The Esthetic Properties of Lips: A Comparison of Models and Nonmodels

Marcus Bisson, BMed Sci, BM, BS, MRCS[a];
Adriaan Grobbelaar, MBChB, MMed(Plast), FCS(SA), FRCS(Plast)[b]

Abstract: It is perceived that fuller lips are more attractive, and hence lip augmentation has become common in esthetic plastic surgery. Numerous materials have been used, including collagen, autologous adipocytes, and more recently Restylane®; however, little data exist on what comprises esthetically beautiful lips. Photographs of 28 models from fashion magazines were scanned to obtain digital images. These were selected strictly, using only exactly anterior-facing pictures. Using image analysis software, a range of defined lengths, angles, the lip area, and perimeter were measured. Lengths were expressed as a ratio of the intercanthal distance. A group of 14 nonmodel hospital employees were used as controls, with images obtained using a digital camera, and the same measurements were calculated. Results were compared for the two groups, and statistical analysis was performed using the Student's *t*-test. Overall lip width was not significantly different between the two groups (models, 15.7 units; nonmodels, 15.9 units). Both upper- and lower-lip height was significantly greater in models than in nonmodels (models, 2.1 and 3.6 units; nonmodels, 1.6 and 2.7 units, respectively), as was the upper-lip height laterally at the point of the angle of cupid's bow. Correspondingly, the angles of both upper and lower lips were also greater in models (models, 30.0° and 47.3°; nonmodels, 23.2° and 37.6°, respectively). We have assumed the model group to have esthetically beautiful lips. Our quantitative measurements have confirmed that this population has fuller lips compared with nonmodel controls, as determined by the lip height and angles. (*Angle Orthod* 2004;74:162–166.)

Key Words: Lips; Esthetic; Beauty; Models; Lip augmentation

INTRODUCTION

The face is divided into thirds, with the lips comprising the key esthetic feature of the lower third,[1] with the upper lip especially having a significant effect on the esthetic judgment of the face.[2] Traditionally, fuller lips have been considered more beautiful; indeed, Peck and Peck[3] suggested that the esthetically attractive Caucasian face demonstrated fuller lips than the norm. Links have been made with voluptuousness, sensuality, and youthfulness, such signs of fertility being strong evolutionary influences on what is considered attractive.[4,5] Resulting from this, there has been a gradual increase in lip prominence among models in the last century,[6] and currently, lip augmentation procedures have become common in esthetic plastic surgery. Many techniques have been developed, all of which aim to provide fuller, larger lips.[7–10] Very little exists in the literature as to what comprises beautiful lips, and the few studies that have focused on lip esthetics have concentrated on profile views or measurements.[6,11,12]

In general, the facial features of models are more attractive than those employed in other occupations. By comparing measurements of models with those of a group of nonmodels, we aimed to examine the esthetic properties of lips and the perioral region from the frontal view and to determine whether the data obtained could be used in our clinical practice.

MATERIALS AND METHODS

Photographs of 28 randomly selected Caucasian models were obtained from popular fashion and lifestyle magazines (see Table 1). The photographs were carefully selected to include only those with strict anterior posterior images and negligible head tilt or rotation. The subjects were judged to have relaxed, nonsmiling lips thus minimizing changes in lip size and shape because of expression. The images were

[a] Specialist Registrar in Plastic and Reconstructive Surgery, Department of Plastic and Reconstructive Surgery, Northern General Hospital, Sheffield, UK.

[b] Consultant Plastic and Reconstructive Surgeon, Department of Plastic and Reconstructive Surgery, Mount Vernon Hospital, Northwood, Middlesex, UK.

Corresponding author: M. A. Bisson, Bmed Sci, BM, BS, 30 Barden Road, Woodthorpe, Nottingham NG3 5QD, UK
(e-mail: marcus@mbisson.fsnet.co.uk).

TABLE 1. Model Images Were Obtained from the Following Magazine Publications

Magazines	Publishers
Cosmopolitan UK	The National Magazine Company
Vogue UK	The Condé Nast Publications Ltd
New Woman UK	The Emap Elan Network
For Him Magazine UK	Emap International
Glamour	The Condé Nast Publications Ltd

digitally captured by scanning them into a desktop computer using a Canon Canoscan FB630P. A control group of 14 nonmodel hospital employees were digitally photographed using a Casio QV-3500EX. Again, the images were taken from the front with relaxed lips. The controls were all in the age range of 18–35 years and of Caucasian origin.

Image analysis software (UTHSCSA Image Tool) was then used to obtain a series of distinct measurements from each of the subject images, including specific lengths, angles, lip area, and perimeter. The actual measurements taken are illustrated in Figure 1 with numbers relating to Table 2. To correct for the inevitable variation of image size, all lengths were expressed as a ratio of the intercanthal distance in each image, which was given a nominal value of 10 units. The mean values for the two groups, models and nonmodel controls, were compared, and statistical analysis was performed using a Student's *t*-test (SigmaStat, Jandel Corp, San Rafael, CA).

Patients

Five patients undergoing lip-augmentation procedures consented to have pre- and postprocedure digital pictures taken. Photographs were again strict anteroposterior (AP) images with no rotation and with relaxed, nonsmiling lips. Preoperative photographs were taken immediately before the procedure, and subsequent images were obtained at 2 weeks of follow-up. All patients received Restylane® through injection; the details are shown in Table 3. The same measurements were obtained as outlined above for pre- and postprocedure images and the means compared.

RESULTS

The results of the mean value for each measurement obtained for models and nonmodels are shown in Table 2. There was no significant difference in the mean lip width or nose to chin height between the two groups; however, both upper- and lower-lip heights in the midline were greater in models (2.07 units and 3.55 units, respectively) than in controls (1.60 units and 2.71 units, respectively) ($P <$ .001). This was also the case for the left and right upper-lip heights, which were 2.51 units and 2.60 units in models and only 2.01 units and 2.01 units in controls. Some other lengths also showed lesser but significant differences between the two groups, with nose to upper lip, lower lip to
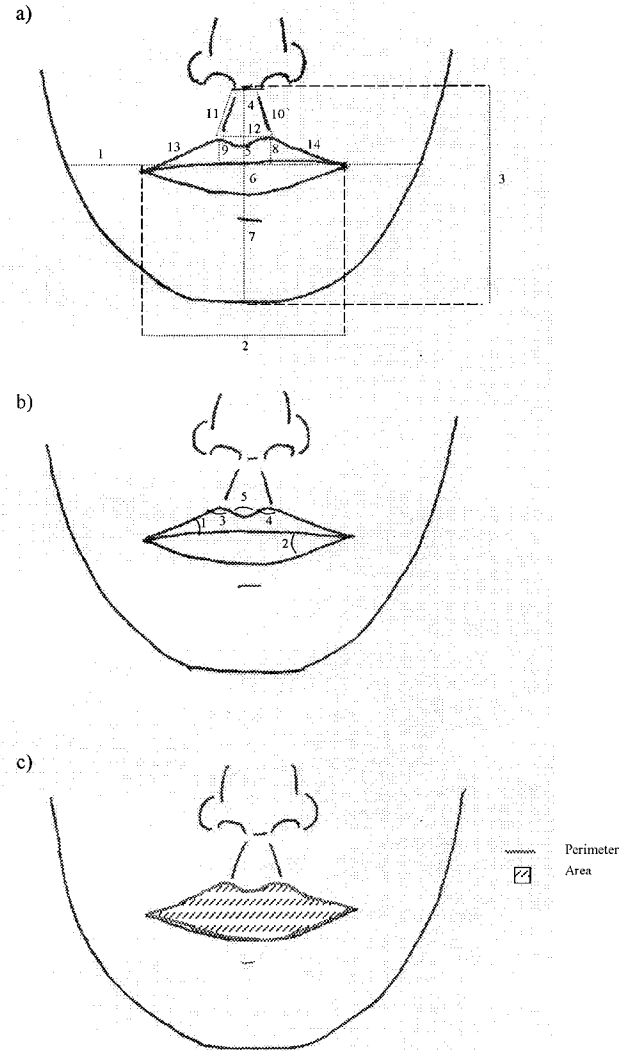
FIGURE 1. A diagrammatic representation of the measurements made on each image. Numbers relate to definitions in Table 2. (a) Lengths, (b) angles, and (c) perimeter and area.

chin, and left and right philtral columns being less in the model group. The upper-lip angle was 30.02° in models and 23.21° in nonmodels and the lower-lip angle 47.28° in models and 37.58° in nonmodels, both being statistically significant differences ($P <$ .001). Interestingly, there was no difference between the groups in the angle measured at the center of cupid's bow, although the right and left bow angles were more acute in models, suggesting a more defined bow overall. The mean lip perimeter in the model population was 37.48 units and 36.79 units for the nonmodels ($P =$ .57), whereas the overall lip area was 1,284 units^2 for models compared with 655 units^2 for controls ($P =$ .01).

Figure 2 displays graphically those values that were found to be highly significant in the first part of this study alongside the corresponding pre- and postoperative mea-

TABLE 2. Mean Values of the Defined Measurements for Models (*n* = 28) and Control Nonmodels (*n* = 14) with SDs and *P* Values Determined by Student's *t*-test

Measurement	Models (units)		Nonmodels (units)		
	Means	SD	Means	SD	*P* Value
Lengths (mm)					
Full face width	32	3.6	34.2	3.02	.06
Full lip width	15.7	1.52	15.9	1.92	.64
Nose to chin	18.37	2.28	19.69	2.17	.08
Nose to upper lip	4.02	0.59	4.73	0.72	<.01
Upper lip	2.07	0.59	1.6	0.3	<.01
Lower lip	3.55	0.46	2.71	0.57	<.001
Lower lip to chin	8.53	1.57	10.44	1.32	<.001
Upper lip left	2.51	0.49	2.01	0.42	<.01
Upper lip right	2.6	0.55	2.01	0.35	<.001
Left philtral column	3.87	0.56	4.48	0.73	<.01
Right philtral column	3.75	0.57	4.42	0.67	<.01
Bow tip to tip	3.7	0.56	3.72	0.56	.9
Right angle to bow tip	6.62	0.82	6.32	1	.3
Left angle to bow tip	6.61	0.85	6.18	0.95	.14
Intercanthal distance	10	0	10	0	1
Angles (°)					
Upper-lip angle	30.02	4.84	23.21	5.33	<.001
Lower-lip angle	47.28	7.21	37.58	7.65	<.001
Right bow	134	9.51	144.62	8.88	<.01
Left bow	133.69	8.91	143.65	10.05	<.01
Central bow	130.68	11.13	135.81	13.49	.2
Total lip perimeter	37.48	3.34	36.79	4.487	.57
Total lip area	1284.08	701.1	655.05	141.61	<.01

TABLE 3. Summary of the Five Patients Analyzed Before and After Augmentation

Patient	Age	Substance Injected	Volume[a]	Anesthesia
1	52	Restylane	2 amp	Infraorbital and mental block
2	41	Restylane	1 amp	Nil
3	39	Restylane	1.5 amp	Infraorbital and mental block
4	57	Restylane	1 amp	Infraorbital and mental block
5	50	Restylane	1 amp	Nil

[a] amp indicates ampoule.
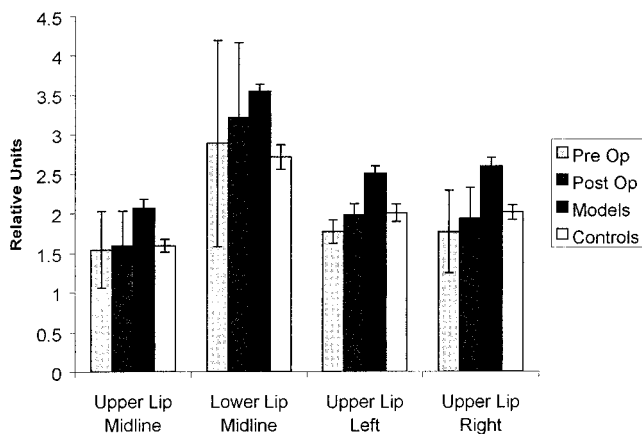
FIGURE 2. Mean measurements with highly significant differences between models and controls compared with the same measurements made before and after lip augmentation in five patients.

surements for the five patients undergoing lip augmentation. The complete pre- and postprocedure values are shown in Table 4. There is a general trend for those measurements that we have already highlighted as being important to increase after the augmentation procedure; however, they do not reach statistical significance.

DISCUSSION

We have used a straightforward method to quantitatively evaluate the relative proportions of the perioral region in a group of models and then compare them with a control group of normal subjects. Women have been highlighting their lips since ancient times with face paints or rouge,[13] lipsticks now being a major part of the cosmetics industry. It is well documented that lips become thinner and less well defined as a result of the aging process,[8,14] and youthful and beautiful lips are therefore considered to be those that ap-

TABLE 4.   Mean Values of the Defined Measurements for Patients ($n = 5$) Pre- and Postaugmentation with SDs

Measurement	Preaugmentation (units)		Postaugmentation (units)	
	Means	SD	Means	SD
Lengths (mm)				
Full face width	32.98	7.38	31.58	7.24
Full lip width	16.57	4.26	16.66	4.7
Nose to chin	18.77	7.60	17.77	7.21
Nose to upper lip	4.85	1.56	4.94	2.04
Upper lip	1.54	1.08	1.6	0.98
Lower lip	2.89	2.91	3.21	2.13
Lower lip to chin	9.39	3.65	7.95	2.9
Upper lip left	1.77	0.33	1.99	0.3
Upper lip right	1.77	1.17	1.94	0.86
Left philtral column	5.07	1.01	4.74	0.98
Right philtral column	4.71	0.68	4.64	1.07
Bow tip to tip	4.18	1.56	4.01	1.57
Right angle to bow tip	6.06	1.03	6.44	0.45
Left angle to bow tip	6.67	1.76	6.59	1.7
Intercanthal distance	10	0	10	0
Angles (°)				
Upper-lip angle	19.48	2.26	22.16	3.02
Lower-lip angle	31.92	7.1	38.37	12.09
Right bow	148.66	11.91	151.24	6.1
Left bow	148.64	10.84	149.79	9.41
Central bow	145.11	13.02	143.67	13.48
Total lip perimeter	38.41	7.29	40.06	4.77
Total lip area	1263.66	371.53	1306.71	268.11

pear full and rounded. Esthetic surgery can provide fuller lips through various augmentation procedures; however, there is very little scientific data concerning lip beauty. In our group of models, certain lengths and angles were significantly greater than in the controls, and these were all measurements that can be directly related to the degree of lip fullness or size. The upper- and lower-lip heights in particular, in conjunction with larger upper- and lower-lip angles, suggest full, rounded lips.

There were limitations in the methodology used for this study. First, the use of the intercanthal distance for normalizing length measurements with respect to image size could be criticized because clearly there is some degree of variation in this distance between subjects. It was necessary to take into account image size using some means, and the intercanthal distance was decided upon as one of the most consistent and easily defined lengths. No subjects were considered to have significant telecanthus, and the fact that there were no significant differences between the model and control groups in measurements of face width, lip width, and nose to chin length suggest that our choice was reasonable. There could have been bias in the model group toward fuller lips because of the use of lipstick extending outside the actual vermillion border or because of previous lip augmentation procedures. Neither of these factors invalidates our observations because both would have been used by the model subjects to enhance the attractiveness of the lips, and in all controls the actual vermillion border was

used for points of measurement. The above criticisms could have been overcome by taking actual measurements in person without lipstick and enquiring about previous augmentation in both groups; however, this was not practical for the model group.

We have not found any previous studies in the literature that examine lip measurements from the frontal view. Peck and Peck[3] proposed that the esthetic Caucasian face had fuller lips than normal, and Sutter and Turley[12] measured a series of lengths and angles from profile photographs, finding slightly fuller lips in Caucasian models than in controls. This was less apparent in African-American models when compared with African-American controls. There appears to be a trend for Caucasian models to have increasingly fuller lips during the last century, as demonstrated by Auger and Turley[6] again from profile photographs. Interestingly, this was also found to hold true for male Caucasian models.[11] It appears, therefore, from the literature that the lips of models, and hence extrapolating from this, those lips considered to be beautiful, are larger and fuller. This has been confirmed by our data examining frontal views.

Although currently we have applied these methods only to compare a limited number of pre- and postaugmentation patients, some interesting features have been highlighted. When we examined those measurements that we had already found to be different between models and nonmodels, there was a noticeable trend for all the upper-lip lengths and angles to be even less than those of the nonmodel con-

trols. This may suggest that those patients seeking lip augmentation do actually have particularly thin lips compared with the average population. The mean age of the patients undergoing augmentation was, however, 47.8 years, and thus some of this difference could be accounted for by age-related changes, with the age limit on our nonmodel controls being 35 years.

It is also apparent from the postaugmentation data that although there is a trend toward increased lip fullness, it falls well short of the measurements seen in the models. This could be due to technical and financial limitations of the procedure. Some patients can only justify the cost of a single ampoule of Restylane®. Additionally, without local anesthetic nerve blockade, injection of more than a single ampoule becomes very uncomfortable for the patient; thus, in both cases the patients may accept a lesser result. Indeed, the one patient who showed the most marked increase in postprocedure measurements did receive an infraorbital nerve block, a mental nerve block and two ampoules of Restylane®. The pros and cons highlighted here are obviously important areas to consider and discuss with the patient when counseling them regarding the procedure and their expectations. It would be useful to extend this study to compare pre- and postaugmentation measurements in a larger number of patients so that the effects of one vs two syringes or topical vs nerve block anesthesia could be evaluated.

CONCLUSIONS

In summary, we have confirmed the commonly held belief that fuller lips are more esthetically beautiful by comparing model lips with those of nonmodels, using image analysis software to analyze AP facial photographs. By applying a similar technique to a series of patients undergoing augmentation procedures, we have highlighted a number of key clinical issues surrounding lip augmentation by using quantitative data.

REFERENCES

1. Patterson CN, Powell DG. Facial analysis in patient evaluation for physiologic and cosmetic surgery. *Laryngoscope* 1974;84: 1004–1019.
2. Michiels G, Sather AH. Determinants of facial attractiveness in a sample of white women. *Int J Adult Orthod Orthognath Surg.* 1994;9:95–103.
3. Peck H, Peck S. A concept of facial esthetics. *Angle Orthod.* 1970;40:284–318.
4. Foster EJ. Profile preferences among diversified groups. *Angle Orthod.* 1973;43:34–40.
5. Peck S, Peck L. Selected aspects of the art and science of facial esthetics. *Semin Orthod.* 1995;1:105–126.
6. Auger TA, Turley PK. The female soft tissue profile as presented in fashion magazines during the 1900s: a photographic analysis. *Int J Adult Orthod Orthognath Surg.* 1999;14:7–18.
7. Alkek DS. Lip augmentation with silicone. *J Dermatol Surg Oncol.* 1991;17:747–748.
8. Austin HW, Weston GW. Rejuvenation of the aging mouth. *Clin Plast Surg.* 1992;19:511–524.
9. Gonzalez Ulloa M. The sensuous lip. *Aesthetic Plast Surg.* 1992; 16:231–236.
10. Ho LC. Augmentation cheiloplasty. *Br J Plast Surg.* 1994;47: 257–262.
11. Nguyen DD, Turley PK. Changes in the Caucasian male facial profile as depicted in fashion magazines during the twentieth century. *Am J Orthod Dentofacial Orthop.* 1998;114:208–217.
12. Sutter RE Jr, Turley PK. Soft tissue evaluation of contemporary Caucasian and African American female facial profiles. *Angle Orthod.* 1998;68:487–496.
13. Romm S. On the beauty of lips. *Clin Plast Surg.* 1984;11:571–581.
14. Fanous N. Aging lips. Esthetic analysis and correction. *Facial Plast Surg.* 1987;4:179–183.