



Hormonal effects on women's facial masculinity preferences: The influence of pregnancy, post-partum, and hormonal contraceptive use



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ABSTRACT

Here, we investigate changes in women's facial masculinity preferences across pregnancy and the post-partum period. The majority of previous research demonstrating changes in women's masculinity preferences has examined the impact of hormonal variation across the female menstrual cycle. Hormonal changes experienced during pregnancy and the post-partum period, critical periods in women's reproductive life histories, are considerably more extreme than the variation that occurs across the menstrual cycle, suggesting that differences in preferences may also be displayed during these times. We find that women's preference for masculinity in men's faces, but not women's faces, decreases in the post-partum period relative to pregnancy. Furthermore, when compared to a sample of nulliparous control participants, post-partum participants showed different masculinity preferences compared with women who were using hormonal contraception, with the direction of this difference dependent upon the sex of the face assessed.

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1. Introduction

A large number of studies indicate that women's preference for masculinity in male faces is moderated by their menstrual cycle stage. For example, in the late follicular phase of the cycle, when oestrogen levels are relatively high and conception risk is highest, women have stronger preferences for facial masculinity than they do in the luteal phase of the cycle when oestrogen and conception risk are low (Little, Jones, & DeBruine, 2008; Little & Jones, 2012; Penton-Voak & Perrett, 2000; Penton-Voak et al., 1999). Increased attraction to masculinity during the late follicular phase has likewise been documented in women's ratings of male voices (Feinberg et al., 2006; Puts, 2005), bodies (Little, Jones, & Burriss, 2007), and masculine characteristics in point-light displays of biological motion (Provost, Troje, & Quinsey, 2008, but see also Peters, Simmons, & Rhodes, 2009). An increased preference for related traits, such as dominant behavioural displays (Gangestad, Simpson, Cousins, Garver-Apgar, & Christensen, 2004), personality traits associated with dominance (Lukaszewski & Roney, 2009), the odour of dominant men (Havlicek, Roberts, & Flegr, 2005), and men's height (Pawlowski & Jasienska, 2005), have also been shown to occur in the follicular phase of the cycle.

One possible explanation for shifts in judgements of masculinity and related traits across the menstrual cycle is that at mid-cycle, when conception risk is highest, cues to a man's condition or genetic quality are especially pertinent for women in order to make an adaptive mate choice. Masculine-faced men are thought to possess 'good genes' and to be healthier than relatively feminine-faced men (Thornhill & Gangestad, 2006), suggesting that a selective preference for masculinity when conception is possible could increase reproductive success. Indeed, masculinity has long been suggested to be an indicator of male quality (Folstad & Karter, 1992; Thornhill & Gangestad, 1999), although there is limited evidence for this proposition (e.g. Scott, Clark, Boothroyd, & Penton-Voak, 2013). Nonetheless, masculine faces are not associated with traits that are desirable in a long term partner, such as investment (Boothroyd, Jones, Burt, & Perrett, 2007), meaning that a general preference for masculinity, even if it does reflect underlying genetic quality, may not be desirable. As such, cycle-dependent changes in line with a woman's conception risk, or current reproductive condition, could carry adaptive benefits.

Irrespective of the logic for why such shifts occur, that cyclical changes in women's preferences for masculine traits occur suggests that within-individual variation in judgements, at least in part, are associated with hormonal variation. Indeed, existing work looking at other phases of hormonal transition across the female lifespan appears consistent with this idea. For example, circum-menopausal women show an increased preference for femininity in male and female faces relative to regularly cycling women

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(Jones, Vukovic, Little, Roberts, & DeBruine, 2011; Little et al., 2010; Vukovic et al., 2009). This finding may be explained by the reduced value placed on adaptive mate choice among circum-menopausal aged women. Specifically, circum-menopausal women may benefit less from choosing a masculine male partner since conception is no longer a relevant concern, and thus the advertised importance of genetic quality in men may be of diminished value. Moreover, increased preference for femininity in female faces may reflect lower levels of intrasexual competition, with women of this age achieving less from rival derogation relative to those of reproductive age. In other related work, Little et al. (2010) showed that post-pubescent girls had stronger preferences for masculinity in male faces than did younger peri-pubescent girls (see also Saxton, DeBruine, Jones, Little, & Roberts (2009), for similar results in both faces and voices). Together, these findings appear to suggest that attraction to masculinity is particularly high at times in which women are reproductively active. Advertisements of male quality may be most salient to women in the reproductive age group, particularly when fertile.

While it is obvious that menarche, the menstrual cycle and the transition to menopause are related to major shifts in women's hormonal profiles, much research remains in determining which hormone, or group of hormones, mediate these changes in judgements of masculinity. Work by Welling et al. (2007) has previously documented a positive association between women's salivary testosterone and preference for male facial masculinity. This finding is consistent with much of the literature outlined above. For example, while effects are mixed, some research suggests very moderate testosterone increases occur near to ovulation in the follicular phase of the cycle (e.g. Alexander, Sherwin, Bancroft, & Davidson, 1990; Dabbs, 1990; but see also: Schultheiss, Dargel, & Rohde, 2003; Welling et al., 2007) and indeed this is the time when women express enhanced masculinity preferences. Moreover, post-pubescent girls have higher levels of testosterone than peri-pubescent girls (e.g. Angold, Costello, Erkanli, & Worthman, 1999) and, while testosterone does not show a precipitous drop in the menopause, it does show a gradual age decline, meaning older women are likely to have lower levels of this hormone (Longcope, Franz, Morello, Baker, & Johnston, 1986; Zumof, Strain, Miller, & Israel, 1995). Therefore, the finding that testosterone positively relates to masculinity preferences is consistent with the pattern of results documented across these phases of female hormonal transition. Nonetheless, a range of other hormones, including oestrogen and progesterone, fluctuate across these reproductive life events. Thus, it is possible that several hormones, or interactions among hormones, underpin shifts in masculinity preferences that have been documented across the female lifespan.

The current experiment investigated the impact of pregnancy and the post-partum period on women's preferences for feminized versus masculinized versions of both same-sex and opposite-sex faces. If variation in testosterone or other ovarian hormones contributes to masculinity preferences, pregnancy and the post-partum period may reflect further life stages wherein women's preferences for this trait change. It is known that testosterone levels increase throughout pregnancy and then drop swiftly post-partum (e.g. Buckwalter et al., 1999; Leary, Boyne, Flett, Beilby, & James, 1991). Given the results of Welling et al. (2007), discussed above, this may suggest that women would exhibit decreased preference for masculinity post-partum relative to pregnancy. Moreover, Watkins (2012) showed that masculinity preferences relate to measures of reproductive interest or ambition, and, if this is the case, we might further expect pregnancy and the post-partum to be associated with lower masculinity preferences than those exhibited by non-pregnant women of reproductive age. Notably, regularly cycling women have been shown to prefer greater levels of masculinity than women who use hormonal contraception (e.g.

Jones et al., 2005; Little, Burriss, Petrie, Jones, & Roberts, 2013). Pre-existing differences between oral contraceptive users and regularly cycling women may result in divergent differences when these groups' preferences are compared to judgements made by pregnant and post-partum women. Thus, based on this previous research, we hypothesized that: (1) preferences for masculinity will be higher during pregnancy than post-partum; (2) preferences for masculinity during pregnancy and the post-partum period would differ from reports made by women using hormonal contraception or regularly cycling; (3) preferences for masculinity would be higher in regularly cycling women than those using hormonal contraception.

2. Methods

2.1. Participants

A total of 103 adult women took part in this research. Twenty-eight of these participants were pregnant women aged between 22 and 39 ($M = 30.89$, $SD = 5.17$). These participants were recruited from social networking sites for pregnant women and via announcements on the University of Stirling's online portal. Recruitment materials specified that we were looking for women who were currently pregnant and who would be willing to complete a questionnaire immediately and then again after the birth. This was critical to allow for a within-subjects assessment of variance in facial preferences. At the time of recruitment, participants were between weeks 13 and 31 of pregnancy ($M = 21.57$, $SD = 4.80$), the vast majority ($N = 26$) were in their second trimester. Seventeen women reported to be pregnant for the first time, while eleven reported that they had been pregnant previously.

The remaining 75 participants were nulliparous females recruited to serve as a control group of comparable age (range 22–42, $M = 29.88$, $SD = 5.01$). Our pregnant participants did not differ in age from our nulliparous control group ($t = .91$, $df = 101$, $p = .37$). Women in the control group were also recruited via the University of Stirling's online portal, but were simply asked to complete a single questionnaire at the time of recruitment. Of this sample of women, 42 were using hormonal contraception and 33 were regularly cycling. The study was administered over the Internet for both groups.

2.2. Procedure

At the time of recruitment, participants gave informed consent online, responded to a number of basic demographic questions, and provided information about their contraceptive use history. Pregnant participants also reported their stage of pregnancy (in weeks), and whether it was their first pregnancy or not.

Following these measures, twenty pairs of faces (10 male, 10 female), one masculine version and one feminine version, were presented (see below for more detail). Participants were asked to indicate which of the two faces was more attractive by clicking a button under the chosen face. We randomly presented the ten male and ten female face pairs in separate blocks, with the order of presentation of the images randomized. We also counterbalanced the side of presentation of the masculine vs feminine image. Note that our participants also completed a series of scales relating to sexual satisfaction which were not relevant to the aims of the current research.

Participants who indicated that they were pregnant at the time of recruitment also provided their contact details so that they could be re-contacted when we expected them to have given birth (based on reported stage of pregnancy) and would be approximately 12 weeks post-partum. On the post-partum questionnaire, we collected information about current contraceptive use or non-use, and confirmed the number of weeks post-partum each participant was ($M = 13.21$ weeks, $SD = 3.96$). Participants then recompleted the face pair rating task.

2.3. Stimuli

The facial stimuli were ten pairs of male, and ten pairs of female, composite facial images, one masculinized, one feminized. These composites were constructed from a set of 100 (50 male) facial photographs of individuals with a neutral expression, which were taken under standardized lighting conditions. Specifically, an average image comprising five randomly selected individual faces (of the same gender) was generated. This average face was then transformed on a sexual dimorphism dimension using linear differences between a composite of the 50 male faces and the 50 female faces, with transforms representing 50%± the difference between the two composites. This technique has been used in previous research (Benson & Perrett, 1992; Little, Cohen, Jones, & Belsky, 2006; Little et al., 2007; Penton-Voak & Perrett, 2000; Penton-Voak et al., 1999) and benefits from the fact that composite faces represent the average trait of the faces within them, meaning that there is a reduction in idiosyncratic differences between faces. The 20 image pairs were presented together in a random order.

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