KEY POINTS

- Physical appearance plays an important role in social perception and interaction. This article presents findings of an evolutionary approach to female facial appearance within and between ethnic groups.
- Implications regarding population-specific skin issues and regimens are also discussed.

Peer-reviewed

Boundless Beauty

Perception of Female Facial Appearance Across Ethnicities and Targeted Solutions

Bernhard Fink, Ph.D., *Biosocial Science Information, Biedermannsdorf, Austria*

Rainer Voegeli, Rotraut Schoop, Ph.D., and Remo Campiche, Ph.D.
DSM Nutritional Products, Kaiseraugst, Switzerland

Todd K. Shackelford, Ph.D.
Oakland University, Rochester, USA

The human face communicates visual information that affects social perception and decisions.[1, 2] Evolutionary scientists suggest humans evolved preferences for certain features and view them as attractive because historically, those features were displayed by healthy individuals.[3, 4] In this view, the interest in and sensitivity to physical appearance reflects adaptations that motivated successful ancestral mate selection.[2, 4]

An interest in beauty is not limited to modern Western culture but has been found in most societies.[5] Studies have reported common attractiveness standards across ethnic groups and historical periods, suggesting that the constituents of beauty are neither arbitrary nor culture-bound.[6] Some social and cultural scientists have challenged this view, proposing variable attractiveness standards across populations are acquired by social learning.[7] However, the consensus in judgments of facial attractiveness is consistent with biologically based standards of beauty.[6, 8]

Moreover, a preference for certain facial characteristics has been documented in infants[9] and societies with little exposure to Western media,[10] suggesting that attractiveness perception of these features transcends age and media influence. This does not preclude individual differences in attractiveness perception, depending on ecological conditions and population-specific morphology as well as proximate factors, e.g., hormonal influences[11] and experience.[12]

Regardless of the assessor's ethnicity, patterns of facial age perception were similarly judged across all the photographed women.

The degree to which conclusions obtained from cross-cultural assessments of attractiveness can be generalized has been a matter of concern, in part because some findings have been derived by pooling information secured in projects with different foci, or from studies that used different equipment or protocols. Presenting images of individuals of one ethnicity to immigrant judges[13] has also been criticized because it is difficult to assess the influence of immigrants' adjustments to population-specific beauty standards.[14]

Finally, many studies investigating the perception of attractiveness have considered targets or assessors of a narrow age range, such as college-aged women and men. This raises questions about differences in age-related changes in physical features influencing attractiveness.

The fastest anti-aging market growth will likely be in Asia-Pacific until 2030 due in part to the growing geriatric population—projected to surge to 954.7 million by 2050.

Source: Research and Markets

The present article reviews research on the perception of female facial appearance across societies. It considers recent evidence of a multi-ethnic and multi-center study, detailed elsewhere, to determine the influence of ethnicity on perceived age, attractiveness and health. It also reviews cultural and evolutionary perspectives on appearance-enhancement practices. Finally, it considers solutions for ethnicity-focused skin care based on data, presented here for the first time, from the previous multi-ethnic study.

Ethnicity and Face Perception

As stated, a recent multi-ethnic and multi-center study was carried out in five regions to address some of the issues that prohibit definitive conclusions about similarities and differences in assessments of female facial appearance.[15] Images of age-matched women ranging 20-65 years were taken in five locations: Guangzhou, Tokyo, Lyon, New Delhi and Cape Town, with identical equipment and following the same research protocol (see **Figure 1**).

Female and male lay assessors identifying with one of five ethnicities in the study, i.e., Chinese,

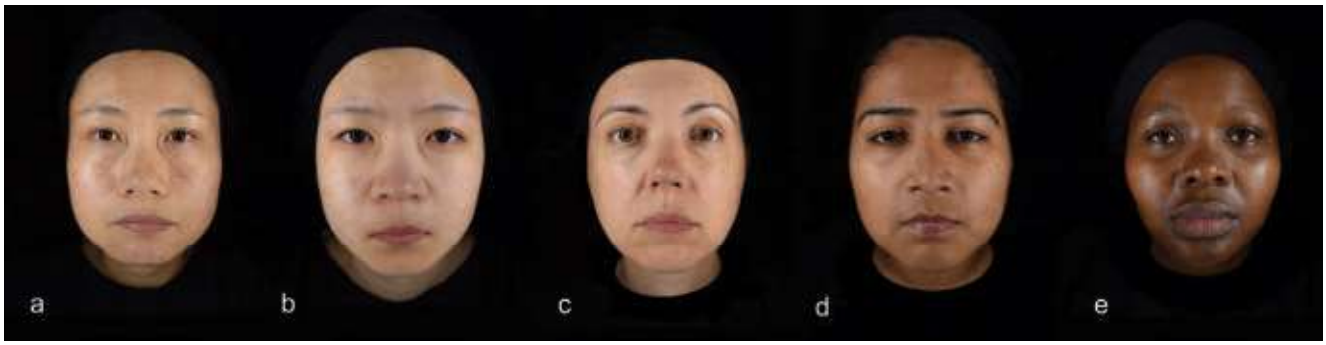


Figure 1. Sample images of female participants for the rating study, including: Chinese (a), Japanese (b), French (c), Indian (d) and South African (e)

Japanese, French, Indian and South African, judged digital images of women using web-based software within and across ethnicities for age, attractiveness and health. Each of 600 assessors judged 270 images (90 per attribute). Thus, each image was assessed ~300 times, producing ~155,000 judgements.

A key finding was that regardless of the assessor's ethnicity, patterns of facial age perception were similarly judged across all the photographed women, with a span of about five years between the ethnicities judged as youngest (Chinese) and oldest (French).

In contrast to the perception of age, facial attractiveness

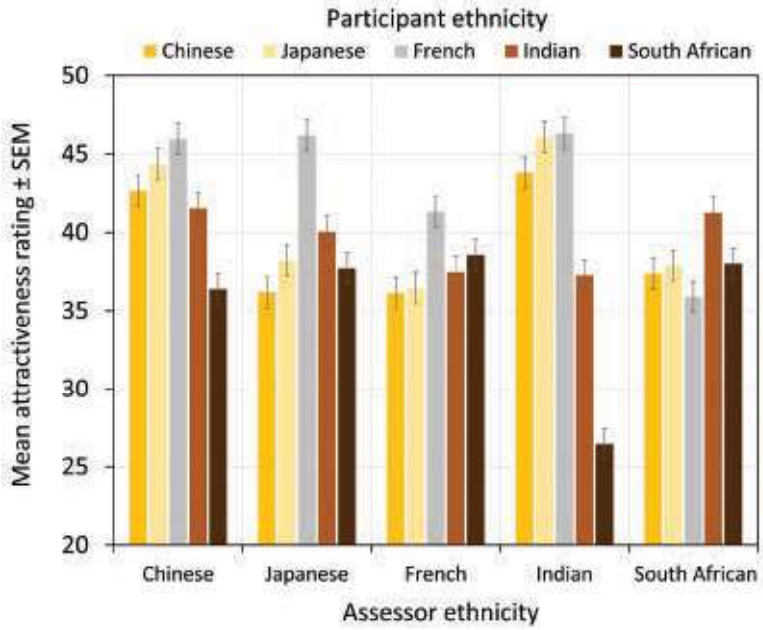
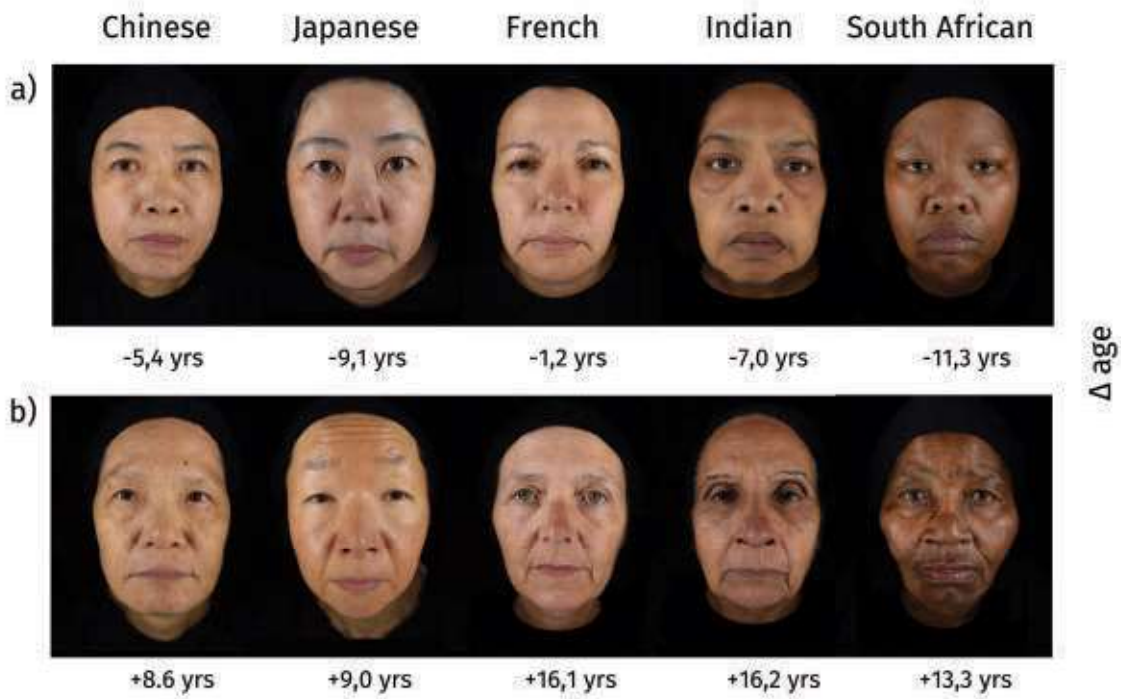


Figure 2. Attractiveness assessments of female facial images by participant ethnicity and assessor ethnicity; female/male assessments are combined in this figure; modified from Ref 14



Negative values (a) denote women who were judged younger than their chronological age and positive values (b) denote women who were judged older than their chronological age. The images were chosen from among those with the largest negative (a) and positive (b) differences in the study sample of an older age group (50-65 years).

Figure 3. Sample images of a multi-ethnic and multi-centre study[15] illustrating the differences between chronological and estimated age of women in five ethnicities

and health judgements were more varied. Differences in female facial attractiveness (see **Figure 2**) and health judgments depended on the ethnicity of the judge, the ethnicity of the participant in the photograph and the gender of the assessor (female or male). Thus, this study reported greater cross-cultural variations in assessments of female facial appearance than indicated in previous research.

A follow-up study[16] of the data examined differences between the chronological age of the photographed women and the age perceived by the assessors—i.e., Δ age = (chronological age) – (perceived age) (see **Figure 3**). French women in the photographs were judged least accurately—older than their chronological age, whereas the smallest Δ age was observed for Chinese women.

French assessors were most accurate in assessing female age, and this was especially so for female assessors. Interestingly, female and male assessors, independent of their ethnicity, judged younger participants to be older than their chronological age (see **Figure 4**). A possible explanation for the latter finding is that an absence of age-related changes in younger faces render them less amenable to accurate assessment.

Signs of aging have been reported to occur later in more darkly pigmented skin, possibly due to the higher melanin content and dispersal of melanosomes, in addition to structural differences.[17] Other research has shown that facial wrinkles and sagging accounted for nearly 100% of perceived age in French women, compared with just 61% in South African women.[18]

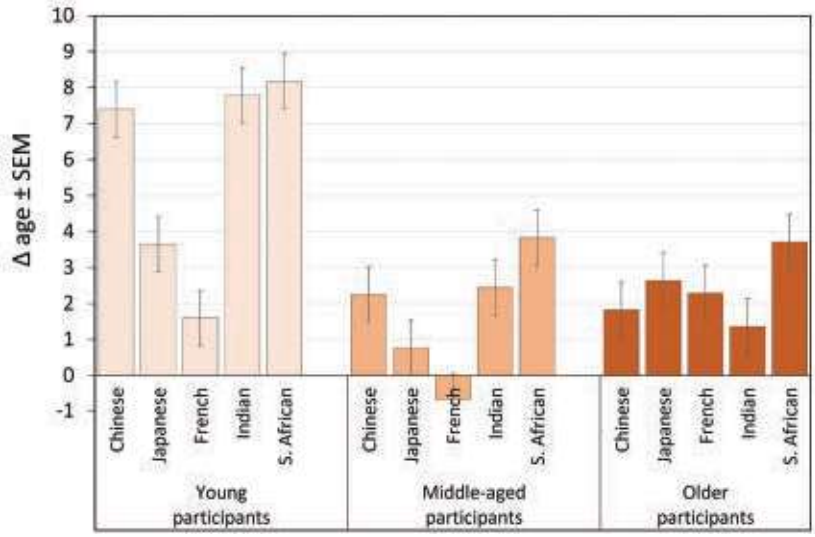


Figure 4. Difference between chronological and estimated age (Δ age) of participant age groups by assessor ethnicity; modified from Ref 15

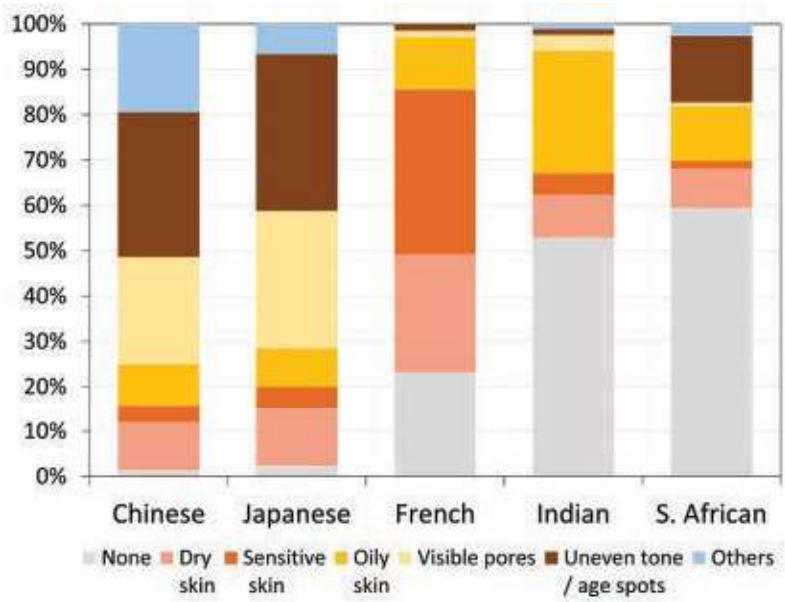


Figure 5. Main skin problem(s) reported by the study participants

Facial sagging and wrinkles were the primary drivers of differences between chronological and estimated age across ethnicities.

Thus, variations in the significance of age-related structural and functional differences across ethnicities contribute to cross-cultural differences in perceived age. It has also been proposed that lifestyle factors and adverse habits such as smoking or alcohol consumption could explain, in part, cross-cultural differences in the accuracy of age estimation.[19]

Biological and Cultural Factors

Cross-cultural differences in perceived attractiveness may be based on several factors, including ecological settings, e.g., the natural and anthropogenic environments; indicators of national health; and socio-cultural effects including ethnocentrism—although the relative contributions of these to preferences are difficult to assess. However, an evolutionary perspective suggests that skin surface topography and coloration provide information about age and health that affect attractiveness perception.[3-6]

Female age and health strongly correlate with fecundity; thus, facial attractiveness provides information about an individual's mating-related quality. While recent findings[15, 16] suggest plasticity in the perception of female facial appearance across cultures and the social significance of given information—especially for the assessment of attractiveness and health—the biology behind this relationship is universal.[8]

Beyond reproductive considerations, susceptibility to infectious diseases can also be signaled by facial appearance.[4, 8] Hence, variations in perceived attractiveness across cultures may reflect evolved preferences in response to variation in ecological settings.

Research on the relationship between attractiveness and health has been controversial. Although one study showed that women with more attractive faces reported fewer health problems,[3] previous research examining the relationship between facial attractiveness and immunocompetence does not provide compelling evidence.[20]

Yet another study showed evidence for an association between immune function and perceived facial attractiveness.[21] Here, researchers examined the relationships between female and male perceived attractiveness (n = 159), self-reported health and measures of immune function. Perceived attractiveness was linked particularly to aspects related to combatting bacterial threats but not to in vivo inflammation and self-reported health. This research concluded that a relationship between facial attractiveness and immune function may exist.

The absence of a clear link between perceived attractiveness and immunity against acute infection suggests that perceived attractiveness plays an important role in guiding the choice of immunocompetent partners more so than preventing contact with "unhealthy" individuals. Still, uncertainty remains as to whether biological factors may "signal" perceived physical attractiveness.

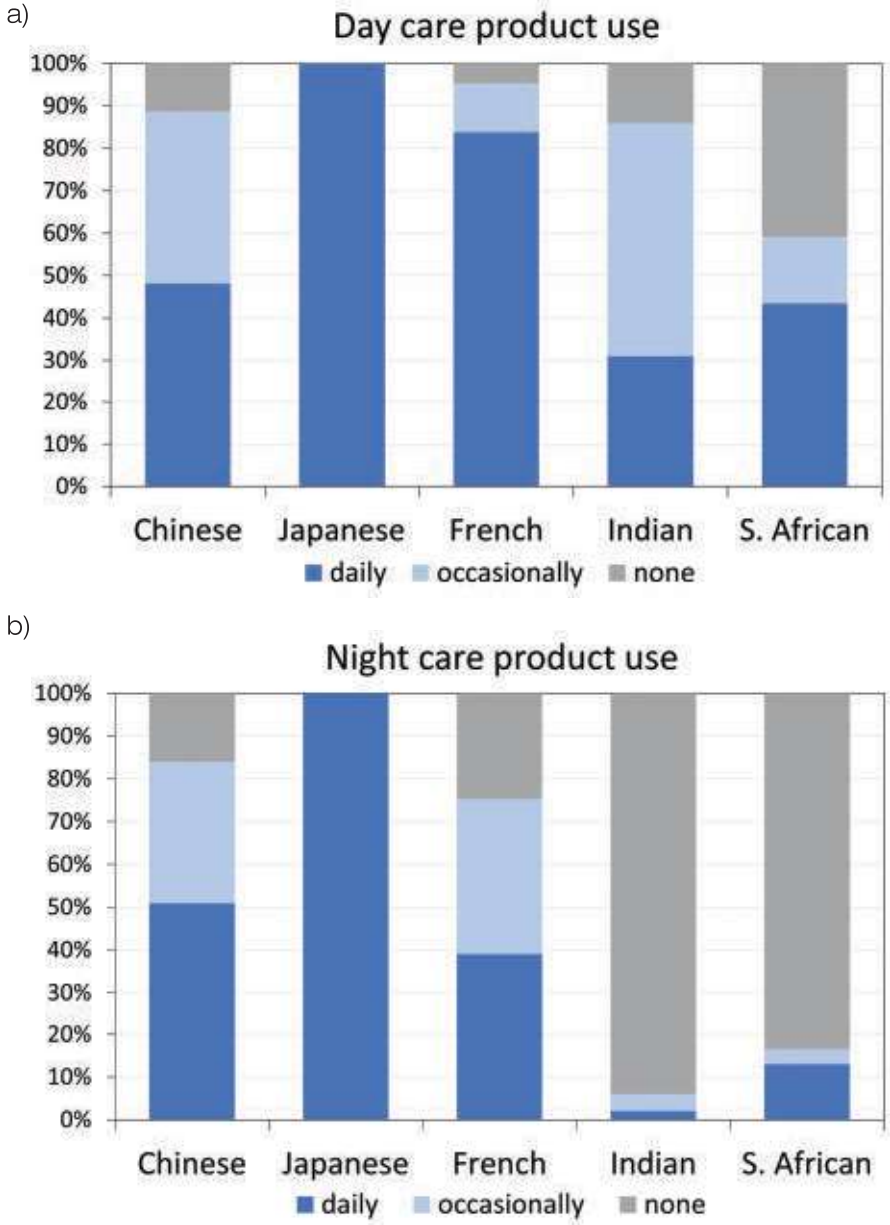


Figure 6. Use of facial products reported by study participants for: a) day care and b) night care

Enhancing Facial Attractiveness

Assuming that physical attractiveness may express desirable attributes, including health, to potential mates, it is not surprising that humans use a wide range of appearance-enhancement behaviors to advertise their mating-related quality. This form of self-promotion increases the individual's mate value over same-sex rivals.

According to evolutionary psychologists, women in particular exaggerate their facial characteristics,

augmenting and shaping them in favor of sexual selection to advertise high reproductive quality and elicit a stronger mating-related perceptual response.[22, 23] Such appearance enhancement practices and preferences are influenced by socio-cultural factors such as media ideals, social norms and gender roles.

External influences may contribute to the explanation of how appearance-enhancement behaviors manifest at the proximate level. An evolutionary perspective may complement these explanations by providing answers to questions about their origin at an ultimate level.[22]

Population-specific Skin Concerns and Product Usage

Although appearance-enhancement behavior is ubiquitous, there is cross-cultural plasticity in preferences and practices according to socio-cultural and ecological settings. Therefore, an understanding of both the evolutionary motivations and the socio-cultural influences is important to address population-specific consumer needs and demands in skin care and cosmetics.

In addition to assessments of female facial images, the described multi-ethnic and multi-center study[15] secured information about women's reported skin concerns and usage of skin care products. The study participants (n = 100 per ethnicity) chose from an array of skin issues, including: none, dry skin, sensitive skin, oily/shiny skin, visible pores, pigmented spots/uneven skin tone, etc. For usage frequency, subjects could select one answer each for facial day and night care—none, occasionally and daily.

The Ins and Outs of Aging

*Check out **Intrinsic/Extrinsic Factors and Nutricosmetic Fixes** in our **October 2021 edition.***

More than half of the participants with darker-complected skin reported no problems: Indian 53% and South African 60% (see **Figure 5**). Oily/shiny skin was the main problem identified by Indian women (27%), and pigmented spots/uneven skin tone was the main issue identified by South African women (15%). French women focused on sensitive skin (33%) and dry skin (24%). Asian participants were concerned about visible pores: Japanese 30% and Chinese 24%; and uneven skin tone/age spots: Japanese 35% and Chinese 32%.

Previous research[19, 24, 25] similarly reported ethnic differences in age-related skin features, as assessed by naïve panelists and expert graders, in women from the countries represented in the multi-ethnic and multi-center study.[15] Facial sagging and wrinkles were the primary drivers of differences between chronological and estimated age across ethnicities. In addition, hyperpigmentation had a stronger role in assessments of Indian, Japanese and South African women.[25]

Similar variances in assessments of women of different ethnic groups have been reported for the age-related density of skin pores. Chinese women, in particular, had lower densities, as assessed through digital image analysis, than French, Indian and Japanese women.[24] Collectively, these studies provide evidence that, in addition to population-specific facial skin features in women of different ethnic origins, these women also differed in their reports of typical skin problems.

One could speculate, therefore, that differences might be found in the skin care routines of women of different ethnic groups. In the multi-ethnic and multi-center study,[15] Japanese and French women were the most intensive users of daily care products (see **Figures 6a** and **6b**). More than 85% of the participants reported using a care product daily or occasionally, except for South African women (59%).

The situation was different for night care. Here, too, Japanese women reported the most frequent use. Among the Chinese women, the majority reported using night care products daily or occasionally and a similar pattern was found for French women. Similar distributions of proportions of day care and night care products used were observed among Chinese women. Night care was infrequent among Indian and South African women.

Differences among women from different ethnic groups in the use of day and night care products are evident and may be explained, in part, by differences in skin biology and environmental factors, and also by women's awareness and knowledge of appropriate product use in addressing age-related changes in visual skin condition. It is known, for example, that the occurrence of hyperpigmentation and wrinkles manifests differently in European and East Asian women and depends on age and anatomical site.[26]

The explanation for differential use of skin care products among women with different ethnic backgrounds, either in terms of frequency or product type, is likely complex. Among the many factors that play a role, any one of them is unlikely to predict a woman's skin care routine better than the others; thus, any scientific or business approach to understanding a skin care routine must be multifactorial and consider population-specific aspects of skin biology along with environmental conditions. In addition, cross-cultural assessments of female facial appearance emphasize the variation in certain social assessments.

Conclusion

The multi-ethnic and multi-center study[15] showed that facial age assessments within and between ethnicities vary less than facial attractiveness and health assessments. Variation in attractiveness assessments does not refute the evidence in favor of biologically based standards of beauty,[2, 8] given that evolutionary adaptations viewing certain features as attractive are expected to vary with local socio-cultural and ecological conditions.[6] Understanding and considering ethnic diversity while researching the face is important from a cosmetic formulation perspective as it addresses specific consumer needs.

Frequent contact with and exposure to people of diverse ethnic origins in a pluralistic world with increased mobility makes it challenging to address these needs and demands from a business perspective. Insights into ethnic variation in skin biology, as well as socio-cultural factors that influence skin care and appearance enhancement, have historically been a focus of cosmetic science. An evolutionary approach to cosmetics as a strategy to augment mate value[22] could provide a clearer understanding of universal and population-specific assessments of facial appearance.

References

1. Zebrowitz, L.A. (2017). First impression from faces. *Curr Dir Psychol Sci* 26 237-42.
2. Fink, B. and Penton-Voak, I. (2002). Evolutionary psychology of facial attractiveness. *Curr Dir Psychol Sci* 11 154-158.
3. Shackelford, T.K. and Larsen, R.J. (1999). Facial attractiveness and physical health. *Evol Hum Behav* 20 71-76.
4. Thornhill, R. and Gangestad, S.W. (1999) Facial attractiveness. *Trends Cogn Sci* 3 452-460.
5. Langlois, J.H., Kalakanis, L., Rubenstein, A.J., Larson, A., Hallam, M. and Smoot, M. (2000). Maxims or myths of beauty? A meta-analytic and theoretical review. *Psychol Bull* 126 390-423.
6. Symons, D. (1995). Beauty is in the adaptations of the beholder: The evolutionary psychology of human female sexual attractiveness. In Abramson, P.R and Pinkerton, S.D., eds.: *Sexual Nature, Sexual Culture.* The University of Chicago Press 80-119.
7. Jackson, L.A. (1992). *Physical appearance and gender: Sociobiological and sociocultural perspectives.* Albany, State University of New York Press.
8. Grammer, K., Fink, B. and Moller, A.P. (2003). Thornhill R. Darwinian aesthetics: Sexual selection and the biology of beauty. *Biol Rev Camb Philos Soc* 78 385-407.
9. Langlois, J.H., Ritter, J.M., Roggman, L.A. and Vaughn, L.S. (1991). Facial diversity and infant preferences for attractive faces. *Dev Psychol* 27 79-84.
10. Fink, B., Butovskaya, M., Sorokowski, P., Sorokowska, A. and Matts, P.J. (2017). Visual perception of British women's skin color distribution in two non-industrialized societies, the Maasai and the Tsimane'. *Evol Psychol* 15 1474704917718957.
11. Penton-Voak, I.S., Perrett, D.I., Castles, D.L., Kobayashi, T., Burt, D.M., Murray, L.K. and Minamisawa, R. (1999). Menstrual cycle alters face preference. *Nature* 399 741-742.
12. Perrett, D.I., Penton-Voak, I.S., ... Barrett, L., et al. (2002). Facial attractiveness judgements reflect learning of parental age characteristics. *Proc R Soc Lond B* 269 873-880.
13. Cunningham, M.R., Roberts, A.R., Barbee, A.P., Druen, P. B. and Wu, C.H. (1995). Their ideas of beauty are, on the whole, the same as ours": Consistency and variability in the cross-cultural perception of female physical attractiveness. *J Pers Soc Psychol* 68 261-279.
14. Pavlović, O., Fiala, V. and Kleisner, K. (2021). Environmental convergence in facial preferences: A cross-group comparison of Asian Vietnamese, Czech Vietnamese and Czechs. *Sci Rep* 11 550.
15. Voegeli, R., Schoop, R., Prestat-Marquis, E., Rawlings, A.V., Shackelford, T.K. and Fink, B. (2021). Cross-cultural perception of female facial appearance: A multi-ethnic and multi-center study. *PLOS ONE* 16 e0245998.
16. Voegeli, R., Schoop, R., Prestat-Marquis, E., Rawlings, A.V., Shackelford, T.K. and Fink, B. (2021). Differences between perceived age and chronological age in women: A multi-ethnic and multi-center study. *Int J Cosmet Sci* 43 547-460.
17. Rawlings, A.V. (2005). Ethnic skin types: Are there differences in skin structure and function? *Int J Cosmet Sci* 28 79-93.
18. Flament, F., Abric, A. and Adam A.S. (2021). Evaluating the respective weights of some facial signs on perceived ages in differently aged women of five ethnic origins. *J Cosmet Dermatol* 20 842-853.
19. Clatici, V.G., Racoceanu, D., ... Fica, S., et al. (2017). Perceived age and life style. The specific contributions of seven factors involved in health and beauty. *Maedica (Bucur)* 12 191-201.
20. Jones, B.C., Jones, A.L., Shiramizu, V. and Anderson, C. (2022). What does women's facial attractiveness signal? Implications for an evolutionary perspective on appearance enhancement. *Arch Sex Behav* 51 67-71.
21. Mengelkoch, S., Gassen, J., Prokosch, M.L., Boehm, G.W. and Hill, S.E. (2022). More than just a pretty face? The relationship between immune function and perceived facial attractiveness. *Proc R Soc B* 28920212476.
22. Davis, A. and Arnocky, S. (2022). An evolutionary perspective on appearance enhancement behavior. *Arch Sex Behav* 51 3-37.
23. Costa, M. and Corazza, L. (2006). Aesthetic phenomena as supernormal stimuli: The case of eye, lip and lower-face size and roundness in artistic portraits. *Perception* 35 229-246.
24. Flament, F., Francois, G., Seyrek, I. and Saint-Leger, D. (2020). Age-related changes to characteristics of the human eyes in women from six different ethnicities. *Skin Res Technol* 26(4) 520-528.
25. Flament, F., Francois, ... Bazin, R., et al. (2015). Facial skin pores: A multiethnic study. *Clin Cosmet Investig Dermatol* 8 85-93.
26. Vierkötter, A., Hüls, A., ... Schikowski, T., et al. (2016). Extrinsic skin aging in German, Chinese and Japanese women manifests differently in all three groups depending on ethnic background, age and anatomical site. *J Dermatol Sci* 83 219–25.

C&T