Does the interaction between partnership status and average progesterone level reliably predict women's preferences for facial masculinity? Comment on Marcinkowska et al. (2018)

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Abstract
Many studies have attempted to identify biological factors that reliably predict individual differences in women's preferences for masculine male faces. Marcinkowska et al. (2018 Hormones & Behavior) recently reported that women's (N=102) preferences for facial masculinity were predicted by the interaction between their relationship status (partnered versus unpartnered) and average progesterone level. Because previous findings for between-women differences in masculinity preferences have often not replicated well, we attempted to replicate Marcinkowska et al's result in an open data set from another recent study that had not tested this hypothesis (Jones et al., 2018 Psychological Science). In this sample of 316 women, we found that facial masculinity preferences were predicted by the interaction between women's relationship status and average progesterone level, consistent with Marcinkowska et al's results. Together, these findings suggest that the combined effects of relationship status and average progesterone level predict facial masculinity preferences relatively reliably.

Introduction
Masculine facial characteristics in men are hypothesized to signal good genes for immuncompetence and/or dominance, while also signaling antisocial tendencies, such as unwillingness to invest time and other resources in romantic relationships (Little et al., 2011; Penton-Voak et al., 2003). Because characteristics of the perceiver may influence how women resolve this putative trade off between the costs and benefits of choosing a masculine mate (Little et al., 2011; Penton-Voak et al., 2003), many researchers have sought to identify biological factors that might reliably predict individual differences in women's preferences for facial masculinity (see Zietsch et al., 2015 for a recent review).

Several recent, high-powered studies (e.g., Dixson et al., 2018; Jones et al., 2018; Marcinkowska et al., 2018; Zietsch et al., 2015) have reported that women's preferences for facial masculinity do not appear to track within-individual changes in women's hormone levels in the way that some mate-preference theories have proposed (Gangestad & Simpson, 2000; Penton-

Voak et al., 1999). However, only one of these studies tested if average, rather than daily, hormone levels predicted women's masculinity preferences (Marcinkowska et al., 2018).

Marcinkowska et al. (2018) reported that the interaction between women's partnership status and average progesterone levels measured throughout one menstrual cycle predicted facial masculinity preference in a sample of 102 women. Specifically, Marcinkowska et al. (2018) found that average progesterone tended to be negatively correlated with masculinity preferences for women in romantic relationships and tended to be positively correlated with masculinity preferences for women not in romantic relationships.

Findings from studies investigating factors that might predict between-women differences in women's masculinity preferences have typically replicated poorly (e.g., Zietsch et al., 2015). For example, studies testing whether women using oral contraceptives show stronger preferences for masculine men than do women not using oral contraceptives have variously reported positive, null, and negative results (Cobey et al., 2015; Feinberg et al., 2008; Jones et al., 2018).

In light of the above, the current study analyzed open data from a large study of the hormonal correlates of women's masculinity preferences (Jones et al., 2018[1]) to establish whether the interaction between partnership status and average progesterone level reported by Marcinkowska et al. (2018) could be replicated in this new, larger data set.

Methods

Procedure

Full methods for data collection are reported in Jones et al. (2018). Briefly, 584 young adult women (age: M=21.46 years, SD=3.09 years) judged the attractiveness of ten pairs of male faces (each pair consisting of a masculinized and feminized version of the same face, created using the same prototype-based computer graphic methods used by Marcinkowska et al., 2018). Participants chose the face in each pair they thought was more attractive. They did this in up to 15 weekly test sessions in which they also provided a saliva sample, reported their partnership status, and reported their hormonal contraceptive use. In each test session, women completed the face-judgment task twice (once assessing men's attractiveness for a short-term relationship and once assessing men's attractiveness for a long-term relationship). Figure 1 shows examples of the face stimuli used in Jones et al. All face stimuli are publicly available at https://osf.io/9b4y7/.

Figure 1. Examples of masculinized (left) and feminized (right) face stimuli used in our study.

[1] Jones et al. (2018) tested for within-subject effects of steroid hormones on masculinity preferences, but did not test for between-women effects. In the current analyses, we tested for the specific effect reported by Marcinkowska et al. (an interaction between average progesterone level and partnership status) and did not test for any other between-subject effects.

Hormone assays

Saliva samples were assayed by Salimetrics UK for progesterone, estradiol, testosterone, and cortisol (see Jones et al., 2018 for details of relevant kits and descriptive statistics). Only progesterone levels were analyzed here.

Analysis

For comparison with Marcinkowska et al. (2018), only women who reported no use of hormonal contraceptives and did not change their partnership status during the study were included in the final data set (N=316; unpartnered = 206, partnered = 106). Three hundred thirty-one of these women completed 5 or more weekly test sessions; 96 women completed 10 test sessions.

Results

Following Marcinkowska et al. (2018), we analyzed our data using a binomial mixed effects model with random intercepts for participants and stimuli. Because we had participants judge faces in both long-term and short-term contexts in each session, we also included a random intercept for each participant's session. Random slopes were specified maximally (for context by participant and for the interaction among context, partnership status, and average progesterone by stimulus). The dependent variable was masculinity preference (1 = chose the more masculine face as more attractive, 0 = chose the more feminine face as more attractive) and the predictors were context (effect-coded: short-term = 0.5, long-term = -0.5), partnership status (effect-coded: 0.5 = partnered, -0.5 = unpartnered), and average progesterone for each participant divided by 400 (following Jones et al., 2018, to facilitate model calculations) and centered on the grand mean of the average progesterone values across all participants. The full analysis code and data are available at https://osf.io/q9szc/.

Our model showed significant main effects of context (beta = 0.133, SE = 0.046, z = 2.880, p = 0.004, 95% CI = 0.0423, 0.2227) and partnership status (beta = 0.379, SE = 0.111, z = 3.401, p < .001, 95% CI = 0.161, 0.597). Replicating Marcinkowska et al. (2018), our model also showed a significant interaction between partnership status and average progesterone (beta = -1.447, SE = 0.615, z = -2.353, p = 0.019, 95% CI = -2.653, -0.242). Separate analyses by partnership status showed that the direction of the relationship between masculinity preference and average progesterone was positive for unpartnered women (beta = 0.700, SE = 0.398, z = 1.760, p = 0.078) and negative for partnered women (beta = -0.753, SE = 0.505, z = -1.491, p = 0.136).

Discussion

Marcinkowska et al. (2018) reported that women's facial masculinity preferences were predicted by the interaction between partnership status and average progesterone. Here we replicated this finding in a larger sample of women, using open data from Jones et al. (2018). Like Marcinkowska et al. (2018), average progesterone tended to be negatively correlated with masculinity preferences for women in romantic relationships and tended to be positively correlated with masculinity preferences for women not in romantic

relationships. Together, our and Marcinkowska et al's (2018) results suggest that the combined (i.e., interactive) effects of average progesterone level and partnership status predict women's facial masculinity preferences somewhat reliably. Furthermore, these results highlight the importance of considering possible effects of partnership status when testing for links between hormone levels and women's masculinity preferences.

In addition to the interaction described above, women preferred masculine men more for short-term relationships than long-term relationships. Partnered women showed stronger preferences for masculine men than did unpartnered women. Both of these results are consistent with previous research reporting effects of relationship context and partnership status on women's facial masculinity preferences (e.g., Little et al., 2002) and are consistent with the proposal that women show stronger preferences for masculine men in circumstances where investment in the relationship is likely to be less important (e.g., extra-pair relationships, Gangestad & Simpson, 2000).

In conclusion, here we used open data from a large study testing for within-subject effects of steroid hormones on women's masculinity preferences (Jones et al., 2018) to replicate the key result from Marcinkowska et al. (2018). Like Marcinkowska et al. (2018), we found that individual differences in women's facial masculinity preferences were predicted by the interaction between partnership status and average progesterone. Together, these results suggest that the combined effects of these variables on masculinity preferences is relatively robust.

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