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Lack of support for relation between woman's masculinity preference, estradiol level and mating context

Urszula M. Marcinkowska [a,*], Peter T. Ellison [b], Andrzej Galbarczyk [a], Karolina Milkowska [a], Boguslaw Pawlowski [c], Inger Thune [d], Grazyna Jasienska [a,e]

[a] Department of Environmental Health, Faculty of Health Sciences, Jagiellonian University Medical College, 20 Grzegorzecka St., 31-531 Krakow, Poland
[b] Department of Human Evolutionary Biology, Harvard University, 11 Divinity Av., Cambridge, MA 02138, USA
[c] Department of Human Biology, University of Wrocław, Kuźnicza 35, Wrocław, Poland
[d] Department of Oncology, Oslo University Hospital, Ullevål, Oslo, Norway
[e] Department of Anthropology, Yale University, 10 Sachem Street, New Haven, CT 06511-3707, USA

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ABSTRACT

It has been proposed that women's preferences for male facial sexual dimorphism are positively correlated with conception probability and differ between short- and long-term mating contexts. In this study, we tested this assumption by analyzing relationships between estradiol levels to the women's preferences of male faces that were manipulated to vary in masculinity. Estradiol was measured in daily saliva samples throughout the entire menstrual cycle collected by Polish women with regular menstrual cycles. In our analyses, we included the three most commonly used definitions of the fertile window in the literature. After computing the overall masculinity preference of each participant and measuring hormone levels, we found that i) the timing of ovulation varied greatly among women (between −11 and −17 days from the onset of the next menses, counting backwards), ii) there was no relationship between daily, measured during the day of the test (N = 83) or average for the cycle (N = 115) estradiol levels and masculinity preferences, iii) there were no differences in masculinity preferences between women in low- and high-conception probability phases of the cycle, and iv) there were no differences in masculinity preferences between short- and long-term mating contexts. Our results do not support the idea that women's preferences for a potential sexual partner's facial masculinity fluctuate throughout the cycle.

Introduction

Many studies suggest that women's preferences for male traits such as masculinity, symmetry and dominance differ between fertile and non-fertile phases of the menstrual cycle. When in fertile phase, women were found to exhibit stronger preferences for more masculine voices (Puts, 2005), body odors (Thornhill et al., 2013) and body shapes (Little et al., 2007) or increased height (Pawlowski and Jasienska, 2005). Many studies have also documented that women exhibit stronger preferences for facial masculinity around the time of ovulation (e.g., Penton-Voak and Perrett, 2000). This fluctuation in preference for masculinity may have evolved as a trade-off between choosing cooperative, warm, and caregiving (i.e., less masculine) partners that are more suited to long-term relationships and partners with purported higher genetic quality (i.e., more masculine, Perrett et al., 1998). Despite numerous studies, common agreement regarding the evolutionary bases (or the occurrence) of this fluctuation is lacking (for a debate on this topic, see DeBruine et al. (2010); Gildersleeve et al. (2014a, 2014b); Harris (2011); Wood (2014)).

Hormonal fluctuations

As the menstrual cycle is characterized by changing levels of steroid hormones, it is likely that changes in women's preferences throughout the cycle may be primarily attributable to fluctuating hormone levels (Bobst et al., 2014). The menstrual cycle has an average length of 28 days and comprises two ovarian phases: the follicular phase that begins on the first day of menstrual bleeding and continues until ovulation, and the luteal phase that begins after ovulation and continues until the day before next menstrual bleeding (Hawkinsa and Matzuk, 2008). In fully functioning cycles, during the follicular phase, a mature follicle is produced, which then releases an egg in a process called ovulation. The ovary secretes estradiol, progesterone and inhibins. Mid-

* Corresponding author at: Department of Environmental Health, Faculty of Health Sciences, Jagiellonian University Medical College, 20 Grzegorzecka St., 31-531 Krakow, Poland.
E-mail address: ummarcinkowska@gmail.com (U.M. Marcinkowska).

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cycle drop in estradiol is a reasonable estimate of the day of ovulation (Lipson and Ellison, 1996).

When does the fertile phase occur?

A body of evidence has found that pre-menopausal women in the most fertile phase of their cycle (and who do not take hormonal contraceptives) have stronger preferences for more masculine faces than they do in their less fertile phases (for a review, see DeBruine et al., 2010). Some studies, however, did not replicate these results (for a meta-analysis, see Gildersleeve et al., 2014aand Wood et al., 2014). One limitation of studies on masculinity preferences and their fluctuations throughout the menstrual cycle is a lack of consistency in the methods used to determine the fertile window. Authors usually do not measure levels of steroid hormones and do not use physiological methods to detect ovulation, but assign women to being in "fertile" or "non-fertile" phase based on a cycle length. This methodology is problematic due to a high variability in menstrual cycle length (Chiazze et al., 1968) and intra- and inter-individual variation in levels of reproductive steroid hormones (Jasienska and Jasienski, 2008). Penton-Voak et al. (1999) defined the fertile phase as ranging from the end of previous menses to 14 days prior to next menses. In a later study, Penton-Voak and Perrett (2000) defined the high-conception probability phase as between 6 and 14 days from the onset of the previous menses. Macrae et al. (2002) and Garver-Apgar et al. (2008) proposed using a backward-counting method to estimate the fertile window; their proposed high-conception probability phases were, respectively, from 2 or 4 days prior to the ovulation. Some authors combined different approaches to determine the fertile window (i.e., Harris, 2011), which resulted in a 5-day window around ovulation (for more examples see meta-analysis by Gildersleeve et al., 2014b). To reliably use these methods, it must be assumed that cycle length and, particularly, the length of the luteal phase is consistent among participants. From studies of hormonal levels in naturally cycling women, we know that this assumption is problematic; multiple factors (Wilcox et al., 2000, Jasienska, 2013) cause cycle lengths to vary within and among participants (Jasienska and Jasienski, 2008). Although it is well established that levels of steroid hormones fluctuate during a cycle, there are surprisingly few studies on mate preferences that incorporate actual measurements of hormonal levels in naturally cycling women (Pisanski et al., 2014, Roney and Simmons, 2008).

Fluctuation of preferences

Ovarian steroid hormones play an important role in female sexual motivation and behavior (Durante and Li, 2009) and overall preference of male facial attractiveness is the highest during the fertile phase of the cycle (Danel and Pawlowski, 2006). Other studies showed that general preference shifts occur only when attractiveness is judged in a short-term, and not in a long-term context (Little and Jones, 2012) or only for women who were in a committed relationship (Little et al., 2008). However, the agreement on the robustness of women's cyclical preferences shifts is lacking. In the most recent meta-analysis of studies investigating menstrual cycle shifts in women's preferences, Gildersleeve et al. (2014a) reported "… analyses revealed robust cycle shifts that were specific to women's preferences for hypothesized cues of (ancestral) genetic quality…". In contrast, a meta-analysis by Wood et al. (2014) was "largely non-supportive [of this hypothesis]. Specifically, fertile women did not desire sex in short-term relationships with men purported to be of high genetic quality (i.e., high masculinity …)". It has been suggested though, that lack of support for cyclical shifts in Wood et al. (2014) could have been caused by differences in methodological and analytic decisions made by the authors (Gildersleeve et al., 2014b, Wood and Carden, 2014).

Hormones and masculinity preferences

Although sex steroid hormones were suggested to be associated with visual processing (Little, 2013) there are surprisingly few studies of preferences that directly measured hormone levels, and those that did measure hormonal levels had conflicting results. Welling et al. (2007), based on within-participants measurements (N = 70), identified a positive correlation of preferences for masculinity and testosterone but failed to find a relationship with estradiol or progesterone. Similar relationships were documented by Bobst et al. (2014) for 27 cycling women. Rosen and Lopes (2009) found in a between-participants study that courtship language preferences fluctuated depending on estradiol levels of participants (N = 17) but not on progesterone or testosterone levels. Salivary estradiol fluctuations have also been found to best predict changes in women's (N = 62) preferences for vocal masculinity (Pisanski et al., 2014). Finally, Roney and Simmons (2008) reported a positive correlation of woman's (N = 75) estradiol levels and preference for the faces of males with high circulating testosterone levels. It should be noted that the studies on preferences that measured hormone levels were not free from methodological problems, including having as participants young women, who are known to have irregular cycles and cycles with low hormone levels, estimating cycle length, taking a single or only a few samples for hormonal assessments from each participant, collecting samples at different times of a day, comparing hormonal values obtained from saliva samples to previously published estimates that were obtained from serum samples, or having small number of participating women. In our sample we aimed to repeat preference measurements correcting for all above mentioned flaws.

Study aim

In this study, we sought to identify the putative fluctuation of facial masculinity preferences exhibited by women throughout the menstrual cycle. Because we measured estradiol levels in saliva samples collected daily for the entire cycle, we were able to detect the day of ovulation based on physiology, rather than estimating ovulation by counting the days of the cycle (i.e., the method used in most previous studies). We compared the masculinity preferences of women from high- and low-conception probability groups (between participant measurement) and also tested how preferences differed within those two groups depending on the mating context (within-participant measurement). Furthermore, we tested for relation between masculinity preferences and estradiol levels of participants. To add to the ongoing debate about the existence of fluctuating masculinity preferences, we conducted 4 separate analyses that compared results based on previously used definitions of the fertile window. Definitions came from studies that did not include hormonal measurements.

Methods

Participants

A total of 115 women from Poland (average age = 29.9, SD = 3.46) participated in this study. Women were recruited between June 2001 and June 2003 by posted advertisements in public places and by newspaper, radio and television. On the basis of an initial interview, the women that were selected to participate in this study were limited to those who met following criteria: between 24 and 36 years of age, regular menstrual cycles and no fertility problems, no gynecological or chronic disorders (e.g., diabetes, hypo/hyperthyroidism), not pregnant or lactating in the 6 months prior to recruitment, and not using hormonal contraception or taking any hormonal medication in the 6 months prior to recruitment.