



## Original Article

# Women's pathogen disgust predicting preference for facial masculinity may be specific to age and study design

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## ABSTRACT

Facial masculinity in men is thought to be an indicator of good health. Consistent with this idea, previous research has found a positive association between pathogen avoidance (disgust sensitivity) and preference for facial masculinity. However, previous studies are mostly based on young adult participants and targets, using forced-choice preference measures; this begs the question whether the findings generalise to other adult age groups or other preference measures. We address this by conducting three studies assessing facial masculinity preferences of a wider age range of women for a wider age range of male faces. In studies 1 and 2, 447 and 433 women respectively made forced choices between two identical faces that were manipulated on masculinity/femininity. In study 1, face stimuli were manipulated on sexual dimorphism using age-matched templates, while in study 2 young face stimuli were manipulated with older templates and older face stimuli were manipulated using young templates. In the full sample for study 1, no association was found between women's pathogen disgust and masculinity preference, but when limiting the sample to younger women rating younger faces we replicated previous findings of significant association between pathogen disgust and preference for facial masculinity. Results for study 2 found no effect of pathogen disgust sensitivity on facial masculinity preferences regardless of participant and stimuli age. In study 3, the facial masculinity preferences of 386 women were revealed through their attractiveness ratings of natural (unmanipulated) faces. Here, we did not find a significant association of pathogen disgust on facial masculinity preferences, regardless of participant and stimuli age. These results call into question the robustness of the link between women's pathogen avoidance and facial masculinity preference, and raise questions as to why the effect is specific to younger adults and the forced-choice preference measure.

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## 1. Introduction

Recent research has identified a link between women's pathogen avoidance and stronger preference for facial masculinity in a mate. For instance, DeBruine, Jones, Tybur, Lieberman, and Griskevicius (2010) conducted two studies investigating the link between women's pathogen disgust and their preference for facial masculinity. In study 1, 345 women were shown 20 pairs of the same face; one had been manipulated to be more masculine and the other more feminine. This study utilised a forced-choice preference measure where participants were asked which face they found more attractive. Results were that women higher in pathogen disgust (but not sexual or moral disgust) were more likely to choose the masculinised face as more attractive. In study 2, 74 women were given a choice between two unmanipulated faces that had been pre-chosen based on rated facial masculinity/femininity. Again, it was found that women with high pathogen disgust were more likely to choose the masculine face. This effect appears to persist across several levels of analysis, not only across individuals with differences in pathogen disgust predicting masculinity preference (DeBruine, Jones, Tybur et al., 2010; Jones, Fincher,

Little, & DeBruine, 2013), but also across countries with different levels of national health predicting mean levels of masculinity preference for that nation (DeBruine, Jones, Crawford, Welling, & Little, 2010; Penton-Voak, Jacobson, & Trivers, 2004), and in response to pathogen cues (Lee & Zietsch, 2011; Little, DeBruine, & Jones, 2011).

The prominent theory behind these findings is that male facial masculinity is an indicator of good health and that women high in pathogen avoidance are therefore more likely to prefer a facially masculine partner. According to this theory, testosterone is an immunosuppressant and is also required in high levels to develop masculine facial features; as such, only males with good immune functioning are able to support the high levels of testosterone necessary to develop a masculine face. In this way, facial masculinity in men is thought to serve as an honest indicator of good health (Folstad & Karter, 1992; Zahavi, 1975). Consistent with this theory, facial masculinity has been found to be associated with objective (Gangestad, Merriman, & Thompson, 2010; Rantala et al., 2012; Rhodes, Chan, Zebrowitz, & Simmons, 2003; Thornhill & Gangestad, 2006) and perceived health (Rhodes et al., 2003; Scott, Swami, Josephson, & Penton-Voak, 2008). However, the underlying mechanism for this preference is unclear. Facial masculinity in men may represent heritable genetic quality that improves offspring's fitness; however, this 'good genes' theory has recently been questioned

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(Scott, Clark, Boothroyd, & Penton-Voak, 2013), and recent evidence suggests that the genes increasing male facial masculinity are detrimental to female attractiveness, reinforcing doubt regarding the link between masculinity and good genes (Lee et al., 2014). Alternatively, indicators of good health may instead be preferred for more direct benefits (Scott et al., 2013; Tybur & Gangestad, 2011). For instance, men with cues to good health may be less likely to succumb to sickness themselves, reducing potential disease transmission to the choosing female. Also, one's ability to acquire resources is hampered while ill, and additional effort/resources are required to nurse a sick individual back to health. We note that it is also possible that facial masculinity may not represent past or current immunocompetence, but may still be associated with good genes or other direct benefits (e.g., facial masculinity may be associated with ability to physically compete intrasexually; (Puts, 2010). However, theory describing the association between pathogen avoidance and masculinity preference relies on facial masculinity being (or once being) associated with some health benefit (either directly or indirectly).

Despite several studies finding a link between women's pathogen avoidance and their preference for facial masculinity, the research has some limitations. First, studies supporting this association solely rely on a forced-choice task (i.e., participants are required to choose between two targets that differ on the trait of interest which is more attractive; (DeBruine, Jones, Crawford, et al., 2010; DeBruine, Jones, Tybur, et al., 2010; Jones et al., 2013; Little et al., 2011; Penton-Voak et al., 2004). Lee et al. (2013), which used a ratings paradigm, found no association between women's pathogen disgust and revealed preference for facial masculinity when 422 women rated realistic dating profiles. This could suggest that the influence of facial masculinity may be limited to the forced-choice study design.

Second, research in this area has also focused on young adults and often neglects older individuals. To illustrate this, the range of mean participant age of studies investigating the link between pathogen avoidance and preference for masculinity is 18.6 to 25.3 years (DeBruine, Jones, Crawford, et al. 2010; DeBruine, Jones, Tybur, et al., 2010; Jones et al., 2013; Lee & Zietsch, 2011; Lee et al., 2013; Little et al., 2011; Penton-Voak et al., 2004). Also, when reported, the age of facial stimuli used to assess masculinity preference is of young adults. Research investigating the link between health and facial masculinity has also been limited to participants in early adulthood or late adolescence (Gangestad et al., 2010; Rantala et al., 2012; Rhodes et al., 2003; Thornhill & Gangestad, 2006). Such an overrepresentation of young adults is problematic for several reasons: first, it is unclear if facial masculinity remains a cue to health in older men even though facial masculinisation, and hence the purported link with immunocompetence, occurs primarily during adolescence. Although evidence for a link between facial masculinity and health has been drawn only from samples of younger men, it has been implicitly assumed that facial masculinity indicates good health in male faces in general. If this were the case, we would expect that women's pathogen disgust should predict preference for facial masculinity regardless of age of the male. Second, restricting assessment of masculinity preferences to samples of young adults might obscure important evidence regarding the underlying mechanism for preferring facial masculinity. Young adults differ in motivations and priorities in mate preference compared to older individuals; for example, younger women within the reproductive age range may place greater importance on genetic quality compared to older women (Little et al., 2010). Therefore, we may expect a different pattern of results when testing different age groups, which in turn has implications for understanding the underlying mechanisms for preferring facial masculinity.

To address these limitations, we conducted three studies investigating the association between women's pathogen disgust and their preference for facial masculinity. In all three studies we include a much wider age of participants and target faces than has been included in

previous studies. Studies 1 and 2 used a force-choice design with target faces manipulated on sexual dimorphism. Study 1 manipulated sexual dimorphism using morphological differences between male and female faces that matched the age of the stimuli, while in study 2 younger stimuli were manipulated on sexual dimorphism based on differences between older faces and older stimuli were manipulated based on differences between younger faces. Study 3 revealed preference for facial masculinity through attractiveness ratings (as oppose to using a forced-choice design) in natural (unmanipulated) faces.

## 2. Study 1

In study 1, we expand upon the first study presented in DeBruine, Jones, Tybur, et al., 2010. Here we assessed the association between the women's pathogen disgust on preference for facial masculinity in manipulated faces using a forced-choice paradigm with a wider range of ages for both participants and targets.

## 3. Method

### 3.1. Participants

A total of 478 women were recruited from <https://www.MTurk.com>, an online crowd-sourcing website in return for online credit. Participation was conditional on being female, heterosexual and residing in the United States. Participants missing data on any variable ( $n = 12$ ), or who fell outside the selection criteria ( $n = 19$ ) were removed from analysis; reducing the sample size to 447 ( $n = 36.79$  years,  $SD = 10.52$ , age range = 20–66 years).

### 3.2. Stimuli

Participants first completed a task measuring their preference for facial masculinity. Participants were randomly assigned to rate either the young or middle-aged male faces with neutral expressions from the FACES database (Ebner, Riediger, & Lindenberger, 2010). The young stimuli (aged between 19 and 31 years) set contained 27 faces, while the middle-aged (aged between 29 and 55) set contained 24 faces. Preference for facial masculinity was measured using a forced-choice task where participants were presented with two images of the same face side-by-side: one had been manipulated to be more masculine while the other more feminine. Participants were asked to rate which face they found more attractive on an 8-point scale (1 = *left is much more attractive*; 8 = *right is much more attractive*).

The masculinity/femininity of each photo was manipulated by morphing each individual face with a masculine or feminine template (similar to that used in Lee et al., 2013). To create the template faces, separate average faces for each sex and age group were made from 25 male and 25 female faces. Seventy facial landmarks were then manually placed on symmetrised versions of each averaged face, and the linear differences between facial landmarks for males and females within the same age group were calculated. These differences were then extended past the average face by 200% to produce a hyper-masculine/feminine template for each age group. To produce the masculinised face, each individual was morphed by 50% with the hyper-masculine template, while morphing each face by 50% with the hyper-feminised template produced the feminised image. This effectively manipulated face shape and colour along the dimension of objectively defined sexual dimorphism. All manipulation of images was conducted in the Fantamorph 5 software package. See Fig. 1 for example stimuli. The order in which face pairs were presented and the location of the masculinised face in each pair (left or right) were randomised for each participant.

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