

# Aesthetic Eyelid Measurements of “Beautiful People”: Gender Differences and Application for Thyroid Eye Disease Patients

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**Background:** There remains a paucity of studies investigating measurements of periocular structures of people popularly seen as “beautiful.” Such measurements may be helpful in establishing postoperative goals and measuring aesthetic outcomes. This study (1) identifies aesthetic measurements of the periocular structures in idealized celebrities, (2) determines gender differences in such measurements, and (3) compares these measurements to patients who underwent surgical repair of upper eyelid retraction associated with thyroid eye disease.

**Methods:** Digital analysis of 38 celebrity photographs in *People’s* “Most Beautiful People” and “Sexiest Man Alive” was performed to measure image-derived (denoted with an “i”) margin reflex distance (iMRD1), tarsal platform show (iTPS), brow fat span (iBFS), and iTPS:iBFS ratio. The same analysis was used for 35 women who underwent surgical repair for thyroid eye disease-related upper eyelid retraction.

**Results:** Significant gender differences ( $P < 0.05$ ) were observed in celebrity metrics, with women having higher upper eyelids (longer iMRD1) (3.30 mm versus 2.50 mm), longer iTPS measurements (3.90 mm versus 2.50 mm), and larger iTPS:iBFS values (0.31 versus 0.20). Postoperative thyroid eye disease patients had significantly higher upper eyelids (longer iMRD1s) (4.80 mm versus 3.30 mm), longer iTPS (5.10 mm versus 3.90 mm), and larger iTPS:iBFS (0.37 versus 0.31) than celebrities.

**Conclusions:** There are significant gender differences in the periocular metrics of “beautiful people.” Optimal aesthetic outcomes may be more effectively obtained by achieving a preferred range of ratios than by relying on independent measurements. Although aesthetic outcomes are multi-factorial, measurements of “beautiful” people provide helpful guidelines to gauge aesthetic outcomes. (*Plast Reconstr Surg Glob Open* 2021;9:e3666; doi: 10.1097/GOX.0000000000003666; Published online 6 July 2021.)

## INTRODUCTION

The pursuit of desirable aesthetic outcomes in surgery has led to the development of new metrics and ways to understand and quantify surgical results. In the periorbital region, the tarsal platform show (TPS) and brow fat span (BFS) have

been identified as contributors to appearance.<sup>1-7</sup> In addition, anatomical relationships are important to the perception of the eyelid, eyebrow, and adnexa, and the ratio of these metrics has been established as a key contributor to upper eyelid and eyebrow aesthetics.<sup>1,3-8</sup> The TPS-to-BFS (TPS:BFS) ratio, for example, has been identified as one such key contributor to eyelid and eyebrow aesthetics.<sup>4</sup> However, despite the variety of metrics used to determine aesthetic outcomes, there remains a paucity of studies investigating the measurements of periocular structures and relationships of people popularly seen as “beautiful.” Determining such measurements may be helpful in establishing postoperative goals and measuring aesthetic outcomes.

The purpose of this study was to better understand the aesthetic metrics of the eyelid and adnexa in the United States by (1) identifying the mean and range of marginal

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reflex distance 1 (MRD1), TPS, BFS, and TPS:BFS ratio values for 38 of the top female and male celebrities listed as *People's* “Most Beautiful People” or “Sexiest Man Alive,” (2) determining whether there are any significant gender differences in these values for such celebrities, and (3) evaluating these values for female celebrities against pre- and postoperative mean values for female patients who underwent surgical repair for thyroid eye disease (TED)-related upper eyelid retraction.

### METHODS

The top 20 women and men from *People's* 2015 and 2016 lists of “Most Beautiful People” and “Sexiest Man Alive” were selected for inclusion in the celebrity cohort.<sup>9-12</sup> Next, a Google search identified images of adequate quality of 19 out of the 20 celebrities of each gender in primary gaze. ImageJ 1.5 software was utilized to perform digital analysis. Because measurements were made using image analysis, the prefix “i” (to denote “image-derived”) has been added to measurements referenced in this article that specifically pertain to the present study. The prefix “i” has been omitted in this article when referencing measurements in general terms. The image-derived measurements taken from the celebrity cohort were the iMRD1, iTPS, and iBFS using a scale based on an assigned constant corneal diameter of 11.70 mm and a previously reported technique.<sup>1,13</sup> As described in a previous study,<sup>1</sup> iMRD1 is the digital measurement of the distance from the pupil centroid to the upper eyelid margin, iTPS is the digital measurement of the distance from the upper eyelid margin to the visible upper eyelid skin crease, and iBFS is the digital measurement of the distance from the visible upper eyelid skin crease to the superior limit of the eyebrow. All of these measurements are performed in primary gaze, with the eyes looking straight ahead. For a visual description of the iMRD1, iTPS and iBFS, see Figure 1 from Evans et al's study that used an identical digital analysis technique.<sup>1</sup>

For comparison with the female celebrity cohort, previously published pre- and postoperative mean measurements from female patients who underwent anterior approach septum-preserving levator recession for repair of TED-related upper eyelid retraction were utilized.<sup>6</sup> These subjects were selected by retrospective chart review of female patients who underwent TED-related upper eyelid repair at the University of Iowa from 1996 to 2014. Those who underwent concurrent surgical procedures that could affect upper eyelid height (including blepharoplasty) at the time of the TED-related upper eyelid repair

were excluded. Only the subset of patients with long-term follow-up (>6 months) were utilized to ensure a more stable postoperative appearance had been reached. However, the postoperative time period was discontinued and the final measurements were obtained if a patient underwent any eyelid-altering therapy (including surgery), received any disease-modifying agents (including corticosteroids) or orbital radiation therapy, or experienced a flare of TED during the follow-up period.<sup>1</sup> Due to the limited number of male patients who underwent TED-related upper eyelid repair during the same period, male patients were not included for comparison with male celebrities. Statistical analyses comparing mean values between female and male celebrities, and between female celebrities and female TED patients were performed utilizing a Wilcoxon signed-rank test. The range of values for female celebrities was also compared against the range of values for male celebrities and against the mean values for female TED patients. This study was conducted in compliance with the authors' institutional review board guidelines, adhered to the tenets of the Declaration of Helsinki, and was HIPAA compliant.

### RESULTS

The mean and range of values for the iMRD1, iTPS, iBFS, and iTPS:iBFS ratio for the 19 female celebrities and 19 male celebrities are listed in Table 1. Statistically significant differences ( $P < 0.05$ ) were observed between female and male celebrities in the mean values for iMRD1, iTPS, and iTPS:iBFS ratio, with female celebrities having a higher upper eyelid (longer mean iMRD1) (3.30 mm and 2.50 mm, respectively), longer mean iTPS measurement (3.90 mm and 2.50 mm, respectively), and larger mean iTPS:iBFS ratio (0.31 and 0.20, respectively) than their male counterparts. The mean iBFS values for female and male celebrities (12.80 mm and 13.70 mm, respectively) did not have a statistically significant difference. The mean value of the eyebrow position (the sum of iMRD1, iTPS and iBFS) for female celebrities was higher than that of male celebrities by 1.30 mm (20.00 mm versus 18.70 mm). There was also a substantial variability in the range of values for both female and male celebrities, with male celebrities exhibiting a wider range in iTPS (0.00–6.80 mm versus 2.21–8.23 mm), iBFS (9.30–19.57 mm versus 10.03 mm–16.89 mm), and iTPS:iBFS ratio (0.00–0.73 versus 0.16–0.55) values than female celebrities and female celebrities exhibiting a wider range in iMRD1 values than male celebrities (1.66–5.28 mm versus 1.65–3.68 mm).

**Table 1. Image-derived Measurements of Female and Male Celebrities**

	Celebrity Women		Celebrity Men		Significance of Difference between Mean Values ( $P$ )
	Mean Value (SD)	Range of Values	Mean Value (SD)	Range of Values	
iMRD1 (mm)	3.30 (0.94)	1.66–5.28	2.50 (0.56)	1.65–3.68	<b>0.002</b>
iTPS (mm)	3.90 (1.53)	2.21–8.23	2.50 (1.83)	0.00–6.80	<b>0.026</b>
iBFS (mm)	12.80 (2.37)	10.03–16.89	13.70 (2.79)	9.30–19.57	0.311
iTPS:iBFS	0.31 (0.11)	0.16–0.55	0.20 (0.17)	0.00–0.73	<b>0.004</b>

iMRD1, image-derived marginal reflex distance 1; iTPS, image-derived tarsal platform show; iBFS, image-derived brow fat span; iTPS:iBFS, image-derived tarsal platform show to brow fat span ratio. Bold type indicates statistical significance.

**Table 2. Image-derived Measurements of Celebrity Women and Pre- and Postoperative Female TED Patients**

	Celebrity Women		TED Preoperative Women		TED Postoperative Women	
	Mean Value (SD)	Mean Value (SD)	Significance of Value Compared with Celebrity Women Value ( <i>P</i> )	Mean Value (SD)	Significance of Value Compared with Celebrity Women Value ( <i>P</i> )	
iMRD1 (mm)	3.30 (0.94)	7.20 (1.72)	> <b>0.001</b>	4.80 (1.84)	<b>0.001</b>	
iTPS (mm)	3.90 (1.53)	2.60 (1.35)	<b>0.001</b>	5.10 (1.73)	<b>0.003</b>	
iBFS (mm)	12.80 (2.37)	14.60 (2.81)	<b>0.012</b>	14.10 (2.06)	<b>0.040</b>	
iTPS:iBFS	0.31 (0.11)	0.17 (0.09)	> <b>0.001</b>	0.37 (0.13)	<b>0.029</b>	

iMRD1, image-derived marginal reflex distance 1; iTPS, image-derived tarsal platform show; iBFS, image-derived brow fat span; iTPS:iBFS, image-derived tarsal platform show to brow fat span ratio; TED, thyroid eye disease. Bold type indicates statistical significance.

A total of 35 female patients (61 eyelids) who had undergone an anterior septum-preserving levator recession for correction of TED-related upper eyelid retraction were included in the cohort whose pre- and postoperative measurements were compared with those of female celebrities. The pre- and postoperative mean iMRD1, iTPS, iBFS, and iTPS:iBFS ratio values of the female TED patients are listed in Table 2. Statistically significant differences ( $P < 0.05$ ) were observed for each metric. The mean measurements for female TED patients were consistently closer to those of female celebrities postoperatively than preoperatively. For example, the mean iMRD1 value for female TED patients was 3.90 mm higher than that of female celebrities preoperatively, but 1.50 mm higher postoperatively. Similarly, the mean iTPS:iBFS ratio value for female TED patients was 0.14 smaller preoperatively and 0.06 larger postoperatively than the value for female celebrities. In addition, the eyebrow position (the sum of iMRD1, iTPS, and iBFS) of female TED patients was 4.40 mm higher than that of female celebrities preoperatively, and 4.00 mm higher postoperatively. However, despite the differences between pre- and postoperative mean values for female TED patients, all such mean values (other than the preoperative mean iMRD1 value) were within the applicable range of such values for female celebrities.

## DISCUSSION

Comparative analysis of the aesthetic parameters of the upper eyelid and eyebrow in female and male celebrities showed statistically significant differences, with women exhibiting higher upper eyelids (longer iMRD1) and eyebrows (sum of iMRD1, iTPS and iBFS) and a larger iTPS:iBFS ratio than male celebrities. This dissimilarity may be attributable to significant frontal bossing, thicker supra-orbital ridges, and thicker eyebrows generally observed in men.<sup>14,15</sup>

A comparison of the mean values for female celebrities against pre- and postoperative mean values for female TED patients demonstrated that mean values for postoperative female TED patients were closer to those of female celebrities for all metrics (iMRD1, iTPS, iBFS, iTPS:iBFS ratio, and eyebrow position) than the mean values for preoperative female TED patients. However, the mean iTPS:iBFS ratio for female celebrities was smaller than that of postoperative TED patients, which is likely a result of TPS elongation resulting from eyelid retraction repair.<sup>1</sup>

Other studies have analyzed aesthetic measurements of the periocular structures and their relationships. McDonnell et al recently found a potentially “ideal” BFS:TPS range for female periorbital aesthetics based on identification of “more aesthetic” and “less aesthetic” periorbital images.<sup>4</sup> When inverted to TPS:BFS, their proposed “ideal” range (rounded to the nearest hundredth) lies between 0.27 and 0.31, encompassing the 0.31 iTPS:iBFS ratio for female celebrities identified in this study.<sup>4</sup> In male eyelid images, McDonnell et al did not find a statistically significant difference between the “more aesthetic” and “less aesthetic” male eyelid metrics. However, the TPS:BFS ratio for the “more aesthetic” group was significantly lower than the iTPS:iBFS ratio for male celebrities in the present study (0.07 versus 0.20).<sup>4</sup> As with the current study, there are confounding variables in the McDonnell et al study that could affect perception of the aesthetic qualities of the images.<sup>4</sup> These include iris color; skin pigmentation, texture, and tone; eyebrow grooming; and eyelash scurf and collarettes.<sup>4</sup> Further studies are needed to better understand gender differences in periorbital aesthetics and to ascertain the preferential range of measurements and ratios of periorbital structures and their relationships.

There are several limitations in using measurements of the periocular structures and relationships of US celebrities to gauge aesthetic outcomes. For example, celebrities designated as the “Most Beautiful People” or “Sexiest Man Alive” are not necessarily selected for the physiologic appearance of their eyes, and the “beauty” of the celebrity eye may be enhanced with cosmetics or lighting that seem to alter the anatomic relationships in the periorbital region. Using image-derived measurements also has inherent limitations, as digital images (and software used to obtain measurements in digital images) may not accurately capture actual measurements and may be affected by cosmetics or lighting. In addition, age and ethnicity have been identified as significant factors affecting popular notions of the “normal” range for upper eyelid metrics,<sup>16,17</sup> but neither of those factors were evaluated in this study. Asian celebrities were notably not included in *People's* 2015 and 2016 lists of “Most Beautiful People” and “Sexiest Man Alive” and preferred periorbital measurements and ratios in Asian countries may differ from those of US celebrities who are not of Asian descent. The periocular measurements of US celebrities also had a range of values and the measurements of female TED patients—both pre- and postoperative—all fit within the range of applicable values of female celebrities (with the

exception of the preoperative mean iMRD1 value). There may, therefore, be a range of values for periocular measurements that may be considered aesthetically “ideal” and a variety of factors, such as age and ethnicity, may play a role in those values. Further studies could compare an aesthetically “ideal” cohort to an aesthetically average age-matched cohort to elucidate these differences.

There are several practical implications of the results of this study. The patient’s gender may be relevant to optimize aesthetic outcomes when manipulating the upper eyelid(s) and/or eyebrow(s). For example, the iTPS:iBFS ratio is larger in celebrity women than in celebrity men, which indicates that more TPS and less BFS may be desirable for optimal female appearance. Surgeons should also ensure that the surgical approach taken for modification of the upper eyelid allows for the desired TPS:BFS ratio. For example, some have proposed that a posterior approach to ptosis or upper eyelid retraction repair offers less control of the postoperative TPS and BFS than an anterior approach, thereby limiting aesthetic outcomes.<sup>6</sup> It is likely that mean values and ratios of certain metrics will need to be used in combination for optimizing aesthetic outcomes. Prior studies have shown that the ratio between the temporal and nasal areas of the upper half of the palpebral fissure is a more effective metric of aesthetic outcome for surgical repair of thyroid-related upper eyelid retraction than relying on mean values for such temporal and nasal areas.<sup>1,8</sup> The TPS:BFS ratio is another example where ratios may provide the most effective metric to optimize cosmesis. As demonstrated by Papageorgiou et al, modifying the TPS or BFS without consideration of the TPS:BFS ratio can have a suboptimal aesthetic outcome.<sup>6</sup> “Beautiful” US celebrities also had a wide range of eyelid measurements, indicating that a specified set of periorbital measurements may not necessarily be aesthetically “ideal” for all individuals. Eyelids are ultimately only one facet of a person’s beauty, and a variety of factors (including other facial characteristics, age, and ethnicity) may play a role in periorbital aesthetics.

## CONCLUSIONS

Evaluating eye measurements of “beautiful” or “sexy” celebrities provides a helpful guide toward understanding popular aesthetic standards for periocular structures, establishing desirable metrics for preoperative planning, and gauging postoperative aesthetic outcomes. We found there to be statistically significant differences in the iMRD1, iTPS and iTPS:iBFS ratio between female and male celebrities. In addition, the mean values for postoperative female TED patients were closer to those of female celebrities than preoperative female TED patients. Female TED patients potentially had TPS elongation from eyelid retraction repair, as the mean iTPS:iBFS ratio for female celebrities was smaller than that of the postoperative TED patients. Statistically significant differences were not observed between male and female celebrities when comparing iBFS mean values but were observed when comparing mean iTPS:iBFS ratios. Optimal aesthetic

outcomes may be more effectively obtained by achieving desirable ratios than by relying on independent measurements. The periorbital measurements of “beautiful” US celebrities had a wide range of values demonstrating that perhaps there is no “ideal” measurement or ratio, but rather a multifactorial range that is considered “beautiful” or “sexy.” Future studies are needed to better evaluate aesthetic outcomes taking into consideration other factors, including age, ethnicity, gender, and other facial characteristics.

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## REFERENCES

- Evans JA, Clark TJE, Zimmerman MB, et al. Rethinking our definition of postoperative success: A comparative analysis of three upper eyelid retraction repair techniques using novel metrics to capture functional and aesthetic outcomes. *Ophthalmic Plast Reconstr Surg*. 2018;34:55–63.
- Goldberg RA, Lew H. Cosmetic outcome of posterior approach ptosis surgery (an American Ophthalmological Society thesis). *Trans Am Ophthalmol Soc*. 2011;109:157–167.
- Lew H, Goldberg RA. Maximizing symmetry in upper blepharoplasty: The role of microptosis surgery. *Plast Reconstr Surg*. 2016;137:296e–304e.
- McDonnell EC, Patel SY, Scofield-Kaplan SM, et al. The mathematical analysis of the aesthetically pleasing eyelid. *Ophthalmic Plast Reconstr Surg*. 2020;36:182–184.
- Pallett PM, Link S, Lee K. New “golden” ratios for facial beauty. *Vision Res*. 2010;50:149–154.
- Papageorgiou KI, Ang M, Chang SH, et al. Aesthetic considerations in upper eyelid retraction surgery. *Ophthalmic Plast Reconstr Surg*. 2012;28:419–423.
- Ramesh S, Mancini R. Dynamic analysis of Müller’s muscle response to phenylephrine. *Ophthalmic Plast Reconstr Surg*. 2016;32:46–48.
- Cruz AA, Coelho RP, Baccega A, et al. Digital image processing measurement of the upper eyelid contour in Graves disease and congenital blepharoptosis. *Ophthalmology*. 1998;105:913–918.
- Sexiest Man Alive: David Beckham. *People*. 2015;84:84–94.
- Baker KC, Calderone A, Dugan C, et al. Sexiest man alive: DJ “The Rock” Dwayne Johnson. *People*. 2016;86:100–119.
- Jordan J. Sandra: World’s most beautiful. *People*. 2015;83:82–90.
- Jordan J, Calderone A, Chiu M, et al. Jen!. *People*. 2016;85:78–88.
- Rüfer F, Schröder A, Erb C. White-to-white corneal diameter: Normal values in healthy humans obtained with the Orbscan II topography system. *Cornea*. 2005;24:259–261.
- Altman K. Facial feminization surgery: Current state of the art. *Int J Oral Maxillofac Surg*. 2012;41:885–894.
- Mogilski JK, Welling LLM. The relative contribution of jawbone and Cheekbone prominence, eyebrow thickness, eye size, and face length to evaluations of facial masculinity and attractiveness: A conjoint data-driven approach. *Front Psychol*. 2018;9:2428.
- Cartwright MJ, Kurumety UR, Nelson CC, et al. Measurements of upper eyelid and eyebrow dimensions in healthy white individuals. *Am J Ophthalmol*. 1994;117:231–234.
- Murchison AP, Sires BA, Jian-Amadi A. Margin reflex distance in different ethnic groups. *Arch Facial Plast Surg*. 2009;11:303–305.