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Women's attractiveness judgments of self-resembling faces change across the menstrual cycle

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Abstract

Two lines of reasoning predict that women's preferences for people exhibiting cues to kinship will be lower in the follicular phase than in the luteal phase of the menstrual cycle. Women may avoid kinship cues during the follicular phase when they are most fertile due to the costs of inbreeding. Alternatively, women may seek kinship cues during the luteal phase as a byproduct of the benefits of associating with kin during pregnancy, which is also characterized by high progesterone. We find that preferences for facial resemblance, a putative kinship cue, follow this predicted pattern and are positively correlated with estimated progesterone levels based on cycle day. Neither estimated estrogen levels nor conception risk predicted preferences for self-resemblance, and the cyclic shift was stronger for preferences for female faces than male faces. These findings lead to the possibility that this cyclic change in preference for self-resemblance may be a byproduct of a hormonal mechanism for increasing affiliative behavior toward kin during pregnancy rather than a mechanism for preventing inbreeding during fertile periods.
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Introduction

Women's preferences for masculine male faces (Johnston et al., 2001; Penton-Voak et al., 1999), faces with cues associated with apparent health (Jones, in press), the body odor of symmetric men (Gangestad and Thornhill, 1998), the body odor of men with immunocompetent genotypes (Thornhill et al., 2003), and masculine behavioral displays (Gangestad et al., 2004) have all been shown to change across the menstrual cycle. While traits such as masculinity and symmetry that are thought to be associated with indirect benefits (i.e., those that reflect good genetic quality) are preferred in the follicular phase when women are most fertile, traits such as current health and diverse genes for immune

system strength that are thought to be associated with direct benefits (i.e., non-heritable benefits) are preferred in the luteal phase and also during pregnancy (Jones, in press).

Cues of kinship can signal both increased direct benefits in the form of altruism from family members and decreased indirect benefits in the form of inbreeding depression. Major histocompatibility complex (MHC) similarity is one potential cue of kinship. Manning et al. (1992) reported that pregnant female mice prefer to nest with others who share their MHC odor signature. Women who use oral contraceptives, which increase progesterone to levels similar to pregnancy and the luteal phase, have been shown to prefer MHC similarity more than women with natural cycles (Wedekind et al., 1995). Results regarding MHC preferences suggest that other cues of kinship, such as facial resemblance, may also be preferred when women's hormonal profile is similar to that of pregnancy. In addition, the costs of inbreeding are highest when women are most fertile, which could cause preferences for cues of kinship to be lowest in the follicular phase. The genetic costs of

inbreeding (e.g., greater incidence of early death of children) in a short-term relationship cannot be offset by the benefits of a long-term relationship with kin (e.g., greater duration of marriage and extended family support for a large family size, Bittles et al., 2002). Accordingly, both men and women judge self-resembling other-sex faces to be less attractive in the context of a short-term relationship than a long-term relationship (DeBruine, in press).

Most previous studies of cyclic shifts in preferences have compared preferences between high conception risk days and low conception risk days (Penton-Voak et al., 1999; Johnston et al., 2001) or have correlated preferences with estimates of conception risk (Gangestad and Thornhill, 1998; Gangestad et al., 2004; Thornhill et al., 2003). Although cyclic changes may function to alter preferences during times of peak fertility, they must be driven by some proximate mechanism such as hormone levels, which may have a different cyclic pattern than fertility.

In the current study, we assessed preferences for self-resemblance, a potential cue of kinship (DeBruine, 2002, 2004a,b; DeBruine, in press), in women at varying points in their menstrual cycles. Progesterone and estrogen levels (Alliende, 2002), and conception risk (Wilcox et al., 2001) were estimated for each cycle day from published data. Preferences for male and female self-resembling faces were assessed using faces computer generated from participants' images. If cyclic changes in preferences for cues of kinship function to increase kin affiliation during pregnancy, preferences for facial resemblance should be greatest in the luteal phase when progesterone levels are highest and should be equally or more pronounced for female faces than for male faces (i.e., unlikely to be stronger for male faces). Alternatively, if cyclic changes in preferences for cues of kinship function to decrease the likelihood of an incestuous mating during fertile periods, preferences for facial resemblance should also be negatively correlated with conception risk and should be equally or more pronounced for male faces than for female faces (i.e., unlikely to be stronger for female faces).

Method

Participants

Participants were 74 women between the ages of 17 and 22 (Mean = 18.8, SD = 1.0) who reported no pregnancy or hormonal contraceptive use. None of the women reported having children. Three women were excluded because they reported a current cycle day of 40, 56, and 78 days and thus were likely to be experiencing an abnormal menstrual cycle. The remaining 71 women were divided into three broad ethnic groups for the purposes of face manipulation (12 East Asian, 8 West Asian, 51 European).

For the between groups analysis, women were divided into two groups based on phase of menstrual cycle. Women on days 6–14 were in the late follicular group ($N = 21$) and women on days 17–27 were in the luteal group ($N = 22$). Women on days 15 and 16 were excluded because they cannot be reliably assigned to the late follicular or luteal phases without hormonal assays or information about typical cycle length. These cycle phases were chosen because they differ most in estimated progesterone levels, estrogen levels, and conception risk. All women's data were used for analyses correlating estimated progesterone, estrogen, and conception risk with preferences for self-resembling faces.

Stimuli

Participants viewed stimuli made from four different composite images: young adult men, young adult women, adult men, and adult women of the same ethnic group as each participant. Each composite was formed by averaging the shape, color, and texture of 15–50 faces of the same sex, ethnic group (East Asian, West Asian, European), and age group (young adults age 13–20, adults age 25–30). Participants were asked to estimate the age of the faces after each testing block. The average perceived ages ($\pm$SD) of the transformed composite faces were similar to the average ages of the faces each of the composites were made from (young adult men, 19.5 $\pm$ 2.9; young adult women, 18.9 $\pm$ 2.5; adult men 27.2 $\pm$ 6.1; adult women 27.3 $\pm$ 4.3). Composites were transformed to resemble each participant (Fig. 1). The transformation process is described in DeBruine (2004b) and technical aspects of the computer graphic methods are described in Tiddeman et al. (2001). Resemblance was subtle and at debriefing, when asked for guesses as to what the study was about, no participants reported detecting the use of their own face in the stimuli.

Procedure

The study was run as part of a larger block of experiments, some of which required repeated testing a week apart. Digital images of the participants' head and shoulders were taken the first week for an unrelated study of facial symmetry and masculinity. These images were used to construct the self-resembling faces.

The testing procedure was identical to that used by DeBruine (2004b). Four testing blocks (young adult female, adult female, young adult male, adult male) were presented in randomized order. In each block, participants viewed all 36 possible paired combinations of 9 images and were instructed to "Choose the more attractive face" by clicking on the face with a computer mouse. The 9 images were made from one of the four composite faces, one transformed to resemble the participant and 8 transformed to resemble 8 other participants, who also viewed the same testing blocks.

Preference for self-resemblance was calculated by subtracting the average number of times that participants chose a particular image as the more attractive of the pair (out of a