

AESTHETIC PERCEPTION OF THE HEIGHT OF THE LIP VERMILION BORDER BY BLACK AND WHITE LAYPEOPLE

ABSTRACT

AIM: To assess the degree of aesthetic perception of the height of the vermilion border of the lip among laypeople of black and white ethnicity. **MATERIAL AND METHODS:** in possession of an extraoral photograph of a 25 years old woman with lips at rest, changes were effectuated reducing the height of the lip vermilion in increments of 0.5 mm (0-default to -3.0 mm). To do so, a program for image manipulation (Adobe Photoshop CS4, San Jose, CA, USA) was used. Once the images obtained, they were printed and arranged randomly on a questionnaire to be evaluated by the examiners (n=200). A graduated visual analogue scale of 0 to 10 points for aesthetic evaluation, where 0 represented "not very attractive", 5 "attractive" and 10 "very attractive", was used. To evaluate the differences between the examiners, the Mann-Whitney test was used. **RESULTS:** There was significant difference between male and female evaluators in evaluating the effect of the height of the vermilion on the attractiveness of the lip. Black and white people were able to identify changes in the height of the vermilion border of the lip, verifying that this height is acceptable till -2mm. Black evaluators gave lower scores to the -3 mm height vermilion than white evaluators, and this has been a clinically significant difference ($p < 0.05$). **CONCLUSION:** changes in the height of the vermilion border of the lip are acceptable up to -2mm gap among black and white people of both genders, gradually decaying to major changes and having a preference, mostly, for the greater height of the vermilion border of the lip.

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KEYWORDS

Lip. Aesthetic. Perception.

INTRODUCTION

Located in the lower third of the face, lips play the role of most important element of this third, which is extremely important as regards the functional and esthetic aspects.^{1,2}

Studies show that lip volume is related to beauty and youth and that the current "new century" standard of beauty shows a trend toward fuller and more outwardly positioned lips.^{1,3}

Orthodontic treatment can interfere with the positioning of the lips and consequently increase or decrease the lip vermilion.⁴⁻⁶ Thus, studies evaluating what would be the acceptable limit of lip vermilion becomes an important tool for orthodontic diagnosis and may be the deciding factor for orthodontic treatment with or without extraction and in some cases with or without the involvement of orthognathic surgery.^{7,8}

There are studies available in the literature that evaluated the influence of the height of the lip vermilion on the smile aesthetics.^{4,8} Nonetheless, it is worth noting that to date there are no reports in scientific literature, of this assessment performed between individuals of black and white ethnicities. In result, there are no parameters to be used with respect to aesthetic preference among black and white people on that issue to be used clinically. Thus, in order to meet this need, the authors' proposal of the present study was to evaluate the degree of perceived

vermilion height regarding lip aesthetics by black and white laypeople.

MATERIAL AND METHODS

This study was conducted according to the STROBE guidelines (Strengthening the Reporting of Observational Studies in Epidemiology). The research protocol was approved by the ethics committee.

SAMPLE SIZE:

The sample size calculation was performed using the nQueryAdviser (Version 6.01 Solution statistics, York, Ireland). Based on a 5 % ($\alpha=0.05$) significance level, the sample size was calculated to achieve the potential of 80%. The sample size calculation showed that a number of 200 subjects would be needed for each group (black and white subjects).

CONSTRUCTION OF THE SERIES OF IMAGES:

An extraoral photograph of a 25 years old woman with aesthetic lips in usual position (rest) of an average vermilion height was used in this study. This image was modified using image manipulation software (Adobe Photoshop CS4, San Jose, CA, USA) in order to create an exact average height of the vermilion and bilaterally symmetrical lips. From this standardized image the heights of vermilion were altered with increments of 0.5 mm (from 0 mm for the standard image to -3.0 mm) with

as reference the average height of the vermilion border of the lip. Seven images were obtained, these in turn were printed and arranged randomly (being one original and six altered) and attached to the questionnaire to be evaluated by the examiners.

EXAMINERS:

Examiners (n=200) comprised white lay persons (50 women, 50 men) and black lay persons (50 female, 50 male) aged varying from 20 to 30 years of age. The evaluation was performed in two stages: in the first step all images were presented to the evaluators grouped on one sheet (Figure 1), they were then requested to choose the image they liked most and their least favorite. In a second sheet the same images had their orders changed randomly and the same questions were made. This second assessment aimed to verify the reliability of the answers given in the first one. In the second phase of the questionnaire, the images were presented individually in random order, it was requested that the evaluators graded the photographs from 0 to 10 points, whereas 0 represented not very attractive, 5 attractive and 10 very attractive, with the aid of a visual analog scale (VAS) graded 10 cm long.

STATISTICAL DATA ANALYSIS:

To compare the distribution of the median scores between the male and female

participants, we used the Mann-Whitney test.

The differences in median aesthetic scores between the seven vermilion heights were analyzed using the Friedman test. The significance level was set at 5 % ($\alpha=0.05$).

Visual analogue scales are commonly used in research to assess pain, and, generally, as clinically significant, a minimum difference on a scale ranging from 9 % to 13 % is adopted⁹⁻¹¹. In orthodontic research more conservative criteria have been used; a 15% difference in visual analog scale was used by other authors as clinically significant for differentiating smile^{12,13} and lip⁸ aesthetics. In this study, we adopted a 15% difference on visual analog scale to determine the clinical significance of the aesthetic scores. Data were analyzed with PASW Statistics for Windows (SPSS 21.0, 2012, Armonk, NY: Corp. IBM.).

RESULTS

There was a significant difference ($p<0.05$) between male and female evaluators in evaluating the effect of the height of the vermilion on the lip attractiveness. Median values and ranges of aesthetic scores for each level of the vermilion height, by gender of the evaluators, are shown in Table 1 and Figure 2.

The Friedman test showed significant differences ($p<0.001$) in median aesthetic scores assigned to the seven levels by male and female evaluators. For male evaluators, the median aesthetic scores remained constant for

vermilion heights from 0 mm to - 2 mm. From - 2 mm vermilion, clinically significant decline occurred progressively ($\geq 15\%$ difference on the visual analogue scale scores) till the height of -3 mm (Figure 2A). For female evaluators, the median scores remained constant in vermilion heights from 0 mm to - 1 mm. In particular, there were clinically significant differences between the following vermilion heights: - 1 mm vs. - 1.5 mm and - 2 mm; - 1.5 mm and - 2 mm vs. - 2.5 mm; - 2.5 mm vs. - 3 mm (Figure 2B). Male evaluators assigned higher scores to vermilion heights of - 1.5 mm, - 2 mm, - 2.5 mm and - 3 mm than female evaluators, and these differences were clinically significant.

Median values and ranges of aesthetic scores for each level of the vermilion height, according to evaluators' ethnicity, are shown in Table 1 and Fig 3. The Friedman test showed significant differences ($p < 0.001$) in the median aesthetic scores attributed to the seven levels by black and white evaluators. Both for black as for white evaluators, the median aesthetic scores remained constant in vermilion heights from 0 mm to -1 mm. There were clinically significant differences between the following vermilion heights: -1 mm vs. -1.5 mm, -2mm, -2.5 mm, 1.5 mm, - 2 mm and - 2.5 mm vs. - 3 mm (Figs. 2A and 2B). Black evaluators attributed lower scores to vermilion height of - 3 mm than white evaluators, and this difference was clinically significant.

DISCUSSION

This study addresses the aesthetic perception among black and white male and female laypeople aged 20 to 30 about the vermilion border of the lip. The height of the vermilion is defined as the length between the edge of the upper vermilion and the lower vermilion edge.^{4,8} This analysis was performed in a subjective manner and quantitative measurements were obtained after observation of black and white laypeople in relation to the height of the vermilion of the lip. For such an assessment we used of a visual analog scale, which enabled quantification.

As proposed by Islam et al.,¹⁴, 7.8 mm and 9.5 mm were established as average height of the lower lip vermilion for the upper lip. These average measurements were used to adjust the default image, an image that was the basis for gradual reduction of the images to be evaluated.

There was a small correlation between female and male individuals, which was considerably lower when the ethnicity variant was evaluated. Regarding male evaluators, it was concluded, when compared to previous concluded research, that the gender in question assigns higher notes for lesser heights of the lip vermilion.⁸ In this study, evaluators ascribed medium to low values for the lip vermilion height, keeping constant scores in 5 pictures from the 7 evaluated, which are

characterized by vermillion heights of 0 mm to -2 mm (Figure 1).

Figure 1. Series of 7 images used in the research, with A: Original; B: -0.5 mm; C: -1.0 mm; D: -1.5 mm; E: -2.0 mm; F: -2.5 mm and G: -3.0 mm, individually presented to lay examiners following the A - G sequence for the assignment of scores from 0 (not very attractive) to 10 (very attractive) according to the scale above.



However, in female evaluators the median scores remained constant in only 3 of the 7 images, with vermilion height of 0 mm to -1 mm, thereby demonstrating that the male evaluators had a more linear pattern of the marks attributed to the images, with declining grades only in the last two images (F and G), while the female evaluators were constant only in 3 images (A, B and C) as well as a progressive dissatisfaction in the other 4 images (D, E, F and G). This reveals that women have a preference for the higher lip vermilion height, which may be because the larger size of the vermilion is related to fertility, youth and attractiveness.¹⁵ Still according to a recent study by Ioi et al.,⁸ female individuals have considerable aesthetic interest for lips with higher vermilion height.

In particular, in both genders, clinically significant differences can be noted between the following vermilion heights: - 1 mm vs. - 1.5 mm and - 2 mm; - 1.5 mm and - 2 mm vs. - 2.5 mm; - 2.5 mm vs. - 3 mm, pointing out that only 0.5 mm difference from one image to the next can significantly affect the aesthetic perception of the evaluators, both in improved satisfaction and in its decrease. This observation is confirmed by Foster¹⁶ when realizing that laypeople surprise by presenting detailed analysis and insight to qualify the facial profile. He also stresses that culture can determine preferences, explaining the discrepancy in results between men and women.

Table 1. Median values and ranges of aesthetic scores for each level of vermilion height, according to gender and ethnicity of the evaluators of the study.

	Height level of the vermilion															p-value						
	0 mm			- 0,5 mm			- 1,0 mm			- 1,5 mm			- 2,0 mm				- 2,5 mm			- 3,0 mm		
	Median	P ₂₅	P ₇₅	Median	P ₂₅	P ₇₅	Median	P ₂₅	P ₇₅	Median	P ₂₅	P ₇₅	Median	P ₂₅	P ₇₅		Median	P ₂₅	P ₇₅	Median	P ₂₅	P ₇₅
Sex																						
Male	7,00	6,00	8,00	7,00	6,00	8,00	6,00	5,00	7,00	6,00	5,00	7,00	6,00	4,50	7,00	5,00	4,00	6,38	4,00	3,00	6,00	< 0,001
Female	7,00	5,00	8,38	6,50	5,00	8,00	6,00	4,00	7,00	5,00	4,00	6,00	5,00	4,00	6,00	4,00	3,00	6,00	3,00	1,00	4,00	< 0,001
Race																						
Black	7,00	5,00	8,00	7,00	5,00	8,00	6,00	5,00	7,00	5,00	4,50	6,00	5,00	4,00	6,00	5,00	3,00	6,00	3,00	2,00	5,00	< 0,001
White	7,00	5,63	8,00	7,00	5,13	8,00	6,00	5,00	7,95	5,00	4,00	7,00	5,00	4,00	7,00	5,00	3,00	6,00	4,00	2,00	5,00	< 0,001

At the end, it was observed that men had a stable pattern till -2 mm, whereas women did not have the same level of stability in their analyses till -1mm, emphasizing that the latter group showed a higher critique in their aesthetic perceptions, as inferred in a

previous study by Korean women evaluating the aesthetic perception of the vermilion height of the lip between Koreans and Japanese.⁸

Regarding the ethnicity variant, both for black and white evaluators, the median

aesthetic scores remained constant in vermilion heights of 0 mm to - 1 mm. There were clinically significant differences between the lower vermilion heights with a minimum interval in size. Regarding this, it was observed

that black evaluators attributed lower scores to vermilion height of - 3 mm than white evaluators, and this difference was significant.

Figure 2. Median values and ranges of scores for each aesthetic vermilion height: A, male evaluators; B, female evaluators ^{a, b, c, d}. Different letters are clinically significant.

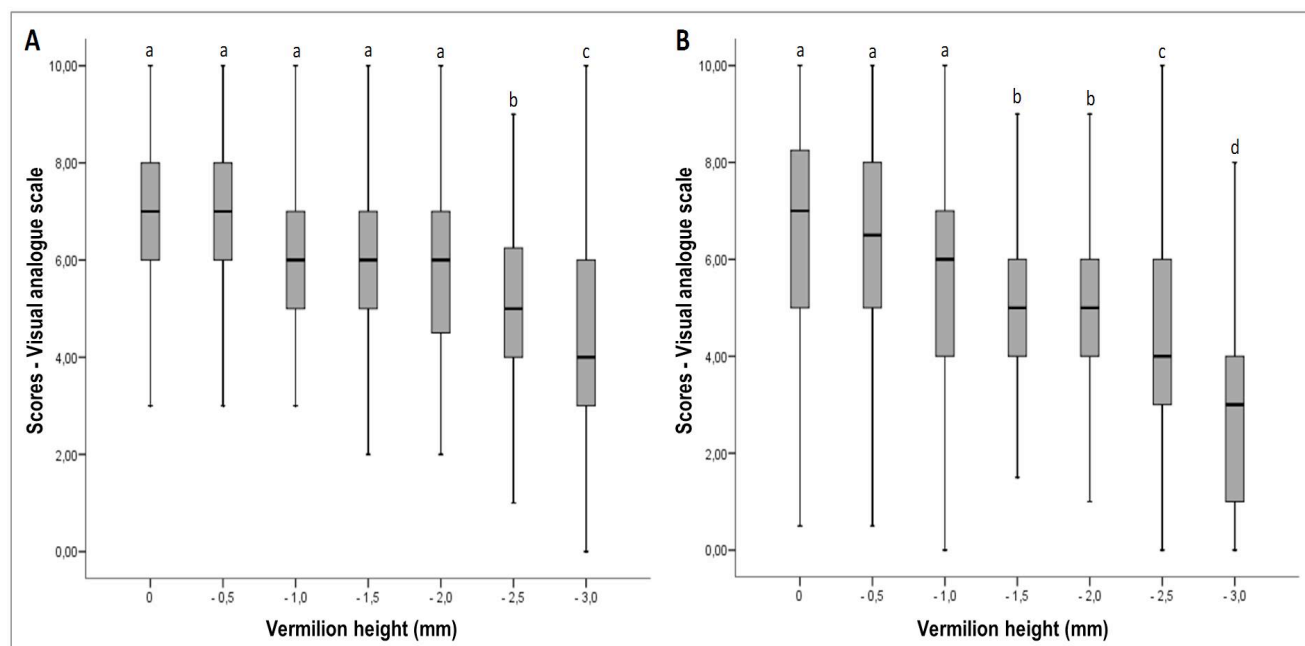
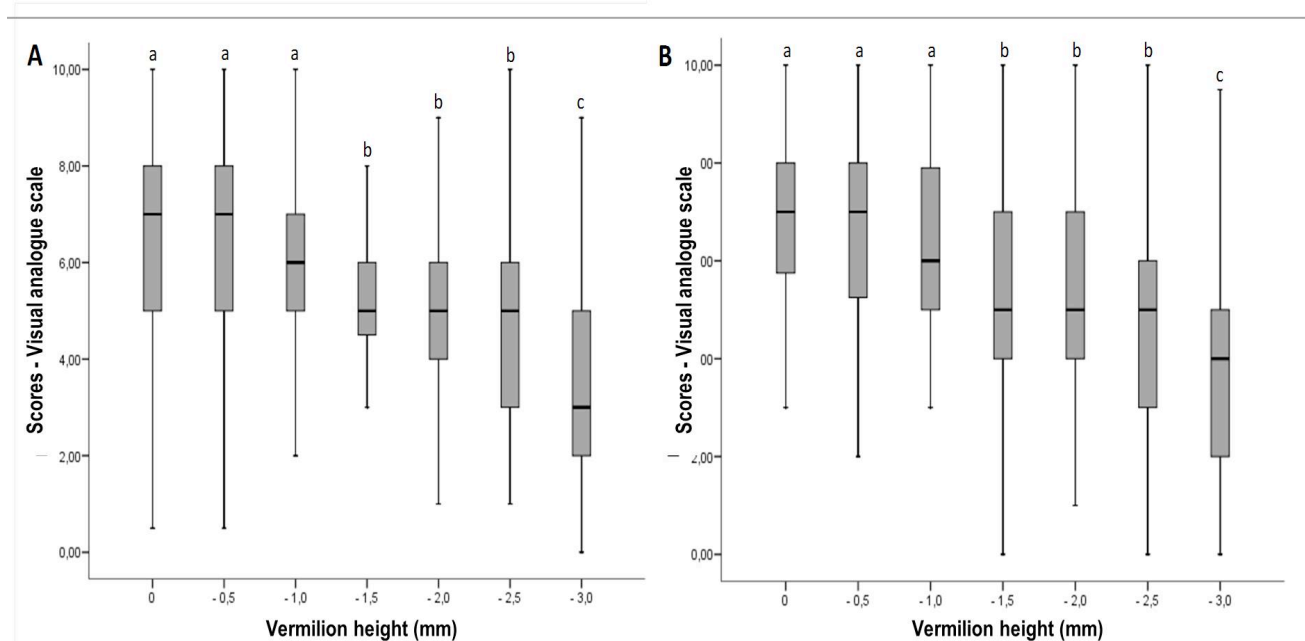


Figure 3. Median values and ranges of scores for each aesthetic vermilion height: A, black evaluators; B, white evaluators ^{a, b, c}. Different letters are clinically significant.



Previous studies confirm that black and white people, both female and male showed mostly preference for a higher height of the vermilion than those who assumed -3 mm.⁸ This statement can be explained by the fact that cultures and genetic influence on the preferences of individuals in relation to the lower face in multiple variables.¹⁷

Researchers stress that the measures found can become aesthetic profile parameters that help in orthodontic treatment planning. These parameters are in fact predictors of patients' preferences.^{8,17} In general, the results state that the highest values assigned were for higher lip vermilion height, which opposes research that suggests that clinicians should reduce the height of the vermilion to median values, improving the facial profiles of their patients.⁴

CONCLUSION

It can be concluded with the execution of this study: (1) Women were more critical in their aesthetic perceptions in relation to the size of the vermilion of the lip; (2) Men are less critical in their aesthetic perceptions; however, they prefer fuller lips; (3) Black and white Individuals, from both genders, preferred mostly a higher vermilion height, than those who assumed less height, with alterations acceptable till - 2mm.

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