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Sensation seeking and men's face preferences

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Abstract

Findings from previous studies suggest that only men who are in good physical condition can afford to pursue high-risk activities and that men who engage in high-risk activities are considered particularly attractive by women. Here, we show that men's interest in high-sensation activities, a personality trait that is known to increase the likelihood of those individuals engaging in high-risk behaviors, is positively related to the strength of their preferences for femininity in women's faces (Studies 1–3) but is not related to the strength of their preferences for femininity in men's faces (Study 2). We discuss these findings as evidence for potentially adaptive condition-dependent mate preferences, whereby men who exhibit signals of high quality demonstrate particularly strong preferences for facial cues of reproductive and medical health in potential mates because they are more likely than lower-quality men to succeed in acquiring such partners.
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1. Introduction

Physical traits that are costly to develop will signal an individual's phenotypic and genotypic quality if only healthy (i.e., 'high quality') individuals are able to develop and maintain costly traits (e.g., Zahavi, 1975). For the same reason, costly *behavioral* traits may also signal men's phenotypic and genotypic quality (Bliege Bird, Smith, & Bird, 2001; Smith, Bliege Bird, & Bird, 2003). For example, turtle hunting among the Meriam men (Torres Strait, Australia) is an inefficient foraging strategy (i.e., a costly, high-risk behavior) that signals men's phenotypic quality (Bliege Bird et al., 2001). Turtle hunting may also increase men's reproductive success since hunters have higher-quality mates and begin mating earlier than nonhunters do (Smith et al., 2003). Another example comes from the Maasai people of Southern Kenya, where young men who act as the 'bait' during lion hunts (by allowing the lion to attack them so that others in their hunting party can secure the kill) are considered particularly attractive by women (Barrett, Dunbar, & Lycett, 2002). Research has also shown that women give higher attractiveness ratings to men who take voluntary risks than they do to men described as altruists or who are required to take risks as part of their jobs (Kelly & Dunbar, 2001; see also Farthing, 2005). Collectively, these positive associations between risk taking and attractiveness suggest that risk taking is an attractive behavioral trait in men (Huston, 1973).

The idea of condition-dependent mate preferences has proven to be useful in predicting and explaining systematic variation in mate preferences in both nonhumans and humans. For example, healthy female stickleback exhibit a stronger preference for healthy males than do females in poorer physical condition (Bakker, Kunzler, & Mazzi, 1999). Additionally, women who perceive themselves to be more attractive exhibit greater preferences for masculinity and symmetry in men's faces (Little, Burt, Penton-Voak, & Perrett, 2001; Little & Mannion, 2006) and women who have more attractive body shapes show greater preferences for both masculinity (Penton-Voak et al., 2003) and cues

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associated with apparent health (Jones et al., 2005) in men's faces. These condition-dependent preferences are potentially adaptive if attractive individuals have more success in their efforts to attract high-quality mates (e.g., mates with high reproductive and/or medical health) than do relatively unattractive individuals. Since mating effort is a finite resource, individuals will increase their reproductive success by directing mating effort toward the highest-quality opposite-sex individuals who will be attracted to them. The condition-dependent preferences in females described above may be analogous to condition-dependent preferences seen in males. Male three-spined stickleback with more prominent sex-typical (i.e., attractive) traits demonstrate stronger preferences for healthy females than do relatively unattractive males (Kraak & Bakker, 1998). Furthermore, Buunk, Dijkstra, Kenrick, and Warntjes (2001) found that older men demonstrated weaker preferences for young adult women (i.e., women with the most reproductive potential), potentially because such preferences may reduce competition with younger men. As risk taking may signal men's phenotypic and/or genotypic quality (e.g., Farthing, 2005; Kelly & Dunbar, 2001), men who engage in risk taking may have stronger preferences for cues of reproductive and medical health in potential mates. Although several studies have reported condition-dependent preferences for various male characteristics (masculinity, symmetry, apparent health) among women, condition-dependent preferences among men have been less widely studied (but see Buunk et al., 2001).

Femininity in women's faces is positively associated with estrogen level (Law Smith et al., 2006), a measure of women's reproductive health (for a review of studies demonstrating this, see Law Smith et al., 2006). Although Rhodes, Chan, Zebrowitz, and Simmons (2003) observed no significant association between incidence of past health problems and femininity in women's faces, Thornhill and Gangestad (2006) found that feminine facial proportions were negatively associated with incidence of past health problems in women. Furthermore, Rhodes et al. (in press) recently showed that perceptions of women's health play an important role in preferences for feminine female faces. Attractiveness in women's faces, a facial characteristic that is thought to be synonymous with femininity (Law Smith et al., 2006; O'Toole et al., 1998; Rhodes et al., 2003; see also Rhodes, 2006), is also positively associated with indices of women's reproductive and medical health (e.g., a low waist–hip ratio, Penton-Voak et al., 2003). Moreover, Hume and Montgomerie (2001) found that facial attractiveness was inversely associated with incidence of past health problems in women and Henderson and Anglin (2003) found that facial attractiveness was positively associated with women's longevity. Collectively, these findings suggest that feminine facial characteristics may signal women's reproductive and medical health. Although preferences for cues of youth may contribute to men's preferences for feminine characteristics in women's faces (Rhodes, 2006), many researchers have noted that male attraction to cues of youth may reflect preferences for cues of reproductive potential, rather than cues of youth per se (e.g., Miller & Todd, 1998; Thornhill & Gangestad, 1999). Since femininity in women's faces may signal reproductive and medical health, men who are willing to engage in high-risk behaviors may have stronger preferences for feminine female faces than do their relatively risk-averse counterparts.

Interest in high-sensation activities (i.e., 'sensation seeking') is a personality trait that varies widely among individuals, with men reporting greater interest in high-sensation activities than women do (Zuckerman, 1984). Furthermore, willingness to pursue high-sensation activities is closely linked to willingness to engage in risky behaviors, with sensation seeking increasing the likelihood of individuals engaging in risky activities (Horvath & Zuckerman, 1993; Zuckerman & Kuhlman, 2000). Given this association between risk taking in men and sensation seeking, as well as previous findings demonstrating female attraction to men who are willing to engage in high-risk activities, it is likely that women will value sensation seeking in potential mates. Indeed, sensation seeking is positively associated with men's potential reproductive fitness, as estimated from their number of sexual partners (e.g., Bogaert & Fisher, 1995; Sheer & Welch Cline, 1995), and is also positively related to men's physical attractiveness and dominance (Bogaert & Fisher, 1995).

We carried out three studies to test for positive relationships between sensation seeking in men and the strength of their preferences for femininity in female faces. The relationship between sensation seeking and femininity preference was investigated in samples of men recruited for both online (Studies 1 and 3) and laboratory-based (Study 2) studies of individual differences in face preferences.

2. Study 1

In Study 1, we tested for a positive relationship between scores on the 13-item Sensation Seeking Scale (Zuckerman, 1984) and the strength of preferences for feminine women's faces in a sample of men recruited for an online study of individual differences in face preferences.

2.1. Methods

2.1.1. Stimuli

Following previous studies of attraction to sexual dimorphism of facial proportions (e.g., Buckingham et al., 2006; DeBruine et al., 2006; Penton-Voak et al., 2003), masculinized and feminized versions of 16 young adult female faces were manufactured by transforming each image by ±50% of the linear differences in 2D shape between male and female prototype faces (see Rowland & Perrett, 1995; Tiddeman, Burt, & Perrett, 2001, for technical details of this computer-graphic method). Previous studies have confirmed that manipulating sexual dimorphism of face shape in this way influences perceptions of facial masculinity in the predicted manner (DeBruine et al., 2006; Welling et al.,

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Fig. 1. Masculinized (left image) and feminized (right image) versions of a female face image used to assess men's preferences for sexual dimorphism of 2D shape in female faces in Studies 1 and 2. Note that both the masculinized and feminized versions differ in 2D shape only and are matched in other regards (e.g., identity, symmetry, skin color, and texture).

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in press). Examples of masculinized and feminized face images are shown in Fig. 1.

2.1.2. Procedure

The 16 pairs of face images, where each pair consisted of two face images that differed in masculinity of 2D shape but were matched in terms of identity, were shown to 156 male participants (mean age=28.30 years, S.D.=9.01) in a fully randomized order. The side of the screen on which any particular image was shown was also fully randomized. Participants were instructed to choose the face in each pair that was more attractive and to indicate the strength of their preference by choosing from the following options: much more attractive, more attractive, somewhat more attractive, and slightly more attractive.

Immediately after completing this face preference test, each participant also completed the 13-item Sensation Seeking Scale (Zuckerman, 1984). This scale consists of 13 pairs of statements (e.g., 'I would like to try parachute jumping' vs. 'I would never like to try jumping out of a plane, with or without a parachute'). Participants are asked to indicate which option in each pair best describes them. High scores on the 13-item Sensation Seeking Scale indicate greater interest in high-sensation activities and situations. The study was administered online. Participants were recruited by following links from web sites listing online psychology studies.

2.1.3. Initial processing of data

Following previous studies of individual differences in preferences for masculine and feminine faces (e.g., Buckingham et al., 2006), responses on the face preference test were coded using the following 0 (very strong preference for masculine face) to 7 (very strong preference for feminine face in each pair) scale:

0=*masculine face was judged much more attractive*
1=*masculine face was judged more attractive*
2=*masculine face was judged somewhat more attractive*
3=*masculine face was judged slightly more attractive*
4=*feminine face was judged slightly more attractive*
5=*feminine face was judged somewhat more attractive*
6=*feminine face was judged more attractive*
7=*feminine face was judged much more attractive*

For each participant, we then calculated the average strength of preference for feminine female faces across all 16 trials. Scores on the Sensation Seeking Scale were calculated by summing the number of times that the high-sensation option was chosen for each of the 13 items. The mean number of high-sensation items chosen by men was 6.86 (S.D.=2.73; Cronbach's α=.67).

2.2. Results

A one-sample *t* test comparing the femininity preference strengths with what would be expected by chance alone (i.e., 3.5) revealed a general preference for feminine faces [$t(155)=19.19$, $p<.001$; mean=4.45, S.E.=0.05]. Furthermore, men's scores on the Sensation Seeking Scale were positively related to the strength of their preferences for feminine female faces ($r=.16$, $n=156$, $p=.046$; Fig. 2). Men's age was not significantly related to their face preferences

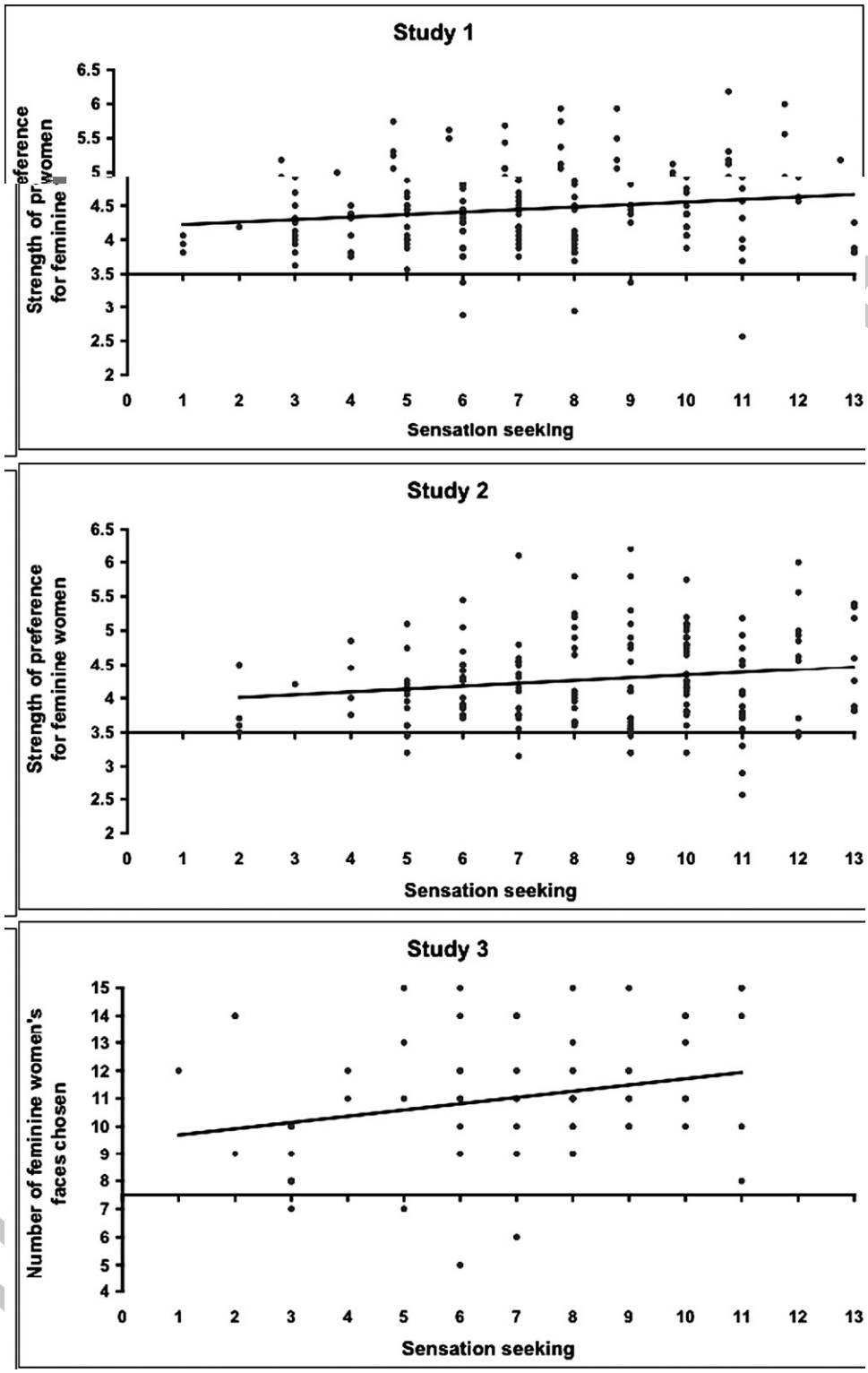

Fig. 2. The relationship between sensation seeking and men's preferences for feminine female faces in Studies 1-3. The x-axis crosses the y-axis at 'chance' (i.e., no preference for masculine or feminine versions) for each study.

(*r*=−.049, *n*=156, *p*=.547), although younger men tended to have higher scores on the Sensation Seeking Scale than did relatively older men (*r*=−.14, *n*=156, *p*=.088). A partial correlation analysis showed that participants with high scores on the Sensation Seeking Scale still tended to have particularly strong preferences for feminine faces when

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controlling for possible effects of age (r=.15, df=153, p=.055). Two-tailed p values are reported for all analyses.

3. Study 2

The positive association between men's scores on the Sensation Seeking Scale and the strength of their preferences for feminine female faces suggests that men who are more likely to engage in high-risk activities have particularly strong preferences for feminine women. While Study 1 demonstrated this relationship in a sample of men recruited for an online study, here we sought to replicate the relationship between sensation seeking and face preferences in a study conducted in the laboratory. By contrast with Study 1, which only investigated preferences for femininity in female faces, in Study 2, we also tested if the relationship between sensation seeking and men's femininity preferences generalized to judgments of male faces. If sensation seeking predicts the strength of men's preference for femininity in female faces but not in male faces, this would support the interpretation that the relationship between sensation seeking and femininity preferences reflects condition-dependent male preferences for high-quality potential mates. Such a pattern has been observed for symmetry and health preferences among women. For example, Little et al. (2001) found that women who consider themselves attractive preferred symmetry in male faces to a greater extent than did women who considered themselves relatively unattractive. In contrast, this pattern was not evident for judgments of female faces. Similarly, Jones et al. (2005) found that women's waist–hip ratios predicted the strength of their preferences for apparent health in men's faces but not in women's faces.

3.1. Methods

3.1.1. Stimuli

Masculinized and feminized versions of face images of 20 men and 20 women were manufactured using the same methods that were used to vary sexual dimorphism of 2D shape in female faces in Study 1. Sixteen of the 20 female face pairs used here had previously been used in Study 1.

3.1.2. Procedure

The 40 pairs of faces (each pair consisting of a masculinized and feminized version of the same identity) were shown to 140 men (mean age=19.84 years, S.D.=2.43). The order in which images were shown and the side of the screen on which any given image was presented were fully randomized. On each trial, participants were asked to choose the face they considered the most attractive and to rate the strength of this preference using the same scale that was used in Study 1. After the face preference test, participants completed the 13-item Sensation Seeking Scale (Zuckerman, 1984) and rated their own attractiveness using a 1 (*very unattractive*) to 7 (*very attractive*) scale. By contrast with Study 1, Study 2 was conducted in the laboratory. Participants were undergraduate students participating in the study in return for course credit.

3.1.3. Initial processing of data

Following Study 1, the average strength of preference for feminine female faces was calculated for each participant. The same algorithm was also used to calculate the average strength of preference for feminine male faces for each participant. The mean number of high-sensation items chosen by men was 7.70 (S.D.=2.42; Cronbach's α=.72).

3.2. Results

One-sample t tests comparing the strength of preference for femininity with what would be expected by chance alone (i.e., 3.5) showed that men preferred femininity in female faces [t(139)=12.38, p<.001; mean=4.22, S.E.=0.06] but not in male faces [t(139)=−0.01, p=.99; mean=3.50, S.E.=0.06]. There was a significant positive relationship between men's scores on the Sensation Seeking Scale and the strength of their preference for femininity in women's faces (r=.17, n=140, p=.04; Fig. 2) but not in men's faces (r=.04, n=140, p=.68). Participant age and self-rated attractiveness were not significantly related and were not related to any of these variables (all absolute r values <.1, all p values >.24).

A partial correlation analysis showed that men's scores on the Sensation Seeking Scale were positively related to the strength of their preferences for feminine female faces when controlling for possible effects of age and self-rated attractiveness (r=.18, df=136, p=.032). Repeating this analysis for judgments of men's faces did not show a significant relationship between sensation seeking and judgments of men's faces (r=.03, df=136, p=.753). Two-tailed p values are reported for all analyses.

4. Study 3

In Studies 1 and 2, men with high scores on the Sensation Seeking Scale demonstrated stronger preferences for feminine female faces than did men with relatively low scores on the Sensation Seeking Scale. Although these associations may reflect condition-dependent face preferences, an alternative explanation is that they reflect a general response bias, whereby men with high scores on the Sensation Seeking Scale are more willing to use extreme values on response scales than are men with lower scores on the Sensation Seeking Scale. To investigate this possibility, in Study 3, we tested for an association between men's scores on the Sensation Seeking Scale and the *number* of trials on which they preferred feminine versions of female faces to more masculine versions. Since this measure of men's preferences for feminine faces does not require participants to indicate the strength of their preferences using a rating scale, it is not subject to a general response bias of the type described above.

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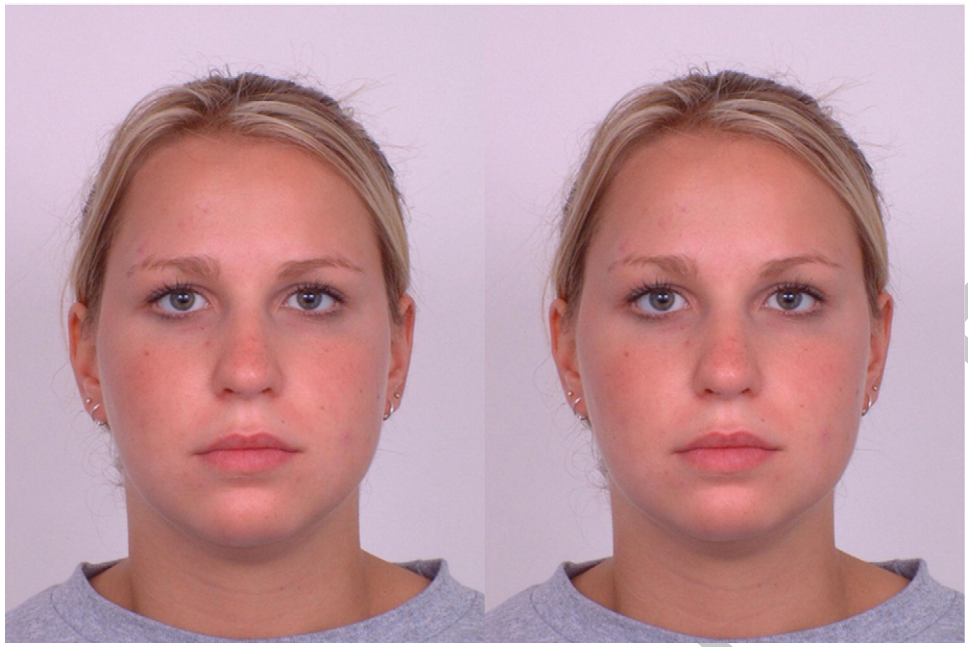

Fig. 3. Masculinized (left image) and feminized (right image) versions of a female face image used to assess men's preferences for sexual dimorphism of 2D shape in female faces in Study 3.

4.1. Methods

4.1.1. Stimuli

First, full-face photographs of 15 White adult women were manipulated in sexual dimorphism of 2D shape by transforming each image by ±25% of the linear differences in 2D shape between symmetric male and female prototype faces using the same computer-graphic methods used to manufacture stimuli for Studies 1 and 2. Examples of these stimuli are shown in Fig. 3. The 15 female face images manipulated here were different individuals to those that had been used to manufacture stimuli in Studies 1 and 2. A more subtle manipulation of sexual dimorphism of 2D shape was used here than was used in Studies 1 and 2 since the number of trials on which the more feminine face was chosen is a less sensitive measure of femininity preference than the rated strength of femininity preference employed in Studies 1 and 2. More subtle variation of sexual dimorphism of 2D shape in face images will reduce the likelihood of ceiling effects masking systematic variation in femininity preference.

4.1.2. Procedure

Seventy participants (mean age=26.11 years, S.D.=6.75) were then shown these pairs of images in a fully randomized order and were asked to indicate which face in each pair was more attractive. The side of the screen on which any given image was presented was fully randomized. Immediately after completing the face preference test, participants completed the 13-item Sensation Seeking Scale used in Studies 1 and 2. The study was administered online. Participants were recruited by following links from web sites listing online psychology studies.

4.1.3. Initial processing of data

The mean number of high-sensation items chosen by men was 6.47 (S.D.=2.55; Cronbach's α=.62). The number of trials on which the feminine version was preferred was calculated for each participant.

4.2. Results

A one-sample t test comparing the number of trials on which the feminine version was preferred with what would be expected by chance alone (i.e., 7.5) showed that men chose the feminine versions more often than the masculine versions [$t(69)$=12.72, p<.001; mean number of feminine faces chosen=11.00, S.E.M.=0.28]. Men's scores on the Sensation Seeking Scale were positively associated with the number of trials on which they preferred the feminine versions (r=.25, n=70, p=.039; Fig. 2). Participant age was not significantly related to face preferences (r=−.05, n=70, p=.684), but older men tended to score lower on the Sensation Seeking Scale than did young men (r=−.24, n=70, p=.050). A partial correlation analysis showed that men's scores on the Sensation Seeking Scale remained positively related to the number of trials on which they preferred the feminine versions when controlling for possible effects of age (r=.24, df=67, p=.046). Two-tailed p values are reported for all analyses.

5. Discussion

In all three studies, men demonstrated significantly stronger preferences for women's faces with exaggerated feminine characteristics than they did for women's faces

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with more masculine shapes. These findings replicate those from other studies of men's preferences for femininity in women's faces (for a review of these findings, see Rhodes, 2006) and complement those from studies of men's preferences for femininity in women's body shapes (e.g., Singh, 1995) and voices (e.g., Feinberg et al., 2005). However, consistent with our predictions, there was systematic variation among men in the extent to which they preferred femininity in women's faces: Men's scores on the Sensation Seeking Scale were positively associated with their preferences for femininity in women's faces (Studies 1–3).

The linear relationships between sensation seeking and femininity preferences suggest that men who are particularly interested in high-sensation activities have stronger preferences for feminine female faces than do men who are relatively disinterested in high-sensation activities. Since femininity in women's faces appears to be associated with indices of reproductive and medical health (see Introduction), the associations we observed between sensation seeking and men's preferences suggest that men's sensation-seeking scores are positively related to the extent to which they are attracted to high-quality, attractive potential mates. Furthermore, that sensation-seeking scores were not related to the strength of men's preferences for sexual dimorphism in male faces (Study 2) complements previous findings for condition-dependent preferences among women, which also appear to occur for judgments of opposite-sex faces but not own-sex faces (Jones et al., 2005; Little et al., 2001). That men's scores on the Sensation Seeking Scale predicted the *number* of trials on which they preferred feminine female faces (Study 3) demonstrates that the association between sensation seeking and preferences for feminine female faces cannot be explained by a general response bias, whereby men with high scores on sensation-seeking scales may have been more willing to use extreme values on rating scales. It is unsurprising that the strength of the relationships between sensation seeking and femininity preferences is relatively weak in our studies given that strong general preferences for femininity were observed in all three studies.

Henderson et al. (2005) have previously reported that participants who had high scores on the Sensation Seeking Scale were more tolerant of negative personality traits when rating the attractiveness of individuals in dating advertisements than were participants who had lower scores on the Sensation Seeking Scale. While Henderson et al. interpreted this as evidence that individuals with high scores on the Sensation Seeking Scale were generally less discriminating in their mate preferences, our findings demonstrate that men with high scores on the Sensation Seeking Scale are *more* discriminating in their preferences for femininity in potential mates (i.e., a trait that is highly and consistently related to women's physical attractiveness; Law Smith et al., 2006; Perrett et al., 1998; Rhodes, 2006). It is possible that there is an important difference between physical and behavioral cues to female attractiveness, whereby high-sensation seeking men are more interested in women's physical attractiveness than they are in their behavioral attractiveness. This issue remains an interesting avenue for future research.

It is also unclear whether our findings are best characterized by stronger attraction to femininity in women's faces in men who are particularly interested in sensation seeking or stronger aversion to masculine women. While our findings suggest that the development of sensation seeking and femininity preference in men may be influenced by common underlying factors, further research is needed to identify what these factors are. Factors could include level of in utero testosterone exposure and/or current testosterone level since men's scores on the Sensation Seeking Scale are associated with both salivary testosterone levels (Aluja & Torrubia, 2004) and masculine digit ratios (Fink, Neave, Laughton, & Manning, 2006) and these factors may also relate to face preferences.

Our findings for sensation seeking in men and their preferences for female faces are consistent with specific predictions that we had derived from condition-dependent models of mate preferences. Sensation seeking in men will increase the likelihood of them engaging in risky activities (Zuckerman & Kuhlman, 2000), potentially increasing their attractiveness (Farthing, 2005; Kelly & Dunbar, 2001) and reproductive fitness (Bliege Bird et al., 2001; Smith et al., 2003). Indeed, sensation seeking is positively associated with men's reported number of sexual partners (Bogaert & Fisher, 1995; Sheer & Welch Cline, 1995) and also with their physical attractiveness and dominance (Bogaert & Fisher, 1995). Furthermore, attractive feminine facial characteristics may also signal women's reproductive and medical health (e.g., Law Smith et al., 2006; Penton-Voak et al., 2003; Thornhill & Gangestad, 2006; but see also Rhodes et al., 2003). That sensation seeking in men is positively related to the strength of their preferences for feminine female faces is therefore consistent with the proposal that men who are desirable as mates tend to have stronger preferences for high-quality potential mates than do their relatively unattractive counterparts. Since mating effort is a finite resource, such preferences will be adaptive if attractive individuals are more successful in securing high-quality mates than are less desirable individuals. In this way, our findings for positive associations between men's sensation seeking and their preferences for feminine women complement previous findings for condition-dependent mate preferences among women (Jones et al., 2005; Little et al., 2001; Little & Mannion, 2006; Penton-Voak et al., 2003) and among males and females in other species (Bakker et al., 1999; Kraak & Bakker, 1998).

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