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Original Article

Do Impressions of Health, Dominance, and Warmth Explain Why Masculine Faces Are Preferred More in a Short-Term Mate?

Victor X. Luevano, Department of Psychology, Brandeis University, Waltham, MA, USA. Email: vluevano@brandeis.edu (Corresponding author)

Leslie A. Zebrowitz, Department of Psychology, Brandeis University, Waltham, MA, USA.

Abstract: Men high in facial masculinity are preferred more as a short-term partner (STP) than a long-term partner (LTP). We used a representative sample of natural faces to examine whether the greater preference for masculine-looking men as a STP could be explained by the fact that they look healthier, more dominant, or lower in warmth. None of these attributes explained the greater preference for facial masculinity in a STP. Rather, masculinity mediated the greater preference for healthy and dominant looking men as a STP. Women also preferred men who appeared high in warmth more as a LTP than a STP, an effect independent of facial masculinity, but mediated by facial expression. Our results suggest that women do not prefer masculine-looking men more as a STP than a LTP simply because they look healthier, more dominant, or less warm.

Keywords: Attractiveness, Facial masculinity, Health, Dominance, Paternal investment

Introduction

Women tend to prefer men high in facial masculinity more as a short-term partner (STP) than as a long-term partner (LTP) (e.g. Little, Jones, Penton-Voak, Burt, and Perrett, 2002; Penton-Voak et al., 2003; Roney, Hanson, Durante, and Maestripieri, 2006). It has been previously posited that preferences for facial masculinity in general might be explained by impressions of health, dominance, or warmth (Johnston, Hagel, Franklin, Fink, and Grammer, 2001; Penton-Voak et al., 1999; Penton-Voak et al., 2001; Perrett et al., 1998). Additionally, those who have documented a greater preference for facial masculinity as a STP than as a LTP have suggested that women are actually varying in their preference for these traits across mating contexts (Little et al., 2002; Penton-Voak et al., 2003; Roney et al., 2006). Here we use a representative sample of natural faces to examine whether these impressions can explain why women prefer men high in facial masculinity more as a STP than a LTP.

When selecting a mate, women are thought to face a trade-off between finding a mate with good genes and finding a mate willing to invest in offspring. Because of this, women should be more concerned with genetic quality in a STP and paternal investment in a LTP

(Gangestad and Simpson, 2000). Women might prefer men high in facial masculinity more as a STP than a LTP because they are inferring genetic quality and potential paternal investment from impressions of health, dominance, and warmth. When considering the heritable aspects of health (e.g. a strong immune system) apparent health might be thought of as a signal of genetic quality. However, it should be noted that health is also important for providing paternal investment, and there are no obvious drawbacks to finding a healthy long-term mate. Even so, since facial masculinity is thought to signal a strong immune system (Folstad and Karter, 1992; Rhodes, Chan, Zebrowitz, and Simmons, 2003), women's increased preference for facial masculinity as a STP might be explained by impressions of health. Facial dominance also appears to serve as an honest signal of genetic quality, since it is associated with status and reproductive success (Mazur, Halpern, and Udry, 1994; Mueller and Mazur, 1996; Mueller and Mazur, 1997). Thus, women's increased preference for facial masculinity in a STP might be explained by impressions of dominance, particularly since men high in social dominance are more likely to engage in extra-pair copulations (Egan and Angus, 2004), making them less desirable as a LTP. Finally, women's lesser preference for facial masculinity in a LTP may be explained by impressions of lower warmth, since men who look warm should be perceived as more likely to provide paternal investment, while there is no evidence that they are especially high in genetic quality In sum, women may prefer men high in facial masculinity more as a STP than a LTP because they look healthier, more dominant, or less warm.

For any of these attributes (i.e. health, dominance, or paternal warmth) to explain why women prefer masculine-looking men more as a STP than a LTP, a number of criteria must be met. For one, we need to find a parallel effect of mating context for that attribute. This effect needs to remain significant when controlling for facial masculinity. Furthermore, the effect of mating context on facial masculinity needs to be reduced when controlling for the attribute. Additionally, facial masculinity needs to be correlated with impressions of the attribute (Baron and Kenny, 1986). If these criteria are met for any of the attributes, we can say that in fact, women prefer men high in facial masculinity more as a STP because they look healthier, more dominant, or less warm.

Materials and Methods

Target faces

The target faces were digitized images of black and white photographs of 122 men drawn from a longitudinal study, The Intergenerational Studies, archived at the University of California, Berkeley Institute of Human Development (IHD), and at the Harvard University, Henry A. Murray Center. The men in the photographs were White, between 17 and 18 years old, and most displayed neutral facial expressions. The photographs were taken of the nude men in a standardized format for the purpose of assessing pubertal development and somatotype. We used only cropped photos of their face, and additionally added oval masks to hide hairstyle. The men came from a representative sample of 5th and 6th grade elementary school students in Oakland California at the time they entered the study in 1932, or from a representative sample of births in Berkeley California in 1928-29 (For further study details see Eichorn, Clausen, Haan, Honzik, and Mussen, 1981). Ratings previously made using these images have been found to have predictive validity. For example, ratings of facial masculinity and apparent health are

correlated with the men's actual health (Kalick, Zebrowitz, Langlois, and Johnson, 1998; Rhodes, 2006), and ratings of general attractiveness are correlated with likelihood of marriage and age at marriage (Kalick et al., 1998) as well as IQ scores (Zebrowitz, Hall, Murphy, and Rhodes, 2002).

Face ratings

STP and LTP attractiveness.

The attractiveness ratings were collected in sessions conducted by a female research assistant. Photographs were presented using a PowerPoint presentation projected on a large screen. This allowed for multiple participants to take part in the experiment simultaneously. We counterbalanced between groups the order in which the pictures were presented, and between participants the order of STP and LTP ratings.

Sixty female participants rated the attractiveness of 122 pictures in two different contexts, as a short-term (sexual) partner (STP) and as a long-term (someone they would consider marrying) partner (LTP). Participants were either paid $10, or they received credit toward the research familiarization requirement of the introductory psychology class. Three of the women were excluded from the analyses because they indicated their sexual orientation was not heterosexual. Thus, the analyses were carried out on 57 heterosexual women between 18 and 26 years of age (M = 19, SD = 2.0). Ratings were made on 7-point Likert-type scales with endpoints labeled *unattractive* and *attractive*. There was high inter-rater reliability for both the STP (α=.95) and the LTP (α=.94) attractiveness ratings. We computed the mean STP (M = 2.53, SD = .70) and LTP (M = 2.61, SD = .66) attractiveness ratings for each face across participants for some analyses.

Masculinity and health.

Ratings of facial masculinity and apparent health were drawn from previous studies. Each measure was based on a 7-point Likert-type scale, and the mean rating for each face across raters was used. The measure of facial masculinity (*not at all masculine/very masculine*; α = .92) was taken from Rhodes, Chan, Zebrowitz and Simmons (2002), M = 4.37, SD = .66. Apparent health (*not at all healthy/very healthy*; α = .83) was drawn from Kalick, Zebrowitz, Langois, and Johnson (1998), M = 4.34, SD = .73.

Perceived dominance and warmth

The measures of perceived dominance and perceived warmth were previously created by Zebrowitz and colleagues, but have not yet been described in published research. In both cases 16 raters (approximately equal numbers of males and females) rated the faces on a 7 point scale. For perceived dominance, the endpoints were *submissive-dependent* and *dominant-independent*. For perceived warmth the endpoints were *warm-affectionate* and *cold-unaffectionate*. As in other measures, the mean across raters was used for perceived dominance (α = .80; M = 2.41, SD = 1.88) and perceived warmth (α = .92; M = 4.02, SD = .84).

Good father

For a subset of the faces (n = 80), we had available ratings of how good a father the men appeared to be. These ratings were obtained using the same procedure as outlined for the STP and LTP attractiveness ratings. Thirteen female participants (*M* age = 20, *SD* = 1.5) were asked to rate "what kind of father do you think this man would make?" on a 7-point Likert-type scale with endpoints *poor father* and *good father*. Inter-rater reliability was acceptable (α = .71), and the mean across raters was used, *M* = 4.04, *SD* = .58. Perhaps due to lower power, there were no significant effects with the good father ratings. Because of this, they are not included in the analyses. However, the good father ratings were substantially correlated with the warmth ratings, $r = .57$, $p < .001$, which suggests that warmth ratings can be used as a proxy for perceived potential paternal investment.

Smile ratings.

The men in the photographs were not given instructions concerning facial expression at the time the photographs were taken, and most had a neutral expression. Even so, we obtained smile ratings because positive expression has been found to influence judgments of attractiveness (Jones, DeBruine, Little, Conway, and Feinberg, 2006; Reis et al., 1990; Roney et al., 2006), and may be related to testosterone levels (Dabbs, 1997). At a lab meeting, 10 undergraduate research assistants and 4 graduate students rated the 122 faces. The smile ratings were made on a 7-point Likert scale with endpoints "not smiling at all" and "very big smile." Inter-rater reliability was high, α = .98 (*M* = 2.5, *SD* = 1.62), and the mean across raters was computed for each face.

Results

Effects of mating-context

The first question was to determine whether preferences for each of the investigated facial qualities were similarly affected by mating context. To assess this, we used hierarchical linear regression models (HLM) that were computed using HLM 6.0 software (SSI Scientific Software). HLM works by calculating a regression slope for each woman using all of the faces, and then tests the null hypothesis that the average regression slope across women is zero. In doing so, HLM uses both the faces and the women raters as the unit of analysis. All variables were standardized prior to data analysis so that the HLM regression coefficients (γ) could be interpreted as the mean standardized beta coefficients across women. In order to directly examine the effects of mating context on attractiveness, we used the difference between the STP and LTP ratings as the outcome measure (as in Roney et al., 2006). A positive relationship would indicate that men high in the tested facial attribute (facial masculinity, health, dominance, or warmth) tended to be rated as more attractive as a STP than a LTP. Conversely, a negative relationship would suggest that the men high in that attribute tended to be rated more attractive as a LTP than as a STP. Facial masculinity, health, dominance or warmth were entered in Step 1 and Smile Ratings were entered in Step 2 to determine whether the effects of interest held true with smiling controlled (see Table 1).

Table 1: HLM analysis of the differential attractiveness of men's facial qualities in a short-term vs. a long-term partner

	Masculinity	Health	Dominance	Warmth
Step 1	γ (SE)	γ (SE)	γ (SE)	γ (SE)
Facial quality	.05 (.01)**	.01 (.01)	.03 (.01)**	-.04 (.01)**
Step 2				
Facial quality	.04 (.01)**	.03 (.01)*	.03 (.01)*	.03 (.02)
Smile	-.07 (.01)**	-.08 (.01)**	-.07 (.01)**	-.10 (.02)**
Step 3				
Facial quality		.01 (.01)	.01 (.01)	.02 (.02)
Smile		-.08 (.01)**	-.07 (.01)**	-.09 (.02)**
Masculinity		.04 (.01)**	.04 (.01)**	.04 (.01)**

Note: *$p < .05$; **$p < .01$

As expected, facial masculinity predicted higher STP than LTP attractiveness ratings, $t_{6938} = 4.59$, $p < .001$, and this effect did not go away when controlling for smiling, $t_{6937} = 3.83$, $p < .001$. By itself, apparent health did not predict differences in attractiveness ratings as a STP and as a LTP, $t_{6938} < 1$, *ns*. However, when controlling for smiling, men who looked healthier tended to be rated as more attractive as a STP than as a LTP, $t_{6937} = 2.50$, $p = .01$. Consistent with hypothesis, perceived dominance predicted higher STP than LTP ratings, $t_{6938} = 3.07$, $p = .003$, and this relationship remained when smile ratings were added, $t_{6937} = 2.60$, $p = .01$. Finally, women preferred men high in warmth more as a LTP than a STP, $t_{6938} = -3.83$, $p < .001$, but this effect reversed and lost significance when the smile ratings were entered into the model, $t_{6937} = 1.82$, $p = .07$.

Mediation effects

Having shown that the attractiveness of masculinity, apparent health, dominance, and warmth were all similarly influenced by mating context, we examined mediation effects following the procedure recommended by Baron and Kenny (1986) Ratings of masculinity and warmth were not significantly correlated, thereby eliminating this facial quality as a potential mediator of the effects of mating context on preferences for masculinity (see Table 2). Although ratings of masculinity were significantly correlated with apparent health and dominance (see Table 2), neither qualified as a mediator because both lost significance when masculinity was entered into the model at Step 3, both $ts_{6936} < 1$, *ns* (see Table 1). Moreover, the effect for facial masculinity was not reduced when entering either of these appearance qualities into the model, which can be seen by comparing the masculinity effect in steps 2 and 3 of Table 1.

Having determined that none of the appearance qualities mediated the greater preference for masculinity in a STP, we examined whether masculinity mediated the greater preference for health or dominance. In both cases, masculinity qualified as a mediator because, as shown in Table 1, it remained significant when either apparent health or dominance was in the model and the effects of health and dominance both lost significance. To determine whether there was significant mediation, we used the bootstrapping method outlined by Preacher and Hayes (2004) with face as the unit of analysis.

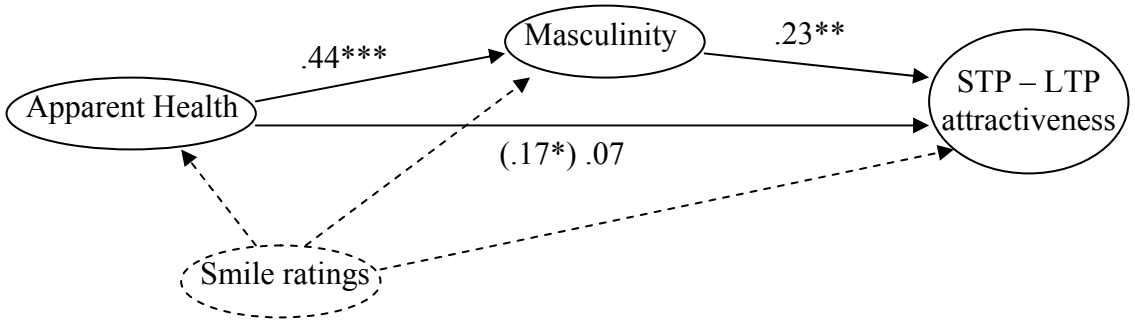
Table 2. Zero-order correlations among facial qualities using face as the unit of analysis.

	1	2	3	4	5	6	7	8
1. STP	—	.96**	.30**	.49**	.63**	.32**	.27**	.16
2. LTP		—	.01	.42**	.65**	.27**	.36**	.32**
3. STP - LTP			—	.31**	.03	.21*	-.26**	-.47**
4. Masculinity				—	.37**	.53**	-.03	-.12
5. Health					—	.24*	.49**	.27**
6. Dominance						—	-.18	-.07
7. Warmth							—	.73**
8. Smile rating								—

Note: STP is rated attractiveness as a short-term partner; LTP is rated attractiveness as a long-term partner; STP-LTP is the difference between attractiveness as a short-term and long-term partner.
*p<.05, **p<.01; n=122

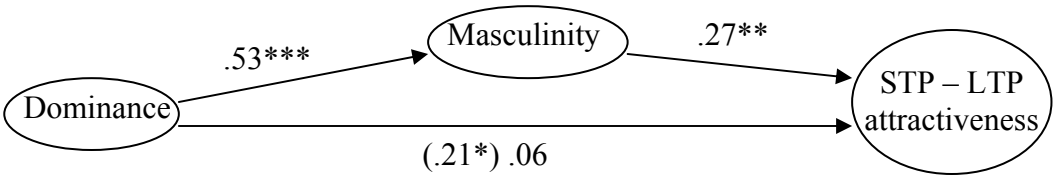
With regard to the increased preference for apparent health in a STP, we found that the indirect effect of facial masculinity was significant at the $p < .01$ level, since zero was not included in the 99% confidence interval, 99%*CI*: *lower limit* = .02, *upper limit* = .24. The more traditional and conservative Sobel test was also significant, $Z = 2.33$, $p = .02$ (see Figure 1). It seems then that the effect of mating context on preferences for healthy-looking men was completely mediated by their tendency to look more masculine.

Figure 1: The standardized beta-coefficients, which show the mediation effect of masculinity on the increased preference for apparent health as a short-term partner, while controlling for smiling. The number in parentheses represents the coefficient before facial masculinity was entered into the model. STP-LTP attractiveness is the difference between attractiveness as a short-term and long-term partner. *$p < .05$; **$p < .01$, ***p < .001



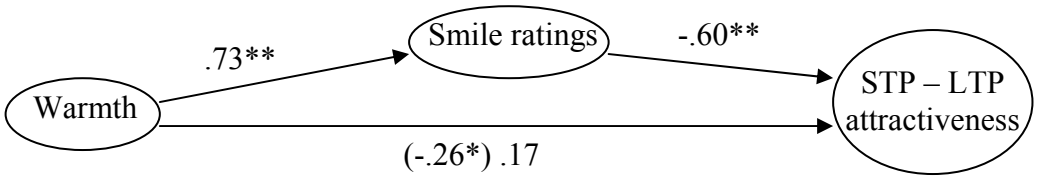
With regard to the increased preference for apparent dominance in a STP, we found that the indirect effect of masculinity was significant at the $p < .01$ level since the 99% confidence interval of the indirect effect did not contain zero, 99%*CI*: *lower limit* = .03 *upper limit* = .29. The more traditional Sobel test was also significant, $Z = 2.46$; $p = .01$ (see Figure 2). Thus, the effect of mating context on preferences for dominant-looking men was completely mediated by their tendency to look more masculine.

Figure 2: The standardized beta-coefficients, which show the mediation effect of masculinity on the increased preference for dominance as a short-term partner. The number in parentheses represents the coefficient before facial masculinity was entered into the model. STP-LTP attractiveness is the difference between attractiveness as a short-term and long-term partner. **p* < .05; ***p* < .01, ***p < .001



Facial masculinity and warmth were unrelated, so facial masculinity did not qualify as a potential mediator for the effect of mating context on preferences for warmth. However, smiling did appear to mediate this effect since, as in the study by Roney and colleagues (2006), this effect lost significance when the smile ratings were added to the model. Because this possible mediation effect replicates previous work (Roney et al., 2006), we formally tested whether smiling mediated the increased preference for warmth as a LTP compared to a STP using the bootstrap method (Preacher and Hayes, 2004). As expected, the indirect effect of smiling was significant at the $p < .01$ level, since the 99% confidence interval of the indirect effect did not contain zero, *99%CI*: *lower limit* = -.23 *upper limit* = -.68. The more traditional Sobel test was also significant, $Z = -4.64$, $p < .0001$, (see Fig. 3). Thus, the effect of mating context on preferences for warm-looking men was completely mediated by their more positive facial expressions.

Figure 3: The standardized beta-coefficients, which show the mediation effect of the smile ratings on the increased preference for warmth in a long-term partner. The number in parentheses represents the coefficient before the smile ratings were entered into the model. STP-LTP attractiveness is the difference in attractiveness between a short-term and long-term partner. **p* < .01; ***p* < .0001



Discussion

The current study replicated the finding that women prefer men high in masculinity more as a STP than as a LTP (Little et al., 2002; Penton-Voak et al., 2003; Roney et al., 2006) using a representative sample of real faces, which extends the generalizability of previous findings. Additionally, this was the first study to directly test previous assertions that women prefer men high in facial masculinity more as a STP than a LTP because they look either healthier, more dominant, or less warm (Little et al., 2002; Penton-Voak et al., 2003; Penton-Voak et al., 2001; Roney et al., 2006). Our results indicate that this is not the case. Rather, women seem to prefer men high in facial dominance or apparent health more as a STP than a LTP because those men

look more masculine. In addition, positive facial expressions accounted for women's greater preference for men who looked warmer as a LTP than a STP.

The greater preference for more masculine-looking men as a STP is consistent with previous research showing that facial masculinity may serve as a cue for genetic quality. Men with more masculine facial features report fewer respiratory infections, less antibiotic use (Thornhill and Gangestad, 2006), and have greater developmental stability as evidenced by lower levels of fluctuating asymmetry (FA) (Gangestad and Thornhill, 2003). Furthermore, a sample of faces almost identical to that used in the current study revealed that masculine facial features predicted overall health status as assessed through detailed medical records (Rhodes et al., 2003). Thus it makes sense that women would prefer men high in facial masculinity more as a STP when genetic benefits are thought to be most important (Gangestad and Simpson, 2000). Indeed, women do take masculinity as a cue to health, not only in the present study where the two ratings were highly correlated, but also in research demonstrating that increasing the masculinity of composite faces also increases impressions of apparent health (Johnston et al., 2001; Scarbrough and Johnston, 2005).

Although perceived masculinity and apparent health are correlated, they are far from identical. Not only did the greater apparent health of more masculine-looking men fail to account for the greater preference for masculinity in a STP in the present study, but also Boothroyd and colleagues (2005) found that women who preferred faces high in apparent health did not necessarily prefer more masculine faces. Furthermore, research has found that women show the greatest preference for apparent health during the low-fertility phase of the menstrual cycle when progesterone levels are highest (Jones et al., 2005a; Jones et al., 2005b), which is opposite for what has been found with preferences for facial masculinity (Johnston et al., 2001; Penton-Voak et al., 1999; Scarbrough and Johnston, 2005).

One way to reconcile the disparity between preferences for masculinity and health is to consider differences between heritable aspects of health and current health. Heritable aspects of health should be preferred more in a STP than a LTP. On the other hand, current health condition is also important for other aspects of mating, including avoiding contagion and securing paternal investment. Thus, women might prefer very healthy looking men in both short- and long-term mating contexts. This is consistent with the fact that we found no effect of mating context on preferences for healthier-looking men. However, such effects might be found if assessments of apparent health differentiated perceptions of heritable aspects of health and current health. Future research should make such differentiations and also try to identify the facial cues are used to assess current and heritable health.

The relationship between dominance and facial masculinity is simpler. The two are positively correlated, and increasing the masculinity of a face also increases perceptions of dominance (DeBruine et al., 2006; Johnston et al., 2001; Perrett et al., 1998; Swaddle and Reierson, 2002). The effects of mating context are also more straight-forward. Since facial dominance appears to honestly signal status and reproductive success (Mazur et al., 1994; Mueller and Mazur, 1996; Mueller and Mazur, 1997), but also aggression and willingness to engage in extra-pair copulations (Egan and Angus, 2004), women should prefer dominance more in a STP than a LTP. This is exactly what we found, which conceptually replicates work done using dynamic video stimuli (Gangestad, Simpson, Cousins, Garver-Apgar, and Christensen, 2004). More surprising perhaps, is our finding that women did not prefer dominant-looking men more as a STP than a LTP when the effects of facial masculinity were controlled, and that women preferred men high in facial masculinity more as a STP than a LTP whether or not

perceived dominance was controlled. It seems that women are more sensitive to variation in facial masculinity than to variation in perceived dominance when discriminating between potential STPs and LTPs.

Another potential mediator for the increased preference for men high in facial masculinity as a STP was perceived warmth. We thought that perhaps masculine-looking men were preferred less as a LTP because they looked less warm and therefore less likely to provide paternal investment. There is some research suggesting that testosterone is negatively related to paternal investment (Gray, Kahlenberg, Barrett, Lipson, and Ellison, 2002; Gray, Yang, and Pope, 2006; Storey, Walsh, Quinton, and Wynne-Edwards, 2000), and circulating testosterone levels have been linked to facial masculinity (Penton-Voak and Chen, 2004; Roney et al., 2006). Yet our results revealed no correlation between facial masculinity and perceived warmth even though women did prefer warmer-looking men more as a LTP than a STP. Similarly, Roney et al. (2006) found no relationship between facial masculinity and impressions of potential paternal investment in real faces. Thus, it seems that men high in facial masculinity are not perceived as less warm or as providing less paternal investment. Rather, there appear to be two independent effects: women prefer more masculine-looking men more as a STP, and women prefer warmer-looking men less as a STP for reasons other than their less masculine appearance. More specifically, the reason that warmer-looking men were preferred more as a LTP than a STP was their more positive expression. The fact that this effect was shown when smiling was minimal underscores the importance of considering facial expression when conducting research on mating preferences.

Whereas women do not prefer men high in facial masculinity more as a STP than a LTP because they look healthier, more dominant or less warm, this preference may reflect the fact that that these men look more like men, and are therefore less likely to be women. Evidence that women are particularly sensitive to maleness when short-term mating is likely is provided by the finding that women are better at categorizing men when they are in the most fertile phase of the menstrual cycle (Johnston, Arden, Macrae, and Grace, 2003; Macrae, Alnwick, Milne, and Schloerscheidt, 2002). Further evidence that women are responding to the extent that the men looked unmistakably male is provided by our findings that increased preferences for healthy and dominant looking men as a STP were explained by the fact that these men looked more masculine. While our results are consistent with the idea that women prefer men high in facial masculinity more as a STP simply because they look more like men, future research is needed to directly test this assertion.

Limitations

Our results suggest that women's increased preference for men high in facial masculinity as a STP are not due to impressions of some attribute associated with masculinity. However, we only tested the three attributes of health, dominance, and warmth. It is possible that some other attribute, such as apparent fidelity or willingness to invest in the relationship, can explain why women prefer masculine-looking men more as a STP than a LTP.

There are also a number of individual difference variables that have been found to predict preferences for facial masculinity, such as relationship status, self- and other-rated attractiveness, position in the menstrual cycle, etc. (Johnston et al., 2001; Jones et al., 2005a; Little, Burt, Penton-Voak, and Perrett, 2001; Little et al., 2002; Penton-Voak et al., 1999). It is possible that these individual difference variables might moderate the mediation effects we examined. The

current study found that impressions of health, dominance, and warmth did not mediate the increased preference for facial masculinity as a STP for women overall. However, there could possibly be a subgroup of women who, for example, prefer masculine men more as a short-term partner because they look more dominant.

Finally, we used a representative sample of real faces, which gave us less control over the stimuli. However, we view this as more of a strength than a weakness, since we have shown that the effect is sufficiently robust to be manifest over and above whatever noise is contributed by uncontrolled facial qualities. In addition, our findings concerning the mediating effects of other variables can be generalized to a real population of faces.

Conclusions

Previous research suggests that facial masculinity is (or ancestrally was) associated with genetic quality in men (Folstad and Karter, 1992; Gangestad and Thornhill, 2003; Rhodes et al., 2003; Thornhill and Gangestad, 2006). Thus it makes sense that women should prefer masculine-looking men more as a STP than a LTP. However, a number of mechanisms could potentially explain this effect of mating context. The results of this study suggest that women do not show an increased preference for masculine-looking men because they look healthier, more dominant, or less warm. Instead, it seems that women's greater preference for masculine-looking men as a STP is fundamental. Evolution may have shaped women to obtain genetic quality when it is most important (e.g. when evaluating a STP) by simply looking to mate with those who looked most like men (Enquist, Ghirlanda, Lundqvist, and Wachtmeister, 2002).

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