

# Validation of Ideal Breast Characteristics With Breast Augmentation Patients

Jason D. Kelly, PhD<sup>o</sup>; Bryan Comstock, MS; Orr Shaully, MD; James M. Smartt Jr., MD; and Daniel J. Gould, MD, PhD<sup>o</sup>

Aesthetic Surgery Journal Open Forum 2022, 1–11

© 2022 The Aesthetic Society.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial License (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact [journals.permissions@oup.com](mailto:journals.permissions@oup.com)

<https://doi.org/10.1093/asjof/ojac010>  
www.asjopenforum.com

**OXFORD**  
UNIVERSITY PRESS

## Abstract

**Background:** Breast augmentation procedures are one of the most commonly performed aesthetic procedures in the United States. Little work has focused on the general public's overall perception of the ideal breast or has validated them with patient photographs.

**Objectives:** To validate crowdsourced perceptions of breasts with their alignment to the aesthetics of breast augmentation patients.

**Methods:** A prospective cross-sectional study was performed using participants enrolled through the Amazon Mechanical Turk crowdsourcing platform (Amazon Web Services, Amazon, Seattle, WA) to obtain participant opinions of how closely patient breasts aligned with previously obtained results of 4 ideal breast characteristics. Outcomes were reported based on the correlation between breast attractiveness and alignment to ideal breast characteristics, both before and after breast implant procedures.

**Results:** 2306 responses from 737 participants reported patient photograph alignment with ideal breast projection proportion (1.0) as having the highest correlation to opinions of heightened aesthetic beauty ( $R = 0.98$ ,  $P < 0.001$ ), and ideal nipple direction (front) as having the lowest correlation to aesthetic beauty ( $R = 0.90$ ,  $P < 0.001$ ). Younger age groups (18–24) and participants with a high school diploma or less rated patients as less attractive, while married and wealthy individuals reported higher attraction levels.

**Conclusions:** Crowdsourcing can be a useful tool for aesthetic surgery preferences and has helped reveal key takeaways. The importance of the 4 breast characteristics has been validated, with alignment to all 4 characteristics tested having a high correlation to preferences. Differences in preference across demographic groups are a topic to further investigate.

Editorial Decision date: January 27, 2022; online publish-ahead-of-print February 5, 2022.

Nearly 300,000 breast augmentations are performed each year, making it one of the most common aesthetic surgeries in the United States.<sup>1,3</sup> Augmentation can be achieved by placement of a saline or silicone implant, fat transfer, or a combination of both techniques. Implants have gone through many iterations of style and design over the decades, with changes to implant surface texture, silicone and saline concentration and fill, shaping, and shell structure. These various factors all contribute to final breast shape and feel, and vary tremendously from patient to patient.<sup>4</sup> Although clinical data

Dr Kelly is a research engineer and Mr Comstock is a biostatistician, Love My Delta, Inc., Philadelphia, PA, USA. Dr Shaully is a plastic surgery resident, Division of Plastic and Reconstructive Surgery, Emory University School of Medicine, Emory University, Atlanta, GA, USA. Dr Smartt Jr. is a plastic surgeon in private practice in Philadelphia, PA, USA. Dr Gould is a plastic surgeon, Keck School of Medicine of USC, Los Angeles, CA, USA; and is a social media ambassador for *Aesthetic Surgery Journal*.

### Corresponding Author:

Dr Jason D. Kelly, 16 Hull Street Apt 3, Boston, MA 02113, USA.  
E-mail: [jasonkelly@lovemydelta.com](mailto:jasonkelly@lovemydelta.com)

have allowed for the tremendous advancement in the development of implants, it is important to consider additional factors such as physician and patient preferences.

The authors previously studied preferences of non-surgeons, as it is thought that patient satisfaction may be more highly correlated to public perception of ideal breast aesthetics.<sup>5</sup> Previous studies have shown, in fact, that there exist differences between patient and surgeon preferences on this issue.<sup>6</sup> Independent objective data for the ideal breast would be valuable to both patients and surgeons. Studies of specific subsets of the public's preferences for breast shape have been conducted,<sup>7</sup> but there is currently no agreed-upon consensus regarding the public's collective perception of the ideal breast shape.<sup>8-10</sup>

In the majority of cases, breast augmentation procedure outcomes are measured by either a physician who performed the procedure or the patients who underwent the procedure. However, these are both biased opinions, and an assessment of  $n = 1$  is unlikely to be objectively accurate or statistically sound. Using crowdsourcing to get a larger cohort of opinions by utilizing real photographs of breast augmentation patients would be ideal, as actual patient photographs have been shown to be the most indicative way to assess outcomes.<sup>11</sup> Amazon Mechanical Turk (AMT) (Amazon Web Services, Amazon, Seattle, WA) has been shown in the past to be a high-quality source of data both inside and outside of medical applications, and in visual tasks is both reliable and repeatable.<sup>12-20</sup>

In previous research completed by the authors, it was found that 4 characteristics were most highly indicative of female breast attractiveness.<sup>5</sup> These 4 characteristics of the 11 tested were: breast projection proportion, breast width to upper buttock width ratio, breast width to shoulder width ratio, and nipple direction. It is now important to validate these findings by using photographs of real patients both before and after receiving breast implants and learn whether patients with more attractive breasts are also perceived as having characteristics more aligned with the previously researched ideal breast shape. This research may help to formulate objective measures for the quality of aesthetic outcomes in procedures as well as provide measures for the average level of aesthetic improvement provided by specific surgeons.

## METHODS

A prospective cross-sectional study was conducted using a popular website used for simple crowdsourcing tasks, AMT.<sup>21</sup> The population of AMT crowds has been shown to be suitable for research purposes in that it is generally representative of the US internet population.<sup>13</sup> Motivation has been shown to be primarily driven from enjoyment, demonstrating a lower bias in the selection of participants who actually complete the survey.<sup>12,22</sup>

Survey questions were designed in multiple-choice or sliding scale format. Questions utilizing a sliding scale encoded responses in the range of 0 to 100, using increments of one. Crowdsourcing was utilized to obtain survey responses to analyze the public's perception of patient breast aesthetics and how closely their preferences aligned with the ideal breast characteristics.

## Worker Requirements and Screening

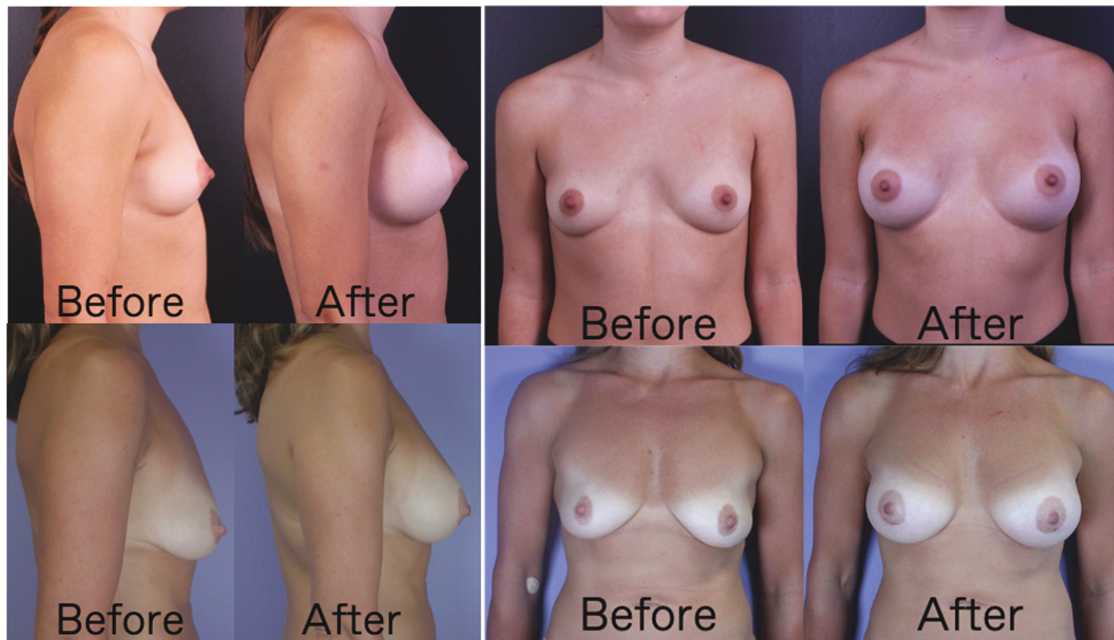
Turkers were given an allotment of one hour to complete each survey, and the survey was set to expire after 5 days of being posted on the website. All users on AMT are required to be at least 18 years old to accept Human Intelligence Task (HIT) requests. In addition to this, however, a question that asked workers which age group they belonged to was included in the surveys to ensure an age of at least 18. Additional requirements were that each worker must have completed at least 500 previous crowdsourcing tasks on AMT as well as that they must have a 90% or higher approval rate for the previous tasks that they completed. This helps dissuade fraudulent workers from being allowed to complete the surveys. There were no constraints for where the workers needed to be located, so as to get a slightly heightened level of diversity in the results.

An additional barrier of entry for fraudulent workers was set in place. For each of the sliding scale questions, users were required to move the slider before being allowed to submit a survey response. They were also required to choose options for each of the multiple-choice questions, one at a time. These processes help prevent workers from simply submitting a survey that they didn't read.

## Demographic Questions

For each survey participant, if their demographic data had not been previously saved in the database, they were asked 8 demographic questions: age group, gender, ethnicity, education level, marital status, number of children raised, number of children living in a household, and socioeconomic status. If these data for a user already existed in the database from a previously completed survey, these questions were omitted. The socioeconomic question asked users, with an illustrative guide, on which rung of a 10-rung ladder would they belong in their country's economy, in which people in the top rung are the most well off and people in the bottom rung are the least well off.

These questions were asked to get a better idea of the kinds of factors that may affect a participant's opinion regarding ideal breast shape. For example, a Turkers' opinion of their socioeconomic status may affect how they perceive the attraction level of others. Additionally, age helps delineate experience but having children or having



**Figure 1.** (Left) Example of lateral before and after patient breast implant photographs of (top) a 24-year-old female and (bottom) a 37-year-old female. (Right) Example of frontal before and after patient breast implant photographs of (top) a 24-year-old female and (bottom) a 37-year-old female. After photographs were taken 3 to 6 months post procedure.

had children changes the adult perception of the breast as the changes that occur prepartum and postpartum affect the breast.<sup>23</sup>

### Breast Preference Questions

Each participant was shown 4 panels from the Breast Preference Questionnaire,<sup>7</sup> which illustrated either 4 or 5 variations of a breast in either the frontal or lateral position. Characteristics that were previously shown to be the most highly correlated with the public's aesthetic preferences were used for this study.<sup>5</sup> The 4 breast characteristics used were: breast width to shoulder width ratio (frontal view), breast width to upper buttock width ratio (frontal view), nipple direction (lateral view), and projection proportion (lateral view). These are the names given to each characteristic from the creators of the scale and not from our own judgments regarding the assessed areas. Ideal variations of each characteristic found in the previous research<sup>5</sup> were:

- Nipple direction: front
- Breast width to shoulder width: 105%
- Projection proportion: 1.0
- Breast width to upper buttock width: 105%

The variation previously deemed to be the most ideal was given a red border with a "Preferred Photograph" caption. The participants were asked to rate how close the patient's photograph was to the preferred photograph in the image panel, using a slider range from "not at all in

alignment" to "exactly in alignment" on a range of 0 to 100. Additionally, participants were asked to rate the overall aesthetic beauty of the frontal and lateral photographs using the same style of slider.

Each survey participant was shown a photograph of one patient's breast state at a time, either before or after a breast implant procedure. Written consent was provided for all patients, by which the patients agreed to the use and analysis of their data. All photographs were taken after a procedure was within the 3- to 6-month postprocedure range. Twenty patients were used, making a total of 40 breast states, in which a state represents one patient at one point in time. Patients were predominantly Caucasian and aged between 21 and 56 years old; examples are shown in Figure 1. Each survey contained both a frontal photograph and a lateral photograph of the patient's breasts. Turkers were welcome to complete as many of these surveys as they wanted, being able to complete all 40 surveys if they preferred, with compensation of \$0.20 per survey submission. A minimum of 80 responses were collected for each patient photograph. On average, each submission took less than 5 minutes to complete. All surveys took place between October 15, 2021, and January 3, 2022.

Data were stratified according to age group, gender, ethnicity, education level, number of children, and socioeconomic status. All data collection was completed using Microsoft Excel (Microsoft Corp., Redmond, WA). All statistical analyses were completed using the Python programming language.<sup>24</sup>

## RESULTS

In total, 737 unique Turkers participated in some portion of the surveys that were submitted, with a total of 2306 survey responses. [Table 1](#) displays a summary of the demographics for these Turkers. Compared with the previous study in which the ideal breast preferences were found, the makeup of the crowd is very similar, with the same general groupings. There was a skew in the 25 to 34 age group, although this group has been shown to be the most likely group to undergo breast augmentation procedures.<sup>25</sup>

On average, among the 20 patients tested, a breast augmentation procedure improved the overall aesthetic rating of the patient by 16.37 points, with lateral and frontal photograph views experiencing approximately the same level of improvement. Of the 4 characteristics tested, the average change in alignment with the ideal variation of that characteristic was plotted and shown in [Figure 2](#). The characteristic that experienced the largest increase in alignment from a breast augmentation appeared to be projection proportion, with an average increase of 18.32 points among the 20 patients. The smallest increase belonged to nipple direction, with an average increase of 13.94, although the ratings for nipple direction were generally higher overall in patients before undergoing a breast augmentation.

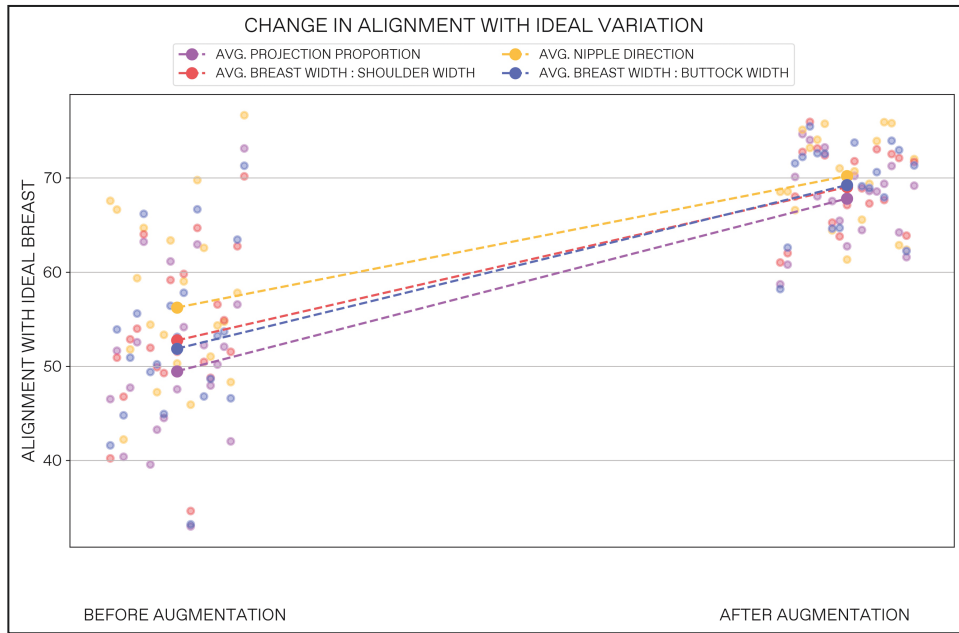
The overall aesthetic rating of each photograph was recorded and plotted against the Turker's opinion of the alignment with the preferred photograph from the image panel illustration. [Figure 3](#) displays a plot for all 4 characteristics tested of the before and after aesthetic ratings and alignment to ideal ratings, for all photographs. [Figure 4](#) additionally displays the change in both of these values for each patient between the before and after photographs, to illustrate the typical levels of aesthetic improvement for each measure with each of the 4 characteristics. [Table 2](#) displays the correlation between the 2 measures for each of the breast characteristics.

From [Figures 3, 4](#), we can see that a breast's projection proportion and a breast's width relative to the patient's buttock width are the 2 most strongly correlated characteristics to perceived aesthetic beauty. Furthermore, it can be surmised from [Figure 4](#) that, on average, for every increase in 10 points in the alignment of a characteristic to the ideal variation, there is an average increase in the breast's overall aesthetic beauty rating by: 9.41 points, 9.39 points, 10.48 points, and 13.59 points for breast width to buttock width, projection proportion, breast width to shoulder width, and nipple direction, respectively. However, although improvement of nipple direction has the largest chance of increasing aesthetic beauty, this was still the least likely variable to improve across all 20 patients.

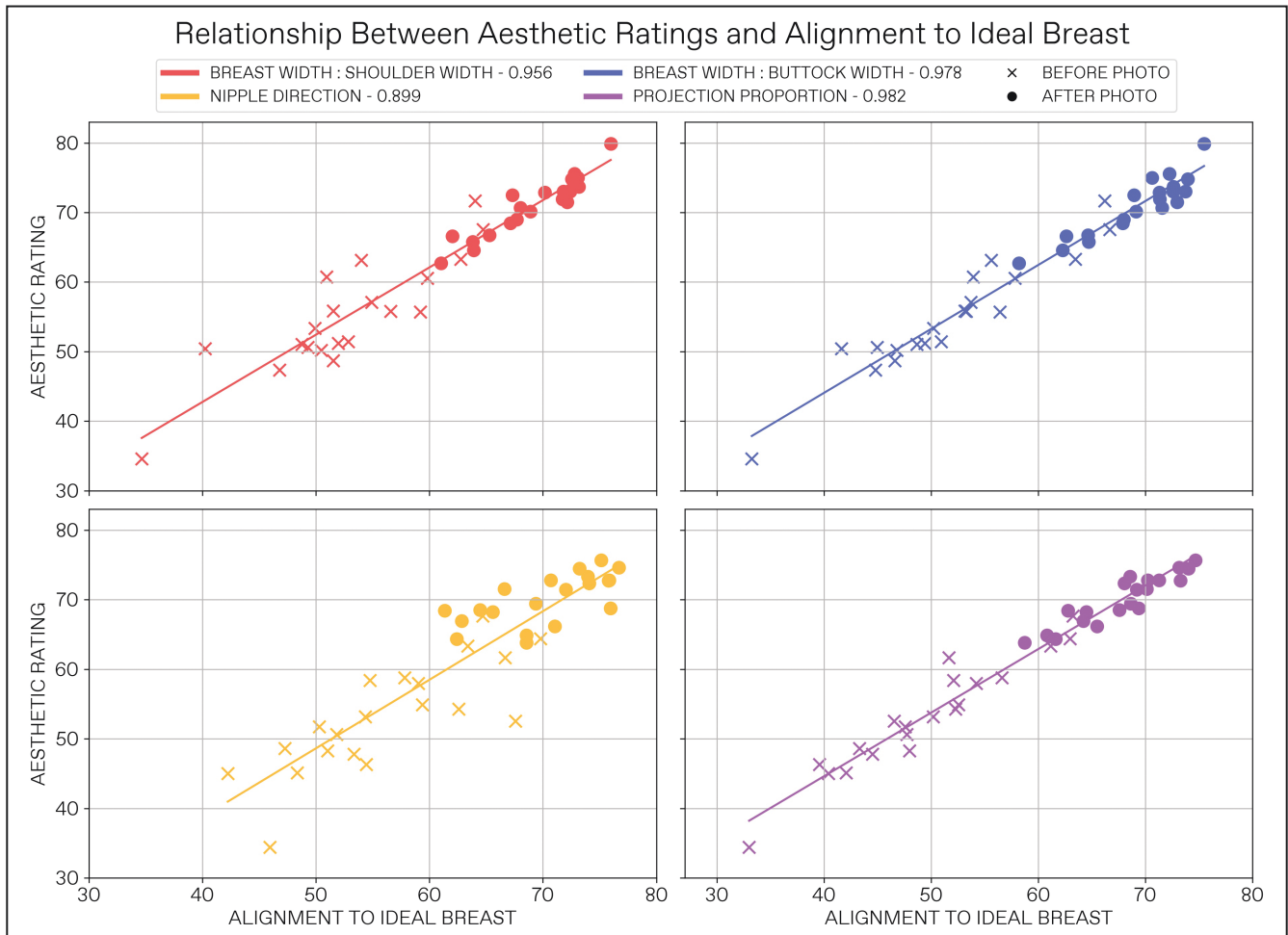
**Table 1.** Summary of Demographic Groups for the 737 Unique High School (HS) Graduate Equivalency Diploma (GED) Participants in the Survey

Variable	Level	No. of participants (%)
Gender	Male	442 (60%)
	Female	295 (40%)
Age	18-24	29 (4%)
	25-34	341 (46%)
	35-44	205 (28%)
	45-54	110 (15%)
	55-64	39 (5%)
	>65	13 (2%)
Education level		
	HS/GED or less	131 (18%)
	Associate's degree	55 (7%)
	Bachelor's degree	440 (60%)
	Graduate degree	111 (15%)
Marital status		
	Single & Never Married	186 (25%)
	Married	495 (67%)
	Other	56 (8%)
Socioeconomic well-being (1 = highest, 10 = lowest)		
	Mean (SD)	5.2 (2.1)
	Median (IQR)	5 (2.0)
	Wealthy (1-2)	77 (10%)
	Upper Middle Class (3-4)	197 (27%)
	Middle Class (5-6)	267 (36%)
	Lower Middle Class (7-8)	144 (20%)
	Poor (9-10)	52 (7%)
No. of children raised		
	None	243 (33%)
	1	182 (25%)
	2	240 (32%)
	3 or more	72 (10%)
No. of children in household		
	None	306 (41%)
	1	189 (26%)
	2	145 (20%)
	3 or more	97 (13%)
Race/ethnicity		
	Asian	14 (2%)
	Black/African	66 (9%)
	Hispanic/Latino	41 (6%)
	Indian subcontinent	67 (9%)
	Other/multiracial	44 (6%)
	White/Caucasian	505 (68%)

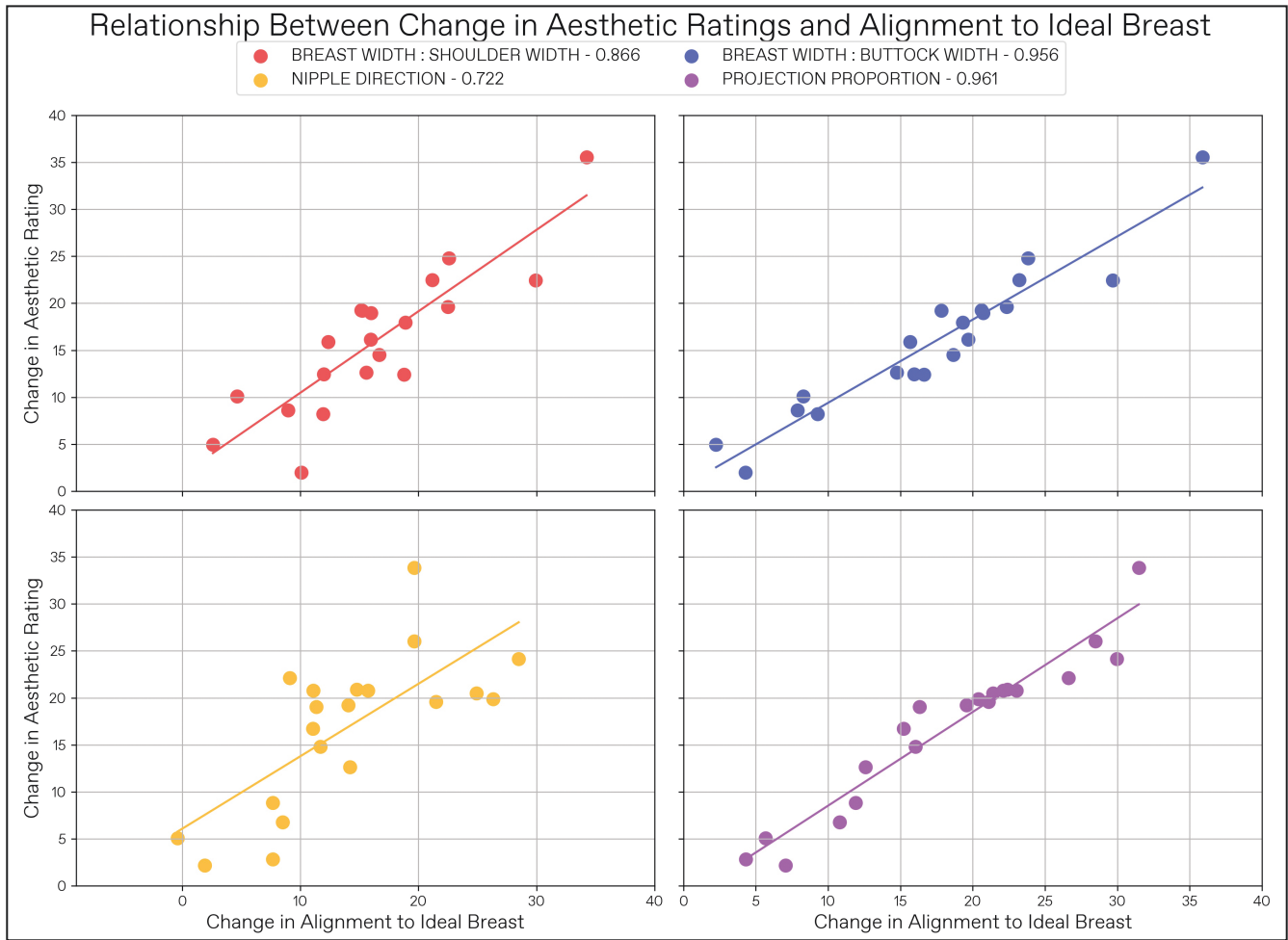
GED, graduate equivalency diploma; HS, high school; IQR, interquartile range; SD, standard deviation.



**Figure 2.** The average change in the alignment of a patient’s breast to the ideal variation, for each characteristic, both before and after receiving a breast augmentation procedure. The individual before and after points have been jittered in this figure. Nipple direction experienced a 13.94 point change from before to after, and projection proportion experienced an 18.32 point change.



**Figure 3.** The relationship between each photograph’s perceived alignment to the ideal variation of each characteristic and the perceived aesthetic beauty of the photograph being viewed.



**Figure 4.** The change between each patient’s breast’s alignment with the ideal variation of each characteristic and the change in the patient’s perceived aesthetic beauty.

The top of Figure 5 is a swimmer’s plot, which illustrates the magnitude of improvement in aesthetic beauty between before and after states of the breast implant patients. The bottom figure gives a more nuanced view of the before and after state for each of the 4 characteristics tested.

### Demographic Preferences

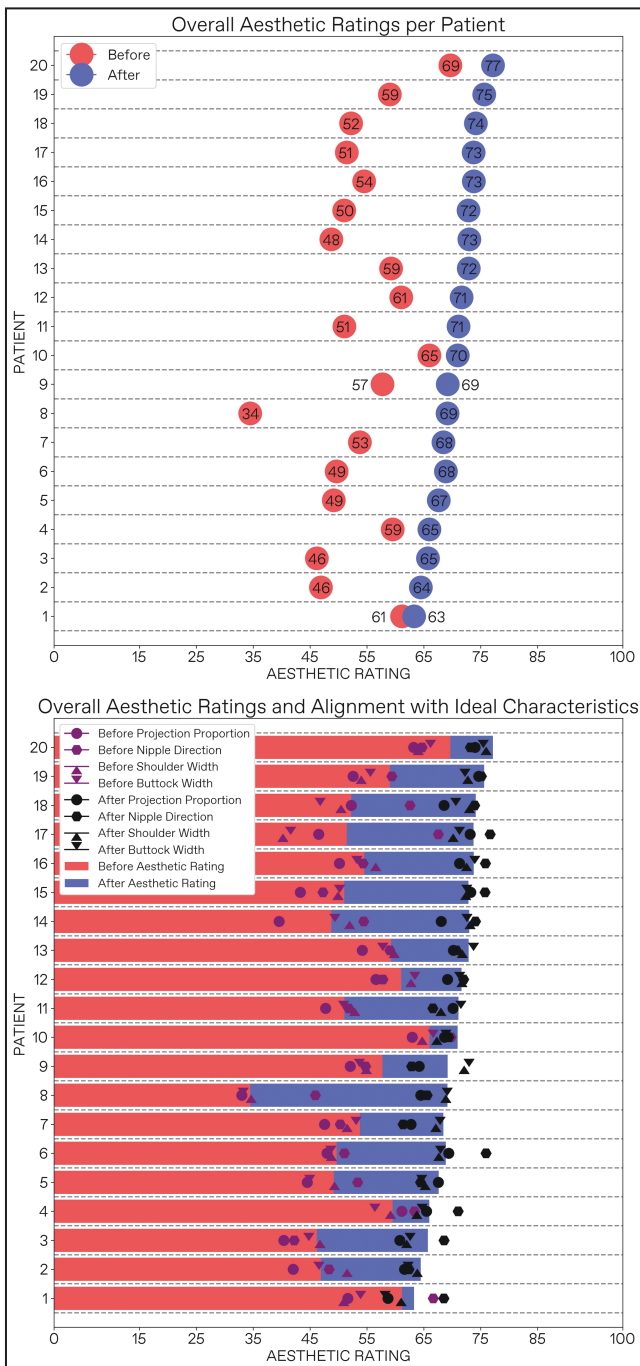
From previous research, it is known that crowdsourced groups of the sizes obtained in this study are large enough to be reliable and repeatable for evaluating visual assessments.<sup>20</sup> Slight differences were seen between males and females completing the surveys, but they were not significant enough to be of interest. Figure 6 illustrates the differences between the demographic groups in their overall preferences of the before and after photographs.

Interestingly, Asian and Indian ethnicities reported lower aesthetic beauty to both before and after photographs, but much lower for the before photographs, whereas the Black/African group reported very high aesthetic beauty

**Table 2.** Correlation Values Between Alignment With Ideal Breast Characteristic Variation and the Aesthetic Ratings

Alignment with characteristic & aesthetics	Correlation – Pearson’s (p)
Breast width: shoulder width	0.96 (<0.001)
Breast width: buttock width	0.98 (<0.001)
Nipple direction	0.90 (<0.001)
Projection proportion	0.98 (<0.001)

overall for both before and after photographs, rating the before photographs as higher than any other demographic group. The number of children raised appeared to have a marked distinction as well, with the perceived beauty for the before photographs increasing as the number of children the participant had raised increased. Married individuals reported higher levels of beauty overall, whereas Separated or Divorced participants reported the lowest values of aesthetic beauty. All participants who had some



**Figure 5.** Top: Overall aesthetic ratings of each of the 20 patients whose photographs were used in this study. Bottom: Overall aesthetic ratings of each patient with the rating of each ideal characteristic in the before and after photographs.

form of post-secondary schooling reported relatively similar levels of attraction to the photographs, while participants who had a high school education or less reported lower attraction to the before photographs.

Users who self-reported as being in the upper rungs or lower rungs of the socioeconomic ladder reported very

similarly, both seeing the before photographs as much more attractive, than any of the other groups. In the age category, the youngest grouping of 18- to 24-year olds appear to view the before photographs as much less attractive than any other age group.

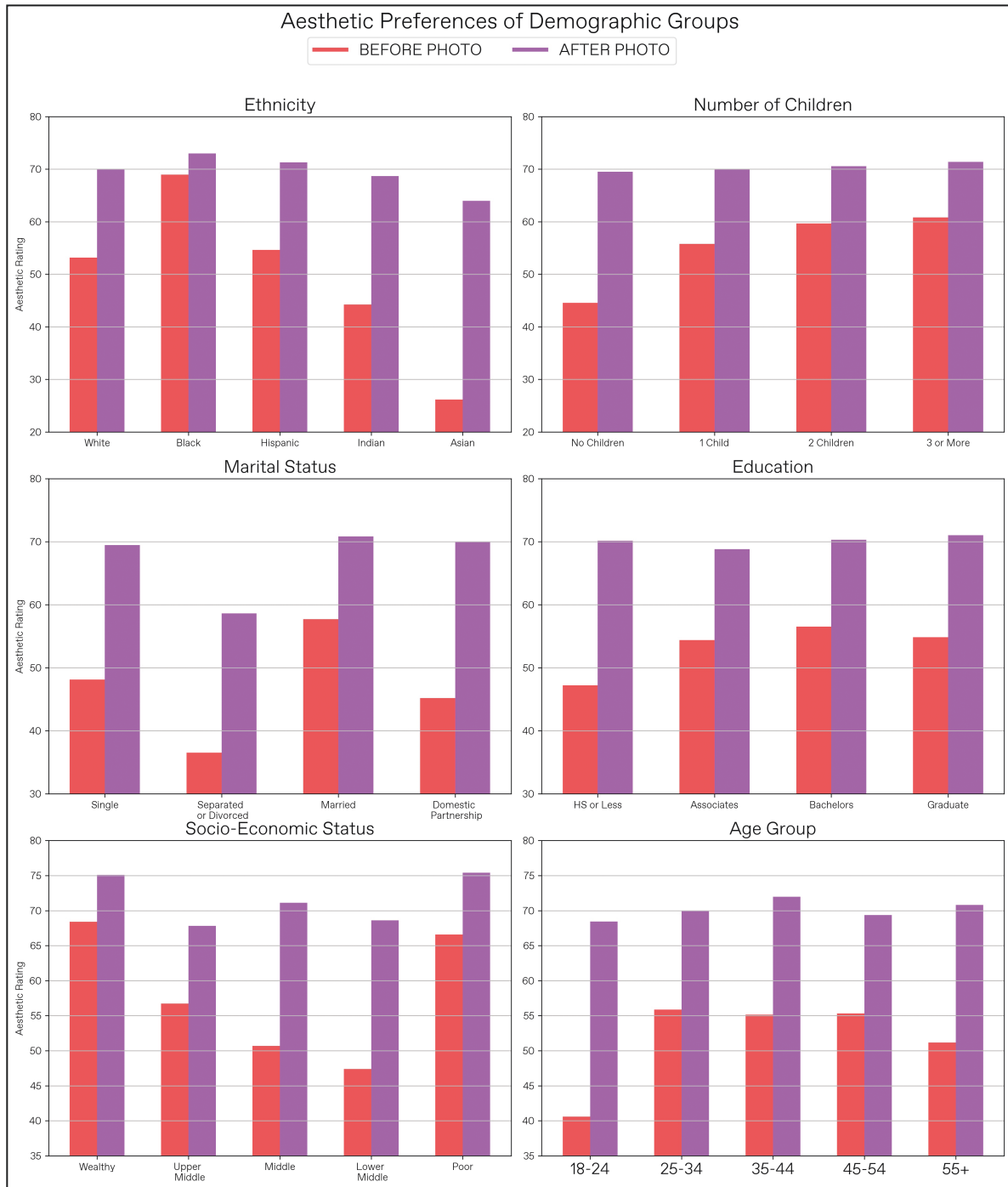
Most demographic groups and subgroups rated the after photographs as approximately the same relative levels of attraction, with just 2 larger outliers, participants who identified as Asian and participants who were Separated or Divorced.

## DISCUSSION

As breast augmentation procedures become more advanced with a widening array of technologies being used, it is important to clearly and comprehensibly understand the public’s perception of ideal breast characteristics. We previously demonstrated the ability to utilize crowdsourcing to understand the public’s perception of aesthetic beauty. This work adds to the literature by validating those results with actual patient photographs and displaying the change in perception after a procedure.

Overall, our study reported that the public’s opinions on photographs of patients before and after breast implant procedures are generally in concordance with the findings of our previous study. Patients who showed large improvements in the characteristics deemed as more important to aesthetic beauty were on average assessed as having a higher level of aesthetic beauty, with projection proportion being the most important of these factors. Other research on the overall breast aesthetic found results without first assessing specific traits that underwent specific variations.<sup>9</sup> We believe that our approach was successfully able to find the traits, which were most indicative of aesthetic beauty, and additionally validate them. Previous literature using some of these methods only focused on a specific ethnicity, whereas our study was able to add to this by giving a broader view of the overall public’s opinion while additionally showing demographic differences.<sup>7</sup> Additionally, past research has shown how aesthetic opinions of breasts change over time as the number of children raised increases, which was further validated in this study, with a changing view of aesthetic beauty as the number of children raised increases.<sup>23</sup>

The varied correlation between aesthetic ratings and ideal characteristics of breast shape can provide a ranked order of which characteristics are more important, from an aesthetic standpoint, when analyzing real photographs of patient breast augmentation outcomes. If this is the case, then breast projection proportion, width relative to buttock width, and width relative to shoulder width are of more importance to aesthetic beauty than is nipple direction. For example, looking at Figure 5, we can see that with patients #8, #14, #17, and #18 there were large improvements in overall aesthetic ratings while having relatively



**Figure 6.** Differences in overall aesthetic ratings for different demographic groups in the cohort of volunteers. Groups that were too small to be represented individually were combined.

small changes in nipple direction compared with the other 3 characteristics. Also, for patients like #4, there appear to be larger differences in nipple direction than any of the other characteristics, with only a minimal increase in the overall aesthetic rating.

Although this study expresses several factors affecting the public’s perception of the ideal breast, there are

several limitations that should be addressed. The population of the AMT crowd was fairly close to a representative sample of what would be desired, albeit there was a skew toward males vs females, and it should be noted that this is an internet literate crowd with a skew in the 25 to 34 age group. The survey-based nature of this study allows for the possibility that either some participants were dishonest



or simply finishing the survey as quickly as possible to be compensated. It is possible that this could have meddled some of the demographic data as well. Albeit the photographs used were the most representative of patients who would undergo a breast implant procedure, photographs used were predominantly of one Fitzpatrick skin type and in a relatively small range of ages. If the patient photographs were more diverse, this could have affected the responses in some way.

The surveys were allowed to be done all at one point in time, as opposed to being parsed out over multiple different points. Although the number of surveys completed for each photograph was large enough to be reliable, this could have still caused a smaller number of Turkers to “hoard” the surveys, making the responses slightly less diverse. The socioeconomic status question, in addition, was based on where the participant felt their status belonged, as opposed to quantitative income levels, and that should be noted. Finally, the demographic question regarding education did not have a selection for “Completed some College,” which could have forced several participants to either choose “High School Diploma” or “Associate’s Degree.” This is a potential source of error in that demographic result.

## CONCLUSIONS

The critical finding from this study is that learning the public’s perception of ideal breast characteristics is possible using crowdsourcing using validation from visual scale assessment. We found that projection proportion and lateral breast width were the most important aspects of breast aesthetics. Although these relationships can inform physicians and patients about the ideal results, they certainly are not a surrogate for the artistic input of the surgeon. Studies like these help us to identify what the general population identifies as aesthetically beautiful. In the future, we hope to utilize these technologies in order to improve aesthetic outcomes by first analyzing the quality of our results and then comparing those to aesthetic norms. In the future, there may be systems designed to help inform surgeons and improve outcomes by providing input for breast augmentation and body procedures. New technologies can help to determine the ideal implant in breast augmentation and may also help in revision cases to get closer to the norm.

More importantly, we can utilize the data collected from these massive crowdsourcing studies to help inform the aesthetic industry in terms of trends and patient preferences. We may be able to utilize these technologies to identify up-and-coming procedures in the aesthetic space and to help identify changes over time in the public’s perception of beauty. For too long, we have been quantifying surgeons’ perception of beauty and trying to categorize what the surgeons and doctors perceive as optimal. This

technology allows us to really ask the patients directly what they think is beautiful.

In the future, these crowdsourcing studies may help to inform artificial intelligence and machine learning algorithms to help guide patients down their aesthetic journey. This in conjunction with base communication may be a powerful force for early patient education and improved outcomes.

## Disclosures

Dr Kelly is an employee of Love My Delta Inc. (Philadelphia, PA, USA), the funding source of this study. Dr Kelly, Mr Comstock, and Dr Smartt Jr. are cofounders of and have equity interests in Love My Delta Inc. Drs Gould and Shauly declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

## Funding

The funding for this study was provided in full by Love My Delta, Inc (Philadelphia, PA, USA).

## REFERENCES

- 2020 National Plastic Surgery Statistics. Published online 2020. <https://www.plasticsurgery.org/documents/News/Statistics/2020/plastic-surgery-statistics-report-2020.pdf>. Accessed November 3, 2021.
- Siddiqui A, Ueno C, Agarwal J, et al. Evidence-based performance measures for autologous breast reconstruction: an American Society of Plastic Surgeons quality performance measure set. *Plast Reconstr Surg*. 2020;145(2):284e-294e. doi: [10.1097/PRS.00000000000006478](https://doi.org/10.1097/PRS.00000000000006478)
- Xue Y, Pu LLQ. Contemporary breast augmentation practice in the United States. *Ann Plast Surg*. 2021;86(3S Suppl 2):S177-S183. doi: [10.1097/SAP.0000000000002646](https://doi.org/10.1097/SAP.0000000000002646)
- Lancien U, Leduc A, Tilliet Le Dentu H, Perrot P, Duteille F. Evaluation of satisfaction and well being with Breast-Q<sup>®</sup> of aesthetic breast augmentations by implants using the “Dual Plane” technique: a series of 191 cases. *Ann Chir Plast Esthet*. 2021;66(4):314-319. doi: [10.1016/j.anplas.2020.07.008](https://doi.org/10.1016/j.anplas.2020.07.008)
- Kelly JD, Comstock B, Shauly O, Smartt JM, Gould DJ. Public perception of ideal breast shape. *Aesth Surg Jour Open Forum*. 2022;4:1-8. doi: [10.1093/asjof/ojab049](https://doi.org/10.1093/asjof/ojab049)
- Hsia HC, Thomson JG. Differences in breast shape preferences between plastic surgeons and patients seeking breast augmentation. *Plast Reconstr Surg*. 2003;112(1):312-320; discussion 321; discussion 321-322. doi: [10.1097/01.PRS.0000066365.12348.A7](https://doi.org/10.1097/01.PRS.0000066365.12348.A7)
- Lee HJ, Ock JJ. An ideal female breast shape in balance with the body proportions of Asians. *Plast Reconstr Surg Glob Open*. 2019;7(9):e2377. doi: [10.1097/GOX.0000000000002377](https://doi.org/10.1097/GOX.0000000000002377)

8. Adams WP, Mallucci P. Breast augmentation. *Plast Reconstr Surg*. 2012;130(4):597e-611e. doi: [10.1097/PRS.0b013e318262f607](https://doi.org/10.1097/PRS.0b013e318262f607)
9. Mallucci P, Branford OA. Concepts in aesthetic breast dimensions: analysis of the ideal breast. *J Plast Reconstr Aesthetic Surg*. 2012;65(1):8-16. doi: [10.1016/j.bjps.2011.08.006](https://doi.org/10.1016/j.bjps.2011.08.006)
10. Tebbetts JB. Achieving a predictable 24-hour return to normal activities after breast augmentation: Part II. Patient preparation, refined surgical techniques, and instrumentation. *Plast Reconstr Surg*. 2002;109(1):293-305; discussion 306-307.
11. Wu C, Scott Hultman C, Diegidio P, et al. What do our patients truly want? Conjoint analysis of an aesthetic plastic surgery practice using internet crowdsourcing. *Aesthet Surg J*. 2017;37(1):105-118. doi: [10.1093/asj/sjw143](https://doi.org/10.1093/asj/sjw143)
12. Ipeirotis PG, Provost F, Wang J. Quality management on Amazon Mechanical Turk. Presented at the *Proceedings of the ACM SIGKDD Workshop on Human Computation (HCOMP'10)*, July 25, 2010, Washington, DC, USA. Association for Computing Machinery; 2010:64-67.
13. Cunningham JA, Godinho A, Kushnir V. Using Mechanical Turk to recruit participants for internet intervention research: experience from recruitment for four trials targeting hazardous alcohol consumption. *BMC Med Res Methodol*. 2017;17(1):156. doi: [10.1186/s12874-017-0440-3](https://doi.org/10.1186/s12874-017-0440-3)
14. Shauly O, Stone G, Gould D. The public's perception of the severity and global impact at the start of the SARS-CoV-2 pandemic: a crowdsourcing-based cross-sectional analysis. *J Med Internet Res*. 2020;22(11):e19768. doi: [10.2196/19768](https://doi.org/10.2196/19768)
15. Shauly O, Calvert J, Stevens G, Rohrich R, Villanueva N, Gould DJ. Assessment of wellbeing and anxiety-related disorders in those seeking rhinoplasty: a crowdsourcing-based study. *Plast Reconstr Surg Glob Open*. 2020;8(4):e2737. doi: [10.1097/GOX.0000000000002737](https://doi.org/10.1097/GOX.0000000000002737)
16. Maas M, Shauly O, Stone G, Gould D. Crowdsourcing the aesthetics of thumb repair in pediatric thumb hypoplasia. *Eur J Plast Surg*. 2020;43:789-794. doi: [10.1007/s00238-020-01712-1](https://doi.org/10.1007/s00238-020-01712-1)
17. Shauly O, Gould DJ, Patel KM. Crowdsourcing the public's perception of microsurgical and nonsurgical interventions for erectile dysfunction. *Eur J Plast Surg*. 2020;43:443-452. doi: [10.1007/s00238-020-01639-7](https://doi.org/10.1007/s00238-020-01639-7)
18. Gould DJ, Shauly O, Qureshi AA, Stevens WG. Defining "Ideal Abs" through a crowdsourcing-based assessment. *Aesthet Surg J*. 2020;40(4):NP167-NP173. doi: [10.1093/asj/sjz344](https://doi.org/10.1093/asj/sjz344)
19. Stone G, Shauly O, Gould DJ. Crowdsourcing the public's perception and systematic review of nipple inversion and its repair. *J Womens Health*. 2021:1812-1823 doi: [10.1089/jwh.2020.8953](https://doi.org/10.1089/jwh.2020.8953) [Epub ahead of print].
20. Kelly JD, Comstock B, Kowalewski TM, Smartt JM. Crowd-sourced reliability of an assessment of lower facial aging using a validated visual scale. *Plast Reconstr Surg Glob Open*. 2021;9(1):e3315. doi: [10.1097/GOX.0000000000003315](https://doi.org/10.1097/GOX.0000000000003315)
21. Buhrmester M, Kwang T, Gosling SD. Amazon's Mechanical Turk: a new source of inexpensive, yet high-quality, data? *Perspect Psychol Sci J Assoc Psychol Sci*. 2011;6(1):3-5. doi: [10.1177/1745691610393980](https://doi.org/10.1177/1745691610393980)
22. Paolacci G, Chandler J, Ipeirotis PG. Running experiments on Amazon Mechanical Turk. *Judgm Decis Mak*. 2010;5(5):411-419.
23. Rinker B, Veneracion M, Walsh CP. The effect of breastfeeding on breast aesthetics. *Aesthet Surg J*. 2008;28(5):534-537. doi: [10.1016/j.asj.2008.07.004](https://doi.org/10.1016/j.asj.2008.07.004)
24. Python Software Foundation. *Python language reference*. <https://www.python.org> Accessed January 3, 2022.