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Sexual dimorphism in the female face is a cue to health and social status but not age

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ABSTRACT

The link between femininity and attractiveness in the female face is attributed to the value placed on fertility in attractiveness judgements of women. This is supported by relationships between femininity, health and age, although relatively little research has systematically tested the contribution of each to femininity, or individual differences in men's face preferences. In Study 1 we found that preferences for femininity remained significant, although reduced, when health was controlled for and remained significant when age was controlled for. We also found a positive relationship between men's ideal number of children and femininity preferences. In Study 2 we found a negative relationship between men's preferences for social status in a partner and for facial femininity. Results suggest that femininity provides cues to multiple traits and we recommend further investigation of systematic variation in men's mate preferences.

1. Introduction

There has been considerable progress in interpreting the adaptive significance of sexual dimorphism in the male face. Systematic analyses have demonstrated that degree of sexual dimorphism is related to circulating testosterone (e.g. Penton-Voak & Chen, 2004; Roney, Hanson, Durante, & Maestripieri, 2006) and testosterone response to competition (Pound, Penton Voak, & Surridge, 2009). Masculine-faced men report greater interest in pursuing short-term relationships (Boothroyd, Jones, Burt, DeBruine, & Perrett, 2008), are perceived as dominant (e.g. Swaddle & Reierson, 2002), and attributed with negative personality traits such as dishonesty (e.g. Boothroyd, Jones, Burt, & Perrett, 2007; Perrett et al. 1998). Additionally, women's preferences for masculinity vary in a manner consistent with a cost-benefit trade off in the importance of "good genes" versus paternal investment (e.g. DeBruine, Jones, Smith, & Little, 2010; Penton-Voak et al. 1999). Relatively less work has explored sexual dimorphism in the female face, or individual differences in men's preferences, with 'femininity' and 'attractiveness' used almost interchangeably (e.g. Law Smith et al. 2006; Perrett et al. 1998; Rhodes, Chan, Zebrowitz, & Simmons, 2003).

The relationship between sexual dimorphism and female facial attractiveness is attributed to the value placed on fertility in attractiveness judgements of women. In support of this, Law Smith et al. (2006) found a positive relationship between facial femininity and late follicular oestrogen, a sex hormone closely linked to conception. There are also links between facial femininity and general measures of health (e.g. Henderson & Anglin, 2003; Thornhill & Gangestad, 2006) and correlations with mate-choice relevant health cues, such as waist-to-hip ratio (Penton-Voak et al. 2003), facial symmetry (Little et al. 2008) and voice pitch (Feinberg et al. 2005; Fraccaro et al. 2010). Furthermore, preferences for femininity are reduced once preferences for cues to health are controlled for (Rhodes, 2006). Rhodes (2006) argues, however, that despite a reduction in preferences for facial femininity once health is controlled for, preferences remain significant, and suggests that femininity may signal multiple traits (e.g. parenting abilities). Likewise, Smith, Jones, DeBruine, and Little (2009) demonstrate an interaction between femininity and health, suggesting that perceived health and femininity are not interchangeable dimensions.

Alternatively, femininity may provide a cue to age (Berry & McArthur, 1985; Perrett et al. 1998), in which case femininity preferences may reflect preferences for youthfulness. Cross cultural research shows that men prefer partners younger than themselves (e.g. Kenrick & Keefe, 1992), interpreted as a strategy to secure a partner with maximum reproductive capacity (e.g. Buss, 1989). Preferences for femininity in the face, then, may be for optimum reproductive capacity, although youthfulness may be a proxy of reproductive health rather than an independently attractive trait (Miller & Todd, 1998; Thornhill & Gangestad, 1999). To date, there has been no systematic analysis of associations between age, health and femininity in the female face. The

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first aim of the current research was to parametrically manipulate female facial stimuli to differ in sexual dimorphism while controlling for either age or health, and to compare preferences for these to preferences for standard sexual dimorphism stimuli. We predict that preferences for sexual dimorphism will decrease when perceived age or health are controlled for. Results will inform as to the contribution of cues to age and health to preferences for female facial sexual dimorphism.

Our second aim was to investigate systematic variation in men's preferences for facial femininity. This methodology has proved insightful in analysis of masculinity in male faces but has remained under-used for female faces. There is evidence to suggest that men's mate preferences are context-dependent with, for example, a relationship between partner age preferences and ideal number of children (treated as a proxy of reproductive strategy; Buss, Shackelford, & Leblanc, 2000), such that men who desire a greater number of children express preferences for younger partners than those who desire fewer children. If femininity is a cue to reproductive status, we predict a positive relationship between men's preferences for sexual dimorphism in the female face and ideal number of children. Studies that have explored individual differences in men's femininity preferences have shown them to relate positively to systemising scores (i.e. the ability to understand logical systems; Smith, Jones, & DeBruine in press), circulating testosterone (Welling et al. 2008) and sensation seeking (Jones et al. 2007). These results may arise from condition-dependence, such that men with a high mate value (i.e. those who possess masculine qualities) are able to secure a similarly high mate-value partner (e.g. Jones et al. 2007). We predict, then, a positive relationship between self-perceived attractiveness and femininity preferences.

2. Study 1

We tested preferences for female facial stimuli constructed to differ in (a) sexual dimorphism, (b) sexual dimorphism controlling for age and (c) sexual dimorphism controlling for health, and tested relationships between men's face preferences and their ideal number of children and self-perceived attractiveness.

2.1. Methods

2.1.1. Facial stimuli

2.1.1.1. Participants. Photographs of 194 Caucasian female students of the University of St Andrews, UK, were collected under standardised lighting with hair pulled back and make up removed (age: 19.64 (1.72)). Images were normalised on interpupillary distance, masked to disguise clothes and hairstyle and displayed in random order. Nineteen participants (age: 25.6 (3.4); male $n = 8$) rated each face for femininity and health on 1–7 Likert scales (1 = not at all feminine/healthy, 7 = extremely feminine/healthy) and estimated age.

2.1.1.2. Stimuli construction. Groups of 12 faces were identified: those with the highest, and those with the lowest, average femininity ratings. There was a significant difference in femininity ratings between groups ($t(23) = 24.46$, $p < 0.001$). Composite images containing average colour, shape and texture cues for each group were constructed (see Tiddeman, Burt, & Perrett, 2001). See Fig. 1.

Femininity ratings were entered as the dependent variable in a linear regression model, with perceived age as the predictor variable. The model was significant (Adj $R^2 = 0.06$, $F_{(1,\ 193)} = 13.72$, $p < 0.001$) with a significant negative relationship between perceived age and femininity ($\beta = -0.26$, $p < 0.001$). Groups of 14 faces were identified: those with the largest positive residuals and those with the largest negative residuals. This enabled construction of composite facial stimuli that differed in femininity ($t(27) = -21.4$, $p < 0.001$) but not perceived age ($t(27) = -0.45$, $p = 0.66$). See Fig. 1.

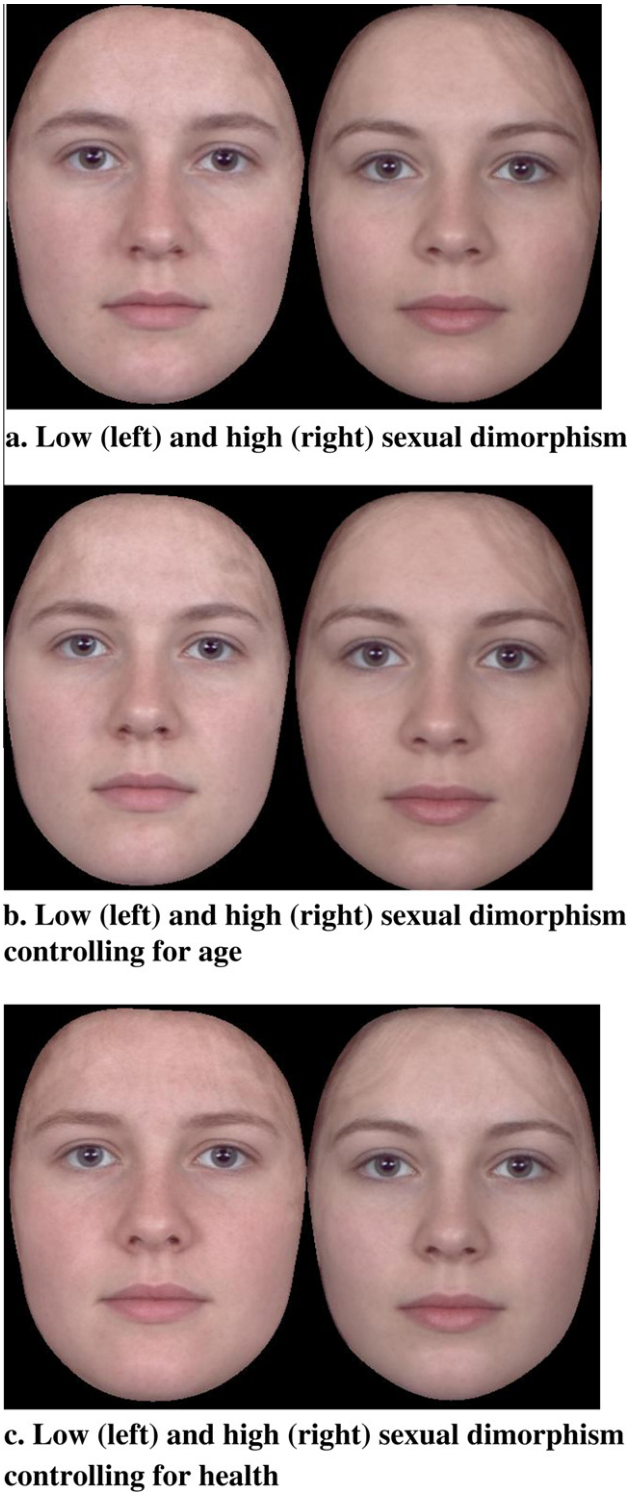

Fig. 1. Facial composites constructed from groups of faces with: (a) lowest (left) and highest (right) femininity ratings (top); (b) femininity ratings controlling for age; (c) femininity ratings controlling for health.

Perceived health ratings were entered as the predictor variable. The model was significant (Adj $R^2 = 0.44$, $F_{(1,\ 193)} = 150.03$, $p < 0.001$) with a significant positive relationship between perceived health and femininity ($\beta = 0.66$, $p < 0.001$). Groups of 14 faces were identified as those with the largest positive and negative residuals.