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Women's own voice pitch predicts their preferences for masculinity in men's voices

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Previous studies have found that indices of women's attractiveness predict variation in their mate preferences. For example, objective measures of women's attractiveness (waist-hip ratio and other-rated facial attractiveness) are positively related to the strength of their preferences for masculinity in men's faces. Here, we examined whether women's preferences for masculine characteristics in men's voices were related to their own vocal characteristics. We found that women's preferences for men's voices with lowered (i.e., masculinized) pitch versus raised (i.e., feminized) pitch were positively associated with women's own average voice pitch. Because voice pitch is positively correlated with many indices of women's attractiveness, our findings suggest that the attractiveness of the perceiver predicts variation in women's preferences for masculinity in men's voices. Such attractiveness-contingent preferences may be adaptive if attractive women are more likely to be able to attract and/or retain masculine mates than relatively unattractive women are. Interestingly, the attractiveness-contingent masculinity preferences observed in our study appeared to be modulated by the semantic content of the judged speech (positively valenced vs. negatively valenced speech), suggesting that attractiveness-contingent individual differences in masculinity preferences do not necessarily reflect variation in responses to simple physical properties of the stimulus. *Key words:* fundamental frequency, masculinity, mate preferences, sexual dimorphism, vocal attractiveness. *[Behav Ecol 21:767–772 (2010)]*

Masculine characteristics in men are positively associated with indices of their long-term health (Rhodes et al. 2003; Thornhill and Gangestad 2006), physical strength (Fink et al. 2006), reproductive potential (Hughes et al. 2004; Puts 2005; Rhodes et al. 2005), and, in natural fertility populations, their reproductive fitness (Apicella et al. 2007). Although these findings suggest that masculinity is associated with traits that women value in a mate (e.g., good long-term health), other research has shown that masculine characteristics are also associated with male traits that are not desirable in a mate. For example, masculine men are more likely to be ascribed antisocial traits, such as dominance and dishonesty, than relatively feminine men are and are also more likely to be perceived as bad parents (Perrett et al. 1998; Boothroyd et al. 2007). Men with masculine characteristics are also more interested in pursuing short-term relationships and less interested in pursuing long-term relationships than are relatively feminine men (Rhodes et al. 2005; Boothroyd et al. 2008). Additionally, men with high levels of testosterone invest fewer resources in their partners and offspring than men with relatively low levels of testosterone do (Gray et al. 2002). Collectively, these findings suggest that masculine characteristics are associated with some male traits that are desirable in a mate (e.g., good long-term health) and other traits that are not desirable in a mate (e.g., low investment, for reviews, see Gangestad and Simpson 2000; Fink and Penton-Voak 2002; Little et al. 2002). Many researchers have emphasized that individual differences in women's preferences for masculine versus feminine men would be expected because women are likely to weight the possible costs and benefits associated with choosing a masculine mate in different ways (see, e.g., Gangestad and Simpson 2000; Fink and Penton-Voak 2002; Little et al. 2002).

One likely source of variation in female preferences for masculine males is the physical attractiveness and/or condition of the female (Gangestad and Simpson 2000; Little et al. 2001; Fink and Penton-Voak 2002). In both guppies and stickleback, females in good physical condition demonstrate stronger preferences for males displaying cues of good health than do females in relatively poor physical condition (Bakker et al. 1999; Lopez 1999). Analogous to these findings for condition-dependent mate preferences in fish, studies have reported positive associations between women's self-rated attractiveness and their preferences for masculine characteristics in men's faces (Little et al. 2001; Little and Mannion 2006). These findings for women's own attractiveness and their preferences for masculine faces have since been replicated using more objective measures of women's physical attractiveness and condition (i.e., waist-hip ratio and other-rated facial attractiveness, Penton-Voak et al. 2003). Such attractiveness-contingent individual differences in masculinity preferences may be adaptive if attractive women are better able to attract and/or retain masculine mates than are relatively unattractive women (see, e.g., Little et al. 2001; Penton-Voak et al. 2003; see also Jones et al. 2005).

Vukovic et al. (2008) recently demonstrated that women's self-rated attractiveness was positively correlated with the strength of their preferences for masculinized versus feminized male voices. Although this finding is analogous to previous findings for self-rated attractiveness and women's face preferences (e.g., Little et al. 2001), self-rated attractiveness is, by definition, a subjective measure of women's physical attractiveness and condition. Thus, examining attractiveness-contingent variation in women's preferences for masculinity

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in men's voices using a more objective measure of women's physical attractiveness would be desirable.

Voice pitch is positively correlated with attractiveness ratings of women's voices (Collins and Missing 2003; Feinberg, DeBruine, Jones, and Perrett 2008; Jones, Feinberg, et al. 2008) and faces (Feinberg, Jones, DeBruine, et al. 2005). Furthermore, women's voice pitch is positively associated with their trait (i.e., average) estrogen level, suggesting that voice pitch may be a cue to women's health and fertility (Feinberg, Jones, DeBruine, et al. 2006; see also Abitbol et al. 1999). Indeed, women's voice pitch is positively correlated with the perceived femininity of their voices (Feinberg, Jones, DeBruine, et al. 2005; Feinberg, DeBruine, Jones, and Perrett 2008) and with both objective and subjective measures of their facial femininity (Feinberg, Jones, DeBruine, et al. 2005). Consequently, voice pitch is a relatively objective indicator of women's physical attractiveness and condition that may predict variation in women's preferences for masculinity in men's voices.

In light of the above, we tested for a relationship between women's voice pitch and the strength of their preferences for masculinized (i.e., lowered pitch) versus feminized (i.e., raised pitch) men's voices. Following previous findings (Little et al. 2001; Penton-Voak et al. 2003; Little and Mannion 2006; Vukovic et al. 2008), we hypothesized that there would be a positive correlation between these 2 variables. We measured women's voice pitch in 3 different conditions (when speaking vowel sounds, when stating a standard introductory sentence, and when reading a standardized passage of text) in order to ensure that we obtained a reliable measure of women's average voice pitch. We also assessed women's preferences for masculinized versus feminized voices in 2 conditions: when the men were saying "I really like you" and when the men were saying "I really don't like you." Vukovic et al. (2008) found no effect of the valence of men's speech on variation in women's preferences for masculinized voices. However, other studies have found that potentially adaptive preferences for voice pitch were more apparent for judgments of voice recordings where the speech content was positively valenced than those where the speech content was negatively valenced (Jones, Feinberg, et al. 2008). Thus, we tested whether condition-dependent preferences for masculinized male voices were more evident when women judged the attractiveness of men who were demonstrating positive social interest in the listener than when women judged the attractiveness of men who were demonstrating negative social interest in the listener. If attractiveness-contingent masculinity preferences reflect variation in women's ability to retain masculine mates and/or individual differences in the extent to which women are able to compete with other women for high-quality mates, attractiveness-contingent preferences may not occur (i.e., may not be relevant) when judging potential mates who are explicitly signaling that they have no sexual or social interest in the listener (i.e., are saying I really don't like you). Using an objective measure of women's physical attractiveness and condition (i.e., women's voice pitch) may reveal an effect of speech content on attractiveness-contingent preferences that was not apparent in Vukovic et al. (2008). Finally, because some studies have found that hormonal contraceptive use may modulate individual differences in women's masculinity preferences (e.g., Little et al. 2002; Feinberg, DeBruine, Jones, and Little 2008; Smith, Jones, Little, et al. 2009), we also considered the possible effects of hormonal contraceptive use on voice preferences.

MATERIALS AND METHODS

Participants

All participants ($N = 113$, mean age = 19.92 years, standard deviation [SD] = 2.36 years) were female undergraduate students at the University of Aberdeen who took part in the study in return for course credits. All participants reported that they were heterosexual. Fifty-eight of the women in our study reported that they were not using any form of hormonal contraceptive and 54 of the women in our study reported that they were currently using some form of hormonal contraceptive. One participant elected not to answer the question about hormonal contraceptive use. None of the participants in our study had taken part in our previous research on individual differences in women's preferences for masculinity in men's voices (Vukovic et al. 2008). Recruitment of women in our study was not based on their menstrual cycle phase. Therefore, menstrual cycle phase can be considered a random variable in our study.

Stimuli

The stimuli we used to assess women's preferences for masculinized versus feminized male voices have previously been used in Vukovic et al. (2008). These stimuli were manufactured from recordings of 4 men (mean age = 26.75 years; SD = 3.10 years) speaking the phrases I really like you and I really don't like you using an Audio-Technica AT4041 microphone. Voices were recorded in a quiet room using WavePad recording software in mono at a sampling rate of 44.1 kHz at 16-bit amplitude quantization. The voice recordings we used to manufacture our stimuli were randomly selected from a larger sample of voice recordings of 30 different men. Next, we manufactured 2 versions of each voice recording: one with raised (i.e., feminized) voice pitch and one with lowered (i.e., masculinized) voice pitch using the methods described below.

Voices were raised and lowered in pitch using the pitch-synchronous overlap add (PSOLA) algorithm in Praat to ± 0.5 equivalent rectangular bandwidths (ERBs) of the original frequency. The methods used here have been used successfully in other voice attractiveness studies (e.g., Feinberg, Jones, Little, et al. 2005; Vukovic et al. 2008). Although the PSOLA method alters voice pitch, other aspects of the voice are unaffected (e.g., speech rate, formant frequency; see Feinberg, Jones, Little, et al. 2005). The manipulation performed here is roughly equivalent to ± 20 Hz in this particular sample but takes into account the fact that pitch perception is on a logarithmic scale in comparison with the natural frequencies (i.e., Hz, Traunmuller 1990). The ERB scale was used here because of its better resolution at human average speaking frequencies than the tonotopic Bark scale, the semitone (Western music) scale, or the Mel scale (Traunmuller 1990). This better resolution is a consequence of the fact that the ERB scale takes into account the temporal contribution to frequency resolution (Traunmuller 1990). A manipulation roughly equivalent to 20 Hz was used because it has previously been shown to alter women's attractiveness ratings of men's voices (Feinberg, Jones, Little, et al. 2005). After pitch manipulation, voices were normalized to a consistent root-mean-square amplitude for consistent presentation volume.

The process described above created 8 pairs of voices in total (each pair consisting of masculinized and feminized versions of the same recording): 4 pairs of voices saying I really like you and 4 pairs of voices saying I really don't like you. Descriptive statistics for these voice stimuli are given in Table 1. Using these stimuli, Vukovic et al. (2008) have demonstrated that female listeners can easily identify the more masculine voice in each pair.

Procedure

Participants were played the 8 pairs of voices (where each pair consisted of masculinized and feminized versions of the same

Table 1
Descriptive statistics for voice stimuli used in our study

Speech content	Manipulation	Mean fundamental frequency (Hz)	SD of mean fundamental frequency (Hz)	Mean fundamental frequency (ERB)	SD of mean fundamental frequency (ERB)
I really like you	Raised	122.9	5.8	3.6	0.1
I really like you	Lowered	85.5	4.2	2.6	0.1
I really don't like you	Raised	115.1	8.7	3.4	0.2
I really don't like you	Lowered	79.0	5.6	2.4	0.2

Note that variation in the SDs of the mean fundamental frequency for raised and lowered voices measured in Hz is expected given the logarithmic relationship between ERB and Hz.

recording, 4 with positively valenced content and 4 with negatively valenced content) and were asked to choose which voice in each pair was the more attractive. Participants were also asked to indicate the strength of each preference by choosing from the options "much more attractive," "more attractive," "somewhat more attractive," and "slightly more attractive." Participants listened to these recordings on headphones. The order in which pairs of voices were presented was fully randomized. The order in which masculinized and feminized versions in each pair were played was also fully randomized. Because participants were judging the attractiveness of the pitch manipulation rather than the individual speakers, the relatively low number of speakers used to generate our stimuli is unlikely to affect our results (see, e.g., Feinberg, Jones, Little, et al. 2005; Feinberg, DeBruine, Jones, and Little 2008; Jones, Feinberg, et al. 2008; Vukovic et al. 2008). The procedure we used to assess women's preferences for masculinized versus feminized versions of men's voices has been used in previous studies of women's voice preferences (e.g., Feinberg, DeBruine, Jones, and Little 2008; Vukovic et al. 2008).

Additionally, all participants reported their age and provided 3 voice recordings. Voices were recorded in a quiet room using Praat recording software in mono at a sampling rate of 44.1 kHz at 16-bit amplitude quantization. In one of the voice recordings, women were instructed to say "Hi, I'm a student at the University of Aberdeen." In the second voice recording, women were instructed to say the vowel sounds "eh" as in bet, "ee" as in see, "ah" as in father, "oh" as in note, and "oo" as in boot. In the third voice recording, women were instructed to say "When the sunlight strikes raindrops in the air, they act as a prism and form a rainbow." These 3 different types of voice recording are referred to hereon as the "Hi" statement, vowel sounds, and rainbow passage, respectively. These 3 types of voice recording have been used to measure speakers' fundamental frequencies in previous studies (Puts et al. 2006; Feinberg, DeBruine, Jones, and Perrett 2008; Bryant and Haselton 2009). The order in which participants completed the voice preference test and had their own voices recorded was fully randomized.

Initial processing of data

Following Feinberg, DeBruine, Jones, and Little (2008) and Vukovic et al. (2008), responses on the voice preference test were coded as strength of preference for masculinized (i.e., lowered pitch) voices using the following 0–7 scale:

0–3: feminized voice rated much more attractive (=0), more attractive (=1), somewhat more attractive (=2), or slightly more attractive (=3) than masculinized voice.

4–7: masculinized voice rated slightly more attractive (=4), somewhat more attractive (=5), more attractive (=6), or much more attractive (=7) than feminized voice.

For each participant, the average strength of preference for masculinity was calculated separately for the positively and negatively valenced speech conditions.

For each of our participants, we also measured the mean fundamental frequency (i.e., pitch) for their Hi statement (M = 210.0 Hz, SD = 18.7 Hz), rainbow passage (M = 209.8 Hz, SD = 16.9 Hz), and vowel sounds (M = 208.0 Hz, SD = 23.1 Hz) recordings. Following Feinberg, Jones, DeBruine, et al. (2005) and Feinberg, DeBruine, Jones, and Perrett (2008), fundamental frequency was measured using Praat's (Boersma and Weenink 2007) autocorrelation function with input parameters set at 100–600 Hz. Acoustic measurements were conducted at 11.025 kHz sampling rate to increase frequency resolution. Mean fundamental frequencies in each of the 3 voice recording conditions were positively intercorrelated (all $r > 0.63$). Principle component analysis of these 3 measures produced a single factor that explained 80.0% of the variance in scores. Loadings for each of the individual measures were all >0.86. We used this factor (labeled hereon as "measured voice pitch factor") in our subsequent analyses of women's voice pitch. High scores on this factor indicated high voice pitch.

RESULTS

Because not all of our variables were normally distributed, analyses were conducted using nonparametric tests. Two-tailed P values are reported throughout.

To test whether women reported stronger preferences for masculinized versions of male voices than for feminized versions, we used a Wilcoxon signed-ranks test to compare the strength of women's preferences for masculinized voices with what would be expected by chance alone (i.e., 3.5 on the 0–7 scale). This analysis showed that women's preferences for masculinized versions of both positively valenced speech ($Z = 4.77$, $N = 113$, $P < 0.001$, $d = 0.49$; $M = 4.14$, standard error of the mean [SEM] = 0.12) and negatively valenced speech ($Z = 3.79$, $N = 113$, $P < 0.001$, $d = 0.37$; $M = 3.99$, SEM = 0.12) were significantly stronger than would be expected by chance. A Wilcoxon signed-ranks test also showed that the strength of women's preferences for masculinized voices did not differ significantly between the positively and negatively valenced speech content conditions ($Z = 1.22$, $N = 113$, $P = 0.26$, $d = 0.15$), though masculinity preferences tended to be marginally weaker for negatively valenced stimuli. Additional analyses of the proportion of trials on which participants chose the masculinized versions of men's voices showed that masculinized versions were chosen significantly more often than chance (i.e., 0.5) when judging both positively ($Z = 4.66$, $N = 113$, $P < 0.001$, $d = 0.51$; $M = 0.67$, SEM = 0.03) and negatively ($Z = 3.80$, $N = 113$, $P < 0.001$, $d = 0.39$; $M = 0.63$, SEM = 0.03) valenced speech. Although the proportion of trials on which participants chose the masculinized versions did not differ significantly between the positively and negatively valenced speech conditions ($Z = 1.41$, $N = 113$, $P = 0.16$, $d = 0.14$), participants did tend to choose the masculinized versions marginally less often in the negatively valenced speech condition.

Next, we investigated the relationship between women's own voice pitch and the strength of their preferences for masculine versus feminine pitch in men's voices. These analyses revealed a significant positive relationship between measured voice pitch factor and "strength of preference for masculinity in positively valenced speech" (Spearman's rho = 0.20, $N = 113$, $P = 0.036$, Figure 1). By contrast, the relationship between measured voice pitch factor and "strength of preference for masculinity in negatively valenced speech" was not significant (Spearman's rho = 0.110, $N = 113$, $P = 0.25$, Figure 1). There were no significant correlations between women's age and either of the voice preference measures or the measured voice pitch factor (all absolute Spearman's rho < 0.15, all $P > 0.12$). Repeating these analyses using the average of the 3 different measures of voice pitch in place of the measured voice pitch factor revealed the same pattern of significant results. Preferences for masculinity in the positively and negatively valenced speech conditions were positively correlated (Spearman's rho = 0.68, $N = 113$, $P < 0.001$).

Finally, we investigated whether the relationship between measured voice pitch factor and strength of preference for masculinity in positively valenced speech, which was significant in the whole sample, was driven by variation among women who were not using hormonal contraceptives. Previous research has reported that, among women with natural menstrual cycles, women's voice pitch is higher around ovulation than at other times (Bryant and Haselton 2009; for a similar finding for ratings of women's vocal attractiveness, see also Pipitone and Gallup 2008) and that women's preferences for masculine men are also strongest around ovulation (for recent reviews, see Jones, DeBruine, et al. 2008 and Gangestad and Thornhill 2008). Consequently, the positive correlation we observed between measured voice pitch factor and strength of preference for masculinity in positively valenced speech may reflect correlated changes in masculinity preference and voice pitch during the menstrual cycle among women with natural menstrual cycles. If this were the case and because cyclic shifts in masculinity preferences do not occur among women using hormonal contraceptives (Penton-Voak et al. 1999), one would expect the correlation between measured voice pitch factor and strength of preference for masculinity in positively valenced speech to be stronger among women with natural menstrual cycles than among women using hormonal contraceptives. By contrast with this alternative explanation of our findings, however, the correlation between measured voice pitch factor and strength of preference for masculinity in positively valenced speech was actually stronger among women using hormonal contraceptives (Spearman's rho = 0.26, $N = 54$, $P = 0.06$) than it was among women with natural menstrual cycles (Spearman's rho = 0.12, $N = 58$, $P = 0.36$), although the correlation was not significant in either subsample of women. Moreover, these correlations were not significantly different to one another ($Z = 0.75$, $P = 0.45$).

Repeating each of the nonparametric tests described above using equivalent parametric tests produced the same pattern of significant results.

DISCUSSION

Consistent with previous studies (e.g., Feinberg, Jones, Little, et al. 2005; Vukovic et al. 2008), women generally preferred men's voices with lowered (i.e., masculinized) pitch to those with raised (i.e., feminized) pitch. However, as we had predicted, we also found that women's average voice pitch was positively correlated with the strength of their preference for masculinized voices when the voices were demonstrating positive social interest in the listener but not when the voices were demonstrating negative social interest in the listener. Women's voice pitch is positively associated with vocal and facial attractiveness (Collins and Missing 2003; Feinberg, Jones, DeBruine, et al. 2005; Feinberg, DeBruine, Jones, and Perrett 2008; Jones, Feinberg, et al. 2008). Thus, our findings present the first evidence that we know of for a positive association between a relatively objective measure of women's attractiveness (i.e., voice pitch) and the strength of their preferences for masculinity in men's voices, complementing previous findings for masculinity preferences and women's self-rated attractiveness (Little et al. 2001; Little and Mannion 2006; Vukovic et al. 2008) and for women's preferences for facial masculinity and more objective measures of physical attractiveness and condition (other-rated facial attractiveness and waist-hip ratio, Penton-Voak et al. 2003). Such attractiveness-contingent preferences may be adaptive if attractive women are more likely to be able to attract and/or retain masculine mates than are relatively unattractive women (Little et al. 2001; Penton-Voak et al. 2003; Little and Mannion 2006; Vukovic et al. 2008).

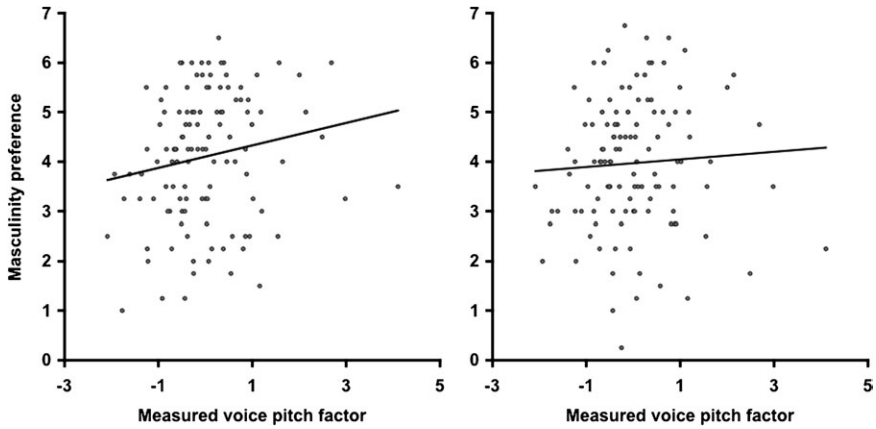

Figure 1
The relationships between women's voice pitch (measured voice pitch factor, high values indicate high pitch) and women's preferences for men's voices with masculinized (i.e., lowered) pitch (high values indicate a strong preference for masculinity in men's voices). The panel on the left shows the significant positive relationship between judgments of positively valenced male speech and women's own voice pitch (Spearman's rho = 0.20, $N = 113$, $P = 0.036$). The panel on the right shows the nonsignificant relationship between judgments of negatively valenced male speech and women's own voice pitch (Spearman's rho = 0.11, $N = 113$, $P = 0.25$).

That we observed no significant association between voice pitch and women's preferences for masculinity when male voices demonstrated negative social interest in the listener, suggests that our findings are unlikely to reflect a possible general response bias whereby women with high voice pitch may be either more or less willing to use extreme points on rating scales than women with relatively low voice pitch. However, there is, potentially, an alternative explanation for our findings that warrants both consideration and discussion. Women demonstrate stronger preferences for masculine men during the late follicular (i.e., fertile) phase of the menstrual cycle than at other times (for recent reviews, see Jones, DeBruine, et al. 2008 and Gangestad and Thornhill 2008). More recent research has also suggested that women's voice pitch may be higher during the late follicular phase of the menstrual cycle than at other times (Bryant and Haselton 2009; for a similar finding for attractiveness ratings of women's voices, see also Pipitone and Gallup 2008). Collectively, these findings raise the possibility that the correlation between women's voice pitch and their preferences for masculinity in men's voices that was observed in the current study may be a consequence of correlated changes in women's voice pitch and masculinity preferences during the menstrual cycle. Importantly and because cyclic shifts in women's masculinity preferences do not occur among women using hormonal contraceptives (Penton-Voak et al. 1999), this alternative explanation of our findings would predict a stronger correlation between voice pitch and women's masculinity preferences among women with natural menstrual cycles than among women using hormonal contraceptives. However, analyses of the correlations between voice pitch and masculinity preferences in the subsample of women using hormonal contraceptives and the subsample of women who were not using hormonal contraceptives suggested that the correlation between voice pitch and masculinity preferences that was significant in our whole sample was not stronger in our subsample of women reporting no use of hormonal contraceptives than in our subsample of women reporting use of hormonal contraceptives. Consequently, these findings suggest that the positive correlation between women's own voice pitch and masculinity preference is unlikely to simply be a by-product of correlated changes in voice pitch and masculinity preferences during the menstrual cycle. However, we acknowledge that these analyses do not rule out the possibility that fluctuations in hormone levels among women using hormonal contraceptives (e.g., those associated with days of the month on which women are taking placebo pills) may affect both masculinity preference and women's voice pitch.

Our study demonstrated a positive correlation between women's own vocal attractiveness and the strength of their preferences for masculinity in positively valenced male speech. Although voice pitch does not explain all the variance in women's vocal attractiveness (e.g., Collins and Missing 2003; Feinberg, DeBruine, Jones, and Perrett 2008), this finding suggests that at least one component of women's vocal attractiveness predicts their preferences for masculinity in men's voices. Moreover, because voice pitch is also positively correlated with other indices of women's physical condition (e.g., facial attractiveness, facial femininity, and trait estrogen levels, Abitbol et al. 1999; Feinberg, Jones, DeBruine, et al. 2005; Feinberg, Jones, DeBruine, et al. 2006), our findings also raise the possibility that women in good physical condition may demonstrate stronger preferences for masculine men than do women in relatively poor physical condition (see also, e.g., Penton-Voak et al. 2003). Further research employing more direct measures of women's physical condition (e.g., physiological measures of long-term health and/or fertility) are needed to clarify this latter issue. A further issue for future studies of voice attractiveness is the extent to which physical and/or perceptual properties of the unmanipulated voices from which voice stimuli are manufactured qualify the effects of manipulated pitch on perceptions of voices. Indeed, Smith, Jones, DeBruine, and Little (2009) recently demonstrated that manipulating masculinity in healthy-looking male face images has a greater effect on attractiveness judgments than does manipulating masculinity in relatively unhealthy-looking faces. This finding raises the possibility of similar interactions between the effects of pitch and other vocal characteristics on perceptions of men's voices.

In summary, we find that women's own voice pitch is positively associated with the strength of their preferences for low (i.e., masculine) pitch in positively valenced male speech, consistent with Penton-Voak et al. (2003) who found that other relatively objective indices of women's attractiveness (i.e., waist-hip ratio and other-rated facial attractiveness) were positively related to their preferences for masculinity in men's faces. That our results for variation in voice preferences and results of Penton-Voak et al. (2003) for variation in face preferences are similar presents novel evidence that masculine characteristics in men's faces and voices signal some common information that is relevant to women's mate preferences (see Feinberg, DeBruine, Jones, and Little 2008). That women's own voice pitch predicted their masculinity preferences when judging positively valenced male speech but not negatively valenced male speech also suggests that attractiveness-contingent variation in masculinity preferences does not solely reflect individual differences in responses to simple physical properties of the stimulus but can be modulated by other social cues (i.e., explicit cues of social interest), potentially because mate choice–relevant psychological adaptations may not be relevant when judging the attractiveness of men who are explicitly signaling a lack of social or sexual interest in the perceiver. Further research investigating similar facultative variation is likely to provide additional insights into the causes of individual differences in women's mate preferences.

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