



Mate-preference drives mate-choice: Men's self-rated masculinity predicts their female partner's preference for masculinity

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ABSTRACT

Women who rate their male partner as more masculine tend to prefer more masculine faces. However, it is unclear whether a preference for masculinity causes women to select masculine partners, or to perceive their current partner as more masculine. By incorporating multiple measures of male masculinity, we establish that women's preference for facial masculinity in short-term partners is correlated with their rating of their partner's masculinity and with their partner's self-rated masculinity, but with neither independent ratings of men's facial masculinity nor a facialmetric masculinity index. Facial masculinity preference in long-term partners is correlated with women's rating of partner masculinity, with a similar trend for men's self-rating. Multiple regression analyses demonstrated that these relationships were independent of age, although only for short-term preference. We conclude that women who prefer masculine men tend to have more masculine partners, and therefore that mate-preferences do drive mate-choice.

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1. Introduction

Male facial masculinity is a putative indicator of heritable immunocompetence (Moore et al., 2011) and signals dominance and physical formidability (Fink, Neave, & Seydel, 2007; Mueller & Mazur, 1996), but the hypothesis that male facial masculinity is attractive (Perrett et al., 1998) has received mixed empirical support. Some studies show that women prefer facially masculine men (DeBruine et al., 2006; Johnston, Hagel, Franklin, Fink, & Grammer, 2001), while others suggest that femininity is preferable (Perrett et al., 1998; Rhodes, Hickford, & Jeffery, 2000; Welling, DeBruine, Little, & Jones, 2009). This disparity may be explained by methodological differences (but see DeBruine, Jones, Smith, & Little, 2010; DeBruine et al., 2006), or by effects of individual differences and the context in which images are judged. For example, women tend to prefer masculinity if their own market-value is higher (Little, Burt, Penton-Voak, & Perrett, 2001; Vukovic et al., 2010), and during the fertile phase of the ovulatory cycle (Penton-Voak et al., 1999), when attractiveness is greater (Roberts et al., 2004). Although evidence for simple masculinity preferences remains equivocal, masculinity appears to be a valued trait because it is preferred by women who are better placed to compete for attractive mates.

Research assessing mate-preferences in the laboratory often tacitly assumes that preferences drive choice. Recent efforts have focused on determining whether possession of attractive traits predicts real-world reproductive success. For example, men who are more dominant (Wolff & Puts, 2010), muscular (Frederick & Haselton, 2007) and physically and facially masculine (Rhodes, Simmons, & Peters, 2005) report more short-term sexual partners. Men with high incomes (Hopcroft, 2006), attractive faces (Jokela, 2009), and deep-voices (Apicella, Feinberg, & Marlowe, 2007) have more offspring. Moreover, attractive persons expect their dating partners to be more attractive (Montoya, 2008), and attractiveness ratings of romantically involved persons are positively correlated (Feingold, 1988). Young and middle-aged couples tend not to assort for facial masculinity (Burriss, Roberts, Welling, Puts, & Little, 2011; Cornwell & Perrett, 2008), but, as DeBruine (2005) points out, mate-preferences and mating behavior may be discrepant because preferences are unconstrained, whereas behavior is a compromise between what is desired and what is available.

DeBruine et al. (2006) conducted the first study of the relationship between masculinity preference and actual partner masculinity. In a sample of 69 heterosexual partnered women, those who preferred male facial masculinity tended to rate their own partners as more masculine (DeBruine et al., 2006). However, it is unclear whether women select partners who meet their criteria for masculinity or instead impute desirable characteristics to their current partner. The latter possibility could be adaptive if it promotes relationship stability. To determine whether women's preferences are

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associated with their male partner's masculinity, it is necessary to obtain estimates of male masculinity from sources other than the women whose preferences are tested.

We recruited a large sample of heterosexual couples, assessed women's preferences for facial masculinity, and made multiple measures of male masculinity. We collected ratings of men's masculinity from both women and men, and had men's faces rated for masculinity by judges who did not know the participants. We also measured men's faces and calculated an index of the extent to which they embodied a male-typical morphology (Burriss, Roberts, et al., 2011; Penton-Voak et al., 2001). Following previous studies (Jones et al., 2007; Little, DeBruine, & Jones, 2011; Little et al., 2001), we also had women express a preference for masculinity in same-sex faces. If women's preferences for masculinity in the faces of men, but not women, are predicted by male partner masculinity, this will provide evidence that women's masculinity preferences are specially designed for acquiring masculine mates, as opposed to more general purpose mechanisms of face perception. Because women's facial masculinity preference varies as a function of context (Little, Jones, Penton-Voak, Burt, & Perrett, 2002), we assessed preferences for male facial masculinity in both prospective long- and short-term partners.

If women's preferences for male masculinity are associated with measures of partner masculinity derived from external sources, these relationships cannot be explained by a simple halo effect. Instead, they would provide stronger evidence that preferences for attractive traits drive real-world mate-choice.

2. Material and methods

2.1. Participants

We recruited 117 heterosexual romantic couples from a psychology department at a university in northeastern USA. Participants received course credit or \$14 USD. After excluding participants and the partners of participants who later withdrew, the sample comprised 112 women (M age = 20.10 years, SD = 1.91, range = 18–28) and 112 men (M = 20.74 years, SD = 3.34, range = 18–45). We recruited an additional nine women and nine men from a university in northwest UK (hereafter referred to as judges) to rate photographs of the couples. There may be some between-group variation in face perception, but we expect differences between US and UK citizens to be limited due to similarities in health and culture.

2.2. Stimuli

We created masculinized and feminized versions of ten male and ten female faces by transforming apparent masculinity by $\pm 50\%$ of the shape differences between symmetrical prototype male and female faces (for more information, see Burriss, Welling, & Puts, 2011).

2.3. Procedure

Participants attended two half-hour laboratory sessions seven days apart. In session one, we took the participants' neutral facial photographs (for more information on the photographic methods, see Burriss, Welling, et al., 2011). Participants then undertook a series of tasks at a private computer workstation. In the first session, they completed a questionnaire and three facial masculinity preference tasks. Participants attended a second session to complete additional tasks that are not the focus of this paper. Participants repeated the questionnaire during session two, thereby permitting the calculation of mean ratings that may more accu-

rately reflect perceptions over time. Age data were collected for use as additional predictors; previous research has shown that age is positively correlated with both facial masculinity preferences (Little et al., 2001, 2010; Saxton, DeBruine, Jones, Little, & Roberts, 2009) and a masculine facial appearance (Boothroyd et al., 2005). Male participants self-rated masculinity, and female participants rated their partner's masculinity, using a ten-point Likert scale (anchors: 1 = *Not at all masculine*, 10 = *Very masculine*). We did not define masculinity. Across sessions one and two there were strong correlations between women's ratings of partner masculinity, $r = .77$, $p < .001$, and men's self-rated masculinity, $r = .86$, $p < .001$.

Female participants read definitions of long- and short-term relationships (see e.g. Penton-Voak et al., 2003) and then judged ten pairs of male faces on their attractiveness for long- and short-term relationships. Female participants also judged ten female face pairs on how attractive they would appear to the average heterosexual man of about the participant's age. Task order was random. Each face pair consisted of a masculinized and feminized version of the same face (see Fig. 1). Trial order and the side of the screen on which any given image appeared were fully random. Participants expressed the extent to which they preferred one face over the other using eight on-screen buttons. We coded each participant's responses on an eight-point scale (1 = *Strong preference for femininity*, 8 = *Strong preference for masculinity*) and calculated mean scores across the ten trials in each of the three tasks.

Seventy-one of the male participants consented to their photographs being rated. One man exhibited evidence of recent facial trauma; therefore his photograph was neither rated nor measured. Photographs were masked to obscure hair and neck. Judges rated photographs for masculinity (7 point scale: 1 = *Very feminine* and 7 = *Very masculine*) in a random order using a laptop computer. Inter-rater reliability was high (inter-rater reliability coefficient: female faces = .87, male faces = .91). We averaged ratings so that each participant received a mean independently rated masculinity score.

We measured men's photographs for seven sexually dimorphic face traits (e.g., jaw angle) and calculated a masculinity index by summing these measures (Burriss, Roberts, et al., 2011; Penton-Voak et al., 2001). A higher index denotes an exaggeratedly male face shape. See Burriss, Roberts, et al. (2011) for further information and for analyses confirming that these traits are sexually dimorphic in this sample. As can be seen in Table 1, the masculinity index correlated significantly with the other measures of male masculinity (the correlation with self-ratings fell just short of significance), but the strongest relationship was with independent ratings. This suggests that the masculinity index captures information similar to that which is used to make subjective ratings of facial masculinity.

2.4. Statistical analyses

We used t -tests to ascertain whether women's preferences were for masculine or feminine faces. Next, we explored zero-order correlations between women's preferences for facial masculinity and the masculinity of their partners. We then used multiple regression to explore the independent contributions of the masculinity measures to variation in women's masculinity preferences. All p -values are two-tailed and considered statistically significant if $< .05$. Independent ratings of masculinity, $D(70) = 0.08$, $p = .20$, and the masculinity index, $D(70) = 0.08$, $p = .20$, were normally distributed. Female ratings of partner masculinity, $D(110) = 0.15$, $p < .001$, and male self-ratings of masculinity, $D(110) = 0.10$, $p = .005$, were significantly non-normal and were log-transformed prior to analysis.



Fig. 1. Example of a feminized (left) and masculinized (right) male face.

Table 1
Correlations among the four measures of male participants' masculinity.

	Women's ratings	Self-ratings	Independent ratings
Self-ratings	$r = .57, p < .001, N = 112$		
Independent ratings	$r = .201, p = .056, N = 70$	$r = .11, p = .37, N = 71$	
Masculinity index	$r = .24, p = .011, N = 110$	$r = .18, p = .054, N = 110$	$r = .51, p < .001, N = 70$

3. Results

One-sample *t*-tests against a chance value of 4.5 revealed a preference for masculinity over femininity in the long-term, $t(112) = 12.28, p < .001$, and short-term contexts, $t(112) = 9.32, p < .001$. Preference for masculinity was significantly stronger when women judged men's long-term ($M = 5.48, SD = 0.85$), rather than short-term ($M = 5.26, SD = 0.87$), attractiveness: paired *t*-test, $t(112) = 26.39, p < .001, r = 0.93$. Women judged feminine females to be more attractive, $t(112) = 19.42, p < .001$.

3.1. Zero-order correlations

Female preference for male facial masculinity when judging short-term attractiveness was significantly correlated with women's rating of their partner's masculinity, $r = .28, p = .003, N = 110$, and with men's self-rating of masculinity, $r = .29, p = .002, N = 110$. Short-term preference was not significantly correlated with independent ratings of men's facial masculinity, $r = .036, p = .77, N = 68$, the masculinity index, $r = .13, p = .19, N = 108$, participant age, $r = -.024, p = .81, N = 110$, or partner age, $r = -.15, p = .12, N = 110$. Women's preference for male facial masculinity in potential long-term partners correlated significantly with women's rating, $r = .25, p = .009, N = 110$, but not with independent ratings, $r = .094, p = .45, N = 68$, or the masculinity index, $r = .060, p = .53, N = 108$. The correlation with men's self-rating was close to significance, $r = .19, p = .051, N = 110$. Long-term preference was also not correlated with participant age, $r = .092, p = .34, N = 110$, or partner age, $r = .12, p = .20, N = 110$. Women's preference for masculinity in same-sex faces was not correlated

significantly with any of the four measures of male masculinity (all $r < .15, p > .12$). Same-sex masculinity preference was, however, significantly correlated with participant age, $r = -.22, p = .022, N = 110$, and partner age, $r = -.19, p = .044, N = 110$.

3.2. Multiple regression models

Women's and men's ratings of male masculinity, the masculinity index, and female and male age, were entered as predictors of women's short-term facial masculinity preference in a multiple regression model. Correlations among some of the variables were significant (see Table 1) but insufficiently strong to advise against conducting regression analyses (Field, 2009, p. 224). All variance inflation factors (VIF) were < 3.29 , indicating that the influence of multicollinearity was reasonably low (Myers, 1990, cited in Field, 2009, p. 224). The model was significant, $R^2 = .18, F(5, 107) = 4.39, p = .001$, with men's self-rating, $\beta = 0.24, t = 2.18, p = .032$, women's age, $\beta = 0.34, t = 2.06, p = .042$, and men's age, $\beta = -0.47, t = -2.89, p = .005$, significant predictors. Women's rating of partner masculinity, $\beta = 0.13, t = 1.14, p = .26$, and the masculinity index, $\beta = 0.08, t = 0.87, p = .39$, did not significantly predict women's preference for facial masculinity in short-term partners. Adding independently rated masculinity to the model reduced the sample size and rendered the model non-significant, $R^2 = .092, F(6, 67) = 1.03, p = .41$.

We used additional regression analyses to determine the relationship between the predictors and women's preference for masculinity in long-term partners. The first model, excluding independent ratings of masculinity, was non-significant, $R^2 = .076, F(5, 107) = 1.67, p = .15$. When independent ratings were included, the model was also non-significant, $R^2 = .059, F(6, 67) = 0.63, p = .70$.

A regression to determine the relationship between the predictors and women's preference for masculinity in same-sex faces was close to significance, $R^2 = .096, F(5, 107) = 2.16, p = .064$. All VIF < 3.36 . The only predictor nearing significance was women's rating of partner masculinity, $\beta = .23, t = 1.97, p = .051$, where higher ratings of masculinity predicted stronger preferences for masculinity in same-sex faces (for all other predictors $\beta < .23, p > .19$). A model including independent ratings was non-significant, $R^2 = .045, F(6, 67) = .48, p = .82$.

3.3. Male age and masculinity

Because men's age was a significant predictor of female partner's short-term masculinity preference, we conducted post hoc correlation analyses to determine whether men's age was associated with measures of their masculinity. Male age was significantly correlated with the masculinity index, $r = .22$, $p = .024$, $N = 110$, and with independent ratings of masculinity, $r = .43$, $p < .001$, $N = 70$, but with neither women's rating of men's masculinity, $r = .13$, $p = .18$, $N = 112$, nor men's self-rating of masculinity, $r = .11$, $p = .25$, $N = 112$.

4. Discussion

Our findings are the first to demonstrate that women's preference for masculinity in unfamiliar men's faces is predicted by their partner's self-rated masculinity, replicating and extending the findings of DeBruine et al. (2006), who showed that women's masculinity preference is predicted by their rating of their partner's masculinity. We measured men's masculinity in four ways, and then assessed the relationship between those measures and the preference for male facial masculinity expressed by the men's female partners. Women's short-term masculinity preference was correlated with their rating of their partner's masculinity and with their partner's self-rated masculinity, but with neither of the independent measures of facial masculinity (independent ratings and the facialmetric masculinity index). We obtained the same pattern of results with respect to long-term preference, although the correlation between preference and men's self-rated masculinity fell short of significance.

We sought to control for the effects of age by conducting multiple regression analyses. Unlike DeBruine et al. (2006), who found that age did not predict masculinity preference, we found that women's preference for masculinity in the short-term context was predicted by their age and the age of their partner, a finding that is nevertheless consistent with other research (Boothroyd et al., 2005; Little et al., 2001; Perrett et al., 1998). DeBruine et al. (2006) did not assess women's preferences in long- and short-term contexts separately, which may explain why they did not find evidence for this relationship. Here, although age predicted short-term preference, it did not predict long-term preference. We also note that, in our sample, male age was correlated significantly with independent measures of facial masculinity and not with self- and partner-ratings, which, because they were based on an undefined "masculinity", could embody aspects of personality (e.g. assertiveness and aggression), non-facial physical appearance (e.g. muscularity and height), and vocal properties. Although participant age predicted women's short-term masculinity preference, male self-rated masculinity also independently accounted for variation in that preference, suggesting that preferences cannot be explained by age alone.

Why should preferences for facial masculinity be correlated with ratings of the partner's undefined "masculinity", but not with more direct measures of the masculinity of the partner's face? One possibility is that, when tasked with judging faces alone, women impute additional masculine traits to the bearers of masculine faces (Perrett et al., 1998). Perhaps when judgments of overall masculinity are made, such as when the masculinity of a known individual is rated (by the self or a partner), less emphasis is placed on the masculinity of the face. We consider this a question that warrants inquiry.

Evidence for women's general preference for male facial masculinity is equivocal. We found that women preferred masculinity over femininity in long- and short-term partners. We also found that women expressed significantly stronger preferences for mas-

culinity when judging men's desirability for long- rather than short-term relationships. The second finding was unexpected given that previous research has suggested that women prefer male facial masculinity more strongly when judging for short-term relationships (Little et al., 2002), although some studies have shown no effect of relationship context (Little et al., 2001; Penton-Voak et al., 2003). These studies all used an interactive methodology whereby participants adjusted the masculinity of a single face until it reached maximum attractiveness. This, or some undetermined property of our sample, may explain the different findings.

We found no significant correlations between women's preference for masculinity in same-sex faces and the four measures of male partner masculinity, supporting the interpretation that relationships between male facial masculinity preference and the masculinity of a woman's partner cannot be explained by a simple response bias whereby women with masculine partners prefer masculinity in all faces. However, we did find that women's rating of partner masculinity may predict preference for masculinity in other women's faces. One possible explanation is that women's preference for same-sex facial masculinity is a by-product of an adaptation for choosing masculine male partners. Thus, a preference for male facial masculinity could simultaneously drive women to choose more masculine mates and to prefer more masculine female faces. Alternatively, a strong general preference for facial masculinity may lead women to exaggerate ratings of their partner's masculinity. Because women's preference for same-sex masculinity was not predicted by other measures of partner masculinity, this finding does not weaken our findings with respect to preferences for male masculinity. On the contrary, it demonstrates the importance of obtaining estimates of men's masculinity from sources other than their female partner.

Our main findings suggest that women's preference for masculinity is reflected in – and possibly influences – their mating outcomes, and that women do not simply adjust perceptions of their partner's masculinity to match their preferences. However, we cannot rule out the possibility that men are aware of their partner's preferences and alter how they perceive their own masculinity to coincide with these preferences. It is also possible that women adjust their preferences to match the traits of their partner, perhaps to promote relationship stability or because exposure to faces with certain characteristics enhances preferences and judgments of normality for novel faces that share those characteristics (Little, DeBruine, & Jones, 2005; Welling, Jones, Bestelmeyer, DeBruine, Little, & Conway, 2009). To test these hypotheses it would be necessary to conduct a longitudinal study in which variation in women's preference for masculinity as they become partnered is measured against the masculinity of their eventual partner. Also, although our findings imply that women's preferences drive their choice of mate, we cannot confirm this: Women who prefer masculine male faces may partner with masculine men because male masculinity is associated with other attractive traits, such as greater face and body symmetry (Gangestad & Thornhill, 2003; Little et al., 2008).

4.1. Conclusions

This study shows that women's preference for masculinity is reflected in the masculinity of the men with whom they partner. This is the second study to show that women's preferences for masculinity are predicted by their ratings of their male partner's masculinity, and the first to show that men's self-rated masculinity is also a significant predictor of women's preferences. Given the lack of any significant correlation between preferences and independent measures of facial masculinity, it is possible that preferences are associated with other, non-facial measures of partner masculinity, such as body muscularity, voice pitch, height, or behavior.

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