

It's All Relative: Associations of Facial Proportionality, Attractiveness, and Character Traits in 597 Individuals

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INTRODUCTION

- Facial structure and anatomy are important to our engagement with and perceptions of others.
- Facial features play a role when character traits and attractiveness are inferred, and facial attractiveness is associated with societal benefits to individuals in the economic and political realms.
- Additionally, proportionality and symmetry are positively associated with perceived levels of facial attractiveness.
- Previous studies associated facial symmetry with increased perceptions of attractiveness, sociability, intelligence, health, liveliness, and confidence.
- Few recent studies have characterized associations of facial *proportionality* with attractiveness and character traits.

OBJECTIVES

The aims of this study were to use a large dataset of human photos and ratings to

- describe a method to quantify relative degrees of proportionality across individuals without absolute anatomic measurements,
 - determine the association of proportionality with perceived levels of attractiveness and character traits, and
- We predicted that higher levels of proportionality would be associated with increased levels of attractiveness and positive character traits (happiness, trustworthiness, etc.)

METHODS

- 597 unique individuals were included from the Chicago Face Database, a publicly available domain of soft-tissue facial measurements and ratings by 1,087 individuals on attractiveness and social characteristics (Ma 2015).
- We calculated upper, middle, and lower thirds of the face using facial anatomic measurements in the Chicago Face Database: upper third " x_1 " = "s"; middle third " x_2 " = ("k" + "c") - "s"; lower third " x_3 " = "e" - ("k" + "c") (Figure 1)

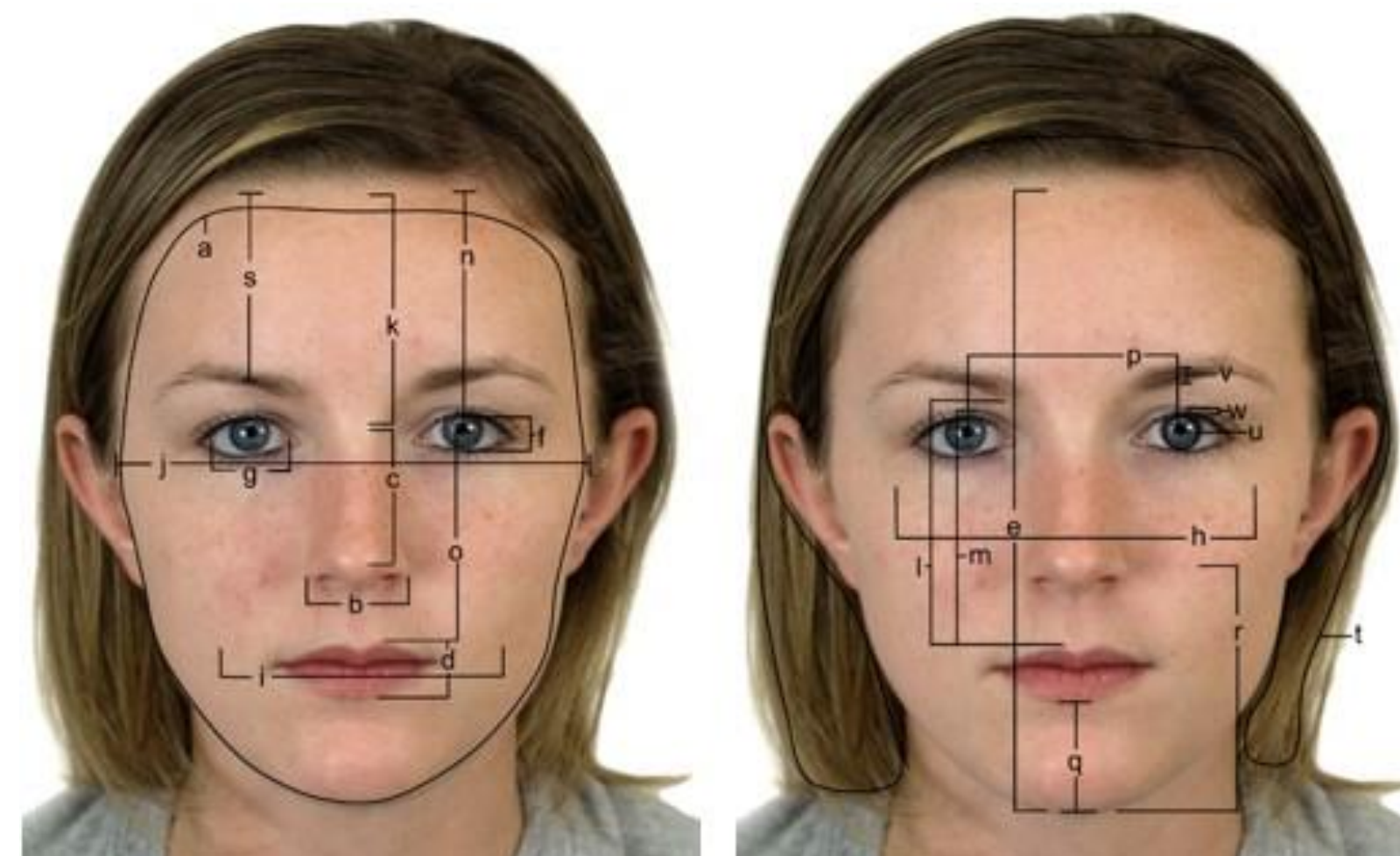


Figure 1. Facial Anatomic Measurements in Chicago Face Database

- We developed the following formula as a proxy of relative horizontal proportionality to the 1:1:1 rule of thirds, where x_1 , x_2 , and x_3 correspond to upper, middle, and lower thirds of the face:

$$\text{Proportionality score} = \frac{\left|1 - \left(\frac{x_1}{\text{mean}_{x_1, x_2, x_3}}\right)\right| \times 100 + \left|1 - \left(\frac{x_2}{\text{mean}_{x_1, x_2, x_3}}\right)\right| \times 100 + \left|1 - \left(\frac{x_3}{\text{mean}_{x_1, x_2, x_3}}\right)\right| \times 100}{3}$$

A proportionality score of "0" indicates perfect horizontal proportionality and lower (more negative) scores indicate relatively less proportionality. We also assessed fitness to individual horizontal thirds proportionality with the formul:

$$\text{Upper proportionality score} = \left[1 - \left(\frac{x_1}{x_1 + x_2 + x_3}\right)\right] \times 100$$

RESULTS

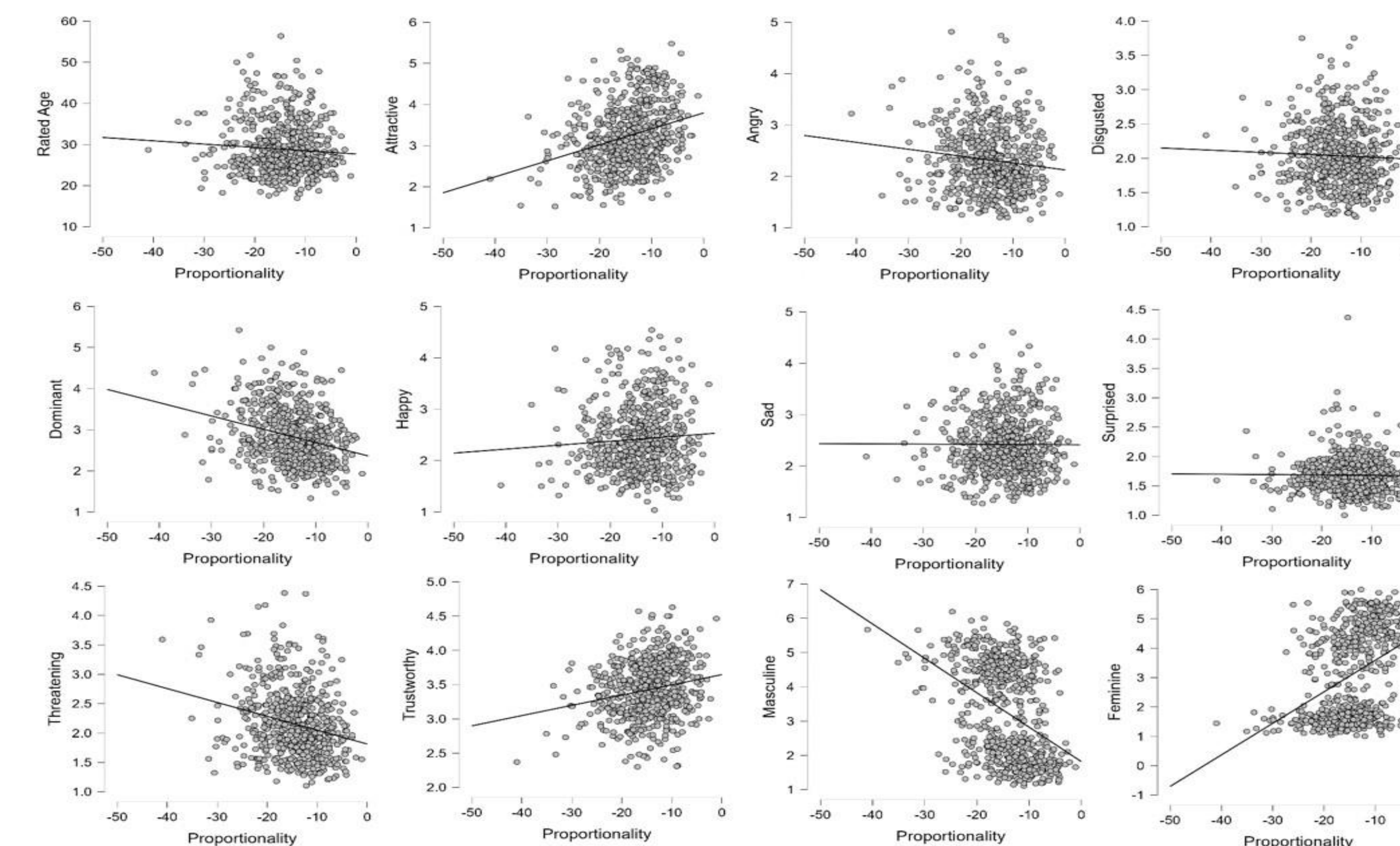


Figure 2. Proportionality, Age, Attractiveness, and Character Traits

Proportionality (unweighted) correlations with rated age, attractiveness, character traits, masculinity, and femininity. More negative proportionality indicates decreased proportionality, with "0" representing "perfect" proportionality. Character traits were rated on a seven-point Likert scale.

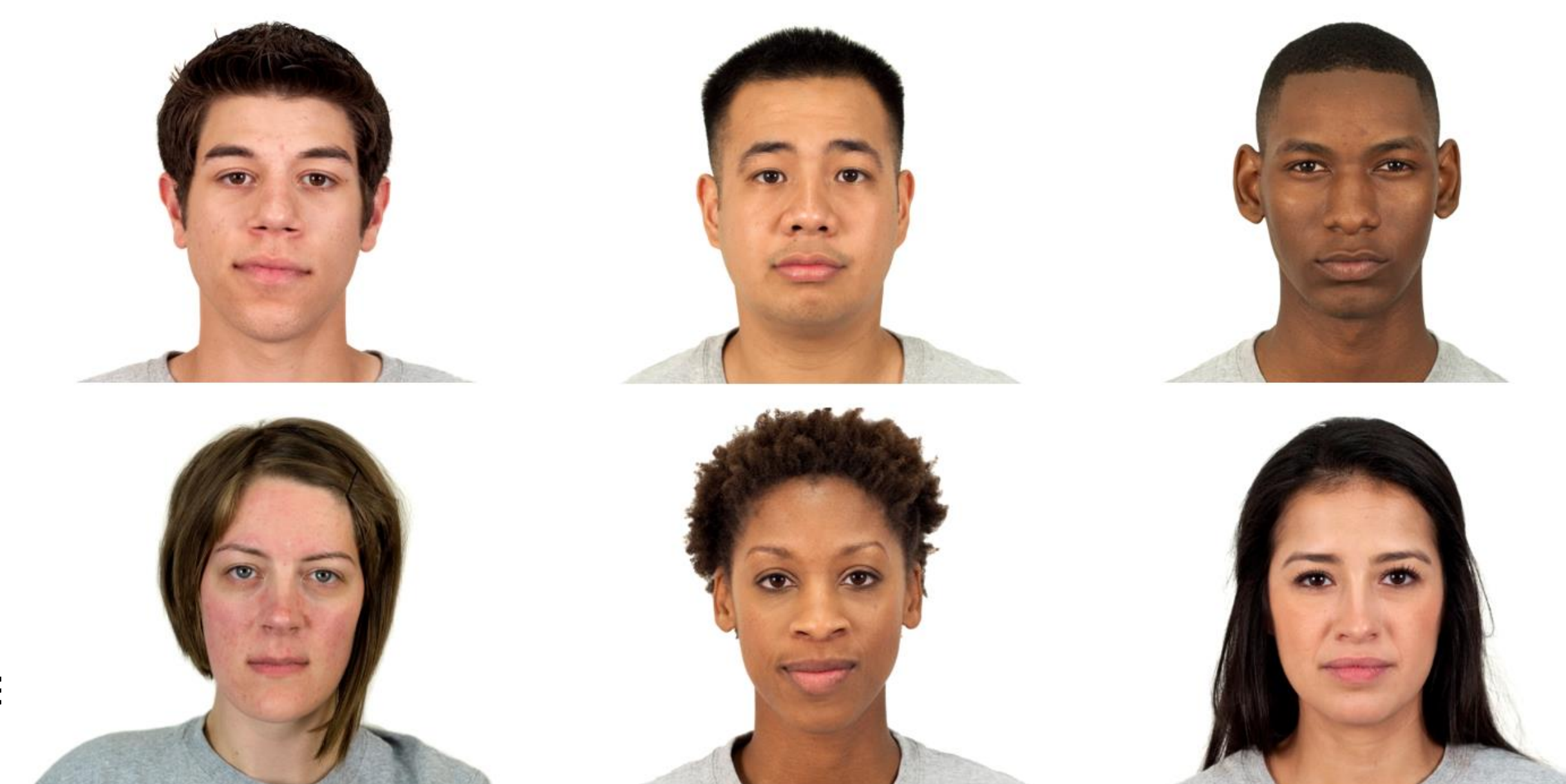


Figure 3. Faces by Proportionality Score

Faces of males (top) representing below average (left, -22.80) average (middle, -16.53) and above average (right, -8.20) proportionality scores and faces of females (bottom) representing below average (left, -22.35), average (middle, -12.30), and above average (right, -4.35) proportionality scores.

Table 1. Face Proportionality and Perceived Character Traits

	Proportionality	Upper Third	Middle Third	Lower Third
Rated age	-0.064	0.055	-0.083*	0.032
Attractive	0.292***	0.006	0.262***	-0.275***
Angry	-0.132***	0.119**	-0.201***	0.116**
Disgusted	-0.055	0.135***	-0.146***	0.041
Dominant	-0.259***	0.069	-0.305***	0.252***
Happy	0.074	-0.048	0.084*	-0.051
Sad	-0.031	0.007	-0.007	0.006
Surprised	-0.011	-0.042	0.025	0.005
Threatening	-0.234***	0.116**	-0.310***	0.220***
Trustworthy	0.193***	-0.088*	0.254***	-0.185***
Masculine	-0.421***	0.076	-0.482***	0.423***
Feminine	0.408***	-0.066	0.461***	-0.414***

Statistical significance denoted as * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

CONCLUSION

- This study demonstrated significant associations between facial proportionality and ratings of attractiveness as well as perceived positive social character traits using a large dataset.

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