

Context-dependent preferences for facial dimorphism in a rural Malaysian population[☆]

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Abstract

Participants in a rural Malaysian population rated masculinised and feminised faces for attractiveness and for trait attribution. Consistent with previous research, we found that female preferences were affected by relationship context but male preferences were not. In a long-term context, however, both male and female preferences were predicted by the observers' own physical quality, as measured by physical health. This suggests that highly sex-typical faces signal high phenotypic quality across contexts but that preferences are constrained by competition from other mates. We also found that perceptions of the health, fecundity, and personality of opposite-sex individuals were predicted by facial masculinity/femininity. For both sexes, highly sex-typical faces were perceived to be more healthy and fecund, while masculine faces were perceived to be "nasty" and feminine faces were perceived to be "nice." Perceptions of health were somewhat different to findings from Western populations, which may be attributable to the harshness of the participants' environment.

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1. Introduction

Transactional models of mate choice have attempted to reconcile the concept of objective physical quality with the documented existence of variation in mate preferences (Hill & Reeve, 2004). In such models, mating behaviour is analogous to an economic market, with phenotypic quality being an objective fitness benefit but potentially associated with reduced investment in a relationship. As overall mate value is defined in terms of both physical quality and expected investment, preferences for the former should be constrained by requirements for the latter.

Transactional models predict that individuals of high physical quality will be the subject of increased competition

(Hill & Reeve, 2004), and evidence to date confirms a positive relationship between attractiveness and "riskiness" — that is, probability of low investment in one's partner (Bogaert & Fisher, 1995; Gangestad & Simpson, 2000; Jankowiak & Ramsey, 2000; Singh, 2004; Waynforth, 2001; Weeden & Sabini, 2007). A corollary of this competition is that preferences for high-quality individuals should vary with factors such as level of investment sought and offered (Hill & Reeve, 2004), and levels of investment vary according to the expected duration of the relationship, with both partners investing heavily in long-term relationships, but males investing less than females in short-term relationships due to sex differences in obligate parental investment (Gangestad & Simpson, 2000). From a market perspective, this imbalance of investment should afford women the power to demand high phenotypic quality more easily in short-term than in long-term relationships (Gangestad & Simpson, 2000). A further consequence of the market perspective is that own mate value should influence mating strategies, with assortative mating for quality observed whenever both parties invest highly (i.e., long-term

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relationships). Consistent with these predictions, men's and women's preferences for attractive partners are influenced by relationship context (Li & Kenrick, 2006), own mate quality (Pawlowski & Dunbar, 1999), and the interaction between the two (Regan, 1998).

Considerable research has investigated contextual variation in mate preferences using facial stimuli (see Gangestad & Scheyd, 2005; Rhodes, 2006, for reviews). Facial sexual dimorphism — the extent to which facial structure deviates in the sex-typical direction — may qualify as an objective cue of quality. Evidence suggests that in men, facial masculinity (high sex typicality) correlates with health and that femininity is related to fecundity (and possibly health) in female faces (*ibid.*).

Preferences for facial dimorphism may, therefore, constitute a measure of orientation toward high physical quality, and a number of authors have investigated both intra- and intersexual variation in preferences (Little, Burt, Penton-Voak, & Perrett, 2001; Little, Cohen, Jones, & Belsky, 2007; Penton-Voak et al., 2003; Waynforth, Delwadia, & Camm, 2005). Female preferences for masculinity are consistent with transactional models of mate choice, with orientation toward masculinity constrained by both the amount of investment sought and by the chooser's mate quality (Little, Jones, Penton-Voak, Burt, & Perrett, 2002; Penton-Voak et al., 2003; Waynforth et al., 2005).

In contrast, male preferences have largely demonstrated a consistent bias toward facial femininity (see Rhodes, 2006) and evidence for intrasexual variation is weaker (Little et al., 2007; Penton-Voak, Jacobson, & Trivers, 2004). Theoretically, transactional models predict variation in male preferences, and it remains unclear as to why men should be more consistent in their preferences than women. Explanations regarding age and variable fecundity have been suggested (i.e., that femininity signals a “nonnegotiable” cue of fertility; see Symons, 1995), but the fact that males, on average, prefer feminised versions even of young women (Perrett et al., 1998) suggests that there is scope for low-quality males to compromise on mate quality.

To date, predictions of assortative male facial preferences remain largely untested. Most research into the effects of own mate value focus on either mating strategy (i.e., long term vs. short term) or female mate choice (Gangestad & Simpson, 2000; Little et al., 2001; Penton-Voak et al., 2003). Preliminary empirical findings suggest that when additional variables (such as environment) are manipulated, male preferences are generally susceptible to variation (Little et al., 2007); hence, concluding that male preferences are invariant is premature.

We conducted an experiment with participants in rural Malaysia in which computer-generated facial photographs, which varied only in levels of masculinity/femininity, were shown to the participants, who were then asked to rate the photographs for long-term and short-term attractiveness, as well as health, fecundity, and personality traits. A measure of own quality, health status, was used to

examine preferences for sex typicality in different relationship contexts.

To date, studies investigating variability in preferences within populations have largely employed undergraduate students from Western cultures as participants. The apparent consensus in results may simply reflect a lack of variability in factors likely to affect preferences. Most Western populations also have excellent access to health care, likely making intrinsic/genetic factors a weaker predictor of health (Weeden & Sabini, 2005). In contrast, participants in the current study experience conditions potentially more similar to those in ancestral environments, with exposure to serious infectious diseases and hard physical labour being part of their everyday lives.

1.1. Predictions

The methods were designed to test hypotheses concerning the following:

- i. Orientation toward high-quality mates,
- ii. The influence of relationship context and chooser's own quality on preferences, and
- iii. Variability of preferences in both women and men.

1.1.1. Female participants

1. Relationship context: Female preferences for masculinity are predicted to be weaker in long-term contexts and stronger in short-term contexts.
2. Own quality: Preference for masculinity should be positively predicted by own quality, at least in long-term contexts.
3. Perceptions of male faces:
 - (a) Masculine men will be seen as being healthier and more fecund than feminine men.
 - (b) Masculine men will be seen as having negative personality attributes.

1.1.2. Male participants

1. Relationship context: No specific prediction is made for context effects on male preferences for facial femininity.
2. Own quality: Low-quality men should show less attraction to femininity, particularly in long-term contexts.
3. Perceptions of female faces:
 - (a) Women with high levels of femininity will be seen as being more fertile, and possibly healthier, than women with more masculine faces.
 - (b) No specific prediction is made about the perceived personality attributes of feminine women.

2. Methods

2.1. Participants

Twenty-five male and 26 female participants were drawn from a rural village community in the state of Sabah in

Malaysian Borneo [age (mean±S.D.): men=30.0±13.5, women=29.4±10.8]. None of the women were pregnant or using birth control. The study site is characterised by relatively low socioeconomic development, with all participants being smallholding paddy farmers (Swami & Tovée, 2005a, 2005b). The population is largely monogamous with polygyny practised only in very rare cases. All follow a relatively traditional way of life and have limited exposure to Western media, that is, restricted to communal televisions (regulated state channels that present mainly local programmes), radios, and print matter (local, statewide newspapers).

2.2. Measures

Given the prevalence of local diseases, participants who have never previously been too ill to work are likely to have high levels of immunity to local pathogens, making this a credible putative measure of physical quality and, hence, mate quality. Past health status was therefore recorded and treated as an index of physical health (see below).

2.3. Stimuli

Stimuli consisted of sets of facial images for each of five ethnic groups (Caucasian, East Asian, South Asian, Afro-Caribbean, and South American). For each ethnic group,

composite photographs were generated using established techniques to average same-sex photographs, thereby creating a male and female composite face for each of the five groups. Feature points were delineated on the male and female composites and used to define a vector describing the average male and female facial morphology. This was used to transform the 10 composites in either a masculine or a feminine direction along the male–female axis, following previous methods (Perrett et al., 1998). Caucasian, East Asian, and South Asian composites used were those constructed in Stephan et al. (2005). Details of the Afro-Caribbean composite can be found in Penton-Voak et al. (2004). The South American composites were constructed from 24 females and 24 males of the Matsigenka, provided by Dr. Douglas Yu. The resulting 10 sets of stimuli each consisted of three same-sex, same-ethnicity composite photographs: the original composite, a 60% feminised composite, and a 60% masculinised composite (see Fig. 1). Stimuli were then printed in colour onto cards and laminated.

2.4. Procedure

Participants were presented with a set of three opposite-sex photographs and asked to choose the one that they felt most typified a particular trait (see questions, below). After

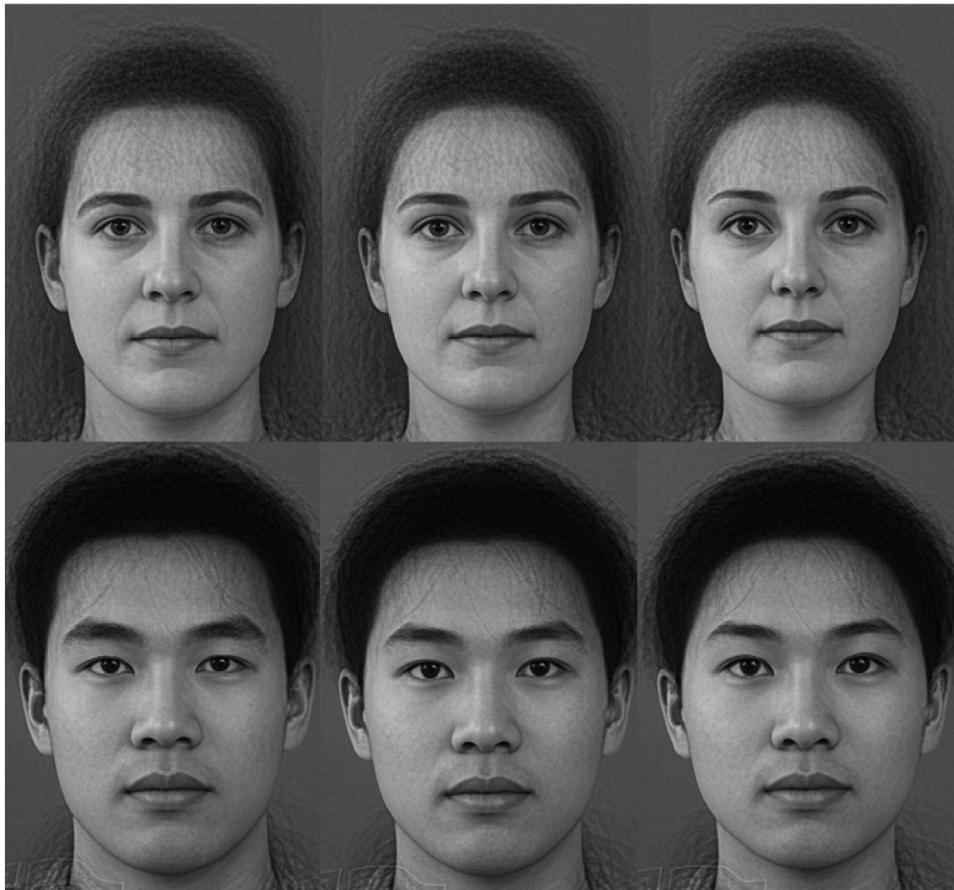


Fig. 1. Examples of female and male stimuli. Photographs on the left are 60% masculinised, those in the middle are original composites, and the images on the right have been 60% feminised.

choosing a face, the same question was repeated using faces from each of the remaining four ethnic groups, one after another, before moving onto the next question. For each question, a brief exposition of what exactly was meant by the question was given (see below). Responses were recorded as either +60 (feminine), 0 (average), or –60 (masculine), and for each question, the participant's averaged response across the five ethnic groups was calculated and treated as a dependent variable in analyses.

The lead questions asked were the following:

1. Which face did participants consider the most attractive in a long-term context [based on the face, which person would be the best candidate as a long-term partner (i.e., the best candidate to be married to)]?
2. Which face did participants consider the most attractive in a short-term context (i.e., for things such as dating but without prospects for the long term)?
3. Which is the healthiest (free from disease, strong)?
4. Which is the most fecund/fertile (likely to have children, or likely to father them)?
5. Which person is the
 - (a) nicest (most agreeable, friendly, easy to live with)?
 - (b) nastiest (most aggressive, difficult, unpleasant to live with)?

After completing the experiment, a participant information questionnaire was administered, in which participants

were asked whether or not they had ever been too sick to work, as a measure of past health status. Additional data regarding participant age, parental status, earnings, and educational status were collected. Participants took part on a voluntary basis, were not remunerated for their participation, and were debriefed following the experiment.

3. Results

Both male and female responses to attractiveness and trait-attribution questions demonstrated a high level of internal consistency, with Cronbach's alpha coefficients of .93 and .82 for men and women, respectively. As men and women were presented with different stimuli for the experiment, representing different groups of participants, male and female preferences are not amenable to either within-subject or between-subject comparisons and are analysed separately. To simplify the presentation of the following analyses, we collapsed preference and attribution data across stimuli ethnicity, as there were no interactions between stimulus ethnicity and any factors discussed.

3.1. Female participants

3.1.1. Relationship context and health status

Seventy-eight percent of women reported having been too sick to work on at least one occasion. Preferences for dimorphism, organised by health status and relationship context, are shown in Fig. 2. Preferences for facial

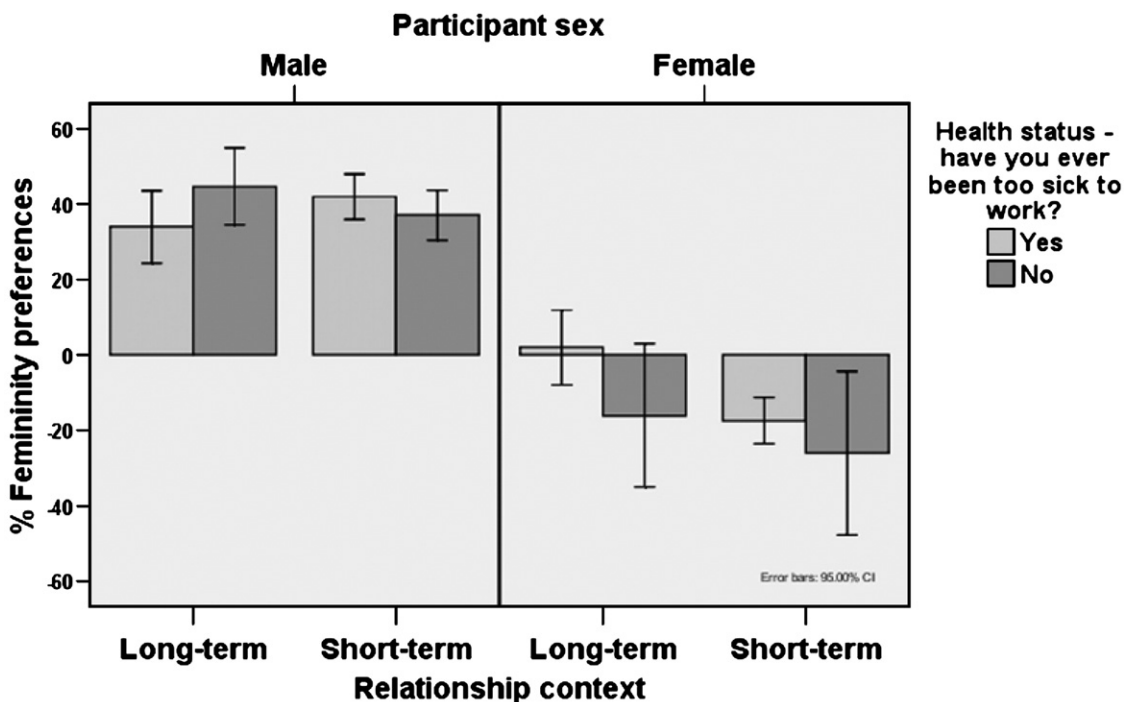


Fig. 2. Facial preferences by relationship context and health status. Preferences are measured on the y-axis, with bars representing mean scores across the group. Positive scores indicate a group bias toward choosing feminised faces, and negative scores indicate preference for masculinity. Error bars indicate 95% confidence intervals.

masculinity/femininity are measured on the y -axis, with positive scores indicating a group bias toward choosing feminised faces and negative scores indicating preference for masculinity. To determine whether relationship context and/or health status exerted significant effects on preferences in different contexts, a mixed between-subjects/within-subjects analysis of variance (ANOVA) was conducted, with preferences for masculinity/femininity as a dependent variable. Participants were divided into those who had been too sick to work on one or more occasion (“unhealthy”) and those who had not (“healthy”), and this was treated as a between-subjects factor. Relationship context was treated as a within-subjects factor.

Results from the ANOVA showed statistically significant main effects for both relationship context [$F(1,24)=6.49$, $p<.05$] and health status [$F(1,24)=5.37$, $p<.05$]. Preferences for masculinity were significantly stronger in a short-term context than in a long-term context and were significantly stronger in the healthy group than in the unhealthy group. Although the interaction between relationship context and health status was not statistically significant [$F(1,24)=0.66$, $p>.05$], independent-sample t tests revealed that the influence of health status on preferences was significant in the long-term context only [long term: $t(24)=2.101$, $p<.05$; short term: $t(22)=1.1246$, $p=.226$].

3.1.2. Trait attributions

Perceptions regarding the relationship between male facial dimorphism and other traits are shown in Fig. 3. On average,

women selected masculinised faces as typifying traits of high physical quality, and one-sample t tests revealed the masculine bias to be significant for both health and fecundity judgements [health: $t(25)=-2.15$, $p<.05$; fecundity: $t(25)=-2.23$, $p<.05$]. Masculine faces were also associated with negative personality attributions. When asked to choose the “nicest” looking face, participants exhibited a significant bias toward feminine faces [$t(25)=3.80$, $p<.001$], while masculine faces were selected as “nasty” more often than would be expected by chance [$t(25)=-7.56$, $p<.001$].

3.2. Male participants

3.2.1. Relationship context and health status

Forty-eight percent of men reported having been too sick to work on at least one occasion. As with female preferences, a mixed between-subjects/within-subjects ANOVA was conducted with preferences for masculinity/femininity as the dependent variable, health status as the between-subjects factor, and relationship context as the within-subjects factor (see Fig. 2). There were no significant main effects of either health status or relationship context, although there was a significant interaction between health status and relationship context [$F(1,23)=4.33$, $p=.05$]. To investigate this further, we separately investigated the influence of health status for long-term and short-term contexts. Independent-sample t tests revealed marginally significant effects of health status in long-term but not in short-term contexts [long term: $t(23)=-2.041$, $p=.053$; short-term: $t(21)=1.20$, $p=.242$].

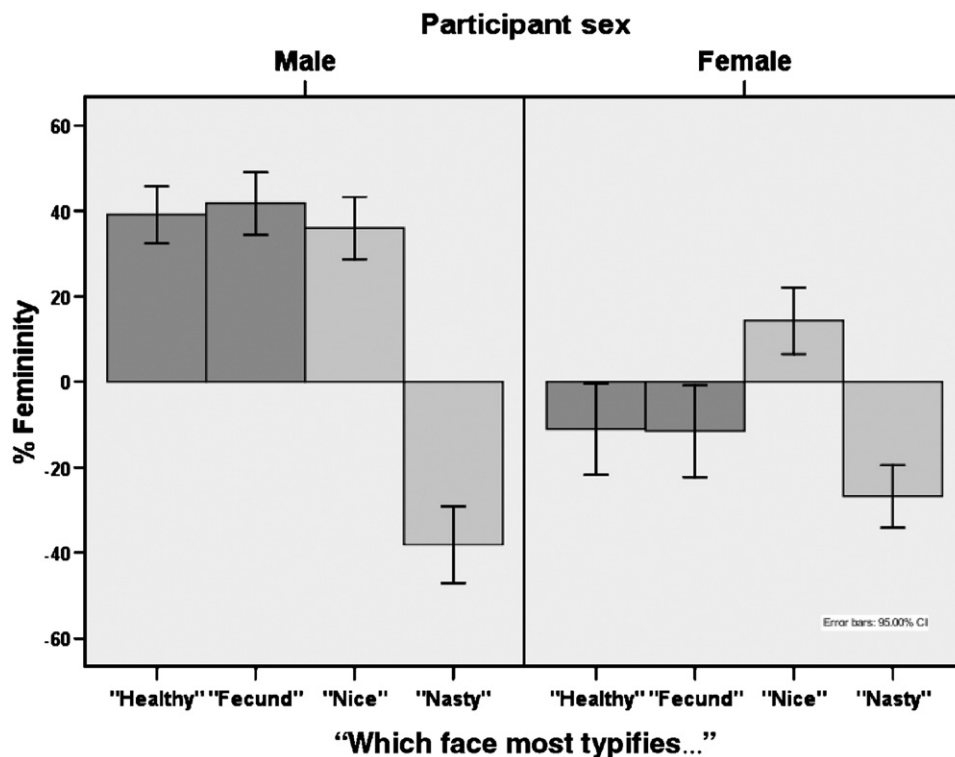


Fig. 3. Subjects' attributions of physical quality and personality. Bars represent group averages, and a positive score indicates a group tendency to select feminine faces as most typical of a given trait, while a negative score indicates a tendency to choose masculine faces. Error bars indicate 95% confidence intervals.

3.2.2. Trait attributions

As shown in Fig. 3, men perceived feminine female faces as typifying good health and high fecundity, and one-sample *t* tests revealed this bias to be significant for both traits [health: $t(24)=11.57$, $p<.001$; fecundity: $t(24)=11.83$, $p<.001$]. As with female participants, however, facial masculinity was associated with negative personality attributions. Feminine female faces were seen as significantly nicer [$t(24)=9.75$, $p<.001$], and masculine faces were seen as nastier [$t(24)=-9.59$, $p<.001$].

4. Discussion

These results showed that rural Malaysian participants' preferences for sex-typical faces were consistent with a transactional mate choice model, in which standards of biological quality are objective but orientation toward them is constrained and variable. As predicted, preferences for sex-typical faces were strongest when low levels of investment were being sought or where choosers' mate quality was high.

Female preferences demonstrated context effects, with preferences for masculinity significantly more constrained in a long-term context where high investment was sought, thereby replicating previous findings from Western populations (Little et al., 2002). As predicted by transactional mate choice models, there was also evidence of within-context variation in preferences. This variation was predicated upon an index of own mate value, with high-quality women preferring more masculine males than lower-quality women. Our findings of assortative female preferences mirror those of previous authors (Little et al., 2001; Little & Mannion, 2006), suggesting that these effects are robust.

In addition, female preferences showed that the influence of participants' own health status on preferences was reduced in a short-term mating context. This is consistent with the fact that less male investment is sought in short-term contexts and, hence, that high-quality males can be partnered with multiple females (including lower-quality ones). The structure of female preferences is thus contingent upon male mating strategies, particularly that males are less choosy in a short-term than in a long-term context, while male choosiness is, in turn, expected to be influenced by the availability of women for matings (Kokko & Rankin, 2006), making male and female strategies mutually dependent. In this population, conservative attitudes toward extramarital relations, in combination with a relatively small population size, may reduce the availability of women for short-term relationships and, hence, reduce male choosiness and assortativity in short-term contexts. Future research should explore the impact of factors that are relevant to the availability of women for short-term matings (such as population density and operational sex ratio, cf. Kokko & Rankin, 2006), on

both male choosiness and assortativity in short-term mate preferences.

In contrast to females, male preferences did not respond at a group level to relationship context. Preferences for femininity were high for both long-term and short-term relationships, thereby replicating findings of consistency in prior research (with the exception of Little et al., 2007). In addition, short-term preferences were homogenous, with men of varying quality preferring highly sex-typical faces. Male consistency of preferences has previously been explained in terms of fecundity and personality attributes; however, the structure of preferences in the current population suggests that such explanations may be superfluous. Our results are consistent with a more economical explanation, which is simply that unconstrained female preferences create a monopolisation of the short-term mating market by attractive men and, hence, that low-quality men cannot increase their mating success by pursuing lower-quality women (if low-quality males are unable to obtain short-term partners, then their preferences in this context are selectively irrelevant). Moreover, in contrast to the short-term context, orientation toward femininity was constrained by participants' own mate quality in high-investment relationships, with "unhealthy" men showing a trend toward preferring reduced levels of femininity for long-term partners. This finding suggests that, in contrast to previous assumptions, male preferences are indeed susceptible to systematic variation.

Responses to trait-attribution questions showed that both sexes perceived exaggerated sex typicality to predict health and fertility status in the opposite sex, in contrast to a previous finding in a Western population (Boothroyd et al., 2005). This result may be attributable to the fact that our participants inhabit an environment in which the consequences of poor immunity are more readily apparent than in Western populations, and future research should address the influence of environmental harshness on social perception of facial morphology.

As transactional models regard attractive individuals to be the subject of greater competition, such individuals have greater opportunity to act in ways contrary to their partners' fitness. A potential consequence of this is that attractive faces might be judged as "nastier." Our results, however, indicated that while masculine male faces were indeed regarded as "nastier" than average faces, feminised female faces were, in fact, perceived to be "nicer," a finding consistent with research from other populations (e.g., Perrett et al., 1998).

One interpretation of these results is that the predictions of the marketplace analogy do not straightforwardly apply to female behaviour. Strong selection on male behaviour, for example, may result in a correlation between testosterone and aggression in female behaviour in a manner that is not explicable in terms of strategic response to the market. At present, however, the empirical evidence regarding the relationship between testosterone, facial masculinity, and behaviour in females remains limited (Christiansen, 2001).

An alternative explanation for our findings is that participants' perceptions regarding female personality and morphology are inaccurate; "halo effects," in which attractive individuals are perceived to possess positive personality attributes, have been well documented (see also Tovée, Furnham, & Swami, in press; Zebrowitz, 1997). When judging male faces, however, participants appear able to parse attractiveness and personality; masculine males are perceived to be both attractive and nasty. Accordingly, in this population, halo effects seem unlikely to account entirely for our findings (or at least some explanation is required as to how they apply to female, but not male, faces).

A third possibility is that the question asked was not sufficiently specific to distinguish between personality attributions and anticipated behaviours. Indeed, prior research suggests that stereotypes of physically attractive women are complex and that, while predominantly positive, they include negative attributions such as likelihood of infidelity and desertion (Cash & Janda, 1984). Moreover, such "negative" behaviours may occur as a function of increased opportunity rather than differences in personality (Weeden & Sabini, 2007). If so, then feminine women may be perceived as both "nice" and "risky" simultaneously.

In summary, our results show that multiple factors, including investment sought/offered and own/partners' phenotypic quality, interact to determine mate choice preferences. Our findings suggest that preferences may be mediated by trait-attribution judgements, in a manner consistent with maximising physical quality while minimising risk. While the incorporation of own mate value into the model results in a more comprehensive set of predictions, certain results, such as the equivalence of male preferences in long- and short-term contexts, were not specifically predicted. At present, the precise determinants of certain patterns are not known, and we suggest that cross-cultural research, incorporating factors such as norms of paternal investment, prevalence of short-term matings, and environmental harshness, may elucidate some of these issues.

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