective of this study was to identify independent demographic predictors of differences in satisfaction with appearance and quality of life following rhinoplasty utilizing the FACE-Q patient-reported outcome instrument.
Methods: Patients presenting for rhinoplasty completed the following FACE-Q scales: Satisfaction with Facial Appearance, Satisfaction with Nose, Social Function, and Psychological Well-being. Higher FACE-Q scores indicate greater satisfaction with appearance or superior quality of life. Pre- and post-treatment scores were compared in the context of patient demographics.
Results: The scales were completed by 59 patients. Women demonstrated statistically significant improvements in Satisfaction with Facial Appearance and quality of life while men only experienced significant improvement in Satisfaction with Facial appearance. Caucasians demonstrated statistically significant improvement in Satisfaction with Facial Appearance and quality of life while non-Caucasians did not. Patients younger than 35 years old were more likely to experience enhanced Satisfaction with Facial Appearance and quality of life compared with patients older than 35 years old. Patients with income ≥$100,000 were more likely to experience significant increases in Satisfaction with Facial Appearance and quality of life than patients with incomes <$100,000.
Conclusions: In an objective study using a validated patient-reported outcome instrument, the authors were able to quantify differences in the clinically meaningful change in perception of appearance and quality of life that rhinoplasty patients gain based on demographic variables. The authors also demonstrated that these variables are potential predictors of differences in satisfaction.

Level of Evidence: 3

Rhinoplasty continues to be one of the most popular cosmetic surgical procedures performed, ranking as the fifth most common cosmetic surgical procedure in 2013.[1] Therefore, while rhinoplasty was once considered an extravagance reserved for wealthy young Caucasian women, the procedure now transcends all gender, ethnic, age, and socioeconomic lines. In 2013, men accounted for nearly 20% of all rhinoplasty procedures and non-Caucasians accounted for nearly 30% of these procedures. Additionally, the age of rhinoplasty consumers is broad, with nearly half of all patients between the ages of 19 and 34 and the other half of patients either younger than 19 or older than 34.[1,2]

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Given the ongoing popularity of rhinoplasty, as well as the movement toward greater implementation of evidence-based medicine, it is essential that the plastic surgery community collects information about procedural outcomes, with the goal of enhancing procedural transparency. In contrast to other fields of medicine and surgery, objective measures of outcome (eg, physical function and health status) are not as important when evaluating cosmetic procedures.[3-6] Rather, the primary measures of success are enhanced satisfaction with appearance and improved quality of life, including social confidence and psychological well-being.[7]

As rhinoplasty patient demographics continue to evolve, surgeons must consider and be knowledgeable regarding the impact of patient demographics on the level of patient satisfaction associated with rhinoplasty outcomes. However, no study has ever been conducted that adequately describes demographic differences in improvement in satisfaction with appearance and quality of life following rhinoplasty utilizing a validated patient-reported outcome (PRO) instrument. Therefore, the objective of this study was to identify independent demographic predictors of differences in satisfaction with facial appearance, satisfaction with nose appearance, and quality of life following rhinoplasty utilizing the FACE-Q PRO instrument.

METHODS

Institutional review board approval was obtained from the New School of Social Research (New York, NY) prior to study initiation. This study was conducted using the FACE-Q, a new validated, reliable, and responsive PRO instrument composed of over 40 independently functioning scales that measure outcomes and concepts important to patients undergoing facial aesthetic procedures, both surgical and nonsurgical, including appearance appraisal, quality of life, and process of care.[5,8-11]

As part of the larger FACE-Q validation study, patients presenting for rhinoplasty from a single academic center in Washington DC, MedStar Georgetown University Hospital, from October 2010 through May 2014 were asked to complete the following FACE-Q scales:

(1) **Satisfaction with Facial Appearance**: This scale measures patient satisfaction with the overall appearance of their face using items that ask, for example, about facial symmetry and profile. Four response options are provided (ie, Very Dissatisfied, Somewhat Dissatisfied, Somewhat Satisfied, Very Satisfied).
(2) **Social Function**: This scale has a series of positively worded statements (eg, I am comfortable meeting new people) that measure social confidence. Instructions ask that respondents answer with facial appearance in mind. Four response options are provided (ie, Definitely

Agree, Somewhat Agree, Somewhat Disagree, Definitely Disagree).
(3) **Psychological Well-being**: This scale measures psychological well-being in terms of a series of positively worded statements (eg, I feel happy). Instructions ask that respondents answer with facial appearance in mind. Four response options are provided (ie, Definitely Agree, Somewhat Agree, Somewhat Disagree, Definitely Disagree).
(4) **Satisfaction with Nose**: This scale measures patient satisfaction with the appearance of their nose using items that ask, for example, about nose size and shape. Four response options are provided (ie, Very Dissatisfied, Somewhat Dissatisfied, Somewhat Satisfied, Very Satisfied).

The FACE-Q scales ask patients to answer scale items with facial appearance in mind.

Inclusion criteria included all patients presenting for cosmetic rhinoplasty, including primary and revision rhinoplasty. Exclusion criteria included patients presenting for reconstructive rhinoplasty (ie, cleft lip and/or palate-associated rhinoplasty, post-traumatic rhinoplasty).

Patients completed the scales either at the time of their preoperative consultation and/or at postoperative follow-up visits while in the office. For patients who completed the FACE-Q scales at multiple postoperative visits, only the most recent FACE-Q scale completed was used for data analysis. Additionally, the following demographic data were collected: age, gender, race/ethnicity, and annual household income. As not all patients completed the FACE-Q both pre- and postrhinoplasty, relevant demographic variables, including gender, age, race, primary vs revision rhinoplasty, and annual household income, were compared between the pre- and postrhinoplasty groups in order to determine the level of similarity and comparability between the 2 groups of patients.

Rasch transformed scores[12] (range, 0-100) were calculated for each patient for each completed scale. FACE-Q scores for the previously validated FACE-Q scales (Satisfaction with Facial Appearance, Social Function, and Psychological Well-being) were compared pre- and postrhinoplasty in the context of patient demographics (gender, race, age, income) using a mixed linear regression model, with the dependent variable being the FACE-Q scale score and adjusted for the following relevant covariates based on the model being studied: age, gender, race, income, and primary vs revision rhinoplasty. As the Satisfaction with Nose scale has not yet been validated, we analyzed mean scale item responses (scale of 1-4) pre- to postrhinoplasty in the mixed linear regression model. A mixed linear regression model was useful for this analysis as most patients completed the FACE-Q either at the time of their preoperative consultation or at postoperative visit(s) (only a subset of patients completed the FACE-Q at both the time of the preoperative consultation

and during postoperative visits), and the model allows for including patients with missing data.

Higher FACE-Q scores (either Rasch transformed or mean item responses) indicate greater satisfaction with facial or nose appearance or superior quality of life (Social Confidence or Psychological Well-being). *P*-values < .05 were considered significant. Data analysis was conducting using SPSS Version 21.0 software (IBM Corporation).[13]

RESULTS

Sixty-one patients presented for cosmetic rhinoplasty, of which 59 completed the FACE-Q scales (Table 1). Fifteen patients completed the FACE-Q both pre- and postrhinoplasty,

while the remaining patients completed either prerhinoplasty or postrhinoplasty. Among patients completing the scales postrhinoplasty, the mean postoperative follow-up period was 6.5 months (range, 1-33 months). Fourteen patients (23.7%) presented for revision (nonprimary) rhinoplasty. Patients had a mean age of 30.1 years (SD 11.1 years), tended to be women (n = 42, 71.2%), and Caucasian (white non-Hispanic) (n = 40, 67.8%). Nearly equal number of patients reported annual household income either < $100,000 or ≥$100,000. Notably the 2 groups of patients, pre- and postrhinoplasty, were very similar, and thus comparable, in regards to gender, age, race, income, and primary vs revision rhinoplasty, with no differences even approaching statistical significance (Table 2).

Table 1. Rhinoplasty Patient Demographics

N	59
Length of Time from Rhinoplasty to FACE-Q completion	
Mean, (range, SD) (months)	6.5 (1-33, 6.6)
Revision Rhinoplasty	
Yes	14 (23.7%)
No	45 (76.3%)
Gender	
Women	42 (71.2%)
Men	14 (23.7%)
No answer provided	3 (5.1%)
Age	
Mean (SD) (years)	30.1 (11.2)
Less than 25 years old (%)	20 (33.9%)
25-35 years old	21 (35.6%)
Greater than 35 years old	15 (25.4%)
No answer provided	3 (5.1%)
Race/Ethnicity	
Caucasian (white non-Hispanic)	40 (67.8%)
Non-Caucasian	13 (22.0%)
No answer provided	6 (10.2%)
Annual Household Income	
Less than $100,000	20 (33.9%)
Greater than/equal to $100,000	19 (32.2%)
No answer provided	20 (33.9%)

SD, standard deviation.

Table 2. Pre- vs Postrhinoplasty Patient Demographics

	Prerhinoplasty N	Postrhinoplasty N	*P*-value
Revision rhinoplasty			
Yes	9 (19.6%)	8 (26.7%)	.47
No	37 (80.4%)	22 (73.3%)	
Gender			
Women	32 (69.6%)	24 (80.0%)	.58
Men	11 (23.9%)	6 (20.0%)	
No answer provided	3 (6.5%)	–	
Age			
Mean (SD) (years)	29.8 (10.9)	30.0 (11.9)	.94
Less than 25 years old (%)	14 (30.4%)	13 (43.3%)	
25-35 years old	19 (41.3%)	8 (26.7%)	.31
Greater than 35 years old	10 (21.7%)	9 (30.0%)	
No answer provided	3 (6.5%)	–	
Race			
White non-Hispanic (%)	31 (67.4%)	24 (82.8%)	.47
Other	10 (21.7%)	5 (17.2%)	
No answer provided	5 (10.9%)	–	
Income			
<$100,000 (%)	15 (32.6%)	11 (36.7%)	.49
≥$100,000	13 (28.2%)	14 (46.7%)	
No answer provided	18 (39.1%)	5 (16.7%)	

SD, standard deviation.

FACE-Q Scores: Gender

Women demonstrated a statistically significant increase in Satisfaction with Facial Appearance pre- to postrhinoplasty, from 45.9 to 71.7 ($P < .01$) (Table 3). Men demonstrated a statistically significant increase from 43.4 to 81.5 ($P = .03$). Women also demonstrated statistically significant increases in all Satisfaction with Nose scale items ($P < .01$ for all), while men demonstrated a statistically significant increase in satisfaction with nose "shape" ($P = .03$), but not in the other 4 items.

Women also experienced statistically significant increases pre- to postrhinoplasty in Social Confidence ($+15.6$, $P = .045$) and Psychological Well-being ($+18.7$, $P < .01$), demonstrating enhanced quality of life following the procedure. However, men demonstrated smaller degrees of improvement in both scales, neither of which were statistically

Table 3. Rhinoplasty Patient FACE-Q Scores: Gender

FACE-Q Scale (Range, 0-100)	Prerhinoplasty			Postrhinoplasty			Pre vs Post	
	N	Mean (SD)	Adjusted Mean[a]	N	Mean (SD)	Adjusted Mean[a]	Δ	P-value
Satisfaction with facial appearance								
Women	32	45.6 (12.0)	45.9	24	71.7 (21.5)	71.2	+25.3	<.01*
Men	9	49.4 (22.1)	43.4	6	72.3 (23.2)	81.5	+38.1	.03*
Social function								
Women	30	59.2 (28.5)	58.7	23	73.7 (23.2)	74.3	+15.6	.045*
Men	8	76.0 (21.7)	73.3	6	76.2 (26.7)	79.7	+6.4	.67
Psychological well-being								
Women	30	60.5 (19.1)	60.7	23	78.2 (20.3)	78.0	+18.7	<.01*
Men	8	74.9 (17.6)	70.0	6	81.0 (27.4)	87.5	+17.5	.28
Satisfaction with nose items (range, 1-4)								
"Size"								
Women	30	2.0 (1.0)	2.1	23	3.2 (1.0)	3.2	+1.1	<.01*
Men	7	2.3 (1.0)	2.1	6	3.2 (0.8)	3.3	+1.2	.08
"Shape"								
Women	29	1.7 (0.8)	1.7	23	3.2 (1.0)	3.2	+1.5	<.01*
Men	7	2.0 (1.0)	1.7	6	3.2 (1.0)	3.5	+1.2	.03*
"Profile"								
Women	30	1.6 (1.0)	1.6	23	3.4 (0.8)	3.4	+1.8	<.01*
Men	7	2.1 (1.1)	1.9	6	3.0 (0.9)	3.3	+1.4	.10
"In the mirror"								
Women	30	1.7 (0.8)	1.7	23	3.3 (0.8)	3.3	+1.6	<.01*
Men	7	2.3 (1.0)	2.1	6	3.2 (1.0)	3.4	+1.1	.11
"In photos"								
Women	30	1.5 (0.6)	1.5	23	3.2 (0.8)	3.2	+1.7	<.01*
Men	7	2.3 (1.0)	2.1	6	3.2 (1.0)	3.4	+1.3	.12

SD, standard deviation; Δ, difference between the pre- and post-mean scores. [a]The "Adjusted" mean scores were calculated using a mixed linear regression model which included the factor pre- vs postrhinoplasty and covariates: age, race, income, and primary vs revision rhinoplasty. *P-value is significant (<.05).

significant, indicating no significant change in quality of life following rhinoplasty.

FACE-Q Scores: Race/Ethnicity

Caucasians (white non-Hispanics) experienced statistically significant increases in Satisfaction with Facial Appearance (+29.1, $P <$ .01) and all 5 Satisfaction with Nose items following rhinoplasty ($P <$ .01 for all) (Table 4). However, while non-Caucasians demonstrated an increase in Satisfaction with Facial Appearance, this change was not statistically significant (+15.8, $P =$ .17). Additionally, while non-Caucasians demonstrated a statistically significant increase in satisfaction with nose "in the mirror" (+1.3, $P =$ .04), they did not do so in the other 4 items.

Caucasians demonstrated statistically significant improvements in both quality of life scales pre- to postrhinoplasty ($P <$ .01 for Social Confidence and Psychological Well-being). However, non-Caucasians did not experience statistically significant increases in either quality-of-life scale.

FACE-Q Scores: Age

Both patients younger than 25 years old and those aged 25 to 35 years old demonstrated statistically significant increases in Satisfaction with Facial Appearance pre- to postrhinoplasty, while patients greater than 35 years old did not (Table 5). Patients between the ages of 25 and 35 had the highest postoperative satisfaction with facial appearance (77.4), followed by patients younger than 25 (73.8), and lastly patients older than 35 (63.0). All 3 age groups also experienced improved Satisfaction with Nose appearance. This improvement was statistically significant among patients under 25 years old and those between 25 and 35 years old in all 5 Satisfaction with Nose items. However, among patients older than 35, this improvement was only statistically significant in Satisfaction with Nose "in photos" (+1.3, $P =$ .049), but not in the other 4 items.

All 3 age groups experienced increases in quality of life following rhinoplasty. However, the increases were much greater in the 2 younger age groups compared with the older age group. Regarding Social Confidence, patients between 25 and 35 years old had the greatest postrhinoplasty score at 81.7 (+20.9, $P =$ .08), followed by patients younger than 25 years old at 78.1 (+17.6, $P =$ .15), and lastly those greater than 35 years old at 67.9 (+6.8, $P =$ .71). Patients less than 25 years old had the greatest increase in Psychological Well-being following rhinoplasty at 87.7, which also was statistically significant (+31.9, $P <$ .01), followed by those between 25 and 35 years old at 78.4 (+11.1, $P =$ .09), and those greater than 35 years old at 67.0 (+4.8, $P =$ .75).

FACE-Q Scores: Annual Income

Both patients with household incomes <$100,000 and those with household incomes ≥$100,000 experienced statistically significant improvements in both Satisfaction with Facial Appearance and all Satisfaction with Nose items preto postrhinoplasty (Table 6).

Both income groups also exhibited enhanced Social Confidence and Psychological Well-being following the procedure. These increases were statistically significant among the higher-income patients in Psychological Well-being (+28.5, $P <$ .01) and approached statistical significance in Social Confidence (+18.7, $P =$ .05). However, among the lower-income patients, these differences were not statistically significant in either quality-of-life scale (+17.4, $P =$ .18 for Social Confidence; +13.3, $P =$ .12 for Psychological Well-being).

DISCUSSION

Although it may have historically been acceptable for plastic surgeons to impose their aesthetic preferences upon patients, the movement of medicine towards a patient-centered approach has made this approach antiquated. Patients seeking rhinoplasty span a wide range of cultures and backgrounds. Thus, although harmony and symmetry are the ultimate goals of any cosmetic surgery, patients seek a variety of desired objectives and outcomes. There is no 1 universal result that appeals equally to all patients, even patients of similar backgrounds. Every procedure must be tailored to each individual patient.

As the cosmetic patient population continues to diversify, it is important that surgeons collect PRO data relevant to different groups of patients. By reviewing PRO data, surgeons can see where and among which groups they are achieving surgical success and, conversely, where and among which groups they are not. This information is valuable in that it provides feedback to surgeons and also allows surgeons to set realistic expectations for new patients based upon prior outcomes demonstrated among similar patients. PRO data can enhance physician-patient communication and transparency in the ever-important presurgical consultation.[14]

Rhinoplasty continues to be 1 of the most complex and technically demanding of all cosmetic procedures. Many factors influence patient expectations and subsequent satisfaction with the procedure. These include culture and life experiences. The evolving demographic trends have made this procedure even more complicated by diversifying the facial proportions and cosmetic objectives of patients. The results of this study demonstrate that demographic variables, including gender, age, ethnicity, and income also influence expectations and satisfaction. Understanding the unique expectations and projected level of satisfaction and

Table 4. Rhinoplasty Patient FACE-Q Scores: Race/Ethnicity

FACE-Q Scale (Range, 0-100)	Prerhinoplasty			Postrhinoplasty			Pre vs Post	
	N	Mean (SD)	Adjusted Mean[a]	N	Mean (SD)	Adjusted Mean[a]	Δ	P-value
Satisfaction with facial appearance								
Caucasian	31	44.1 (13.0)	44.2	24	73.5 (22.0)	73.3	+29.1	<.01*
Non-Caucasian	10	53.7 (17.4)	51.8	5	63.8 (18.4)	67.6	+15.8	.17
Social function								
Caucasian	29	59.0 (26.8)	59.0	24	74.0 (21.8)	73.9	+14.9	<.01*
Non-Caucasian	9	74.6 (29.4)	67.7	5	75.6 (33.6)	87.9	+20.2	.25
Psychological well-being								
Caucasian	29	61.1 (19.5)	61.2	24	78.7 (21.5)	78.6	+17.4	<.01*
Non-Caucasian	9	71.3 (18.2)	67.8	5	79.2 (23.3)	85.8	+18.0	.18
Satisfaction with nose items (range, 1-4)								
"Size"								
Caucasian	27	2.0 (0.9)	2.1	24	3.3 (0.9)	3.2	+1.1	<.01*
Non-Caucasian	10	2.2 (1.0)	2.1	5	3.0 (1.0)	3.1	+1.0	.18
"Shape"								
Caucasian	27	1.6 (0.6)	1.6	24	3.2 (0.9)	3.2	+1.6	<.01*
Non-Caucasian	9	2.3 (1.1)	2.3	5	3.2 (1.1)	3.3	+1.0	.23
"Profile"								
Caucasian	27	1.6 (0.8)	1.5	24	3.3 (0.8)	3.3	+1.8	<.01*
Non-Caucasian	10	2.3 (1.2)	2.3	5	3.2 (0.8)	3.3	+1.0	.16
"In the mirror"								
Caucasian	27	1.7 (0.8)	1.8	24	3.3 (0.9)	3.3	+1.5	<.01*
Non-Caucasian	10	2.1 (1.0)	2.0	5	3.2 (0.8)	3.3	+1.3	.04*
"In photos"								
Caucasian	27	1.5 (0.6)	1.5	24	3.3 (0.8)	3.2	+1.7	<.01*
Non-Caucasian	10	2.1 (0.9)	2.0	5	2.8 (0.8)	3.0	+1.0	.08

SD, standard deviation; Δ, difference between the pre- and post-mean scores. [a]The "Adjusted" mean scores were calculated using a mixed linear regression model which included the factor Pre vs Post-rhinoplasty and covariates: age, gender, income, and primary vs revision rhinoplasty. *P-value is significant (<.05).

how these demographics influence outcomes is essential if surgeons are to continue producing aesthetically pleasing results among a broad and diverse patient population and to understand which patients are likely to benefit most by undergoing rhinoplasty. Although there were some differences in the levels of satisfaction and degrees of improvement, nearly all groups of patients in this study demonstrated improvement in satisfaction with facial and nose appearance and quality of life following rhinoplasty. Regardless of the

differences in satisfaction experienced in this study, 1 thing is clear: virtually all groups of patients are happy following rhinoplasty.

Although women continue to account for the vast majority of rhinoplasty patients, the number of men undergoing rhinoplasty is increasing. Therefore, we examined differences in satisfaction according to gender. One of the major findings of this article is the improvement in quality of life by women following rhinoplasty versus the lack of

Table 5. Rhinoplasty Patient FACE-Q Scores: Age

FACE-Q Scale (Range, 0-100)	Prerhinoplasty			Postrhinoplasty			Pre vs Post	
	N	Mean (SD)	Adjusted Mean[a]	N	Mean (SD)	Adjusted Mean[a]	Δ	*P*-value
Satisfaction with facial appearance								
Less than 25 years old	13	47.4 (11.9)	47.7	13	74.1 (17.4)	73.8	+26.1	<.01*
Between 25 and 35 years old	19	47.0 (10.9)	47.1	8	77.6 (17.1)	77.4	+30.3	<.01*
Greater than 35 years old	9	43.8 (23.9)	43.3	8	62.4 (29.6)	63.0		.21
Social Function								
Less than 25 years old	11	65.4 (28.0)	60.5	13	74.0 (22.7)	78.1	+17.6	.15
Between 25 and 35 years old	18	60.7 (28.3)	60.8	8	81.9 (17.9)	81.7	+20.9	.08
Greater than 35 years old	9	63.4 (29.8)	61.1	7	64.5 (30.4)	67.9	+6.8	.71
Psychological well-being								
Less than 25 years old	11	57.7 (21.1)	55.8	13	86.1 (17.8)	87.7	+31.9	<.01*
Between 25 and 35 years old	18	67.1 (16.0)	67.3	8	78.8 (14.6)	78.4	+11.1	.09
Greater than 35 years old	9	63.7 (24.0)	62.2	7	65.1 (29.8)	67.0	+4.8	.75
Satisfaction with nose items (range, 1-4)								
"Size"								
Less than 25 years old	11	1.9 (0.8)	1.9	13	3.5 (0.8)	3.4	+1.5	<.01*
Between 25 and 35 years old	18	2.2 (1.0)	2.2	8	3.3 (0.9)	3.3	+1.1	.02*
Greater than 35 years old	8	2.1 (1.0)	2.0	8	2.8 (1.0)	2.9	+0.9	.07
"Shape"								
Less than 25 years old	11	1.6 (0.5)	1.6	13	3.5 (0.8)	3.5	+1.9	<.01*
Between 25 and 35 years old	17	1.9 (0.9)	1.9	8	3.3 (0.9)	3.1	+1.2	<.01*
Greater than 35 years old	8	1.8 (1.0)	1.6	8	2.8 (1.2)	2.9	+1.3	.05
"Profile"								
Less than 25 years old	11	1.8 (1.0)	1.7	13	3.3 (0.5)	3.4	+1.7	<.01*
Between 25 and 35 years old	18	1.6 (0.9)	1.6	8	3.6 (0.7)	3.6	+2.0	<.01*
Greater than 35 years old	8	2.0 (1.2)	1.8	8	2.9 (1.1)	3.0	+1.2	.10
"In the mirror"								
Less than 25 years old	11	1.7 (0.6)	1.9	13	3.3 (0.6)	3.2	+1.3	<.01*
Between 25 and 35 years old	18	1.9 (0.9)	1.9	8	3.6 (0.7)	3.6	+1.7	<.01*
Greater than 35 years old	8	1.9 (1.0)	1.8	8	2.9 (1.1)	2.9	+1.1	.10
"In photos"								
Less than 25 years old	11	1.6 (0.5)	1.5	13	3.3 (0.8)	3.4	+1.9	<.01*
Between 25 and 35 years old	18	1.6 (0.7)	1.6	8	3.3 (0.9)	3.2	+1.6	<.01*
Greater than 35 years old	8	1.9 (1.0)	1.7	8	2.9 (1.0)	3.0	+1.3	.049*

SD, standard deviation; Δ, difference between the pre- and post-mean scores. [a]The "Adjusted" mean scores were calculated using a mixed linear regression model which included the factor pre- vs postrhinoplasty and covariates: gender, race, income, and primary vs revision rhinoplasty. *P*-value is significant (<0.05).

Table 6. Rhinoplasty Patient FACE-Q Scores: Annual Household Income

FACE-Q Scale (Range, 0-100)	Prerhinoplasty			Postrhinoplasty			Pre vs Post	
	N	Mean (SD)	Adjusted Mean[a]	N	Mean (SD)	Adjusted Mean[a]	Δ	P-value
Satisfaction with facial appearance								
<$100,000	15	45.3 (14.0)	44.2	11	70.0 (16.3)	71.6	+27.4	<.01*
≥$100,000	13	45.1 (14.0)	45.0	14	74.4 (25.1)	74.5	+29.5	<.01*
Social function								
<$100,000	14	62.3 (31.1)	61.3	11	77.4 (22.1)	78.7	+17.4	.18
≥$100,000	12	50.8 (21.4)	54.4	14	76.2 (23.5)	73.1	+18.7	.05
Psychological well-being								
<$100,000	14	60.9 (20.5)	59.5	11	71.0 (16.5)	72.8	+13.3	.12
≥$100,000	12	56.3 (18.7)	57.6	14	87.3 (22.4)	86.1	+28.5	<.01*
Satisfaction with nose items (range, 1-4)								
"Size"								
<$100,000	15	2.2 (0.9)	2.2	11	3.2 (0.9)	3.1	+0.9	.03*
≥$100,000	11	2.0 (1.0)	2.1	14	3.1 (0.9)	3.1	+1.0	.03*
"Shape"								
<$100,000	14	1.7 (0.9)	1.7	11	3.0 (1.0)	3.0	+1.3	<.01*
≥$100,000	11	1.6 (0.7)	1.7	14	3.4 (0.9)	3.3	+1.6	<.01*
"Profile"								
<$100,000	15	1.8 (1.0)	1.8	11	3.4 (0.7)	3.4	+1.6	<.01*
≥$100,000	11	1.4 (0.9)	1.4	14	3.3 (0.9)	3.3	+1.9	<.01*
"In the mirror"								
<$100,000	15	1.7 (0.7)	1.6	11	3.2 (0.8)	3.3	+1.7	<.01*
≥$100,000	11	1.9 (0.9)	1.9	14	3.3 (0.9)	3.3	+1.4	<.01*
"In photos"								
<$100,000	15	1.6 (0.6)	1.6	11	2.9 (0.8)	2.9	+1.3	<.01*
≥$100,000	11	1.4 (0.5)	1.4	14	3.4 (0.8)	3.3	+1.9	<.01*

SD, standard deviation; Δ, difference between the pre- and post-mean scores. [a]The "Adjusted" mean scores were calculated using a mixed linear regression model which included the factor pre- vs postrhinoplasty and covariates: age, gender, race, and primary vs revision rhinoplasty. *P-value is significant (<.05).

improvement in men. This result has been seen in another study,[15] which utilized pre- and postrhinoplasty psychiatric interviews and psychological tests, and found a highly significant statistical association between improved "social outcome" and being a woman. The authors concluded from this association that women are likely more capable than men of "becoming aware of the social benefits of a surgically-produced physical improvement." However, the authors fail to provide arguments or evidence for why this

may be the case. While the results of the present study seem to concur with those of the previous study, the issue of gender in cosmetic surgery must be further studied and analyzed to provide the surgical community with a clearer explanation of the differences seen between female vs male patients.

As the United States continues to become more racially and ethnically diverse, with non-Caucasians expected to become the majority in less than 30 years,[16] the number of

non-Caucasians undergoing cosmetic surgery procedures will continue to increase as well. With this dramatic shift in mind, it is imperative that surgeons have an appreciation for various concepts of aesthetic beauty and preferences among different races and ethnicities. Therefore we compared patient satisfaction and quality of life in the context of race. Interestingly, we found that non-Caucasians were less likely to demonstrate a significant improvement in satisfaction with appearance of their nose following rhinoplasty than Caucasians. It is possible that non-Caucasians have different expectations than Caucasians, indicating that perhaps surgeons should approach these cases differently than they would for Caucasians. These are questions that should be further studied.

As mentioned earlier, patients presenting for rhinoplasty represent a broad range of ages, from teenagers to those nearing old age. Thus, age-related differences in outcomes should be understood. In this study, patients in the oldest group, those greater than 35, did not experience statistically significant improvements in satisfaction with facial appearance or nose (exception nose "in photos") unlike patients in the 2 younger age groups. The older patients did not experience a statistically significant enhancement in quality of life either. One possible explanation for this result is that as any alteration in the nose can have a profound impact on facial appearance, older patients are the least likely to be comfortable and to react positively to major changes in facial appearance post-rhinoplasty, as older individuals have "lived" with and become accustomed to their face the most. Older patients are more "set" on who they are and how they look, and thus, they are more likely to experience difficulty in adapting to major changes in facial appearance following the procedure than younger patients who are accustomed to changes in facial appearance as they mature from child to teen and finally to adult. Another possible reason for the lower levels of improvement among patients greater than 35 might be related to the fact that as patients age, they may become dissatisfied with additional areas of facial appearance. Thus, while a 22-year-old patient may only be concerned with his or her nose, a 45-year-old patient might be concerned with increasing facial lines, loss of cheek fullness, bags under the eyes, etc. Providing this 45-year-old patient with a rhinoplasty will not make him or her any less concerned about other facial issues. Therefore, concern about additional facial appearance areas might also explain the lower levels of satisfaction with facial appearance and quality of life demonstrated by older patients in this study. Based on these findings, older patients may require more detailed preoperative guidance with complete information on the limitations and impact of the surgery to ensure that a satisfactory outcome is achieved.

Another possible explanation for the lower levels of improvement in satisfaction seen among older patients compared with younger patients, is that often patients who wait to undergo rhinoplasty until an older age may have noses with less severe problems and thus deferred correction to a later date. Thus, those patients who underwent rhinoplasty later in life may not achieve as significant an improvement in satisfaction, as their noses did not require a "dramatic" improvement to begin with. Thus, it is possible that most severe rhinoplasty cases are done while patients are relatively young, which is why satisfaction improves more among younger patients than older patients.

Another study[17] used a different PRO instrument, the Rhinoplasty Outcome Evaluation (ROE) instrument,[18,19] which is composed of 6 questions regarding physical, emotional, and social domains, to measure patient satisfaction following rhinoplasty. In contrast to the results seen here, the authors found no significant differences in mean improvement following rhinoplasty in satisfaction with appearance or quality of life when comparing scores by age. However, unlike the present study, their study population was divided into 2 groups: those < 30 years old and those ≥30 years old, which may account for the different results.

As rhinoplasty is an elective procedure not typically covered by insurance, one of the goals of this study was to better delineate differences in patient satisfaction in the context of income. In this study, patients with higher income, ie, those with household incomes ≥$100,000, had greater post-rhinoplasty Satisfaction with Facial Appearance than the lower income group, and they also experienced statistically significant increases in Social Confidence and Psychological Well-being, while the lower income group did not. One potential explanation for these results is that as patients in the lower income group must apportion a larger portion of their income to undergo rhinoplasty, it is possible that these patients have greater expectations and are less likely to be pleased than patients in the higher income group, who have the benefit of needing to contribute a smaller percentage of their livelihood towards the procedure.

There are limitations to this study. This study reflects a single surgeon's experience in one surgical practice. Thus the generalizability of the results cannot be certain. Additionally, not every rhinoplasty patient at this practice was asked to complete the FACE-Q. While most were, some were not asked due to oversight (office assistants were tasked with distributing and collecting the FACE-Q scales), which may have impacted study results. Additionally, not all patients completed the FACE-Q at the same postoperative interval. There was a range of 1 to 33 months postoperatively. It is possible that given the process of maturation, patients may rate the outcome of the rhinoplasty differently at different time intervals.

Regarding the gender and racial analyses conducted in this study, it should be noted that there were far fewer men and non-Caucasians than women and Caucasians, respectively. Although these demographics reflect the nature of

cosmetic rhinoplasty consumers in the general population, it is possible that had the number of men and non-Caucasians been greater, some nonstatistically significant *P*-values may have become significant ($P < .05$) with a larger sample size. Future studies should be directed at this population, as differences might be seen.

CONCLUSIONS

Satisfaction with facial appearance and improved quality of life are key outcomes for patients undergoing rhinoplasty. In an objective study using a validated PRO instrument, we were able to quantify differences in the clinically meaningful change in both perception of facial appearance and quality of life that rhinoplasty patients gain based on sociodemographic variables. We were also able to demonstrate that these variables are potential predictors of differences in patient satisfaction.

This model supports the successful outcomes possible in rhinoplasty among numerous groups of patients, while also demonstrating possible differences in outcomes based on patient demographics.

Disclosures

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