The Impact of Geographic, Ethnic, and Demographic Dynamics on the Perception of Beauty

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Background: Beauty lies in the eyes of the beholder, but influenced by the individual's geographic, ethnic, and demographic background and characteristics. In plastic surgery, objective measurements are used as a foundation for aesthetic evaluations. This study assumes interdependence between variables such as country of residence, sex, age, occupation, and aesthetic perception.

Methods: Computerized images of a model's face were generated with the ability to alter nasal characteristics and the projection of the lips and chin. A survey containing these modifiable images was sent to more than 13,000 plastic surgeons and laypeople in 50 different countries, who were able to virtually create a face that they felt to be the aesthetically "ideal" and most pleasing. Demographic information about the interviewees was obtained.

Results: Values of various aesthetic parameters of the nose were described along with their relationship to geography, demography, and occupation of the respondents. Interregional and ethnic comparison revealed that variables of country of residence, ethnicity, occupation (general public vs surgeon), and sex correlate along a 3-way dimension with the ideal projection of the lips and the chin. Significant interaction effects were found between variables of country of residence or ethnicity with occupation and sex of the respondents.

Conclusions: What are considered the "ideal" aesthetics of the face are highly dependent on the individual's cultural and ethnic background and cannot simply and solely be defined by numeric values and divine proportions. As confirmed with this study, ethnic, demographic, and occupational factors impact peoples' perception of beauty significantly.

Key Words: Beauty, facial aesthetics, ethnic and cultural background, demographic impact, academic practice, private practice, interaction effect, international

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In the 15th and 16th centuries, renaissance artist, including Leonardo da Vinci, adhered to the concept of the divine proportions and the golden standard, using mathematical ratios to define aesthetically pleasing dimensions of a person or an object. Da Vinci defined beauty as a combination of symmetry and proportion, perceived to be objective and universal.[1]

Today, beauty has a different connotation. Beauty and the individual perception of beauty reflect cultural and ethnic perceptions of aesthetics. Cultural implications of beauty are noticeable in every culture among ethnicities, impacting how a person is perceived.[2] In particular, the face is an eminent contributor to a person's personality. Facial appearance influences the perception of this person by himself/herself and the society. Especially the nose, lips, and chins with their prominent central position capture the attention of the observers and influence perception.[3] It has been commonly accepted and repeatedly proven that beauty lies in the eye of the beholder, directly linked to individual cultural and ethnic backgrounds.[4–7]

Still, plastic surgery often applies universal linear and angular parameters for aesthetic evaluations. Studies have emerged investigating the link between demographic, cultural, and ethnic variables. However, only few have elucidated these facts and tried to define the impact of these variables on the perception of beauty. There is a need to increase knowledge on the scope and extent of the influence of such variables on the individual perception.[8–14]

Facial features cannot be defined in isolation. Proportion, balance, and harmony define its attractive dimensions. Despite a rich body of literature on proportions and measurements aimed at defining an aesthetic face,[15–18] these parameters might not necessarily be applicable on a cross-cultural, demographic, and ethnic basis.[19]

Based on findings of a previous study by the authors on the correlation between single cultural and ethnic variables regarding preferred nasal shapes and dimensions, this work investigates the dependence among independent geographic, demographic, ethnic, and occupational variables with a special focus on lip and chin projection. This analysis aims to raise awareness among plastic surgeons and the greater public on differences in aesthetic preferences to enhance future patients' and surgeons' satisfaction.[20]

METHODS

Computerized images of a white woman's face were generated using digital imaging software. The viewer was asked to alter various elements in the shape and dimension of the face. The modifications imitate structural lip and chin characteristics typically adjusted in aesthetic procedures to remodel a patient's face. Specifically, the respondents were asked to adjust each photograph by either augmenting or reducing the projection of the lips and the chin (Fig. 1), with every measure on the 6-point scale representing 1 gradient of augmentation or reduction of the specific facial characteristic.

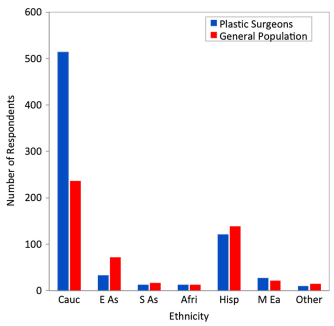

FIGURE 1. Distribution of respondents' ethnicities.

TABLE 1. Tests of Between-Subjects Effects, Country of Residence, Sex, and Occupation—Ideal Lip Projection

Dependent Variable: Ideal Lip Projection

Source	Type III Sum of Squares	*df*	Mean Square	F	*P*	Partial η^2	Noncentrality Parameter	Observed Power*
Corrected model	113.195†	31	3.651	1.778	0.006	0.043	55.103	0.997
Intercept	27.35	1	27.35	13.314	0	0.011	13.314	0.954
Sex	0.072	1	0.072	0.035	0.851	0	0.035	0.054
Occupation	12.287	1	12.287	5.981	0.015	0.005	5.981	0.686
Country	21.063	8	2.633	1.282	0.249	0.008	10.253	0.598
Sex × occupation	7.914	1	7.914	3.852	0.05	0.003	3.852	0.501
Sex × country new	9.163	8	1.145	0.558	0.813	0.004	4.461	0.263
Occupation × country new	10.089	7	1.441	0.702	0.671	0.004	4.911	0.307
Sex × occupation × country new	27.352	5	5.47	2.663	0.021	0.011	13.315	0.815
Error	2489.747	1212	2.054					
Total	2644	1244						
Corrected Total	2602.942	1243						

*Computed using $\alpha = 0.05$.
†$R^2 = 0.043$ (adjusted $R^2 = 0.019$).

The online questionnaire, containing these photographs, also gathered demographic data about the interviewee, including information on sex, age, country of residence, and ethnic background.

The authors send the online survey (http://plastics.yale.edu/~jong/nose/) to more than 13,000 people, including plastic surgeons and laypeople in more than 50 countries. Plastic surgeons were targeted through national surgery societies with more than 500 listed members, and the general public was randomly contacted via social and professional networks.

Data were collected in North America (Canada, United States), Latin America, and the Caribbean (Argentina, Brazil, Chile, Colombia, Dominican Republic, Ecuador, Jamaica, Mexico, Panama, Peru, and Venezuela), Western Europe (Austria, Belgium, Croatia, United Kingdom, France, Germany, Greece, Hungary, Italy, Norway, Poland, Portugal, Spain, Sweden, Switzerland, the Netherlands, and the United Kingdom), Oceania (Australia), Eastern Asia (China, Japan, Republic of Korea), Southern Asia (India, Iran, Pakistan), Southeastern Asia (Thailand, Vietnam), Western Asia (Cyprus, Iraq, Israel, Jordan, Kuwait, Lebanon, Turkey, United Arab Emirates), and Northern Africa (Egypt, Morocco, Tunisia). National response threshold for inclusion was set at 25. Countries were grouped together based on regional definitions set by the United Nations. The geographic categorization includes physicians and the general public from North America (n = 330), Latin America and the Caribbean (n = 244), and Western Europe (n = 91).[21]

Regarding the unit of analysis, numeric values were assigned to the arithmetic means of augmentations or reductions, enabling the authors to interpret the data visually, based on the images of the model face.

In July 2012, the authors published a first analysis, investigating the correlation between single cultural and ethnic variables in preferred nasal shapes and dimensions. In this study, the authors described how the perception of ideal nasal shapes and dimensions compared among plastic surgeons and the general public from different countries.

Assuming high dependence among the independent variables, in a second step, the authors analyzed the data for interaction effects. The variables in question included country of residence, sex, age, and occupation.

RESULTS

The authors received a total of 1226 responses (response rate of 9.6%). Seven hundred twenty (612 male and 108 female) plastic surgeons and 506 (145 male and 361 female) people from the general public responded to the survey. Of all respondents, 39% were female.

The age of the respondents ranged from 18 to 87 years, with a mean age of 40 years. The mean age of plastic surgeons was significantly higher than that of the general public (50.2 vs 30.3 years).

With 71%, 512 whites made up the largest ethnic group among all plastic surgeons, followed by 15% of Hispanics (n = 115). Similar trends were observed for the general public (Fig. 1).

Most plastic surgeons who replied to the survey live in North America (n = 332), predominantly in the United States (n = 320), followed by Latin America and the Caribbean (n = 252), primarily from Brazil (n = 142) and Colombia (n = 53). The spatial distribution of responses from the general public is also dominated in North (n = 329) and South America (n = 137). The majority of the responses were received from the United States (n = 322) and Peru (n = 124).

Given the findings from the first analysis on the relationship between variables including sex, country of residence, ethnicity, occupation, and history of rhinoplasty with respect to preferred nasal dimensions, in a second step the authors analyzed the dependence among these variables, using 3-way interaction effects, to see whether its interaction further clarifies the relationship.

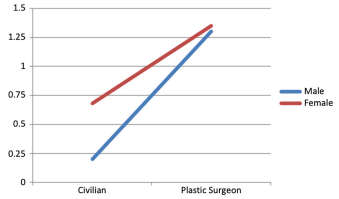

FIGURE 2. Preference for ideal chin projection in the United States.

FIGURE 3. Preference for ideal chin projection in Brazil.

TABLE 2. Tests of Between-Subjects Effects, Country of Residence, Sex and Occupation—Ideal Chin Projection

Dependent Variable: Ideal Chin Projection

Source	Type III Sum of Squares	*df*	Mean Square	F	*P*	Partial η^2	Noncentrality Parameter	Observed Power*
Corrected model	261.688†	31	8.442	3.595	0	0.084	111.434	1
Intercept	100.722	1	100.722	42.89	0	0.034	42.89	1
Sex	25.256	1	25.256	10.754	0.001	0.009	10.754	0.906
Country new	31.393	8	3.924	1.671	0.101	0.011	13.368	0.738
Occupation	0.302	1	0.302	0.129	0.72	0	0.129	0.065
Sex × country new	22.329	8	2.791	1.189	0.302	0.008	9.508	0.558
Sex × occupation	39.341	1	39.341	16.752	0	0.014	16.752	0.983
Country new × occupation	29.644	7	4.235	1.803	0.083	0.01	12.623	0.733
Sex × country new × occupation	28.672	5	5.734	2.442	0.033	0.01	12.209	0.775
Error	2846.231	1212	2.348					
Total	4332	1244						
Corrected total	3107.92	1243						

*Computed using $\alpha = 0.05$.
†$R^2 = 0.084$ (adjusted $R^2 = 0.061$).

Impact of Country of Residence, Occupation, and Sex on Perceptions of Ideal Lip Projection

Analyzing statistics regarding the impact of country of residence, occupation (general public vs surgeon), and sex on the ideal projection of the lips, significant 3-way interaction effects were found ($F_{5,1212} = 2.66$, $P = 0.021$).

It appears that male respondents from the general public in the United States and Brazil prefer greater lip projections than do female respondents (Table 1). These findings elucidate significant 3-way interaction effects, which have been confirmed statistically using tests of simple main effects.

In visual terms, the difference is greatest between civilian men and women in Brazil, with females preferring less projected lips, 2 interval points below the male preference.

Interestingly, this trend is opposite for surgeons. Among plastic surgeons, in both countries, females preferred greater lip projections.

Comparing men and women of both occupational categories, men and women in the United States show similar trends regarding their preference of lip projection, reflected by steep positive slopes.

This, however, is not the case in Brazil, where civilian men and male surgeons seem to content in their assessment of ideal lip projection, whereas women's preferences show significant differences depending on their occupation. The negative slope of male preferences is almost equal to zero, that is, agreement among male civilians and plastic surgeons, whereas analysis for female preferences results in a steep positive slope, that is, major discrepancies between female aesthetic perceptions.

Interestingly, opposite trends emerge when interpreting statistics from Australia, Mexico, and Peru. Here, females among the general public preferred greater lip projection compared with male respondents, and among surgeons, the males were the ones who preferred more pronounced lips than females. The regression for the sexes results in a steep negative slope for female respondents and in a steep negative slope for the males.

Impact of Country of Residence, Occupation, and Sex on Perceptions of Ideal Chin Projection

Another significant interaction effect of the variables country of residence, occupation, and sex was observed regarding ideal chin projection ($F_{5,1212} = 2.44$). Marked differences along this dimension occur across countries among plastic surgeons and the general public with respect to their sex ($P = 0.033$).

In the United States and Brazil, surgeons, regardless of their sex, agree on the ideal chin projection. In the United States, surgeons selected a more pronounced chin projection than the general public. Among the latter, females prefer slightly larger chins than do males. Sex differences regarding this dimension were greater among men, resulting in a steeper positive slope (Fig. 2).

In Brazil, civilians display a marked difference across sexes compared with surgeons. Females from the general public preferred far greater chin projection compared with male respondents (Fig. 3 and Table 2). The visual difference is of 6 alteration points (Fig. 4).

Again, perceptions in Australia, Mexico, and Peru follow an opposite trend. Significant differences can be seen among the sexes and occupational classes. In Australia, female civilian respondents prefer greater chin projections than do males, whereas female surgeons prefer less chin projection than do males (Fig. 5).

Impact of Ethnicity, Occupation, and Sex on Perceptions of Ideal Chin Projection

In another multiple variable analysis regarding ideal chin projection, the authors introduced the variable of ethnicity. Also in this case, the relationship between sex, occupation, and ethnicity proved to be significant ($F_{6,1216} = 2.74$). Major differences among the various

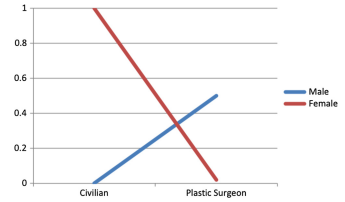

FIGURE 4. Difference between male and female preferences in chin projection, Brazil.

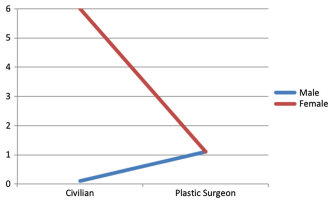

FIGURE 5. Preference for ideal chin projection in Australia.

TABLE 3. Tests of Between-Subjects Effects, Ethnicity, Sex, and Occupation—Ideal Chin Projection

Dependent Variable: Ideal Chin Projection

Source	Type III Sum of Squares	*df*	Mean Square	F	*P*	Partial η^2	Noncent.. Parameter	Observed Power*
Corrected model	284.306†	27	10.53	4.535	0	0.091	122.438	1
Intercept	153.895	1	153.895	66.275	0	0.052	66.275	1
Sex	11.132	1	11.132	4.794	0.029	0.004	4.794	0.59
Occupation	37.427	1	37.427	16.118	0	0.013	16.118	0.98
Ethnic new	29.303	6	4.884	2.103	0.05	0.01	12.619	0.761
Sex × occupation	2.295	1	2.295	0.988	0.32	0.001	0.988	0.168
Sex × ethnic new	27.442	6	4.574	1.97	0.067	0.01	11.818	0.728
Occupation × ethnic new	13.263	6	2.211	0.952	0.457	0.005	5.712	0.382
Sex × occupation × ethnic new	38.123	6	6.354	2.736	0.012	0.013	16.418	0.877
Error	2823.613	1216	2.322					
Total	4332	1244						
Corrected total	3107.92	1243						

*Computed using $\alpha = 0.05$.
†$R^2 = 0.091$ (adjusted $R^2 = 0.071$).

ethnic groups have been observed between the sexes of plastic surgeons and the general public ($P = 0.012$) (Table 3).

Focusing the analysis on whites, ideal chin projection varies significantly between the sexes of the general public. Whereas male respondents seemed to prefer less projection of the chin, female respondents chose higher values regarding chin projection. The difference in the estimated marginal mean is of 1.1. However, both male and female surgeons seem to prefer more projection of the chin. Occupational differences between females are insignificant, as reflected in a positive slope almost equal to zero. Males do, however, display major differences when evaluating the optimal projection of the chin.

Tendencies between the sexes of Hispanic respondents are similar. Both male and female civilians selected less projection of the chin when compared with their surgeon counterparts. This difference is, however, less pronounced for females. Similarly, East Asian preferences for chin projection differ among the sexes. However, among East Asians, the female civilians have selected smaller chin projection as preferred parameter, whereas the male plastic surgeons preferred smaller measurements.

Comparing along the variable of sex, it is interesting to note that while it is the males among the white and Hispanic civilians who prefer a smaller projection of the chin, it is the females in the case of plastic surgeons.

Interesting patterns were found among Middle Eastern respondents. Here, differences between the sexes were large. Male civilians and plastic surgeons agree on a relatively small projection of the chin as ideal. Both female civilians and plastic surgeons prefer more projected chins, with plastic surgeons displaying the highest estimated marginal mean along this variable.

Similar trends hold true when comparing the parameter selected by women and men with mixed ethnic background. Compared with their Middle Eastern corespondents, the preferences, however, changed. Among the mixed ethnic group, men prefer more projected chins compared with women. Noteworthy are the close-to-zero differences when evaluating chin projection between civilians and surgeons. For both sexes, differences between the estimated marginal mean are smaller than 0.2.

DISCUSSION

This study aimed at investigating the 3-way interaction of various variables, that is, the 2-way interaction varies across the levels of a third variable, for instance, the interaction between (*a*) sex, (*b*) country of residence, and (*c*) occupation varies across different levels of factor (a) sex. By using tests of simple main effects, that is, the effect of 1 variable (or bundle of variables) across levels of the other variable(s), this 3-way interaction was analyzed.

The identified evidence for aesthetic facial preferences from 1 subgroup of respondents differed markedly from widely used standards.[22] Farkas et al[23] analyzed facial dimensions of 34 young white women from North America based on 19 nasal and 15 craniofacial measurements. They found that the percentage of disharmonies and disproportions was significantly higher in the group of 21 women with below-average faces. Average nasal and craniofacial parameters were considered beautiful in only 12 of the 34 attractive faces.[23]

Although the authors concur with the main findings of the study regarding a wide range of "ideal" facial aesthetics, they point out that ethnic and cultural backgrounds of the evaluators were not considered.

Visual perception of beauty is strongly impacted by the relationship of the objects in the face to each other as well as by the proportions of themselves. To draw conclusions on differences in aesthetic preferences among male and female plastic surgeons and the general public from different countries and with different ethnic backgrounds, the authors built on the analysis of a previously published study.[24]

In recent years, various evaluations of cross-cultural facial attractiveness have shown that respondents assessed the same faces as beautiful and agreed on the importance of certain facial attributes in aesthetic perception independent of the ethnic background of the evaluator.[25–28]

This study, however, found a significant impact of, *inter alia*, ethnic background. This might be due to the focus on specific facial parameters with the ability to alter these minimally. Given the predominance of Latin American and North American responses to the first round of questionnaires, the authors are currently expanding the scope of the survey by targeting Arab, Asian, African, and European countries.

Although the authors are aware that the inclusion of the respondents might carry a selection bias due to its approach through social networks, this contact method increased the random participation of respondents across multiple cultures and social backgrounds. Also, among the surgeons approached with the survey, those with a particular interest in facial surgery are more likely to respond, which

poses another selection bias. Furthermore, because of the use of modified computer images for alteration and evaluation, these findings may not translate one-to-one to humans. However, one strength of this study is that all respondents performed their evaluations using the exact same images; thus, they were all confronted by the same conditional factors.

CONCLUSIONS

Metrics on beauty are not universally applicable, and this study aimed to clarify which beauty lies in which beholder's eye. This study emphasized the importance of considering individual preferences and their underlying demographic, geographic, and ethnic dynamics.[29–32] Its findings may aid in sensitizing the plastic surgeons' eyes and help in further defining the common denominator between patients and surgeons with respect to aesthetic facial plastic surgery.

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Management of a Bulky Capillary Hemangioma in the Parapharyngeal Space With Minimally Invasive Surgery

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Abstract: In this article, the authors report their management with minimally invasive surgery of a bulky capillary hemangioma in the

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