

Aesthetic Characteristics of the Ideal Female Breast

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Background: The female breast is a subject of significant focus within plastic surgery. Little work to date has examined public perceptions of attractiveness with respect to breast anatomy and morphology. This study provides a comprehensive assessment of anatomic and aesthetic breast characteristics valued by the general population.

Methods: A single-institution retrospective review was conducted of patients presenting for aesthetic or reconstructive breast surgery between 2009 and 2019. A cohort of 25 patients were included in a nationwide survey designed to assess subjective impressions of overall “breast attractiveness.” Survey responses were assessed, and the five patients with the highest mean scores were identified. An in-depth analysis of this subgroup was performed, evaluating anatomic metrics on both two-dimensional photographs and three-dimensional imaging. Statistical analysis examined correlations between objective breast characteristics and subjective perceptions of “attractiveness.”

Results: There were 1021 survey responses. Across the entire patient cohort, the mean age was 47.4 years and mean BMI was 24.9 kg/m². On a five-point Likert scale, the mean “breast attractiveness” score for the highest-scoring subgroup patients (n = 5) was 3.1 ± 0.1. Within this group, all patients had minimal ptosis and a projected contour. Average breast size was moderate, with mean volume of 299.4 ± 115.8 cm³.

Conclusions: This study reverse engineers the aesthetically appealing female breast, beginning with overall impressions of attractiveness and subsequently analyzing the influence of objective anatomic parameters on subjective perceptions. In surveying a large and diverse population, moderately sized, projected breasts with upper pole fullness were found to be associated with increased “attractiveness” scores. (*Plast Reconstr Surg Glob Open* 2023; 11:e4770; doi: 10.1097/GOX.0000000000004770; Published online 20 January 2023.)

INTRODUCTION

The aesthetic ideal of the female breast has long been a topic of considerable focus within the field of plastic surgery. According to the American Society of Plastic Surgeons, breast augmentation has been the most commonly performed cosmetic surgical procedure in the United States for the past several years, with over 300,000 performed annually in 2017 and 2018. Furthermore,

mastopexy, breast reduction surgery, and revisions of previously augmented breasts remain extremely common, with tens of thousands of patients choosing to undergo these procedures every year.¹ Reconstructive breast surgery also occupies a place of significance in today’s society, as breast cancer is the world’s most commonly diagnosed cancer among women² and roughly 20% of women treated surgically will eventually have some form of breast reconstruction.³ In the United States, this has translated to approximately 180,000 procedures annually in the past several years.¹

The interest in this topic also extends to the larger medical and lay communities. From an aesthetic perspective, the female breast is regarded by many as a symbol of femininity. The desire to enhance a sense of womanliness or improve one’s self-confidence and body image are frequently cited as contributing to a patient’s decision

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to pursue cosmetic breast surgery.⁴ Additionally, attention toward breast cancer awareness among the general public has increased tremendously in recent years. With this, more consideration has been given to exploring the psychosexual impact of surgical treatment (lumpectomy, mastectomy, etc.) and subsequent posttreatment reconstruction.⁵⁻⁷

At present, there is much debate about the ideal aesthetic characteristics of the female breast. Anatomic parameters dictating ideal proportions are widely published,⁸⁻¹¹ and the plastic surgery literature is rife with efforts to define the ideal breast aesthetics.¹²⁻¹⁴ However, much of this work has centered on the preferences and opinions of professionals in the field. There is little information about those traits which patients and others in the lay community find most important and cosmetically appealing. From the few published studies discussing this perspective, the findings presented are limited in scope.¹⁵⁻¹⁷

This study aims to fill that void by providing a comprehensive assessment of anatomic and aesthetic breast characteristics valued by patients as well as members of the general public to guide plastic surgeons and others performing breast surgery towards improving outcomes and optimizing satisfaction. In doing so, this study seeks to reverse engineer the aesthetically appealing female breast, beginning with overall perceptions of attractiveness and then working backwards to analyze an objective series of anatomic parameters to assess the influence each has on perceived attractiveness as well as the interplay between these variables.

METHODS

Patient Identification and Cohort Creation

Patients were identified by first performing a chart review of individuals presenting for aesthetic or reconstructive breast surgery consultation with one of the senior authors (M.C. and N.S.K.) between May of 2009 and May of 2019. To be eligible for inclusion, patients needed to be between the ages of 18 and 45, have accessible two-dimensional (2D) preoperative photographs, and also have had a presurgical three-dimensional (3D) breast scan performed (Vectra; Canfield Scientific, Parsippany, N.J.).

Fifty patients were identified who met these initial criteria. Twenty were excluded because of factors such as breast or chest wall scars that could bias survey respondent impressions, identifying characteristics such as hair, jewelry, or tattoos that could not effectively be removed from the photographs, or poor image quality. Ultimately, a final cohort of 25 patients was selected by the senior authors with the aim of choosing a sample that maximized potential diversity on the basis of breast size and shape, skin tone, and nipple-areola complex size and position. Relevant clinical data pertaining to the demographics, medical history, and treatment course of these patients were gathered from clinical charts. Additionally, preoperative 2D photographs and 3D scans were assessed for a number of objective anatomic parameters such as chest wall diameter, breast

Takeaways

Question: What elements or characteristics of female breast anatomy and morphology impact perceptions of attractiveness?

Findings: Moderate breast size with projected appearance and upper pole fullness correlated with increased subjective attractiveness scores.

Meaning: In aesthetic and reconstructive breast surgery, patients who are unsure of their goals with respect to post-operative outcome can be counseled on the attributes and features that influence opinions of aesthetic appearance.

volume, distances from sternal notch to nipple (SN-N) and nipple to inframammary fold (N-IMF), and breast ptosis.

Survey Instrument Design

The survey instrument used in this study was designed with the intention of assessing respondents' subjective impressions of "breast attractiveness." Several questions were included of the respondents to obtain demographic information on variables such as age, gender, racial identity, and education level. Two-dimensional anteroposterior photographs for each of the 25 patients included in the final cohort were then compiled in an order that was not varied from respondent to respondent. Each photo was cropped uniformly above the clavicles and inferiorly to the umbilicus. Survey participants were asked to provide their impression on how attractive they felt each pair of breasts to be, using a five-point Likert scale from 1 (least attractive) to 5 (most attractive).

Survey Administration

A target response population of 1000 participants was established to ensure a large and diverse sample. Administration of the survey was facilitated by Qualtrics (Seattle, Wash.). In an effort to ensure diversity and minimize bias among survey responses, the sample was constructed to be representative of the demographic and socioeconomic makeup of the United States.

Statistical Analysis

For the patients included in the survey cohort, descriptive statistics and measures of central tendency were used to describe absolute and mean results for demographics. Subjective breast rating survey data were assessed for consistency among respondents. ANOVA F testing with Tukey HSD post-hoc analysis was used to evaluate mean equality of ratings for each of the 25 pairs of breasts. Correlation tests were performed to identify relationships between subjective scores and objective anatomic metrics.

For the cohort of patients included in the survey, an in-depth analysis was performed evaluating anatomic metrics on 2D photographs such as projection and symmetry as well as objective measurements on 3D imaging, such as SN-N distance and breast base width (BW). For three patients, this 3D analysis was unable to be conducted because of technical problems with the patient's files. All

other analyses were conducted on the entire cohort unless otherwise specified.

Additionally, the five patients with the highest and lowest mean scores were identified. Statistical analysis was then performed to examine possible correlations between objective breast characteristics and subjective perceptions of “attractiveness.” The highest-scoring subgroup was compared to the entire cohort to assess for any significant differences in three-dimensional measurements using the Mann–Whitney U test. Comparisons with the five lowest-scoring patients were deferred because of subgroup size.

For all analyses, the level of statistical significance was set at an alpha of 0.05. Statistical analyses were performed using IBM SPSS Statistics v28 (IBM, Armonk, N.Y.).

Institutional Review Board Approval

Before commencement of this study, approval was sought and obtained from the New York University Langone Health Institutional Review Board (Study Number: S19-00850).

RESULTS

Survey Respondents

A total of 1021 survey responses were received. The population of respondents comprised a variety of age ranges, gender identities, sexual orientations, and racial

Table 1. Demographics of Survey Respondents

Age (y)	Number (n)	Percentage (%)
18–24	138	13.5
25–34	182	17.8
35–44	256	25.1
45–54	91	8.9
55–69	257	25.2
70 or older	95	9.3
Prefer not to answer	2	0.2
Sex at birth		
Male	480	47.0
Female	537	52.6
Other	4	0.4
Gender identity		
Male	481	47.1
Female	526	51.5
Transgender	4	0.4
Nonbinary/genderqueer	9	0.9
Prefer not to answer	1	0.1
Sexual preference		
Men	502	49.2
Women	433	42.4
Both	75	7.3
Neither	5	0.5
Other	3	0.3
Prefer not to answer	3	0.3
Race		
American Indian or Alaska Native	2	0.2
Asian	54	5.3
Black or African American	186	18.2
White or Caucasian	747	73.2
Other	19	1.9
Multiple answers	11	1.1
Prefer not to answer	2	0.2
Hispanic/Latinx/Spanish Heritage		
No	823	80.6
Yes	185	18.1
Prefer not to answer	13	1.3

and ethnic backgrounds consistent with the current US population (Table 1).

Analysis of Survey Patient Cohort

Among the 25 patients included in the study survey, the mean age was 47.4 years and mean BMI was 24.9 kg/m². The mean “breast attractiveness” score for all patients was 2.5 ± 1.2. With respect to 2D metrics, most patients had a linear (60%) or convex (28%) upper pole (UP) slope with a projected breast contour (76%). Ptosis was absent or mild (grade I) in 44% and 28% of the cohort, respectively. (See table, Supplemental Digital Content 1, which displays the comparison of 2D and 3D anatomic and morphologic characteristics across study cohort and high- and low-scoring subgroups, <http://links.lww.com/PRSGO/C353>.) A projected breast contour demonstrated a significant relationship to increased perception of attractiveness when compared to a deflated contour ($P = 0.013$). However, no other significant correlations were identified between the studied 2D metrics and subjective score.

Regarding 3D measurements, notable mean values included SN-N distance of 22.9 ± 4.3 cm, BW of 14.0 ± 2.1 cm, and N-IMF distance of 7.9 ± 1.6 cm. The average breast volume was 468.1 ± 332.8 cm³. When assessing volumetric symmetry by comparing the right and left breasts within an individual, a mean volume difference of 34.8 cm³ was detected. On comparative analysis, there were no parameters found to be significantly correlated with subjective impressions of breast aesthetics.

Identification and Analysis of Highest-scoring Subgroup

The scoring data for the entire patient cohort from all 1021 survey respondents was assessed using ANOVA F testing with Tukey HSD post-hoc analysis to identify statistically comparable subgroups within the overall sample. The patients with the five highest average “breast attractiveness” scores were found to belong to a distinct group from a statistical standpoint and so were designated as a subgroup to be compared to the larger cohort.

Within the highest-scoring subgroup, the mean age was 47.0 years and mean BMI was 23.5 kg/m². The mean subjective score was 3.1 ± 0.1. All five patients had a projected breast contour, and none had breast ptosis classified higher than Grade I (Figs. 1 and 2). (See table, Supplemental Digital Content 1, <http://links.lww.com/PRSGO/C353>.) Four of five patients had a linear or flat UP slope, whereas all had convex curvature of the lower pole (LP). On 3D analysis, this subgroup had a mean SN-N distance of 20.7 ± 1.8 cm and N-IMF of 7.2 ± 0.8 cm. The average BW was 13.2 ± 1.1 cm with a mean breast volume of 299.4 ± 115.8 cm³. When comparing the right and left breasts within an individual to assess symmetry, the mean volume difference was 28.3 cm³.

This subgroup was then further analyzed to determine the relative distribution of breast volume in the UP and LP. Sixty percent (n = 6) of breasts had at least 60% of the total volume concentrated in the UP, with the average found to be a 55:45 UP-to-LP ratio (Table 2). On analyzing variations in the ratio of volume distribution between the right and left breasts of the same individual, a

mean difference equating to 3.2% was noted. The Vectra scans for these five patients were then used to generate a morphed composite breast (Fig. 3) which was analyzed in a similar fashion and found to have an approximate UP-to-LP volume ratio of 60:40.

Comparison of Highest-scoring Subgroup to Entire Cohort

The highest-scoring subgroup was then directly compared to the entire patient cohort to identify any parameters from 2D or 3D analysis on which they differed significantly. Regarding 3D metrics, medians and interquartile ranges are represented in Table, Supplemental Digital Content 1, <http://links.lww.com/PRSGO/C353>, given the nonnormal distribution of the sample data. Notably, the highest-scoring subgroup had a significantly

narrower median internipple distance (19.2 versus 20.6 cm, $P = 0.015$) and narrower chest wall diameter (29.8 versus 32.7 cm, $P = 0.020$), as well as a shorter median N-IMF distance (7.4 versus 7.8 cm, $P = 0.047$). There was no statistically significant difference in SN-N distance or breast volume. On analysis of 2D metrics, there were no significant differences detected between the two groups.

DISCUSSION

Throughout the history of plastic surgery, considerable time and attention have been paid toward the aesthetics of the female breast. Before plastic surgery was fully incorporated as a recognized surgical specialty, it was evident that surgeons recognized the value of maintaining, restoring, and even enhancing the appearance

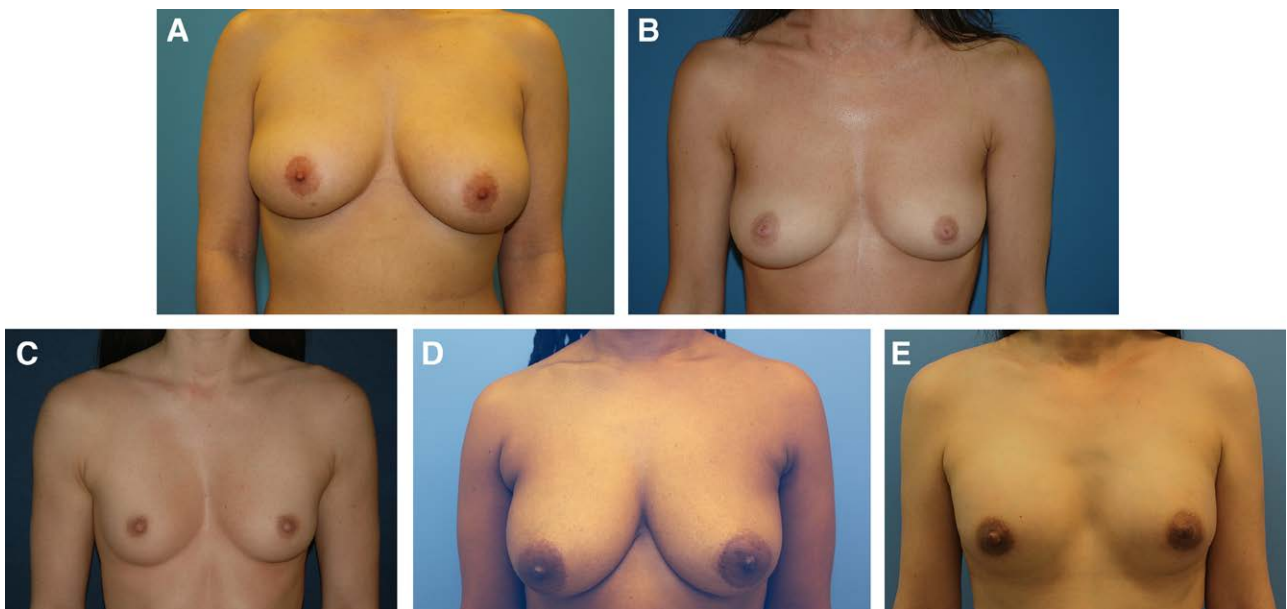


Fig. 1. Representative anteroposterior images of the five patients with the highest average survey scores for subjective “breast attractiveness.” A–E, Photographs arranged from the highest to lowest mean score proceeding.

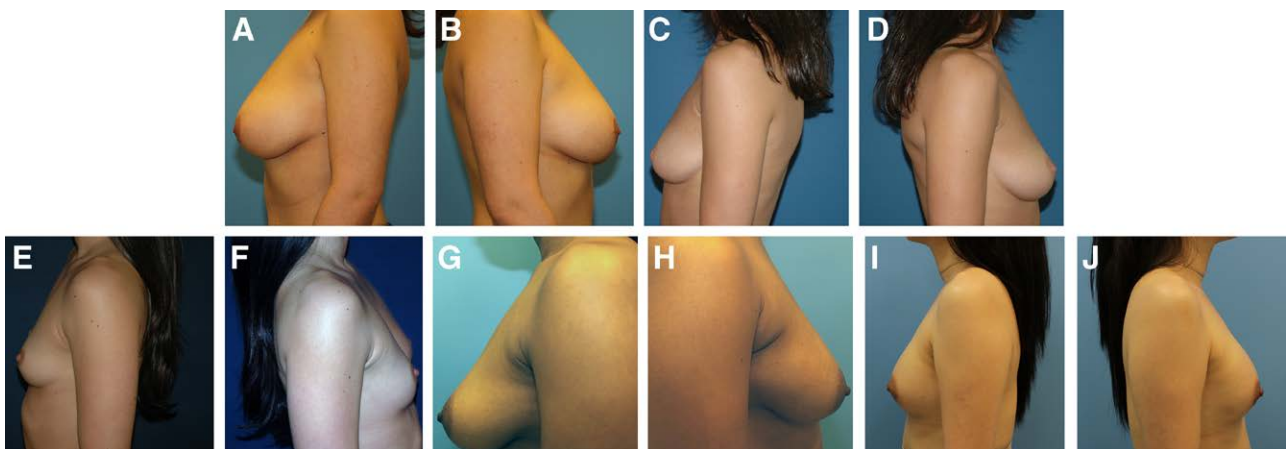


Fig. 2. Representative left and right lateral images of the five patients with the highest average survey scores for subjective “breast attractiveness.” A–J, Photographs arranged from the highest to lowest mean score proceeding.

of the breast. The first known autologous breast reconstruction procedure was reported in the late 19th century by Aristide Auguste Stanislas Verneuil of France, who used tissue pedicled off the contralateral breast.¹⁸ The dawn of the modern age of aesthetic breast surgery came in the 1960s, when the first silicone and saline implants were developed, whereas breast reconstruction was ushered into a new era in the late 1970s when Holmström introduced the abdominally based free flap.^{18,19}

As over 600,000 breast surgery procedures are performed annually by plastic surgeons in the United States alone, the motives behind efforts to describe universal standards of breast aesthetics are easily appreciated.¹ Both in aesthetic surgery, aimed to guide a patient closer to a desired size or shape, as well as in breast reconstruction, seeking to restore or even improve upon the native anatomy, the availability of clearly described ideal parameters and morphologic characteristics would serve as valuable tools for surgeons and patients alike. Perhaps, the most well-known work toward this end has been done by Mallucci and Branford. Much of the research to date has centered on the preferences and

opinions of professionals in the field, with little information about those traits that patients and others in the lay community find most important and cosmetically appealing.¹⁴

This study sought to address that void by surveying a large and diverse sample of respondents reflective of the demographics of the United States with the aim of understanding the anatomic features and characteristics of the female breast that influence perceptions of beauty and attractiveness. These included 2D metrics such as ptosis and UP slope similar to those described in other studies on the topic of breast aesthetics.^{13,14,20} Additionally, 3D data incorporated through the use of Vectra 3D scans allowed for analysis of parameters such as total breast volume and UP and LP volume distribution (Vectra; Canfield Scientific).

In attempting to identify hallmark characteristics or traits that correlated with perception of attractiveness, only a projected breast contour was found to be associated with an increased subjective survey score. However, no other singular feature significantly impacted opinions about breast aesthetics, a finding that is perhaps reflective of the wide variations in personal preferences and the way individuals determine what they find attractive. Alternatively, it may suggest that the overall global appearance may bear more significance on one’s assessment than the presence or absence of certain individual breast components.

In a well-known 2012 article, Mallucci and Branford laid out four traits that they described as ubiquitous among a series of 100 patients chosen on the basis of “the attractiveness of their breasts.” These included a 45:55 ratio of UP height to LP height, a slightly upward-pointing nipple, a linear or slightly concave UP, and a convex LP.¹³ The authors then further validated these findings by comparing the 45:55 UP-to-LP vertical height ratio

Table 2. Average “Breast Attractiveness” Scores and Ratios of UP to LP Volume Distribution for Highest-scoring Subgroup

Patient	Mean Score ± SD	Right Breast UP:LP Ratio	Left Breast UP:LP Ratio
1	3.1 ± 1.3	47:53	41:59
2	3.1 ± 1.4	60:40	61:39
3	3.2 ± 1.3	41:59	37:63
4	3.3 ± 1.3	62:38	66:34
5	3.0 ± 1.3	66:34	65:35
Composite	N/A	61:39	59:41

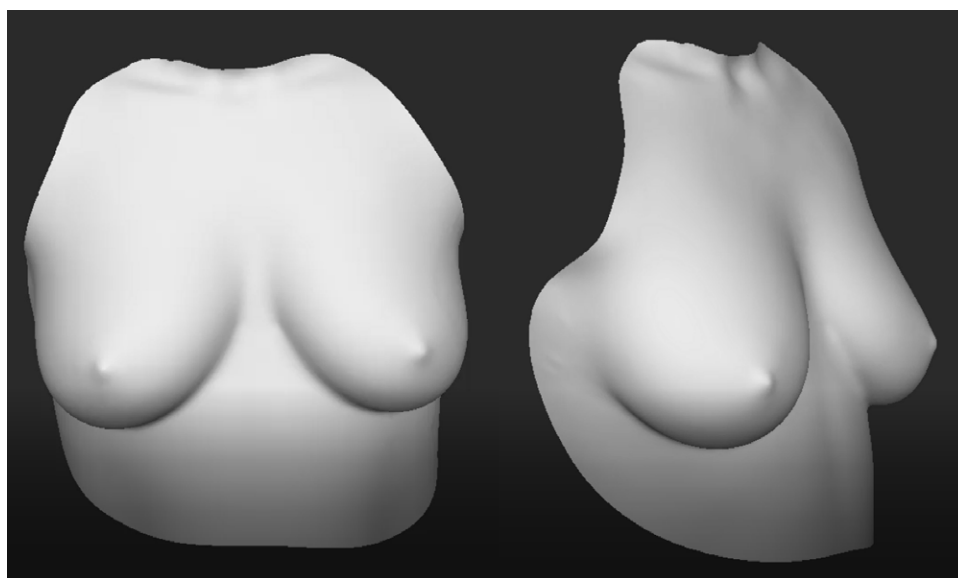


Fig. 3. Vectra 3D images depicting composite breast size and shape produced by morphing features of the five patients in the highest-scoring subgroup (Vectra; Canfield Scientific).

against several other variations and finding the aforementioned standard to be almost universally chosen as the most appealing.¹⁷

Critics of Mallucci's analysis have pointed to the apparent desire for UP fullness among the general population, evidenced by the popularity of garments like pushup bras and corsets designed specifically to provide this appearance, as well as expressed preferences for breast augmentation outcomes.^{15,21} To explore this among our own cohort, a statistically-distinct subgroup of the five highest-scoring patients was identified and analyzed separately. Anthropometric measurements were similar to those described in 2011 by Liu and Thomson, with a mean SN-N distance of 20.7 cm ± 1.8 cm and N-IMF of 7.2 cm ± 0.8 cm.¹² As cited by Mallucci, a linear UP slope and convex LP were commonly seen among this subgroup, though convexity of the UP was noted in one patient. Rather than analyzing the ratio of vertical height between the UP and LP though, an analysis of the distribution of volume was conducted. A 55:45 UP-to-LP ratio was found to be the average among this group, with most patients having at least 60% of their breast volume concentrated in the UP, consistent with the aforementioned preference for UP fullness when assessing breast aesthetics.

Among the study limitations that should be addressed, the size of the survey cohort should be noted. Although care was taken to select a diverse sample, it is not possible to represent the full range of breast size, shape, skin tone, and body habitus in a single series of patients without creating an overly burdensome survey instrument. Additionally, the use of two-dimensional photographs in the survey may have impacted the ability of respondents to fully appreciate certain aspects of breast anatomy and morphology. Finally, although the Vectra 3D system has repeatedly demonstrated reliability in estimating breast volumes, variance across cup sizes has been previously observed and the possibility of user error inevitably exists.^{22,23}

It must also be emphasized that this study does not seek to define a universal standard for breast aesthetics nor does it in any way attempt to classify features and characteristics as attractive or unattractive. As reflected by the findings herein, perceptions and standards of beauty vary widely from individual to individual or across groups of various ages, cultural backgrounds, and gender or sexual identities. As stated in a 2021 article by Sisti et al,²⁴ "the concept of beauty is still ambiguous, and there is not a unanimous explanation for it. It seems that the definition of beauty differs in every individual's mind and over the history of humankind."

The data presented herein merely attempt to report on preferences expressed by a representative sample across a large and diverse nation. Ultimately, the goal of this study is to provide breast surgeons and other healthcare providers with a framework around which they can structure discussions with their patients. Final decisions regarding a surgical plan must ultimately be made by the surgeon and patient together and not based on the opinions or preferences of outside influences. However, entering conversations about aesthetic or reconstructive breast procedures armed with such an understanding can be of tremendous

use in helping patients meet their goals and achieve satisfactory outcomes.

CONCLUSIONS

Across a large survey population, representative of the demographics of the United States, analysis of anatomic and anthropometric breast parameters revealed only a projected breast shape to be significantly correlated with increased perceptions of attractiveness. Among patients felt to have the most ideal aesthetics, key characteristics included a moderate size, linear or convex UP slope, convex LP, and UP fullness in a ratio of UP to LP volume distribution of approximately 55:45.

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