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Women's genital sexual arousal to oral versus penetrative heterosexual sex varies with menstrual cycle phase at first exposure

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ABSTRACT

Reproductive-aged women show increased interest in sexual activity during the fertile phase of the menstrual cycle that can motivate sexual behavior and thereby increase the likelihood of conception. We examined whether women demonstrated greater sexual responses (subjective and genital sexual arousal) to penetrative versus oral sexual activities during the fertile versus non-fertile phases of their cycles, and whether women's arousal responses were influenced by the phase during which they were first exposed to these sexual stimuli (e.g., Slob et al., 1991; Wallen and Rupp, 2010). Twenty-two androphilic women completed two identical sexual arousal assessments in which genital responses were measured with a vaginal photoplethysmograph and their feelings of sexual arousal were recorded. Women viewed an array of 90 s films varying by couple type (female–female, male–male, female–male) and sexual activity type (oral or penetrative), during the fertile (follicular) and non-fertile (luteal) phases of their menstrual cycle, with the order of cycle phase at the first testing session counter-balanced. Women tested first in the fertile phase showed significantly greater genital arousal to female–male penetrative versus oral sex in both testing sessions, whereas self-reports of sexual arousal were not affected by cycle phase or testing order. These results contribute to a growing body of research suggesting that fertility status at first exposure to sexual stimuli has a significant effect on subsequent sexual responses to sexual stimuli, and that this effect may differ for subjective versus genital sexual arousal.

Introduction

Women's sexuality changes significantly across the menstrual cycle, with women's interest in sexual behavior peaking during the most fertile phase, or the periovulatory period. Women report that they have more sexual fantasies (Bullivant et al., 2004; Dawson et al., 2012) and that their fantasies are more intense (Bullivant et al., 2004) and arousing (Dawson et al., 2012) at or around the time of ovulation. Sexual desire tends to be heightened during the periovulatory period (Bullivant et al., 2004; Roney and Simmons, 2013; Stanislaw and Rice, 1998), though not consistently (e.g., Pillsworth et al., 2004; Regan, 1996). Similarly, women engage in a greater number of behaviors that would increase the probability of encountering and attracting potential sexual partners during this time. For example, single (Durante et al., 2008) and pair-bonded women (Haselton et al., 2007; but see Durante et al., 2008) dress in more revealing clothing, single and pair-bonded women report more interest in attending events where they may meet sexual partners (Haselton and Gangestad, 2006), and naturally cycling women's gait tends to be slower and rated as "sexier" (Guéguen, 2012, but also see Provost et al., 2008). Women in the fertile phase are also significantly more likely to give out their telephone numbers (Guéguen, 2009a) and accept requests for slow dances from male confederates (Guéguen, 2009b) than women in the non-fertile phase of their menstrual cycle. Taken together, these results indicate that women's sexual cognitions, emotions, interests, and behaviors change significantly across the menstrual cycle.

The frequency of women's sexual behavior also fluctuates across the menstrual cycle. Consistent with shifts in sexual desire, both androphilic women (i.e., women who are sexually attracted to men) and gynephilic women (i.e., women who are sexually attracted to other women) report greater sexual activity at or around the time of ovulation (Adams et al., 1978; Brown et al., 2011; Bullivant et al., 2004; Harvey, 1987; Diamond and Wallen, 2011; but see Brewis and Meyer, 2005). Increases in sexual activity include an increase in female-initiated partnered sex (Adams et al., 1978), autosexual (i.e., masturbation) behaviors (Adams et al., 1978; Harvey, 1987), and male-initiated sexual activity (Harvey, 1987), as well as reduced female rejection of sexual advances within heterosexual relationships (Harvey, 1987). Women also report feeling significantly more sexually aroused during these activities when in the fertile compared to the non-fertile phase (Harvey, 1987) and are more likely to reach orgasm during penile–vaginal intercourse when fertile (Marczyk, 2011; but see Caruso et al., 2005). Consistent with the literature showing shifts in women's sexual cognitions, emotions, and behaviors, women's interest in sexual activity, initiation of sex, and the pleasure derived from it also increase when fertile.

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Given that women's interest in and self-reported arousal from sexual activity increase when fertile, one might also expect to find differences in sexual responses or interest in sexual stimuli across the menstrual cycle. Specifically, greater genital responses and subjective feelings of sexual arousal to sexual stimuli may be related to shifts in reproductive behavior and thereby influence the likelihood of conception. In the present study, we examined women's sexual responses to depictions of different sexual activities (i.e., penetrative and oral sex), including those that could directly lead to conception (i.e., penetrative versus oral sex between a woman and man relative to the same activities between two women and two men) during women's fertile (i.e., follicular) and non-fertile (i.e., luteal) cycle phases to examine cycle-related shifts in patterns of sexual arousal.

Sexual psychophysiology and the menstrual cycle

There is mixed evidence for increases in women's genital responses and subjective sexual arousal during fertile phases of the menstrual cycle. For example, Schreiner-Engel et al. (1981) found that women showed significantly stronger genital responses (assessed using a vaginal photoplethysmograph, VPP) in the follicular and luteal phases, relative to the ovulatory phase, and a similar non-significant trend for subjective sexual arousal. Hoon et al. (1982) did not find significant changes in genital blood flow or subjective sexual arousal across the menstrual cycle. Meuwissen and Over (1992) found that women's genital responses, also measured via VPP, were greatest following ovulation toward the end of the menstrual cycle, and that subjective sexual arousal did not vary across the menstrual cycle, inconsistent with the notion that women's sexual responses peak at or around ovulation to motivate sexual activity and facilitate conception.

Wallen and Rupp (2010) suggested that the lack of a consistent relationship between a woman's hormonal status (inferred from cycle phase) and her sexual arousal to sexual stimuli across the menstrual cycle may be obscured or masked by an *order effect*, whereby a woman's cycle phase when first exposed to sexual stimuli influences responses during both the initial and subsequent testing sessions. Slob et al. (1991) were the first to report such an effect based on women's labial temperature in response to an erotic audiovisual stimulus. Women who were first tested in the luteal phase exhibited lower levels of genital response during this first session, but higher levels of genital response in their subsequent testing session in the follicular phase. Women first tested in the follicular phase exhibited high levels of genital response, and these large increases in genital temperature were maintained in their second testing session in the luteal phase. Subjective reports of sexual arousal were, however, unaffected by the order of testing sessions. These results were later replicated by Slob et al. (1996) using the same methodology, and then again by Wallen and Rupp (2010) using viewing time as a measure of sexual interest. Wallen and Rupp (2010) found that women who were first tested in the fertile phase of their menstrual cycle showed longer viewing times for sexual stimuli overall compared to those women who started the study in their luteal phase, but women's subjective reports (sexual attractiveness of the images) were not affected by testing order. Overall, these results suggest that cycle phase at first exposure to sexual stimuli significantly influences women's genital sexual responses and objectively assessed attention to sexual stimuli during the initial and subsequent testing sessions.

Until recently, all research examining cycle-related changes in sexual arousal examined change in *magnitude* of responding to preferred sexual stimuli (e.g., heterosexual sex) as a function of fertility status, with mixed results (Hoon et al., 1982; Meuwissen and Over, 1992; Schreiner-Engel et al., 1981; Slob et al., 1991, 1996); instead of the magnitude of sexual responses to preferred stimuli, perhaps women demonstrate variation in their *relative pattern* of sexual responses to preferred and nonpreferred sexual stimuli. We recently investigated whether androphilic women's sexual responses to reproductively relevant sexual targets (men) relative to stimuli featuring women (reproductively irrelevant targets) changed across the menstrual cycle. On average, androphilic women's genital sexual responses to stimuli depicting preferred and nonpreferred couple types (e.g., heterosexual versus same-sex; Chivers et al., 2004; Chivers and Bailey, 2005; Chivers et al., 2007; Suschinsky et al., 2009) or gender of the person described (Chivers and Timmers, 2012) are undifferentiated, thus androphilic women exhibit a pattern of *category-nonspecific* genital response with respect to gender (i.e., *gender-nonspecificity*). Bossio et al. (2013) tested women in the fertile and non-fertile phases of their cycle, counter-balancing cycle phase, and found that women's genital response patterns were gender-nonspecific regardless of cycle phase and testing order. Subjective responses were not influenced by cycle phase or testing order.

Bossio et al.'s (2013) results are consistent with previous literature suggesting that gender cues are less influential than sexual activity cues for women's genital responses. Women show greater genital response to stimuli depicting partnered sexual activities (intercourse and oral sex) relative to solitary sexual activities (masturbation) and non-sexual activities (nude exercise; Chivers et al., 2007). Likewise, women show lower genital arousal to stimuli depicting couples engaging in lower intensity sexual activities such as kissing and caressing compared to stimuli depicting couples engaging in higher intensity activities such as oral or penetrative sex (Laan et al., 1995a,b; Suschinsky et al., 2009). Women with preferences for conventional sexual activities show significantly greater genital responses to stimuli depicting conventional sex relative to masochistic sex (Chivers et al., 2013). Thus, women's genital responses may be *category-specific* with respect to activity cues (i.e., demonstrates *activity-specificity*). To date, no research has examined whether women's genital responses differentiate between types of sexual activities (i.e., penetrative and oral sex), including those that could directly lead to conception or not, namely penetrative versus oral sex between a woman and man relative to other couple types, and whether these sexual responses fluctuate across the menstrual cycle.

Current study

In the current study, we examined whether women's sexual response patterns (i.e., genital responses and subjective feelings of sexual arousal) to oral and penetrative sexual activities varied as a function of testing order, cycle phase, and couple type. Given previous research indicating that women's genital sexual responses are more influenced by activity than gender cues (Chivers, 2010), we expected that women's genital responses would vary based on the activity depicted (e.g., greater arousal to penetrative sex), but not the gender of the actors depicted; subjective sexual arousal was expected to vary as a function of both activity and gender cues. Based on the evidence that women show increased sexual interest during peak fertility, as well as the hypothesis that increased sexual interest is associated with sexual response, we predicted that women would show greater genital response and report more arousal to penetrative sex in the fertile (follicular) phase relative to the non-fertile (luteal) phase of the menstrual cycle. Lastly, based on Slob et al.'s (1991, 1996) and Wallen and Rupp's (2010) work, we predicted that women tested in the fertile phase first would show greater genital response than luteal phase first women in both testing sessions. Subjective sexual arousal was not expected to be affected by order of testing sessions.

Method

Participants

Thirty-seven naturally cycling, androphilic women were recruited from a university campus via posters. Eligibility criteria were identical to previous research (e.g., Bossio et al., 2013) and included: Aged 18