

Aesthetic Preferences of the Anterior Thigh as a Beauty Factor in Women

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Background: In body contouring surgery, some regions, such as the abdomen, thorax, upper limbs, and glutes, are prioritized over others, including the lower limbs, particularly the anterior thighs. This study aimed to identify anterior thigh preferences by age, sex, ethnicity, and region and assess their importance as a factor of female beauty by conducting an online survey.

Methods: Photographs of a 24-year-old female model were modified in two front-view and side-view panels. Through a survey on the Amazon Mechanical Turk platform, participants were asked to order the images from the most beautiful to the least beautiful, and the results were broken down by age, sex, ethnicity, and region.

Results: A total of 1000 respondents were surveyed, all of whom answered the survey without error; therefore, no one was excluded. Of the 1000 respondents, 504 were men (50.4%) and 496 were women (49.6%). The predominant age group was 26–35 years, with 443 people (44.3%), the region with the highest number of participants was North America, with 484 respondents (48.4%), and the predominant ethnicity was White, with 555 respondents (55.5%). The survey showed that the most beautiful images were image A on the side-view panel (25.9%) and image I on the front-view panel (28.5%) ($P < 0.001$).

Conclusions: In the side view, the aesthetic preferences of the anterior thigh do not appear to be associated with the anterior projection. However, in the front view, the increase in width generates a beauty trend, but only up to an intermediate level, quantified in the ratio (0.44). (*Plast Reconstr Surg Glob Open* 2022;9:e4055; doi: 10.1097/GOX.0000000000004055; Published online 18 January 2022.)

INTRODUCTION

Although the concept or definition of beauty differs in the mind of each person and throughout history,¹ some measurable parameters can be used to define beauty in each region of the body. In body contouring surgery, we generally focus on the abdominal and gluteal regions, rarely considering the relevance of the thighs in the stylization of the body.^{2,3} Thighs are usually studied in association with gluteal proportions, prioritizing the back of the thighs⁴ and overlooking the anterior region.

Much is said about the “ideal body,” or “natural results,” and even “body harmony.” However, the question

arises of what objective parameters do we base ourselves on to define the aforementioned concepts?

Multiple body beautification techniques have been described,^{5–7} but no consensus on objective data is yet available to guide us toward the much desired “perfect body.” We must consider differences in race, ethnicity, geographical location, and beauty perceptions in each of these different regions.⁸ Buttock beautification is a widely discussed topic, which has become a symbol of femininity over the years,^{4,7,9} to such an extent that the popularity of this procedure is on the rise.¹⁰

In 2011, 8000 gluteal augmentation procedures were performed, whereas this number increased to 20,000 procedures in 2016, expressing an increase of 180% in just 5 years.¹⁰ Lipograft has been widely used for a volume increase in both breasts and buttocks,¹¹ the harmony between gluteal augmentation and thigh volume must be preserved.⁴ However, the number of studies that address this problem remains insufficient.

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In their study, Vartanian et al⁴ concluded that a wide upper thigh, with an optimal transition from the buttock to the thigh, was the most attractive shape. Therefore, both gluteus and thighs should be increased simultaneously.

This study aimed to identify the aesthetic preferences of the anterior thigh by conducting a survey using the Amazon Mechanical Turk digital platform, considering the place of origin, ethnicity, and age group of each respondent.

MATERIALS AND METHODS

The photographs were taken of a 24-year-old female model in front view and side view, who authorized the use of her photographs for manipulation and study in a survey on the aesthetics of the anterior thigh. The approval of the research ethics committee is waived due to the design of the study, which is based on a survey not associated with patients. This study was conducted following the ethical standards established in the Declaration of Helsinki.

The photographs were manipulated using Adobe Photoshop CC by applying image editing tools, using angles in the side view and ratios in the front view (Figs. 1 and 2).

In side-view photographs, the angles were defined considering the tangent line that passes in the anterior border of the crural quadriceps and the diagonal line that intersects this line and crosses the anterior border of the patella, therefore assessing six significant angles (155°, 157°, 160°, 164°, 169°, and 175°) placed on a panel in the study survey (Fig. 1).

In front-view photographs, manipulations were made by altering the ratio between the vertical line that runs from the anterior superior iliac spine and that reaches the upper edge of the patella and the largest width of the thigh, assessing the six most significant ratios (0.40, 0.42, 0.44, 0.46, 0.48, and 0.50) placed in a panel in the study survey (Fig. 2).

The survey was designed on the Amazon Mechanical Turk platform in which each participant was paid \$0.06 to fill in demographic data, such as place of origin, age, sex, ethnicity, and to order the thighs in descending order, that is, from the most beautiful to the least beautiful, in two panels of images in the side view and front view, with six modifications. Similarly, two additional questions were asked about the preponderant factor in female beauty and the importance of the anterior thigh. (See survey, Supplemental Digital Content 1, which displays data about beauty in anterior thigh designed in Amazon Mechanical Turk, <http://links.lww.com/PRSGO/B892>.)

All data were downloaded from the Amazon Mechanical Turk digital platform and stored in a database in Microsoft Excel 16.43. Similarly, the chi-square test for goodness of fit was performed using the software package for statistical analysis SPSS version 25.

Takeaways

Question: Is the anterior thigh an important beauty factor in women?

Findings: In the side view, the aesthetic preferences of the anterior thigh do not appear to be associated with the anterior projection. However, in the front view, the increase in width generates a beauty trend, but only up to an intermediate level, quantified in the ratio (0.44).

Meaning: The anterior thigh is an important beauty factor in women, and could be considered for a surgical plan to achieve successful results in body contouring surgeries.

RESULTS

In total, 1000 people responded to the survey using the Amazon Mechanical Turk platform, all of whom responded without error. For this reason, none of the respondents were excluded. Of the 1000 respondents, 504 were men (50.4%) and 496 were women (49.6%). The predominant age group was 26–35 years, with 443 people (44.3%); the region with the highest number of participants was North America, with 484 respondents (48.4%); and the predominant ethnicity was White, with 555 respondents (55.5%) (Table 1).

General Preferences

In terms of preferences identified in the survey through images in the side-view panel (Fig. 1), the most beautiful image was image A (25.9%), whereas the second most beautiful images were B (22.4%) and C (22.4%). Regarding the front-view panel (Fig. 2), the respondents selected image I as the most beautiful image (28.5%) and image G as the second most beautiful (24.1%). All preferences were significant ($P < 0.001$) (Table 2).

In this survey, two additional questions were asked. The first question was, “what is the most important beauty factor in females?” Of the 1000 respondents, the most prevalent response was a preference for the breasts, with 306 (30.6%), followed by the buttocks, with 286 (28.6%), and then the legs with 234 (23.4%), and the abdomen with 174 (17.4) respondents. Significant differences were observed for this question ($P < 0.001$) (Table 3).

The second question was, “how important did they consider the anterior thigh for female beauty?” Of the 1000 respondents, 400 (40%) deemed it important, 312 (31.2%) very important, 210 (21%) less important, and only 78 (7.8%) very unimportant. Significant differences were also observed for this question ($P < 0.001$) (Table 4).

Anterior Thigh Preference by Age Group

The survey was broken down by age group, showing that image A was chosen as the most beautiful image in the side-view panel (Fig. 1) in the following age groups: 26–35 (27.31%), 46–55 (29.21%), 56–59 (23.53%), and older than 60 years (39.29%). In the age group of 18–25 years, the most beautiful image was B (24.77%), and

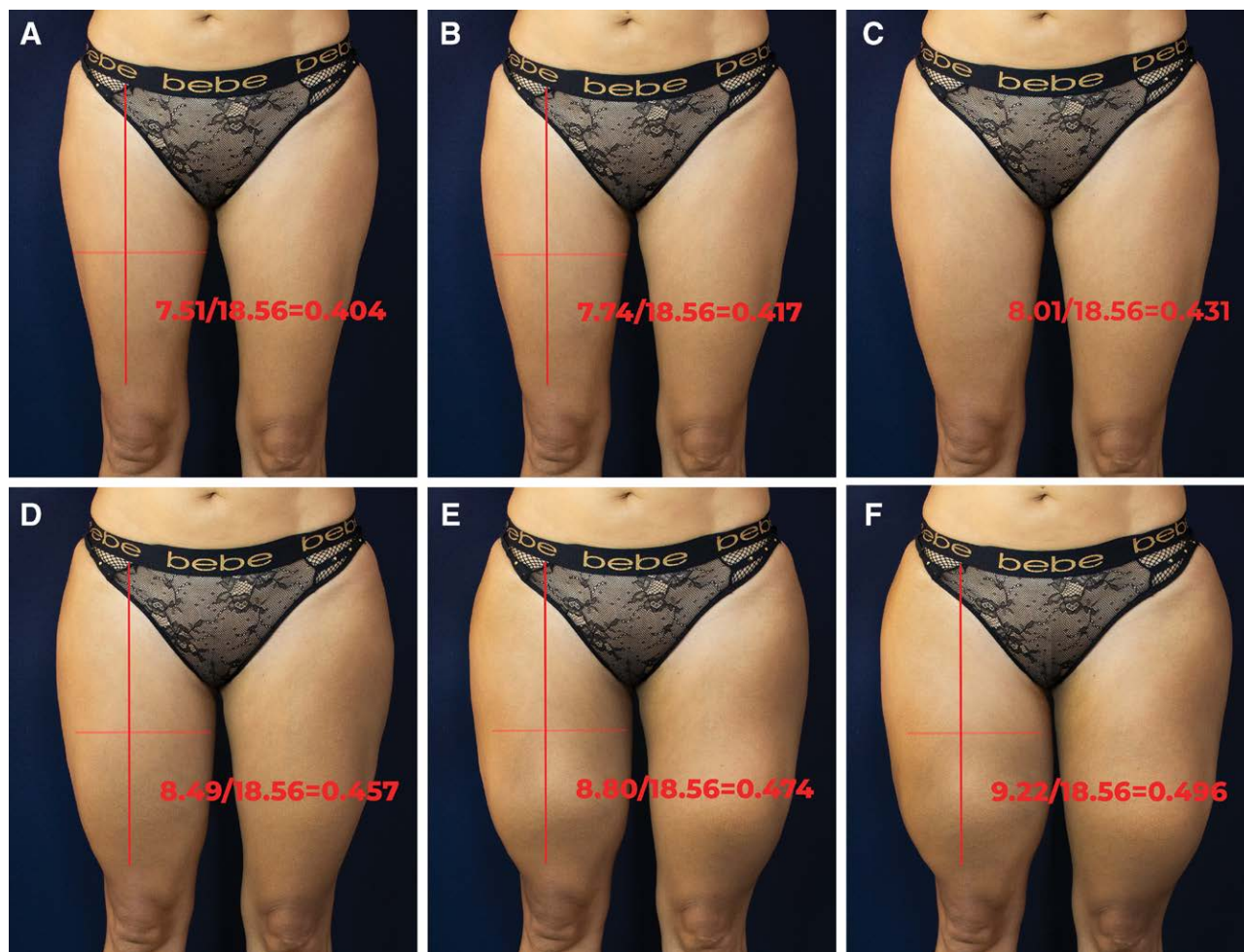


Fig. 1. Side-view modified photographs panel, with parts labeled A–F as shown in the survey.

respondents in the age group 36–45 years preferred image C (23.90%) (Table 5).

Similarly, in the front-view panel (Fig. 2), image I was considered the most beautiful in the age groups 18–25 (27.98%), 26–35 (28.22%), 36–45 (28.78%), 46–55 (32.58%), and 56–59 years (35.29%), whereas image G (46.43%) was the most beautiful image in the age group older than 60 years. However, in both panels, no significant differences were observed in preferences between the age groups ($P > 0.05$) (Table 5).

Anterior Thigh Preference by Region

The analysis of thigh preferences by the respondents' region showed that image A was the most beautiful in North America (28.51%) and Europe (27.78%), image B was the most beautiful in the Middle East (25.27%) and Caribbean and Pacific Islands (26.67%), and images A, C, and E tied for the preferred image in Australia, with the same percentage of 21.43% regarding the side-view panel (Table 6).

In the front-view panel, image I was the most beautiful in North America (28.1%), South America (30.39%), Europe (28.33%), the Middle East (26.37%), and Caribbean

and Pacific Islands (40%), while image G was the most beautiful in Africa (40%) and Australia (50%). However, in both panels, no significant differences were observed in preferences between regions ($P > 0.05$) (Table 6).

Anterior Thigh Preference by Ethnicity

Regarding the preferences of the thigh associated with ethnicity, in the side-view panel, image A was the most beautiful for the following ethnicities: White (26.1%), Chinese (41.4%), and Korean (50%). In contrast, image B was the most beautiful for the following ethnicities: Middle Eastern (24.1%) and other/multiracial (70.8%). Image F was the most beautiful for Japanese (40%), and image C was the most beautiful for Hispanic/Latino (25.5%) respondents. Among Black/African respondents, images A and C had the same percentage of aesthetic preferences of the anterior thigh, with 26.4% (Table 7).

In the front-view panel, image I was the most beautiful for the following ethnicities: White (28.8%), Hispanic/Latino (26.5%), Japanese (40%), Korean (50%), and other/multiracial (86.9%), whereas image J was the most beautiful for Black/African (27.59%), image G for Chinese (31%), and image H for Middle Eastern (24.1%)

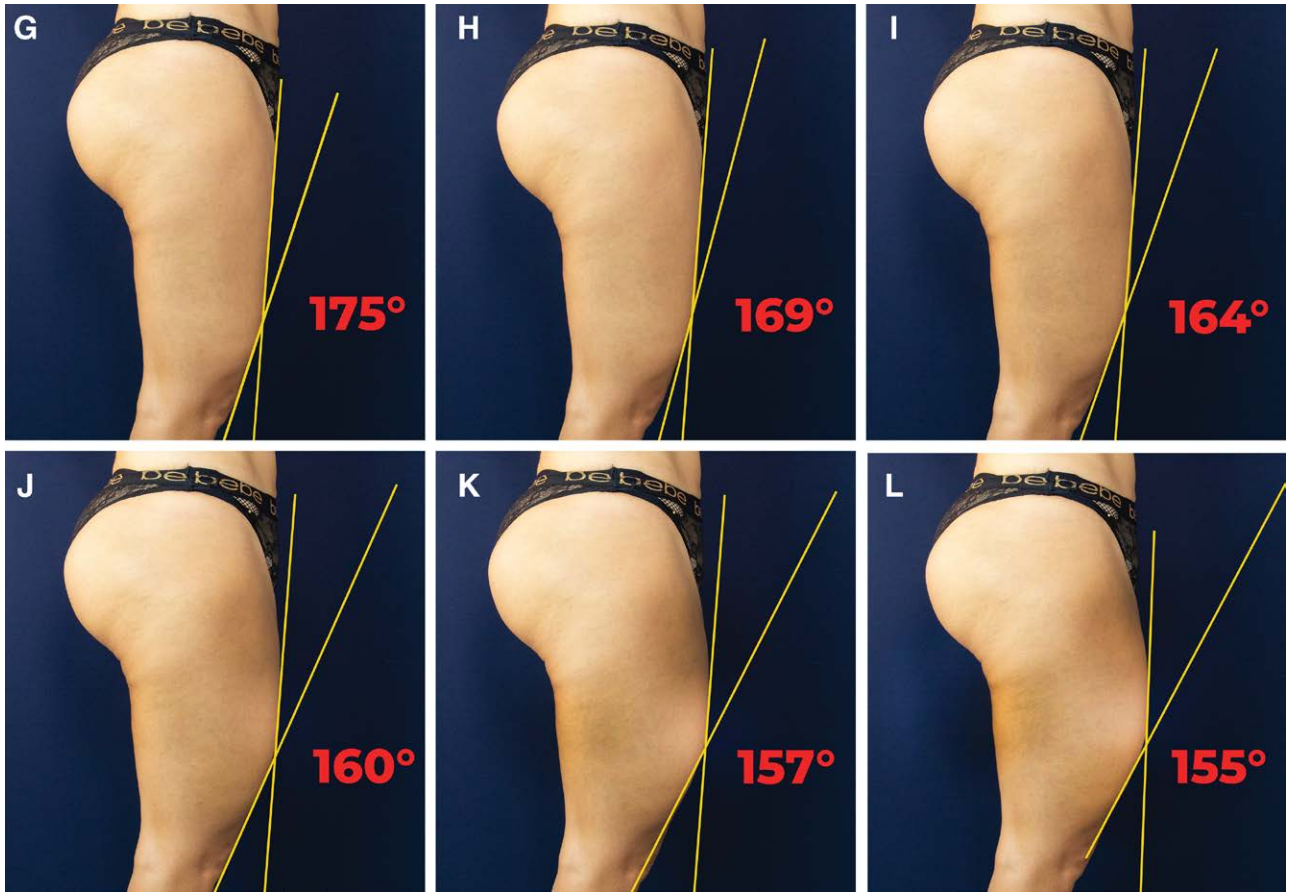


Fig. 2. Front-view modified photographs panel, with parts labeled G–L as shown in the survey.

Table 1. Demographic Characteristics

Age, y	Demographic characteristics					
	Female	%	Male	%	Total	%
18–25	120	12	98	9.8	218	21.8
26–35	210	21	233	23.3	443	44.3
36–45	96	9.6	109	10.9	205	20.5
46–55	46	4.6	43	4.3	89	8.9
56–59	9	0.9	8	0.8	17	1.7
>60	15	1.5	13	1.3	28	2.8
Total	496	49.6	504	50.4	1000	100
Region						
North America	274	27.4	210	21	484	48.4
South America	90	9	91	9.1	181	18.1
Europe	76	7.6	104	10.4	180	18
Africa	9	0.9	11	1.1	20	2
Australia	5	0.5	9	0.9	14	1.4
Middle East	31	3.1	60	6	91	9.1
Caribbean/Pacific Islands	11	1.1	19	1.9	30	3
Ethnicity						
Black/African	53	5.3	34	3.4	87	8.7
White	291	29.1	264	26.4	555	55.5
Hispanic/Latino	52	5.2	46	4.6	98	9.8
Chinese	11	1.1	18	1.8	29	2.9
Japanese	7	0.7	3	0.3	10	1
Middle Eastern	20	2	34	3.4	54	5.4
Korean	3	0.3	3	0.3	6	0.6
Other/multiracial	59	5.9	102	10.2	161	16.1

Table 2. Anterior Thigh Aesthetic Preferences

Side View	The Most Beautiful Thighs		Front View		
	Total	Percentages		Total	Percentages
A*	259	25.9	G*	241	24.1
B*	224	22.4	H*	179	17.9
C*	224	22.4	I*	285	28.5
D*	108	10.8	J*	162	16.2
E*	85	8.5	K*	63	6.3
F*	100	10	L*	70	7

* $P < 0.001$ based on the chi-squared test.
Highest preference by each comparative factor.

Table 3. The Most Important Beauty Factor in Women

Beauty factor	Quantities	Percentages %
Abdomen*	174	17.4
Legs*	234	23.4
Buttocks*	286	28.6
Breasts*	306	30.6
Totals*	1000	100

* $P < 0.001$ based on the chi-square test.
Highest preference by each comparative factor.

Table 4. Anterior Thigh Importance for Female Beauty

Importance	Quantities	Percentages %
Very important*	312	31.2
Important*	400	40
Less important*	210	21
Very unimportant*	78	7.8
Total	1000	100

* $P < 0.001$ based on the chi-square test.
Highest preference by each comparative factor.

Table 5. Anterior Thigh Preferences by Age Range

	18–25*	26–35*	36–45*	46–55*	56–59*	>60**
Side view*	B (54)	A (121)	C (49)	A (26)	A (4)	A (11)
%	24.77	27.31	23.90	29.21	23.53	39.29
Front view*	I (61)	I (125)	I (59)	I (29)	I (6)	G (13)
%	27.98	28.22	28.78	32.58	35.29	46.43

* $P > 0.05$ based on the chi-square test.

respondents. No significant differences were observed in the preferences of both panels between ethnicities ($P > 0.05$) (Table 7).

The Most Important Beauty Factor in Women

In the same survey conducted in Amazon Mechanical Turk, respondents were asked about the most important beauty factor in women, breaking down their answers by age, sex, ethnicity, and region of origin. The responses with the highest percentages and significant differences in female beauty were the preference for buttocks

(27.02%) as the most important beauty factor, with 32.3% of North Americans choosing buttocks, whereas 33.15% of South Americans chose legs as the most important beauty factor. Caribbean and Pacific Islanders chose breast as the most important factor (70%) ($P < 0.05$), with no significant differences between the remaining responses (Table 8).

Importance of Anterior Thigh Aesthetics for Female Beauty

In the last question in the Amazon Mechanical Turk survey, participants were asked how important the anterior thigh was as a beauty factor in women. The most significant differences were found between sexes, men (42.86%) and women (37.1%), considering the anterior thigh important as a beauty factor in women, and between ethnicities, with White (39.82%) respondents who answered that the anterior thigh was important, whereas Middle Eastern (50%) and other/multiracial (41.61%) respondents who answered that the aesthetics of the anterior thigh were very important for female beauty ($P < 0.05$).

The analysis of the responses by region showed that the North American (38.22%) and South American (46.41%) respondents believe that the anterior thigh is important for female beauty, whereas the Middle Eastern (54.95%) respondents believe that the anterior thigh is a very important beauty factor in women ($P < 0.05$) (Table 9).

DISCUSSION

This study aimed to assess the aesthetic preferences of the anterior thigh based on manipulated images displayed in two panels, in side view and front view, using the Amazon Mechanical Turk digital platform, which is an efficient, reliable, and cost-effective tool to generate sample responses.¹²

The beauty of the thigh is usually associated with the gluteal region and its projection in the posterior region of the thigh.⁴ Similarly, in body contouring surgery, the most worked regions are the abdomen, thorax, upper limbs, and buttocks.^{2,3,10,13–16} As a result, body contouring surgeries aimed at providing an athletic image tend to overlook the anterior thigh.

In this context, we conducted a study to assess anterior thigh preferences and their relevance in female beauty, thereby identifying image A (175°) in the side-view panel and image I (0.44) in the front-view panel as the most beautiful images, according to the respondents. Both images showed significant differences. Therefore, the participants effectively recognized differences in the anterior thigh.

Table 6. Anterior Thigh Preferences by Region

	North America*	South America*	Europe*	Africa*	Australia*	Middle East*	Caribbean/Pacific Islands*
Side view*	A (138)	C (44)	A (50)	C (6)	A/C/E (3)	B (23)	B (8)
%	28.51	24.31	27.78	30.00	21.43	25.27	26.67
Front view*	I (136)	I (55)	I (51)	G (8)	G (7)	I (24)	I (12)
%	28.1	30.39	28.33	40.00	50.00	26.37	40.00

* $P > 0.05$ based on the chi-square test.

Table 7. Anterior Thigh Preferences by Ethnicity

	Black/ African*	White*	Hispanic/ Latino*	Chinese*	Japanese*	Middle Eastern*	Korean*	Other/ Multiracial
*Side view %	A/C (23) 26.4	A (145) 26.1	C (25) 25.5	A (12) 41.4	F (4) 40	B (13) 24.1	A (3) 50	B (44) 70.8
Front view %	J (24) 27.59	I (160) 28.8	I (26) 26.5	G (9) 31	I/K (4) 40	H (13) 24.1	I (3) 50	I (54) 86.9

**P* > 0.05 based on the chi-square test.

Thigh beautification methods have been developed within body contouring surgical procedures. For this reason, the thighs and their volumization must be defined because this volumization can occur through implants and fat grafting.^{4,7,17,18}

Volumization through fat grafting¹⁸ is among the surgical techniques with fewer adverse events than silicone implants.¹⁷ Although this technique is known to be applied, especially in the subdermal plane, the intramuscular fat graft has been shown to be a better recipient for this type of autograft, except for the intramuscular gluteal graft, where venous drainage has specific characteristics that increase the risk of thromboembolic events.^{19–25} This volumization is performed at the level of the vastus muscles of the thigh (medialis and lateralis) so that combining inferences based on previous aesthetic preferences of the thigh with the goals of the patient enables adequate surgical planning.

Different methods are available to generate visual changes using imaging software. We decided to use the angle method for side-view images and the ratio for front-view images because we believed that the vertical axis (of the femur) was important for these manipulations. No mathematical criterion was used to choose

angles or ratios. The most significant images were chosen at the discretion of the authors and placed in the survey panels.

In the side-view panel, image A (175°) showed the highest number of aesthetic preferences of the anterior thigh, with 259 (25.9%) respondents. In the same panel, image F was chosen as the least beautiful thigh by 623 respondents (62.3%). The percentages of all answers were significantly different (*P* < 0.001). These results indicate that the respondents do not consider the aesthetics of the anterior thigh an important beauty factor because the figure with the lowest anterior projection (A) was chosen as the most beautiful, and the least beautiful image (F) had the highest anterior projection.

In the front-view panel, the images were manipulated with respect to the ratios calculated from two measurements, one vertical (not modifiable) and the other

Table 8. Beauty Factors by Demographics

Demographics	Abdomen	Legs	Buttocks	Breasts
Age, y				
18–25	35	62	67	54
26–35	70	103	133	137
36–45	41	36	57	71
46–55	18	20	21	30
56–59	3	5	2	7
>60	7	8	6	7
Gender				
Male	54	116	152	182
Female*	120	118	134 (27.02%)	124
Ethnicity				
Black/African	15	18	34	20
White	92	134	161	168
Hispanic/Latino	15	27	32	24
Chinese	5	11	5	8
Japanese	3	3	2	2
Middle Eastern	5	13	13	23
Korean	1	3	1	1
Other/multiracial*	38	25	38	60 (37.27%)
Region				
North America*	95	97	156 (32.23%)	136
South America*	32	60 (33.15%)	42	47
Europe	25	49	50	56
Africa	3	7	5	5
Australia	2	2	3	7
Middle East	16	18	23	34
Caribbean/ Pacific Islands*	1	1	7	21 (70%)

**P* < 0.05 based on the chi-square test for proportions. Highest preference by each comparative factor.

Table 9. Importance of Anterior Thigh Aesthetics by Demographics

Demographics	Very Important	Less Important	Very Unimportant
Age, y			
18–25	58	76	60
26–35	148	175	88
36–45	63	92	36
46–55	28	38	19
56–59	8	7	1
>60	7	12	6
Gender			
Male*	170	216	96
		(42.86%)	
Female*	142	184	114
		(37.1%)	
Ethnicity			
Black/African	36	35	14
White/ Caucasian*	140	221	140
		(39.82%)	
Hispanic/Latino	27	49	15
Chinese	11	10	6
Japanese	2	8	0
Middle Eastern*	27 (50%)	20	5
Korean	2	3	1
Other/ multiracial*	67 (41.61%)	54	29
Region			
North America*	111	185	133
		(38.22%)	
South America*	71	84	15
		(46.41%)	
Europe	51	74	47
Africa	9	10	1
Australia	5	5	3
Middle East*	50	32	6
	(54.95%)		
Caribbean/ Pacific Islands	15	10	5

**P* < 0.05 based on the chi-square test for proportions. Highest preference by each comparative factor.

horizontal (modifiable), as described in the Materials and Methods section, which allowed us to have different images with variations in thigh width. Thus, image I (0.44) showed the highest number of the aesthetic preferences of the anterior thigh, with 285 (28.5%) respondents. In the same panel, image L was considered the least beautiful anterior thigh by 657 (65.7%) respondents. All preferences in this panel were significantly different ($P < 0.001$). The responses assessed in this panel showed that thigh width is considered a relevant factor in female beauty, although only up to an intermediate level since image L had the greatest width and was considered the less beautiful thigh.

This survey also allowed us to learn about preferences in beauty factors, generally showing that breasts (30.6%) and buttocks (28.6%) are the most relevant factors for the respondents, with legs (23.4%) ranking third. Although many responses were not significantly different by region, South American (33.15%) respondents chose legs as the most important beauty factor, with a significant difference ($P < 0.05$) from general preferences. Similarly, all participants recognized the thighs as an important factor (40%) in female beauty at a significant level. As such, thigh aesthetics must be considered when planning a body contouring procedure. The results of the aesthetic preferences of the anterior thigh by age, region, and ethnicity did not show significant differences, which may be associated with the variety of cultural trends, the number of respondents, or access to digital tools, such as the Amazon Mechanical Turk platform.

The Amazon Mechanical Turk platform is a useful and adequate tool, which has been used in different studies to survey opinions and preferences. One of the main advantages of this tool is the variety of responses from many regions of the world and people of different ages and ethnicities; thus, increasing the significance of general preferences.¹²

In our experience, this platform has allowed us to collect information in an orderly and stratified manner. The survey was designed to enable respondents to rank the images by preference while reducing the risk of error by preventing them from choosing the same image twice when ordering images by preference and allowing them to select only one option in the preference questions, as configured. All participants had a specific code, which prevented the same participant from answering the survey more than once before proceeding with the payment to each participant. The survey was reviewed to ensure that no errors were introduced and that all questions were answered appropriately, ensuring that all respondents were included in the study analysis.

Our study helps to know the aesthetic preferences of the anterior thigh because the currently available information is limited or disregards this region when performing body contouring surgery. However, we also recognize that our study has limitations regarding information trends because, despite globalization, we cannot control some factors, such as the veracity of participants' preferences

or the accessibility of the Amazon Mechanical Turk platform in all ages, regions, or ethnicities included in the survey.

CONCLUSIONS

Anterior thigh aesthetic preferences assessed in side-view (A) and front-view (I) panels showed that image manipulations generated by increasing the anterior projection (angle) are not a relevant beauty factor; however, when increasing the thigh width (ratios) obtained in front view, an intermediate level can be considered beautiful, maintaining the symmetry of the previous projection.

In general, our survey shows that although buttocks (28.6%) and breasts (30.6%) are considered the most important beauty factors in women, legs ranked third (23.4%) overall and even ranked first in some regions, such as South America (33.15%).

The respondents in this study considered anterior thigh aesthetics in women as important, and respondents of some regions (ie, Middle East) and ethnic groups deemed them very important.

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