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Mating Strategies across the Menstrual Cycle:

Preferences, Jealousy, and Masculinity

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Abstract

Recent research suggests that there is more within- than between-sex variation in sociosexuality and that there may be organizational and activational effects of gonadal steroids on the mating tactics of women. For instance, there is preliminary evidence of a periovulatory sociosexuality tactic shift (PSTS), whereby women exhibit shifts away from their primary strategies when fertility is high. The present study was one of the first to examine mate preferences as measured by the Romantic Partner Attribute Index, and romantic jealousy, across the menstrual cycle. Two hundred and thirteen women completed a Laboratory Session and an Online Questionnaire at each of three phases (menstrual, preovulatory, and luteal), but only 14 met strict post hoc criteria for phase comparisons. Also, second-to-fourth digit ratio (2D:4D), a sexually dimorphic putative measure of prenatal androgen exposure, was obtained. Although support for the hypothesis that relationship interest, mate preferences, and extra-pair desire would exhibit PSTSs was not found, there was evidence of phase effects for long-term interest, the importance of personal/parenting attributes in a long-term mate, and behavioural jealousy. Women tended to (a) report more interest in a long-term relationship in the luteal than the preovulatory phase, (b) rate personal traits in a mate as more important in the preovulatory than the luteal phase, and (c) display more behavioural jealousy in the preovulatory and luteal phases than the menstrual phase. The findings were interpreted in the context of theories in psychoendocrinology and evolutionary psychology. Also, supplementary analyses indicated that sociosexual unrestrictiveness increased with masculinity and that both were similarly related to most other variables of interest in the expected directions. Overall, this study suggests that restricted and unrestricted women, as well as self-ascribed masculine and non-masculine women, may employ different reproductive strategies and tactics, including mate selection criteria.

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Mating Strategies across the Menstrual Cycle:
Preferences, Jealousy, and Masculinity

The mating strategies of animals, including humans, have been of interest to evolutionary psychologists for centuries (see Buss, 2005). In brief, a mating or sexual strategy is a cohesive array of adaptations that organize and direct an individual's overall reproductive efforts (Belsky, Steinberg, & Draper, 1991; Buss & Schmitt, 1993; Gangestad & Simpson, 1990; Gangestad & Simpson, 2000; Simpson & Lapaglia, 2007; Trivers, 1972). In contrast, tactics are the specific actions and behaviors of an individual for the purpose of (i.e., within) a mating strategy (Buss, 1998; Greer & Buss, 1994; Simpson & Lapaglia, 2007). As Buss and Schmitt (1993), Gangestad and Simpson (2000), and Simpson and Lapaglia (2007) discuss, mating strategies and tactics need not be deliberate; namely, mating strategies are considered to be implicit decision rules and psychological mechanisms.

It is generally agreed that most species have evolved context dependent (Buss & Schmitt, 1993), conditional (Gross, 1996), ecologically-contingent (Gangestad & Simpson, 1990), mixed (Trivers, 1972) mating strategies. In humans, strategy and tactic deployment may depend on an individual's self-perceived mate value (Landolt, Lalumiere, & Quinsey, 1995) and physical attractiveness (Clark, 2004), environmental context such as need for biparental care (Schmitt, 2005a) and pathogen prevalence (Gangestad & Buss, 1993), and organizational and activational effects of hormones (see Gangestad, Thornhill, & Garver-Apgar, 2005; and Moore, 1991). One of the more recent and significant models of human sexuality, Buss and Schmitt's (1993) sexual strategies theory (SST), implies that mating exists on a bipolar, temporal dimension ranging from short-term to long-term. Long-term mating often involves pair-bonding, commitment, affection, and biparental care of offspring, an example being matrimony. Short-term mating is characterized by transient sexual relationships (Schmitt, 2005b).

Sociosexuality

In 1991, Simpson and Gangestad published the Sociosexual Orientation Inventory (SOI), a measure of within-sex variance in human mating strategy. Sociosexual orientation or sociosexuality is considered a bipolar, individual difference dimension ranging from restrictive (low SOI score) to unrestricted (high SOI score). Those with a restricted sociosexual orientation tend to require emotional intimacy with, and commitment from, a romantic partner to feel comfortable having sex. Alternatively, unrestricted individuals are considered to be fairly promiscuous in that they are more willing to have casual sex (Gangestad & Simpson, 1990).

Restrictiveness seems to be analogous to a long-term mating strategy, while unrestrictiveness may be akin to a short-term approach to mating. That is, mating strategies differ in the degree to which they are conservative (Allen & Bailey, 2007). SST hypothesizes that men, more so than women, have evolved to enact short-term mating strategies and tactics due to sex differences in parental investment and sexual selection pressures (Buss & Schmitt, 1993). Indeed, Buss and Schmitt found that more men than women reported that they were looking for short-term relationships. A sex difference was also found in the desire for sexual variety in a sample of 16, 288 people across 52 nations, 6 continents, and 13 islands (Schmitt, 2003). Moreover, across 48 nations, men had higher SOI scores and were thus more sociosexually unrestricted than woman (Schmitt, 2005a).

While SST focuses on sex differentiation, the strategic pluralism model (SPM) of human mating applies to within-sex variation, particularly that of women (Simpson & Gangestad, 2000). The core premise of SPM is that mating strategies and tactics are more pluralistic or diverse within the sexes than between them. As Simpson and Gangestad revealed, only 16% of the variance in seeking short-term partners was accounted for by sex in Buss and Schmitt's (1993)

sample. Also, in comparison to the median views of women, approximately 30% of men held less favourable attitudes toward uncommitted sex. Taken together, such findings suggest that significant overlap exists between the sociosexual attitudes and behaviors of men and women (Simpson & Gangestad, 2000).

In explaining why women may have evolved a repertoire of mating strategies, SPM unites good genes and good provider theories of sexual selection (Simpson & Lapaglia, 2007). More specifically, SPM posits that women should value viability and investing potential in men so as to pass adaptive attributes to, and ensure the survival of, their offspring, respectively. However, women probably evolved to selectively trade-off between these two characteristics in men (Gangestad & Simpson, 2000). SST implies that women lure men into, and assess them for, long-term relationships through short-term mating (Buss & Schmitt, 1993). In comparison, SPM hypothesizes that short-term and long-term mating are quite independent in that short-term mating evolved as a means to seek genetic benefits for offspring (Gangestad & Simpson, 2000).

Evidence of strategic pluralism in human female mating comes from several lines of research. First, sociosexuality has been linked to mate preferences. Over three studies, Simpson and Gangestad (1992) found that sociosexually restricted men and women were likely to rate personal/parenting qualities on the Romantic Partner Attribute Index (RPAI) as most important in a romantic partner as well as choose prospective mates and actually have partners with such qualities. The same pattern of results was apparent in individuals with an unrestrictive sociosexual orientation, a short-term mating strategy, but with the qualities of attractiveness/social visibility. However, Cunningham and Russell (2004) determined that SOI score was unrelated to partner preferences such as attractiveness and status, yet a positive predictor of the importance of commitment.

Second, mate preferences change across the menstrual cycle in predictable ways, with a tendency to switch to signals of genetic quality around the preovulatory phase (Gangestad et al., 2005). Free-cycling women, those who do not use a hormonal contraceptive (HC), prefer masculine faces (Jones et al., 2005), vocal masculinity (Puts, 2005), the scent of symmetrical men (Thornhill & Gangestad, 1999; Thornhill et al., 2003), and symmetrical male faces (Little, Jones, Burt, & Perrett, 2007; cf. Cardenas & Harris, 2007; Koehler, Rhodes, & Simmons, 2002; Oinonen & Mazmanian, 2007) when fertile. Furthermore, such women find behavioral displays of social presence and direct intrasexual competition (Gangestad, Simpson, Cousins, Garver-Apgar, & Christensen, 2004), masculine male bodies (Little, Jones, & Burriss, 2007), and creativity (Haselton & Miller, 2006) most attractive when they are fertile and evaluating men as potential short-term partners. It is therefore surprising that the RPAI has yet to be compared across ovarian phases.

Third, not only do women show changes in preferences across the menstrual cycle, they also show mating tactic shifts. For instance, women's reports of extra-pair desire and fantasy peak with fertility and thus conception likelihood (Gangestad, Thornhill, & Garver, 2002; Gangestad et al., 2005; cf. Pillsworth, Haselton, & Buss, 2004). They also report less commitment to their partners during the late follicular phase (Jones et al., 2005). Gangestad et al. (2002) and Pillsworth and Haselton (2006) found that in-pair desire did not significantly change across the menstrual cycle. However, women report that their primary partners' engage in more mate retention tactics near the relatively fertile ovulatory phase (Gangestad et al., 2002).

More recently, Oinonen, Klemencic, and Mazmanian (2008) found preliminary evidence of a periovulatory sociosexuality tactic shift (PSTS). Free-cycling women were categorized as sociosexually restricted or unrestricted using the 50th percentile of mean SOI scores at two

menstrual cycle phases (periovulatory, and luteal or menstrual) as the cut-off point. As measured by ratings of male faces, restricted women shifted towards greater one-night stand interest during the periovulatory phase. Their SOI scores however did not significantly differ across phases. Conversely, unrestricted women displayed a trend towards diminished interest in one-night stands and a shift towards restrictiveness at the periovulatory phase.

Overall, the results of Oinonen, Klemencic, et al. (2008) suggest that women may be hormonally primed for one of two mating strategies that show opposing patterns of sociosexual orientation across the menstrual cycle. While restricted women seem to avoid casual sex for the majority of their cycle, they may shift towards greater interest in uncommitted sex when they are most likely to conceive. Although unrestricted women may show relatively more interest in uncommitted sex for the majority of their cycle, they seem to shift towards a restricted interest in casual sex when they are most fertile. To be exact, both groups may have a PSTS away from their primary strategy. Such a phenomenon, arguably extending Simpson and Gangestad's (2000) SPM, necessitates further investigation.

Masculinity

Gender identity. The sociosexual variance observed between women, and between men for that matter, may be influenced by their gender identities or roles. As implied previously, women who score relatively high on the SOI may employ mating strategies and tactics that are masculine (i.e., typical of, or normative for, men) (Buss & Schmitt, 1993). For example, more men than women, and more self-ascribed masculine men and women than their feminine counterparts, consider physical attractiveness rather than commitment to be important in partner selection (Cunningham & Russell, 2004). The controversial Bem Sex-Role Inventory (BSRI; Bem, 1974) was used in the aforementioned study, as it seems with the majority of research

concerning gender identity. As will become apparent, few alternative measures have been developed and employed in the relevant literature.

Mikach and Bailey (1999) looked for differences between women with comparatively high and low lifetime numbers of sex partners. Those with numerous sex partners had extremely high SOI scores. They were more interested in casual sex and had their first sexual experiences earlier in life as well as lower waist-to-hip ratios than women with fewer sexual encounters. Moreover, they scored as relatively masculine on the four measures utilized including physical masculinity and behavioral masculinity, as rated by a third party; childhood gender nonconformity; and gender identity. The last two measures were self-report and had yet to be published. However, the results of two subsequent, larger studies are congruent with those of Mikach and Bailey.

Using the same self-report instruments, Ostavich and Sabini (2004) showed that sociosexuality is somewhat related to self-reported masculinity in childhood and adulthood among women. Sociosexual orientation positively predicted the number of sex partners over the lifespan of both sexes. Also, women, but not men, who reported having had a greater number of sexual partners had more masculine gender identities as children than those who reported having had fewer sexual partners. However, masculinity, as measured by the BSRI but referred to as instrumentality, has been found to be positively correlated with the lifetime number of sexual partners of both men and women (Fink, Brewer, Fehl, & Neave, 2007). As Mikach and Bailey (1999) state, one explanatory hypothesis for results like these is that sociosexual orientation and gender identity are affected by early neuroendocrine activity such as that of prenatal androgens.

Second-to-fourth digit ratio. The ratio of the length of the index finger (second digit) to the ring finger (fourth digit), referred to as 2D:4D, is often used as a putative index of

developmental masculinization. This is because 2D:4D has been found to be sexually dimorphic such that males tend to have lower ratios relative to females, yet within-sex differences are considerable (e.g., Manning, Scutt, Wilson, & Lewis-Jones, 1998). To be exact, women tend to have second and fourth digits of similar to equal length and so 2D:4D ratios close to one, whereas men's second digits tend to be smaller than their fourth digits with ratios less than one (e.g., Manning et al., 2000). Digit ratios seem to be established early in gestation (Garn, Burdi, Babler, & Stinson, 1975) and sexual dimorphism in 2D:4D has been seen in children as young as two years (Manning et al., 1998; Manning, Stewart, Bundred, & Trivers, 2004). Thus, this sex difference may be a result of organizational effects, namely that of prenatal androgen exposure (Lutchmaya, Baron-Cohen, Raggatt, Knickmeyer, & Manning, 2004; Manning et al., 1998). In support of this notion, Kondo, Zakany, Innis, and Duboule (1997) determined that the development of digits and genitals are both affected by the Hox genes; also, 2D:4D is related to androgen sensitivity and thus the androgen receptor gene (Manning, Bundred, Newton, & Flanagan, 2003).

Low 2D:4Ds in women are deemed to be "masculinized" in the literature. If 2D:4D is a biomarker of the relative amount of androgens in utero, one might wonder if women with low 2D:4Ds are masculinized in other ways as well. 2D:4D has been linked to numerous characteristics, particularly those thought to be mediated by sex hormones. Among women, 2D:4D is positively associated with reproductive success (Manning et al., 2000); age at the onset of breast cancer (Manning & Leinister, 2001); and current levels of estrogen, luteinizing hormone (LH), and progesterone (Manning et al., 1998; cf., Hönekopp, Bartholdt, Beier, & Liebert, 2007), for instance. It is negatively associated with congenital adrenal hyperplasia (e.g., Brown, Hines, Fane, & Breedlove, 2002); WHR (e.g., Manning et al., 2000); homosexuality

(e.g., Putz, Gaulin, Sporter, & McBurney, 2004); reactive aggression (Benderlioglu & Nelson, 2004); and sensation seeking (Austin, Manning, McInroy & Mathews, 2002), to identify a few.

Although many of the phenotypic correlations with 2D:4D are variable across studies, by and large they suggest that the brain and behaviour of a woman with a low digit ratio may in some ways be masculinized. Accordingly, variance in the mating psychology of women may be partially accounted for by masculinization (Clark, 2004). Clark found that alcohol expenditure and self-perceived attractiveness were positive predictors of women's SOI scores, whilst right 2D:4D and spatial rotation ability were negative predictors (cf. Putz et al., 2004). Spatial rotation ability is another sexually dimorphic trait that is connected to testosterone in the uterine environment. Furthermore, it has been shown that current oral contraceptive (OC) users have more unrestricted sociosexual orientations and lower left 2D:4Ds in comparison to never users, among other disparities. Although previous OC users had the highest digit ratios, they did not differ from current users in terms of sociosexuality (Oinonen, Jarva, & Mazmanian, 2008). Similar to Clark (2004), Oinonen and colleagues concluded that OC users and nonusers may also have pre-existing hormonal differences.

Gender identity and 2D:4D may or may not be related given that the literature is scant and conflicting. First, in 1983, Wilson demonstrated a weak relationship between low 2D:4D and assertiveness in women. Only recently has the affiliation between gender-related personality variables and 2D:4D regained attention. Csathó et al. (2003) expanded on Wilson's results since they found that women's right and mean 2D:4Ds and masculinity-femininity scores on the BSRI were associated. That is, the lower the 2D:4D, the more self-reportedly masculine the woman. Similarly, right 2D:4D has been found to be negatively correlated with masculinity and

positively correlated with femininity, whereas left 2D:4D was not significantly linked with masculinity but was positively correlated with femininity (Beech & Mackintosh, 2005).

In analyses pertaining to gender-relevant personality traits it was shown that women's mean 2D:4Ds were marginally inversely associated with scores on an unpublished 6-item self-report scale of masculinity-femininity (Lippa, 2006). However, higher (more feminine) 2D:4Ds among women were weakly associated with occupational preferences that are more common among men. Men's 2D:4Ds were not significantly connected to gender-related traits nor were scores on the BSRI short form significantly associated with the digit ratios of either sex (Lippa). In contrast, Schmukle, Liesefeld, Back, and Egloff (2007) indicated that the right 2D:4Ds of men were associated, albeit marginally, with BSRI masculinity-femininity scores, while their left and particularly right and mean digit ratios were related to implicit gender self-concept. The digit ratios of women were not significantly associated with explicit or implicit gender self-concept. In another study, femininity, not masculinity or masculinity-femininity, scores on the BSRI were associated with the left 2D:4Ds of men but not women (Rammsayer & Troche, 2007). It is undoubted that the relationship between gender identity and 2D:4D merits further examination.

As discussed earlier, women's mate preferences change according to menstrual phase. For example, several studies have revealed that male faces that are relatively masculine are rated as most attractive when women are most fertile (i.e., in the preovulatory phase) (Penton-Voak & Perrett, 2000; Jones et al., 2005). In 2001, this relationship was reported to be moderated by scores on the BSRI such that the extent of the preference shift decreased as a function of low masculinity (Johnston, Hagel, Franklin, Fink, & Grammer). Scarbrough and Johnston (2005) built on Johnston et al.'s design by measuring 2D:4D and mental rotation ability. Femininity was positively related to 2D:4D, whereas masculinity was positively correlated with mental rotation

score. Women with low digit ratios as well as those low in femininity displayed a periovulatory shift towards greater attraction to masculine faces. In contrast, women with high 2D:4Ds as well as those high on femininity shifted towards a diminished preference for masculine faces at the periovulatory phase. These results substantiate Oinonen, Klemencic, et al.'s (2008) PSTS hypothesis in that the mating strategies and tactics of women, including changes in partner preferences, may be mediated by the organizational and activational effects of sex hormones (Scarborough & Johnston).

Romantic Jealousy

Buss (2000) refers to jealousy as a blind, dangerous passion and an evolved mechanism of mate retention. Romantic jealousy can be defined as an emotional state that is a psychological response to the real or imagined infidelity of a sexual partner (Buss, Larsen, Semmelroth, & Westen, 1992). Putative sex differences in two types of romantic jealousy have been examined at length: sexual and emotional. In general, men are more distressed by sexual jealousy in comparison to women, who are more jealous of emotional infidelity. This effect has been found using a forced choice paradigm (Buss et al., 1992; Geary, Desoto, Hoard, Skaggs Sheldon, & Copper, 2001; Pietrzak, Laird, Stevens, & Thompson, 2001), continuous scales (Becker, Sagarin, Guadagno, Millevoi, & Nicastle, 2004; Pietrzak, Laird, Stevens, & Thompson, 2001), physiological measures (Buss et al., 1992; Pietrzak et al., 2001), and by experimental design (Schützwohl, 2005; Schützwohl & Koch, 2004). Still, other studies have had mixed or null results (e.g., Harris, 2002; Penke & Asendorpf, 2008a; Sabini & Green, 2004; Sagarin & Guadagno, 2004).

Nevertheless, it seems likely that sex accounts for a portion of variance in romantic jealousy (Bohner & Wänke, 2004). As Buss et al. (1992) proposed, sex differences in jealousy

may have evolved because men have historically confronted the adaptive problem of paternity uncertainty (Symons, 1979), whereas women have dealt with the issue of losing a mate's investment (Trivers, 1972). Interestingly, Bohner and Wänke (2004) found that masculinity and femininity partially mediate sex differences in sexual versus emotional jealousy. Moreover, in 2003, Mathes showed that men and women in short-term relationships, as well as those who have had numerous sexual partners, report that sexual infidelity is a greater threat than that which is emotional. It has also been found that individuals high in mating effort, in opposition to parental effort, are more upset by imagined sexual infidelity than those low in mating effort (Jones, Figueredo, Dickey, & Jacobs, 2007). These results allude to the possibility that romantic jealousy, another potential sexually dimorphic variable, may be related to 2D:4D, gender identity, and/or mating strategy.

In a recent study, romantic jealousy as related to 2D:4D, and thus as indirectly related to embryonic androgen exposure, was examined for the first time (Park, Wieling, Buunk, & Massar, 2008). Men with high (feminine) digit ratios were most likely to report that they would be jealous when their rivals are socially dominant. Among women, low (masculine) 2D:4D was positively related to jealousy involving physically attractive rivals. The results of Park et al. implicate organizational effects of androgens in romantic jealousy. As the researchers hypothesized, feminine men and masculine women seem to be more jealous of rival characteristics that they may possess less of or lack in terms of partner attributes valued by the opposite sex (see Brase, Caprar, & Voracek, 2004; Buss, Shackelford, Choe, Buunk, & Dijkstra, 2000; Buunk & Dijkstra, 2004; Dijkstra & Buunk, 1998). However, further research is necessary to corroborate the preliminary findings of Park et al. (2008).

Activational hormonal effects on romantic jealousy in women may also take place. First, in 1996, Krug, Finn, Pietrowsky, Fehm, and Born examined sensitivity to jealousy across three phases of the menstrual cycle (preovulatory, midluteal, and menses), confirmed using ovulation test kits and serum hormone concentrations. Free-cycling women listened to stories of, and then imagined, nonsexual jealousy (emotional jealousy), sexual jealousy, and jealousy-free situations. Sympathetic excitation as measured by nonspecific electrodermal activity as well as subjective ratings of jealousy increased just prior to ovulation in general, but particularly when nonsexual jealousy was induced. Divergent thinking and coping with socially frustrated events also improved at this time. Unfortunately, Krug et al. did not provide an adequate explanation for these findings.

Subsequently, Gaulin, Silverman, Phillips, and Reiber (1997) not only reported sex differences in romantic jealousy and spatial performance consistent with the literature reviewed herein, but also activational effects on these variables. Buss et al.'s (1992) forced choice jealousy item was adapted for this study. Menstruating women performed better on a mental rotation task and were more likely to choose a partner's sexual infidelity as worse than his emotional infidelity in comparison to non-menstruating women. In addition, estrogen estimates were related to feminine mental rotation performance and jealousy of emotional infidelity. Gaulin et al. suggested that any cyclic changes in relationship jealousy may be by-products of organizational effects. Conversely, an increase in sexual jealousy when signalling infertility via menstruation may have been adaptive in our evolutionary history as a tactic of mate retention.

In contrast, Geary, DeSoto, Hoard, Skaggs-Sheldon, and Copper (2001) found that salivary estrogen levels at week two of the menstrual cycle were associated with jealousy of imagined sexual infidelity at weeks two and three, when conception risk is peaking. Emotional

infidelity was more jealousy-provoking than sexual infidelity across four cycle weeks. Geary et al. also showed that HC users rated sexual infidelity as more distressing, and imagined having more intense affective responses to partner infidelity, than did free-cycling women. This finding is interesting in view of Oinonen, Jarva, et al. (2008). However, the results of Krug et al. (1996), Gaulin et al. (1997), and Geary et al. (2001) are inconsistent.

The Present Study

The purpose of the present study was to add to the existing literature on women's mating strategies and tactics as related to masculinity and across the menstrual cycle.

More specifically, the periovulatory sociosexuality tactic shift (PSTS; Oinonen, Klemencic, et al., 2008) was tested over three cycle phases: menstrual, preovulatory, and luteal. Both Gangestad and Simpson (2004) and Oinonen, Klemencic, et al. argued that the two main mating strategies (restricted/long-term and unrestricted/short-term) may have adaptive value and distinct evolutionary histories for both men and women. If a woman is relatively masculine, she should show different mating strategies, tactics, and preferences over the menstrual cycle than a more feminine woman. Essentially, this is what was found with the PSTS. Women who tended to be sociosexually restricted made a shift toward unrestrictiveness at the periovulatory phase and vice versa (Oinonen, Klemencic, et al.). Based on the literature reviewed, two main, theory driven hypotheses were made.

Hypothesis 1: Interest in a relationship, mate preferences measured by the Romantic Partner Attribute Index (RPAI), and extra-pair desire will exhibit PSTSs. It was expected that relationship interest and partner preferences would change only when women were evaluating their importance in the context of a short-term relationship. Theories in evolutionary psychology, such as SPM, suggest that long-term interest and preferences should remain relatively stable

across the menstrual cycle, though there may be slight variations that coincide with changes in short-term interest and preferences (e.g., Gangestad et al., 2004; Haselton & Miller, 2007; Little et al., 2007). Restricted women were predicted to shift towards an increased interest in short-term relationships, more extra-pair desire, and a greater preference for qualities of attractiveness/social visibility (i.e., genetic quality). In contrast, unrestricted women's short-term interest and extra-pair desire were expected to diminish as their preference for personal/parenting qualities increased during the preovulatory phase. In summary, both groups were expected to exhibit shifts away from their primary strategies when conception risk was high. A study of the RPAI across the menstrual cycle has yet to be published, as mentioned previously, and the relationship between extra-pair desire and SOI score has not been examined.

Hypothesis 2: Gender identity and 2D:4D, recognized measures of masculinity, were hypothesized to predict the direction of the PSTSs. More specifically, relatively masculine women were expected to have a tendency to be sociosexually unrestricted but to display a shift towards restrictiveness. Conversely, less masculine (i.e., relatively feminine) women should be predominately restricted but should move towards unrestrictedness at the preovulatory phase. If this were the case, there may be genetic and/or organizational effects as well as activational effects behind the PSTS (Moore, 1991; Oinonen, Klemencic, et al., 2008).

A supplementary set of research questions pertaining to relationship jealousy was also investigated. (a) Does romantic jealousy change across the menstrual cycle and if so what might account for this? (b) How does jealousy relate to sociosexual orientation? (c) How does jealousy relate to putative measures of masculinity such as 2D:4D and gender identity? Most evolutionary psychological research has examined jealousy in relation to sexual and emotional infidelity. This

study was one of the first to use a measure of different types of romantic, and potentially pathological, jealousy across the menstrual cycle.

Method

Participants

Laboratory data was collected from 213 female volunteers between the ages of 18 and 47.7 years. Of these women, 211 completed the first, 209 completed the second, and 206 completed the final online questionnaire, and 204 took part in the entire study. Thus, the attrition rate was 4.23%. Participants were recruited from Lakehead University and the Thunder Bay community for a “reproductive hormones and sociosexuality research project.” Methods of recruitment included posters, an article in Lakehead’s student paper, publicity through the Lakehead Office of Communications, class-wide e-mails, and in-class announcements. All volunteers were given the opportunity to participate in each phase of the study. There were no initial inclusion or exclusion criteria. Introductory Psychology students, the majority of the sample, received up to three bonus points for their participation. All other volunteers were entered into one of two draws for a \$50 gift card at a local shopping mall.

Materials

Personal Information and Background Questionnaire. Participants were given a paper-and-pencil questionnaire that was adapted from Oinonen (2003) (see Appendix A). The Personal Information and Background Questionnaire was designed to collect information pertaining to demographics (e.g., age, years of education, and occupation), current romantic situation, reproductive statuses (e.g., menstrual cycle status, age at menarche, pregnancy, and HC use), medical and psychiatric history (e.g., medication use, family history, and diagnosed conditions), and substance use. The Gender Identity Scale (GIS), developed for the present study, was

incorporated. Additionally, a measure of handedness (Welsh, 2007), the Kinsey Scale of Sexual Orientation (Kinsey, Pomeroy, & Martin, 1948), and the SOI (Simpson & Gangestad, 1991) were included. Overall, this questionnaire had nine sections.

The Gender Identity Scale (GIS) is a four-item self-report measure of one's current gender identity. The respondent rates (1) how feminine and (2) how masculine she feels that she is as well as (3) how feminine and (4) how masculine most of her friends would consider her to be on a Likert-type scale from 1 (*not at all*) to 10 (*very*). The handedness scale includes seven items whereby the respondent rates which hand she uses for activities on a 5-point Likert-type scale from *left* to *right*. Welsh (2007) used the Edinburgh Handedness Inventory (Oldfield, 1971) and the applicable literature (e.g., Salmaso & Longoni, 1985) to choose the most discriminative items. The Kinsey Scale is a popular 7-point continuum of self-reported sexual orientation from 1 (*exclusively heterosexual*) to 6 (*exclusively homosexual*) and X (*asexual*) (Kinsey et al., 1948).

The Sociosexual Orientation Inventory (SOI), as originated by Simpson and Gangestad (1991), consists of four items that measure sociosexual behaviours and three that assess attitudes toward casual sex. Three of the behavioural items require that the respondent indicate a numerical estimate, while the remaining question is rated on an 8-point scale. All of the attitudinal items are statements coded on a 9-point Likert-type scale (*strongly disagree* to *strongly agree*). Composite SOI scores were calculated using the formula suggested by Oinonen, Klemencic, et al. (2008) and adapted from Simpson and Gangestad (1991): $SOI = [5 \text{ (number of partners in the past year)} + 1 \text{ (number of partners foreseen)} + 5 \text{ (number of one-night stands)} + 2 \text{ (attitudes toward engaging in casual uncommitted sex)}]$. The higher the score, the more one is

reportedly sociosexually unrestricted. The frequency of extra-pair fantasy item was not used in the calculation of SOI because 43% of single participants left this item blank.

The SOI has been found to have reasonable internal consistency with a Cronbach's alpha of .73 (Simpson & Gangestad, 1991). Simpson and Gangestad found a high 2-month test-retest reliability ($r = .94$) as well as evidence of convergent and discriminant validity. Unrestricted men and women tend to have sexual intercourse relatively early in their romantic relationships as well as engage in extra-pair sexual relationships. Restricted individuals have a greater propensity for exclusive relationships characterized by love and investment. Furthermore, sociosexuality is unrelated or, at most, only slightly correlated with sex drive, sexual satisfaction, or sex-related anxiety or guilt. However, the unidimensionality of the SOI has been contested of late, in favour of a two-factor (Webster & Bryan, 2007) or an extended three-factor (Jackson & Kirkpatrick, 2007) model. As discussed previously, there is a moderate correlation between SOI score and sex ($r = .40$), as men are generally less restricted than women (Simpson & Gangestad, 1992).

Body measurements. The ventral surfaces of participants' hands were scanned onto a secure desktop computer twice using a Hewlett Packard (HP) Scanjet G3010 during the Introductory Laboratory Session. Digits two (2D) and four (4D) of both the left and right hand were measured for length in millimetres, from tip to basal crease, using Screen Calipers (www.iconico.com) on each image. Second-to-fourth digit ratios were calculated by dividing 2D by 4D. Repeatability of 2D:4D is high ($r_s = .81 - .95$) (Lutchmaya et al., 2004; Manning et al., 1998). Measuring tape was used to measure waist and hip circumference as well as height in metres. A digital scale was used to assess weight in kilograms. The digits, hips, waists, and weights of subsets of participants were measured by a second researcher to assess inter-rater reliability. An estimate of body fat known as body mass index (BMI) was calculated based on

height and weight (kg/m^2). Waist-to-hip ratio (WHR) was determined by dividing waist circumference by hip circumference.

Online Phase Questionnaire. Three identical Online Phase Questionnaires (see Appendix B) were administered to coincide with three phases of the menstrual cycle (see Procedure). Paper-and-pencil versions were made available, though no one chose this option. Each questionnaire included 15 sections.

Questions relating to (1) substance use, (2) reproductive statuses (e.g., pregnancy, current HC use, and menstruation), and (3) current romantic situation were adapted from Oinonen (2003). Participants also completed (4) the GIS, (5) the SOI, (6) the Infrequency Scale of the Personality Research Form (PRF; Jackson, 1984), (7) a measure of extra-pair desire (Gangestad et al., 2002), (8) the Multidimensional Jealousy Scale (MJS; Pfeiffer & Wong, 1989), and (9) the RPAI (Simpson & Gangestad, 1992). Additionally, measures or items pertaining to the following were included as part of a larger program of research: (10) self-perceived mate value (the Self-Perceived Mating Success Scale; Landolt et al., 1995), (11) mood (the Positive and Negative Affect Schedule [PANAS]; Watson, Clark, & Tellegen, 1988), (12) in-pair desire and general sexual desire (Gangestad et al., 2002), (13) perceived partner solicitousness and jealousy (Pillsworth & Haselton, 2006), (14) self-perceived attractiveness (Patola & Oinonen, 2008), and (15) perceived partner attractiveness.

The infrequency scale of the PRF was used to appraise the validity of responses, namely non-purposeful responding. It is made up of eight true-or-false statements, half of which are implausible and therefore unlikely to be endorsed (Jackson, 1984). The other four items are almost always true. As for extra-pair desire, a composite of five items from Gangestad et al. (2002) was used. Two of the items pertain to sexual fantasy, one to sexual attraction, and the

remainder to sexual arousal; all are rated on a 4-point frequency scale from 0 (*not at all*) to 3 (*more than a few times*). Higher scores reflect greater extra-pair desire (Gangestad et al.).

Pfeiffer and Wong's (1989) MJS is a self-report measure consisting of three eight-item scales that assess cognitive, emotional, and behavioural romantic jealousy. Respondents are first asked to think of a person with whom they are having (or have recently had) a romantic relationship. This individual is referred to as X throughout the instrument. The items on the cognitive scale of the MJS are statements that reflect suspicions of threat to a partnership, particularly those involving a rival. Items on the emotional scale are hypothetical jealousy-evoking situations to which one indicates how she would feel on a scale from 1 (*very pleased*) to 7 (*very upset*). The behavioural scale consists of detective and protective behaviours. On the cognitive and behavioural scales, respondents are asked to rate how often they engage in each item on scale from 1 (*never*) to 7 (*all the time*). A score was computed for each scale and the higher the score, the more pathological the jealousy.

Using principal components factor analysis, Pfeiffer and Wong (1989) found a three-factor solution, which suggested that the scales of the MJS are orthogonal. Also, the three scales were internally consistent with Cronbach's alphas between .83 and .92 as well as moderately correlated. The one- to two-month test-retest reliabilities were reported to be .75 for the cognitive, .82 for the emotional, and .34 for the behavioural scale. Evidence for concurrent validity comes from the significant positive correlation between the scales of the MJS and White's Relationship Jealousy Scale (White, 1981), a one-dimensional, quantitative measure. Moreover, the MJS is related to sexual jealousy, love, liking, and happiness in theoretically consistent ways, and thus shows convergent and discriminant validity (Pfeiffer & Wong).

The Romantic Partner Attribute Index (RPAI) is a list of 15 features based on those in the relevant literature, such as sex appeal, intelligence, and sense of humour (Simpson & Gangestad, 1992). Respondents rate how much a given attribute affects their selection of a romantic partner on a 9-point scale (from *not at all important* to *extremely important*). As reported by Simpson and Gangestad, principal axis factor analysis revealed two factors. Together, qualities of personal/parenting and attractiveness/social visibility accounted for 40% of the variance in the scale. As mentioned previously, Simpson and Gangestad determined that this scale interacts with biological sex and sociosexuality. The RPAI was in the Online Phase Questionnaires twice such that it followed a definition of short-term and then long-term relationships (adapted from Little et al., 2007). The following attributes were appended to each RPAI: facial attractiveness, masculinity, femininity, height, eye colour, hair colour, body type, and clothing style.

Measures of hormonal status. The questions “Are you menstruating today?” and “If yes, for how many days have you been menstruating?” from the Online Phase Questionnaires were used to verify menstrual cycle phase. Additionally, ovulation detection, specifically urinary luteinizing hormone (LH), strips were used by a subset of participants as confirmatory measures of phase. According to Stanford, White, and Hatasaka (2002), LH strips measure the rise in LH that tends to occur 24 hours prior to, and thus are an accurate prospective marker of, ovulation. The strips were packaged in fives and referred to as hormone detection kits. Participants were asked to take part in this optional part of the study at random and were not informed which hormone the strips were intended to test. Volunteers began testing 18 days prior to the reported start of their next cycle for 5 days, or until a positive result (i.e., two bands present on a strip). Each day, they were sent an online Hormone Detection Test Results questionnaire (see Appendix C). If and when a positive test result was obtained, participants were asked to provide a

confidence rating from 0 (*0% confident*) to 8 (*100% confident*). Paper-and-pencil versions were made available, though no one chose this option.

Procedure

The study received approval from the Research Ethics Committee of the Department of Psychology as well as Lakehead's Research Ethics Board. For each participant, the study took place in five stages over 1 month (approximately 25 days): Stage 1 (Introductory Laboratory Session), Stage 2 (Online Phase Questionnaire 1), Stage 3 (Online Phase Questionnaire 2), Stage 4 (Online Phase Questionnaire 3), and Stage 5 (Debriefing).

Introductory Laboratory Session. Volunteers were asked to attend an Introductory Laboratory Session at Lakehead University. Participants were first asked to read the Cover Letter (see Appendix D) and the Consent Form (see Appendix E). At this time, participants were given the opportunity to ask questions. The Cover Letter was to be kept by participants for future reference. Each volunteer was required to sign the Consent Form to participate in the study. The principal researcher collected such forms before the study commenced. Participants were then given the Personal Information and Background Questionnaire. In addition, up to two female researchers took measurements of participants' height, weight, waist, and hips as well as scanned both their hands at the same time. Lastly, random participants were invited to use hormone detection kits and those that chose to do so were given an Instructions Sheet (see Appendix F). The Introductory Laboratory Session took approximately 20 to 40 minutes to complete.

Menstrual cycle phases. An Online Phase Questionnaire was to be completed during each of three menstrual cycle phases. Testing dates were determined using Jöchle's (1973) reverse counting method, based on information provided in the Personal Information and Background Questionnaire. Participants were not told that testing dates were to coincide with cycle phases.

For free-cycling women and HC users who still experienced menses, testing was to correspond with the following three times: (a) menstrual phase (days 1 to 5), (b) preovulatory phase (days 10 to 14 or 19 to 15 days prior to expected menses [days -19 to -15]), and (c) luteal phase (days 20 to 24 or -9 to -5) (e.g., Oinonen, 2003).

These phases were chosen because they differ in the probability of conception and in relative hormone levels (i.e., estrogen, progesterone, follicle-stimulating hormone [FSH], and LH). Conception probability is highest in the preovulatory phase and the menstrual phase is somewhat more fertile than the luteal phase (Guerrero, 1978). The luteal phase is the most regular as it is almost always 14 days in length (Schnatz, 1985). Participants were given optimal dates on which to complete the questionnaires that corresponded with days 2, 12 or -17, and 22 or -7 of their menstrual cycles. HC users who did not experience menses and free-cycling women with irregular cycles were scheduled for testing periods that were roughly 10 days apart.

All online data was collected through a secure internet database (www.surveymonkey.com). As an added precaution, optional enhanced security (Secure Sockets Layer [SSL]) for the online surveys was purchased to encrypt all responses. Questionnaires and reminders were sent from the online database to the e-mail address(es) that participants provided on their Consent Forms. Note that all Consent Forms were detached and stored separately from the Personal Information and Background Questionnaires. Following completion of the study, participants received a printable online Debriefing Form (see Appendix G).

Data Reduction and Analysis

Menstrual phase and day of cycle were confirmed or disconfirmed for each completed Online Phase Questionnaire. This was accomplished using menstrual cycle information from the Personal Information and Background Questionnaire, from the Online Phase Questionnaires, and

provided by participants via e-mail. Participants were also categorized by testing order (30% menstrual-preovulatory-luteal, 31.5% luteal-menstrual-preovulatory, 32.4% preovulatory-luteal-menstrual). About six percent of all participants were scheduled for testing periods that were roughly 10 days apart as they reported very irregular menstrual periods. Data from participants who met strict post hoc exclusion criteria were not included in any menstrual cycle analyses.

A total of 121 women indicated that they were currently using an HC and were excluded from any analyses of cyclicity. However, 10 participants were recruited specifically because they were free-cyclers and so the best estimate of the percentage of the sample that was on an HC is 59.6. The other women were previous users ($n = 47$) or never users ($n = 45$). Of the free-cycling women, 63 were excluded from the menstrual cycle phase comparisons for one or more of the following reasons: (a) age greater than 44 ($n = 2$), (b) current pregnancy ($n = 1$), (c) current or chronic medical condition(s) that could affect hormone levels (e.g., thyroid disorders, diabetes, depression) ($n = 19$), (d) current use of any medication that may affect hormone levels (e.g., steroids, antidepressant medication) ($n = 13$), (e) use of an HC within the past six months ($n = 13$), (f) irregular menstrual cycle ($n = 26$), and (g) average menstrual cycle length that is short (below 25 days) or long (more than 35 days) ($n = 13$).

Of the remaining 29 nonusers of HCs, 15 were excluded from analyses of menstrual cyclicity because they did not meet strict phase criteria: (a) completed fewer than three online questionnaires ($n = 2$) or (b) at least one online questionnaire was completed outside of the target menstrual cycle phases ($n = 13$). Therefore, the final subsample for the menstrual cycle phase comparisons was 14 and the exclusion rate for free-cyclers was 85% as 78 such women met post hoc exclusion criteria. Demographic and menstrual cycle information for the full sample and the free-cycling subsample can be found in Table 1. There were no significant differences between

Table 1

Means and Raw Frequencies of Demographic and Menstrual Cycle Variables

Variable	Full sample (<i>N</i> = 213)	Subsample (<i>n</i> = 14)
Means (Standard deviations)		
Age (years)	22.03 (5.93)	23.06 (5.61)
Education (years)	14.43 (7.25)	13.93 (1.33)
Relationship length (months) ^a	33.17 (47.42)	58.44 (69.56)
Age at menarche (years)	12.59 (1.49)	12.07 (1.49)
Average menstrual cycle length (days)	28.89 (12.83)	27.80 (3.15)
Average menstruation length (days)	4.83 (1.31)	5.00 (1.80)
Raw frequencies (Percentages)		
Ethnic background		
Caucasian/white	187 (87.8)	11 (78.6)
Native-Canadian/Aboriginal	8 (3.8)	
Hispanic/Latino	1 (0.5)	
Asian	1 (0.5)	
Middle Eastern	1 (0.5)	
East Indian	2 (0.9)	1 (7.1)
European	8 (3.8)	1 (7.1)
Other (broad mixture, Italian)	2 (0.9)	1 (7.1)
Unspecified	3 (1.4)	
Relationship Status		
Married	12 (5.6)	2 (14.3)
Common law/living together	26 (12.2)	1 (7.1)
One steady dating partner	93 (43.7)	7 (50.0)
More than one dating partner	1 (0.5)	
No steady dating partner	74 (34.7)	4 (28.6)
More than one non-dating partner	3 (1.4)	
Other (e.g., engaged, on/off partner)	4 (1.9)	
Long distance relationship ^a	30 (22.4)	4 (44.4)

Table 1 (continued)	Full sample ($N = 213$)	Subsample ($n = 14$)
Hormonal contraceptive use		
Current use	121 (56.8)	
No use	45 (21.1)	8 (57.1)
Previous use	47 (22.1)	6 (42.9)

^a $n = 79$ and $n = 9$ respectively.

the corrected full sample and the subsample on these variables, though there was a non-significant trend for relationship length, $t(131) = -1.67, p = .098$. The mean relationship length (in months) of the corrected full sample appeared lower ($M = 31.33, SD = 45.27$) than that of the free-cycling subsample ($M = 58.44, SD = 69.56$).

For the main analyses, nine scores were calculated for each menstrual cycle phase: sociosexuality (or SOI), interest in a short-term relationship, interest in a long-term relationship, preference for personal/parenting attributes in a short- and in a long-term partner, preference for attractiveness/social visibility attributes in a short- and in a long-term partner, extra-pair desire, masculinity, and 2D:4D. For the supplementary analyses, cognitive, emotional, behavioural, and total jealousy scores were calculated for each menstrual cycle phase. Scores were aggregated across questionnaires and averaged for non-menstrual cycle analyses.

Groups low and high on sociosexuality were created for the main analyses using mean SOI scores. The 50th percentile (median split) was used to avoid a loss of data. A second set of SOI groups based on those in a relationship was created for the analysis of extra-pair desire over the menstrual cycle. Independent-samples t -tests and chi-square analyses were used to assess group equivalency. To test the main hypothesis, a series of mixed between-within-subjects analyses of variance (ANOVAs) and follow-up repeated measures ANOVAs and t -tests were conducted. The two-way interactions between menstrual cycle phase and sociosexuality (SOI) group were of interest. A significant two-way interaction would indicate that the SOI groups differed on the dependent variable as a function of menstrual cycle phase (or conception risk). To test the effect of time (or repeated exposure), main effects for phase were also followed up with repeated measures ANOVAs on the data reorganized by session (i.e., time 1, time 2, time 3). One-way ANOVAs, t -tests, and Pearson product-moment correlations were used for the

supplementary and exploratory analyses. Alpha was set at .05 unless otherwise noted and all significance tests were two-tailed.

Results

Data Screening

Prior to the main analyses, the data were screened for errors at data entry, missing values, univariate and multivariate outliers, and the assumptions of split-plot ANOVA. Also, the infrequency scale of the PRF was examined by phase to determine whether any respondents endorsed over three items, resulting in an invalid questionnaire. No questionnaires were invalidated. Missing values were estimated by the mean of the items from the scale or subscale, provided that 75% of it was complete. The subsample for the menstrual cycle analyses was missing four values out of 1,932. There were no univariate outliers for any group and phase combination using the standards suggested by Tabachnick and Fidell (2007) (i.e., $\pm z \geq 3.29$). Using Mahalanobis distance ($p < .001$ criterion), there were no multivariate outliers at any menstrual cycle phase.

The assumptions of normality, linearity, and homogeneity of variance were assessed by group and phase as well. All dependent variables demonstrated adequate normality on visual inspection and using the criteria that skewness or kurtosis divided by the standard error of the statistic is less than three. Based on graphical checks, linearity was judged to be adequate for the dependent variables.

Box's M test for homogeneity of variance-covariance matrices showed that this assumption was not violated for most of the main analyses, $F_s(6, 1043) = 1.01, 1.29, 1.77, 0.94$, $p_s > .05$. The assumption was violated for the analyses involving the short-term interest rating, $F(6, 1043) = 2.95, p = .007$, and the personal/parenting subscale, $F(6, 1043) = 2.45, p > .05$.

Box's M was not calculated for the extra-pair desire scale as there were fewer than two non-singular cell covariance matrices (two of the means were zero). Levene's test of equality of error variances indicated homogenous variances for all but one of the between-subjects analyses, $F_s(1, 12) = 0.07 - 3.29, p_s > .05$. Heterogeneous variances were found for the short-term interest rating at the menstrual phase, $F(1, 12) = 10.37, p = .007$, and the luteal phase, $F(1, 12) = 6.23, p = 0.28$. Mauchly's test indicated that the assumption of sphericity was met for most of the within-subjects analyses, $\chi^2(2) = 2.01, 0.97, 4.00, 2.93, 2.64, p_s > .05$. This assumption was violated for the short-term interest rating, $\chi^2(2) = 8.19, p = .017$, and the extra-pair desire scale, $\chi^2(2) = 5.90, p = .052$. In these cases, the Geisser-Greenhouse correction was used.

Reliability

Self-report measures. Cronbach's alpha coefficients were calculated for the scales of interest in both the main and supplementary analyses. The means, standard deviations, and internal consistencies are presented in Table 2 by sample and by phase for the subsample. The internal consistencies of most measures were adequate to good. The SOI at the preovulatory phase ($\alpha = .37$), the long-term personal/parenting subscale of the RPAI at the menstrual phase ($\alpha = .25$), and the extra-pair desire scale at the menstrual ($\alpha = .44$) and luteal phase ($\alpha = .26$) did not perform well. All measures performed well when the items were averaged across menstrual cycle phase for the full sample.

Body measurements. Inter-rater data was collected for all body measurements, including WHR and BMI. However, only 2D:4D will be considered as the others are not pertinent to the main hypotheses. The 2Ds and 4Ds of all participants were measured twice by the same researcher (i.e., each of two scans was measured). Repeatabilities were adequate and significant at the $p < .001$ level: left, $r_l(212) = .85, F = 12.67$; right, $r_l(212) = .75, F = 6.97$; and mean r_l

Table 2

Scale Means, Standard Deviations, and Internal Consistencies by Sample and by Menstrual Cycle Phase

Scale	Full sample (<i>N</i> = 213)		Subsample (<i>n</i> = 14)					
	Average		M		P	L		
	Means (Standard deviations)		Internal consistencies					
Sociosexual Orientation Inventory	36.74 (23.82)	.64	26.36 (23.96)	.63	26.29 (19.99)	.37	26.57 (19.41)	.57
Short-term interest rating ^a	2.58 (1.97)		2.14 (1.96)		2.36 (1.78)		2.29 (2.02)	
Short-term Romantic Attribute Index	65.83 (12.78)	.85	62.71 (11.45)	.75	63.07 (12.57)	.72	57.93 (11.33)	.76
Personal/parenting subscale	40.00 (10.71)	.91	38.43 (9.47)	.84	39.71 (10.77)	.82	35.14 (8.55)	.79
Attractiveness/social subscale	25.83 (4.93)	.71	23.29 (5.53)	.62	23.36 (6.02)	.56	22.79 (5.58)	.63
Long-term interest rating ^a	7.95 (2.23)		6.43 (3.06)		6.50 (2.82)		7.29 (2.87)	
Long-term Romantic Attribute Index	82.83 (8.61)	.83	78.21 (7.23)	.55	79.43 (6.94)	.53	77.50 (7.22)	.76
Personal/parenting subscale	56.42 (4.74)	.74	54.43 (4.13)	.25	55.64 (4.57)	.52	53.57 (4.29)	.79
Attractiveness/social subscale	26.44 (4.99)	.80	23.79 (4.79)	.59	23.79 (4.56)	.54	22.93 (4.48)	.63
Extra-pair desire scale ^b	1.41 (1.88)	.87	1.22 (1.64)	.44	1.22 (2.64)	.81	0.44 (0.73)	.26
Masculinity scale	5.76 (3.04)	.93	4.86 (2.57)	.77	5.07 (2.89)	.91	5.57 (2.77)	.77

Table 2 (continued)	Full sample (<i>N</i> = 213)		Subsample (<i>n</i> = 14)					
	Average		M		P		L	
Jealousy scale	71.18 (18.01)	.92	69.54 (12.60)	.79	71.71 (12.46)	.78	71.50 (11.23)	.77
Cognitive	16.88 (8.98)	.94	15.93 (7.84)	.89	16.21 (7.32)	.85	15.93 (5.23)	.78
Emotional	38.98 (7.78)	.91	40.11 (6.28)	.71	40.64 (6.23)	.76	40.50 (5.69)	.66
Behavioural	15.14 (6.53)	.88	13.50 (4.82)	.68	14.86 (4.90)	.60	15.07 (5.80)	.76

Note. M = menstrual phase. P = preovulatory phase. L = luteal phase.

^aSingle item scale. ^b*n* = 79 and *n* = 9 respectively.

(212) = .87, $F = 14.46$. A subset of 25 participants was measured four times, twice by two individuals. The inter-rater reliability of 2D:4D was high and significant at the $p < .001$ level: left, $r_I = .92$, $F = 27.84$; right, $r_I = .95$, $F = 41.02$; mean, $r_I = .95$, $F = 42.84$. The mean 2D:4D was 0.98 ($SD = 0.03$) on the left hand, 0.97 ($SD = 0.03$) on the right hand, and 0.97 ($SD = 0.03$) overall. These means are similar to other samples of women from the same university, though slightly lower (Oinonen, 2009; Oinonen, Jarva, et al., 2008).

Measures of hormonal status. Overall, 120 participants completed an online questionnaire when they were in the menstrual phase, as determined by the question “Are you menstruating today?” These women had been experiencing menses for an average of 2.19 days ($SD = 1.39$). Five participants did not fill out the questionnaire scheduled for when they were most likely to be menstruating. Of the 42% of the sample that said “no” to the above question, eleven HC users indicated that they never or rarely experience a menstrual period and 15 free-cyclers reported having irregular cycles. Thus, about 68% of participants who were not scheduled precisely using the reverse count method, and self-report of last and next menses and average cycle length said that they had regular, predictable cycles.

Of the total sample of free-cyclers, 45 women completed an online questionnaire when they were in the menstrual phase. Three participants did not fill out the questionnaire scheduled for when they were most likely to be menstruating. Although the phases of about 49% of free-cyclers were scheduled imprecisely, 68% of such participants reported having regular, predictable cycles. In contrast, the menstrual phases of about 37% of HC users were inexactly predicted as 75 of these women were tested during the menstrual phase. There was a non-significant trend for current HC users having been more likely to complete an Online Phase Questionnaire during menses than nonusers, $\chi^2(1, n = 208) = 3.24$, $p = .072$, $\phi = .13$, which may

be related to the greater cycle regularity of HC users ($M = 4.14$, $SD = .88$), $t(207) = -4.21$, $p < .001$, compared to free-cyclers ($M = 3.66$, $SD = .75$). Moreover, the percentages reported above may be overestimations of scheduling imprecision as a several women informally reported having skipped their periods (e.g., due to stress) or having taken their OC continuously (i.e., started a new pack of pills early) to avoid menstruation.

Fifty-one women agreed to use LH detection strips, half of whom were HC users. Nine volunteers, including six HC users, dropped out of this part of the study, resulting in a 17.6% attrition rate. Reasons cited were: lost detection strips, did not check email, did not have time, and was out of town. A positive test result was reported by 11 women, three of whom were HC users, and thus 26% of strip users. On a scale from 0 to 8, confidence ratings ranged from 5(62.5%) to 8 (100%) with a mean of 7.22 or about 90 percent. However, 62% of strip users completed a phase questionnaire during menses. Of the 42 strip users, 19 did not use a strip on at least one of five days. Of the participants who reported a positive result, two missed at least one day of testing. Whether or not the volunteers missed at least one day of testing was negatively related to reporting a positive test result, $\chi^2(1, n = 42) = 4.40$, $p = .036$, $\phi = -.32$.

Twelve of the 23 free-cycling strip users were excluded from analyses of menstrual cyclicity as per several of the aforementioned criteria: (c) current or chronic medical condition(s) that affect hormone levels ($n = 6$), (d) current use of medication(s) that may affect hormone levels ($n = 4$), (e) use of an HC within the past six months ($n = 4$), and (g) average menstrual cycle that is short or long ($n = 5$). However, three free-cycling women who reported a positive test result met exclusion criteria (c) and (d).

Group Equivalency

Group equivalency (low and high SOI) for the main (i.e., menstrual cycle) analyses was examined using age, education, BMI, WHR, typical alcohol and drug consumption, age at menarche, relationship status, and averaged SOI score (see Table 3). The high SOI group was significantly older ($M = 26.37, SD = 6.19$) than the low SOI group ($M = 19.73, SD = 2.09$), $t(7.36) = -2.69, p = .030$. The high SOI group was also significantly more likely to be in a relationship, $\chi^2(1, n = 14) = 4.98, p = .021$ Fisher's exact test, $\phi = .76$. However, age and relationship status were not significantly correlated with any of the dependent variables at any menstrual cycle phase. The difference between the high and low SOI groups in terms of averaged SOI score was significant ($M = 12.04, SD = 5.58$ and $M = 40.89, SD = 19.99$, respectively), $t(12) = -3.68, p = .003$.

Group means and standard deviations for the averaged SOI items can be found in Appendix H. All differences between the item means of the low and high SOI groups were statistically significant or non-significant trends. Also, the SOI groups made up of those in a relationship did not significantly differ on any of the variables except averaged SOI score ($M = 20.38, SD = 7.47$ and $M = 47.35, SD = 20.38$, respectively), $t(7) = -2.49, p = .042$.

Main Analyses

Hypothesis 1. Seven 2 between (group: low SOI, high SOI) x 3 within (phase: menstrual, preovulatory, luteal) repeated measures ANOVAs were conducted to test for PSTSs. Short-term relationship interest ratings, personal/parenting subscale scores, and attractiveness/social visibility scores; long-term relationship interest ratings, personal/parenting subscale scores, and attractiveness/social visibility subscale scores; and extra-pair desire scale scores were entered as separate dependent variables. Means and standard deviations are presented in Table 4 by group and phase and a summary of the ANOVAs is displayed in Table 5.

Table 3

Means and Standard Deviations of the Variables Used to Assess Group Equivalency

Variable	Low SOI (<i>n</i> = 7)	High SOI (<i>n</i> = 7)
Means (Standard deviations)		
Age (years)*	19.74 (2.09)	26.37 (2.34)
Education (years)	13.57 (.98)	14.29 (1.60)
Age at menarche (years)	12.14 (1.07)	12.00 (1.91)
Body mass index (kg/m ²)	22.82 (4.32)	25.28 (3.90)
Waist-to-hip ratio	0.76 (0.08)	0.84 (0.22)
Alcohol consumption score	0.57 (0.54)	1.00 (0.58)
Drug consumption score	0.00 (0.00)	0.57 (0.79)
Averaged SOI score**	12.04 (5.58)	40.89 (19.99)
Raw frequencies (Percentages)		
Relationship status**		
Current primary partner	2 (28.6)	7 (100)

p* < .05. *p* < .01.

Table 4

Means and Standards Deviations of the Main Dependent Variables by Group and Menstrual Cycle Phase

Variable	Menstrual	Preovulatory	Luteal
	Low SOI (<i>n</i> = 7)		
Short-term			
Interest rating	1.29 (0.49)	2.29 (1.45)	1.86 (0.90)
Personal/parenting subscale	39.14 (12.46)	42.86 (13.28)	35.29 (10.26)
Attractiveness/social subscale	23.00 (6.30)	22.14 (6.57)	22.29 (7.02)
Long-term interest			
Interest rating	6.00 (2.77)	6.43 (2.37)	7.57 (2.64)
Personal/parenting subscale	53.71 (5.15)	55.00 (5.54)	52.86 (4.98)
Attractiveness/social subscale	24.43 (5.65)	24.43 (4.65)	24.57 (4.31)
Extra-pair desire scale ^a	1.00 (1.41)	0.25 (0.50)	0.50 (1.00)
	High SOI (<i>n</i> = 7)		
Short-term			
Interest rating	3.00 (2.52)	2.43 (2.15)	2.71 (2.75)
Personal/parenting subscale	39.71 (6.24)	36.57 (7.18)	35.00 (7.28)
Attractiveness/social subscale	23.57 (5.44)	24.57 (5.65)	23.29 (4.19)
Long-term interest			
Interest rating	6.86 (3.49)	6.57 (3.41)	7.00 (3.27)
Personal/parenting subscale	55.14 (3.02)	56.29 (3.68)	54.29 (3.73)
Attractiveness/social subscale	23.14 (4.10)	23.14 (5.15)	23.29 (4.89)
Extra-pair desire scale ^b	1.40 (1.95)	2.00 (3.46)	0.40 (0.55)

Note. SOI = Sociosexual Orientation Inventory.

^a*n* = 4. ^b*n* = 5.

Table 5

Summary of the Repeated Measures Analyses of Variance for Hypothesis 1

Source	df	<i>F</i>	partial η^2	<i>P</i>
Short-term interest ratings				
Between subjects				
SOI group (G)	1	0.92	.07	.357
G within-group error	12	(9.35)		
Within subjects				
Phase (P)	2	0.21	.02	.809
P X G	2	2.79	.19	.082
P X G within group error	24	(0.78)		
Long-term interest ratings				
G	1	0.01	.001	.928
G within-group error	12	(25.21)		
P	2	2.99	.20	.069
P X G	2	1.66	.12	.207
P X G within group error	24	(1.06)		
Short-term personal/parenting subscale				
G	1	0.19	.02	.669
G within-group error	12	(218.03)		
P	2	2.55	.18	.099
P X G	2	1.36	.10	.276
P X G within group error	24	(35.94)		
Long-term personal/parenting subscale				
G	1	0.37	.03	.553
G within-group error	12	(53.81)		
P	2	5.49	.31	.012*
P X G	2	0.01	.001	.991
P X G within group error	24	(2.76)		

Table 5 (continued)	df	<i>F</i>	partial η^2	<i>P</i>
Short-term attractiveness/social subscale				
G	1	0.24	.02	.633
G within-group error	12	(77.87)		
P	2	0.10	.01	.901
P X G	2	0.25	.02	.778
P X G within group error	24	(13.03)		
Long-term attractiveness/social subscale				
G	1	0.28	.02	.606
G within-group error	12	(61.76)		
P	2	0.02	.002	.976
P X G	2	0.00	.000	1.00
P X G within group error	24	(3.96)		
Extra-pair desire scale				
G	1	0.42	.06	.540
G within-group error	7	(2.50)		
P	2	0.98	.12	.399
P X G	2	1.32	.16	.299
P X G within group error	14	(1.55)		

Note. Values enclosed in parentheses represented mean square errors. SOI = Sociosexual Orientation Inventory.

* $p < .01$.

There were no significant group x phase interactions. The interaction for the short-term interest rating approached significance, $F(2, 24) = 2.79, p = .082, \text{partial } \eta^2 = .19$. Exploratory repeated measures ANOVAs were conducted on both groups. There was no phase effect for either the low SOI group, $F(2, 12) = 1.70, p = .225, \text{partial } \eta^2 = .22$, or the high SOI group, $F(2, 12) = 1.12, p = .362, \text{partial } \eta^2 = .16$.

However, there was a significant phase effect for the long-term personal/parenting subscale, $F(2, 24) = 5.49, p = .012, \text{partial } \eta^2 = .31$. Follow-up paired samples t -tests revealed that the long-term personal/parenting subscale was rated as more important during the preovulatory phase ($M = 55.64, SD = 4.58$) than the menstrual phase ($M = 54.23, SD = 4.13$), $t(13) = -2.52, p = .026$, and the luteal phase ($M = 53.57, SD = 4.29$), $t(13) = 2.90, p = .012$ (see Figure 1). Using the data file reorganized by session (as opposed to phase), a 3 within repeated measures ANOVA was conducted on the long-term personal/parenting subscale. The effect of time was not significant, $F(2, 26) = 1.48, p = .245, \text{partial } \eta^2 = .10$.

The effect of phase approached significance for the long-term interest rating, $F(2, 24) = 2.99, p = .069, \text{partial } \eta^2 = .20$. Exploratory paired samples t -tests showed that long-term interest was higher during the luteal phase ($M = 7.29, SD = 2.87$) than the preovulatory phase ($M = 6.50, SD = 2.82$), $t(13) = -2.62, p = .021$. The difference between the luteal phase and the menstrual phase ($M = 6.43, SD = 3.06$) was not significant, $t(13) = 1.71, p = .111$ (see Figure 2). Using the data file reorganized by session, a 3 within repeated measures ANOVA was conducted on the long-term interest rating. The effect of time was not significant, $F(2, 26) = 0.68, p = .514, \text{partial } \eta^2 = .05$.

Lastly, the effect of phase approached significance for short-term personal/parenting, $F(2, 24) = 2.55, p = .099, \text{partial } \eta^2 = .18$. Exploratory paired samples t -tests revealed that there

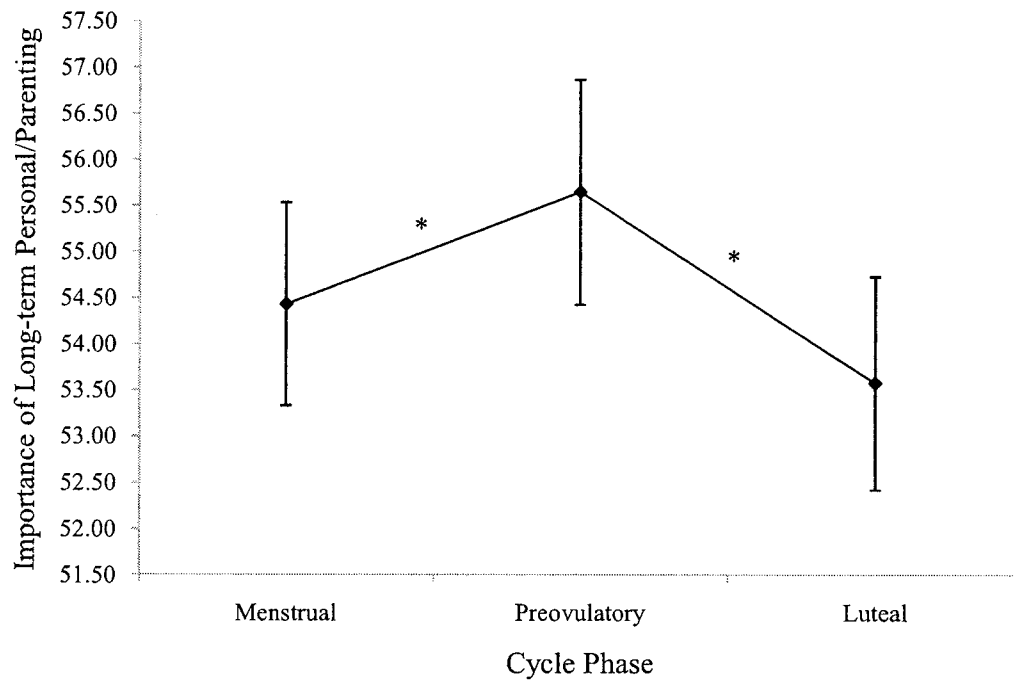


Figure 1. Mean scores of the importance placed on personal/parenting attributes in a long-term mate as a function of menstrual cycle phase. Error bars represent the standard error of the mean.

* $p < .05$.

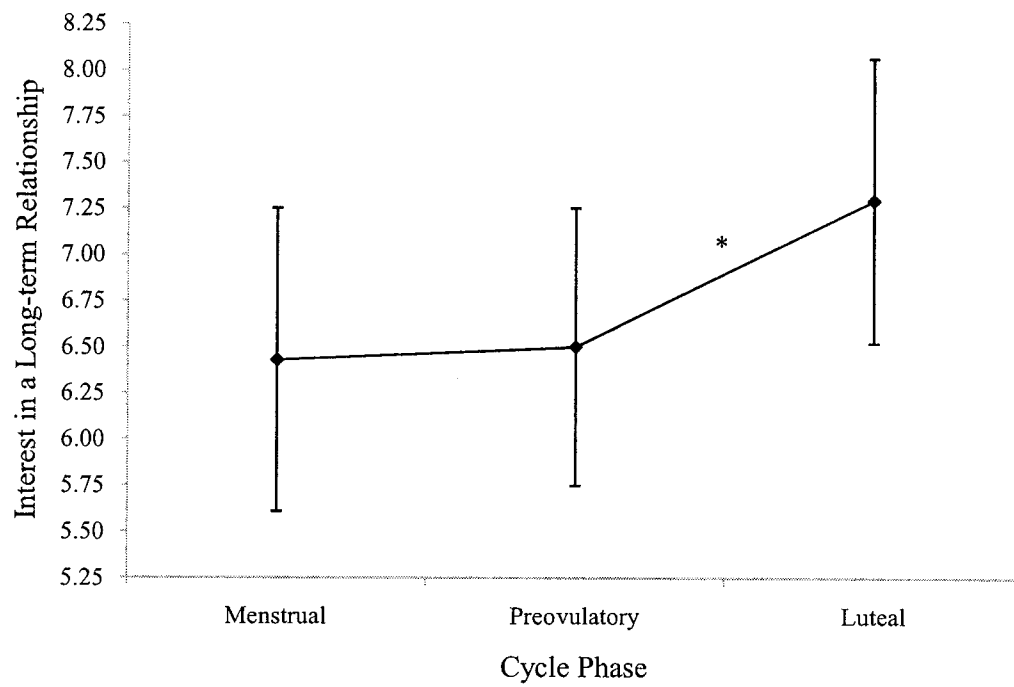


Figure 2. Mean ratings of interest in a long-term relationship as a function of menstrual cycle phase. Error bars represent the standard error of the mean.

* $p < .05$.

were trends towards the short-term personal/parenting subscale being rated as less important during the luteal phase ($M = 35.14$, $SD = 8.55$) than the menstrual phase ($M = 39.43$, $SD = 9.47$), $t(13) = 1.84$, $p = .089$, and the preovulatory phase ($M = 39.71$, $SD = 10.77$), $t(13) = 1.77$, $p = .100$ (see Figure 3). Using the data file reorganized by session, a 3 within repeated measures ANOVA was conducted on the short-term personal/parenting subscale. The effect of time was significant, $F(2, 26) = 4.71$, $p = .018$, partial $\eta^2 = .27$. Follow-up t -tests revealed that the items on this subscale was rated as more important at the first session ($M = 41.86$, $SD = 8.23$) than the second ($M = 36.71$, $SD = 11.93$), $t(13) = 2.49$, $p = .027$, and the third ($M = 35.71$, $SD = 7.48$), $t(13) = -3.81$, $p = .002$.

Pearson product-moment correlations were used to further examine the possible relationships between the dependent variables and SOI (collapsed across phase). Only the correlation between SOI and the short-term interest rating was significant in the subsample, $r(14) = .67$, $p = .009$. In the full sample, however, SOI was negatively correlated with the short- and the long-term personal/parenting subscale, $r(211) = -.29$, $p < .001$ and $r(211) = -.15$, $p = .027$, respectively. It was positively related to the short-term interest rating, $r(212) = .31$, $p < .001$, and the extra-pair desire scale, $r(133) = .28$, $p = .001$.

Hypothesis 2. Since there were no significant interactions between SOI group and menstrual cycle phase, hypothesis 2 could not be tested. Pearson product-moment correlations that follow from hypothesis 2 and therefore involve 2D:4D and masculinity were computed instead. The full sample correlations are presented in Table 6. Right 2D:4D was negatively correlated with the masculinity scale in the subsample, $r(14) = -.56$, $p = .036$, but they were not significantly correlated in the full sample, $r(212) = -.01$, $p = .920$. Right, left, and mean 2D:4D were not significantly correlated with any of the eight main variables in either the free-cycling

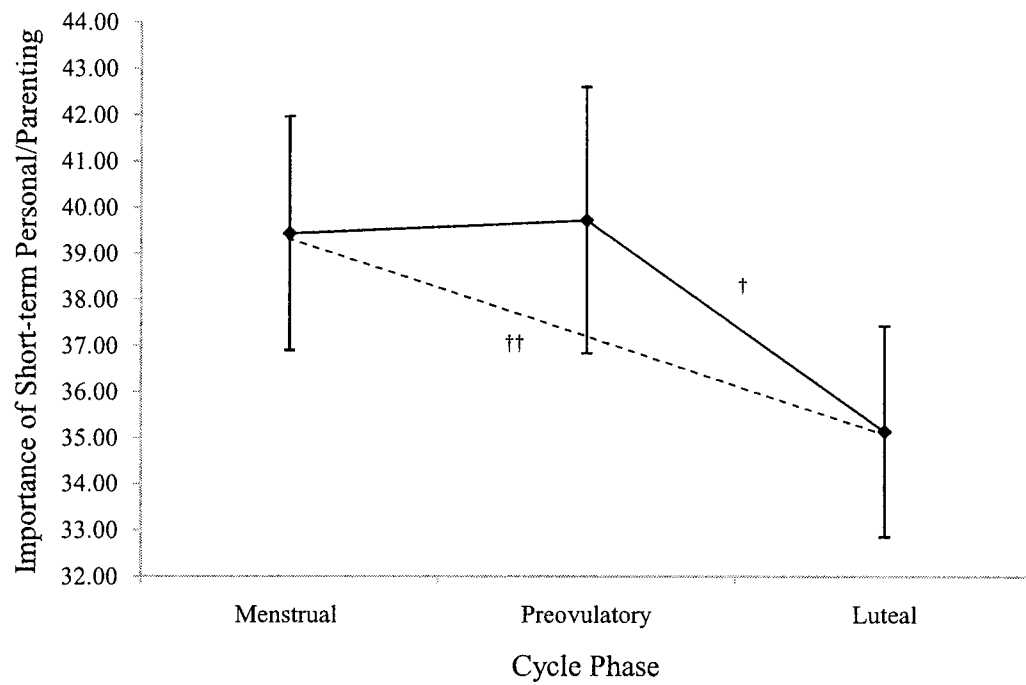


Figure 3. Mean scores of the importance placed on personal/parenting attributes in a short-term mate as a function of menstrual cycle phase. Error bars represent standard error of the mean.

† $p = .100$. †† $p = .089$.

Table 6

Full Sample Correlations between 2D:4D and the Masculinity Scale, and the Main Variables and the Femininity Scale (N = 213)

Variable	Left 2D:4D	Right 2D:4D	Mean 2D:4D	Masculinity scale
Sociosexual Orientation Inventory	-.02	.002	.01	.22**
Short-term				
Interest rating	.04	.09	.08	.03
Personal/parenting subscale	.05	.02	.03	-.18**
Attractiveness/social subscale	.03	-.01	.01	-.05
Long-term				
Interest rating	-.05	-.02	-.04	-.15*
Personal/parenting subscale	.13	.08	.11	-.22**
Attractiveness/social subscale	.05	.08	.07	-.16*
Extra-pair desire scale	-.06	-.06	-.06	.14
Femininity	.02	.04	.03	-.75**

* $p < .05$. ** $p < .01$.

subsample or the full sample. In the subsample, the masculinity scale was not significantly related to any of the main variables. In the full sample, it was positively correlated with SOI and negatively correlated with the short-term personal/parenting subscale and the long-term interest rating, personal/parenting subscale, and attractiveness/social visibility subscale. Also, 2D:4D was not significantly related to the femininity scale, while the masculinity scale was negatively correlated with this variable in both samples, $r(14) = -.88, p < .001$ for the subsample.

An exploratory 2 between (SOI group) x 3 within (phase) repeated measures ANOVA was conducted on masculinity. The mean masculinity scores for the high SOI group were 5.29 ($SD = 3.04$) at the menstrual phase, 6.29 ($SD = 3.30$) at the preovulatory phase, and 6.57 ($SD = 3.46$) at the luteal phase. The mean masculinity scores for the low SOI group were 4.43 ($SD = 2.15$) at the menstrual phase, 3.86 ($SD = 1.95$) at the preovulatory phase, and 4.57 ($SD = 1.51$) at the luteal phase. The main effects of phase and group were not significant, $F(2, 24) = 1.8, p = .185$, partial $\eta^2 = .13$ and $F(1, 12) = 1.69, p = .218$, partial $\eta^2 = .12$, respectively, nor was there a phase x group interaction, $F(2, 24) = 2.2, p = .130$, partial $\eta^2 = .16$.

Supplementary Analyses

Jealousy across the menstrual cycle. Four repeated measures ANOVAs were conducted using total, cognitive, emotional, and behavioural jealousy scores as the dependent variables. These within-subjects ANOVAs were performed to assess whether any of the types of jealousy changed across the menstrual cycle. The means and deviations for each scale are presented in Table 7 by menstrual cycle phase. As seen in Table 8, the only significant main effect was for behavioural jealousy, $F(2, 26) = 4.63, p = .019$, partial $\eta^2 = .26$. Follow-up t -tests showed that behavioural jealousy was lower in the menstrual phase ($M = 13.50, SD = 4.82$) than the preovulatory phase ($M = 14.86, SD = 4.50$), $t(13) = -2.56, p = .024$, and the luteal phase ($M =$

Table 7

Means and Standards Deviations of the Supplementary Dependent Variables by Menstrual Cycle Phase (n = 14)

Variable	Menstrual	Preovulatory	Luteal
Total jealousy scale	69.54 (12.60)	71.71 (12.46)	71.50 (11.23)
Cognitive jealousy subscale	15.93 (7.84)	16.21 (7.32)	15.93 (5.23)
Emotional jealousy subscale	40.11 (6.28)	40.64 (6.23)	40.50 (5.69)
Behavioural jealousy subscale	13.50 (4.82)	14.86 (4.90)	15.07 (5.80)

Table 8

Summary of the Supplementary Repeated Measures Analyses of Variance for Romantic Jealousy

Source	df	F	partial η^2	p
Total jealousy scale	2, 26	0.59	.04	.563
Cognitive jealousy scale	2, 26	0.02	.002	.980
Emotional jealousy scale	2, 26	0.19	.01	.831
Behavioural jealousy scale	2, 26	4.64	.26	.019*

* $p < .05$.

15.07, $SD = 5.80$), $t(13) = -3.22$, $p = .007$. The difference between the preovulatory phase and the luteal phase was not significant, $t(13) = -0.33$, $p = .746$ (see Figure 4). Using the data file reorganized by session, a 3 within repeated measures ANOVA was conducted on the behavioural jealousy subscale. The effect of time was not significant, $F(2, 26) = 0.56$, $p = .578$, partial $\eta^2 = .41$.

Correlates of jealousy. Pearson-product moment correlations between total, cognitive, emotional, and behavioural jealousy and the eight main variables of the study, 2D:4D, and masculinity were computed. The subsample and full sample correlations are displayed in Tables 9 and 10, respectively. In the subsample, the total jealousy scale was positively correlated with the long-term personal/parenting subscale and its inverse relationship with the masculinity scale approached significance. The correlation between the cognitive jealousy subscale and the short-term personal/parenting subscale approached significance in the subsample. In the full sample, the cognitive jealousy subscale was related to the short-term interest rating and the extra-pair desire scale. In the subsample, the emotional jealousy subscale was positively associated with the long-term personal/parenting scale and inversely related to the extra-pair desire scale; its relationship with the short-term personal/parenting subscale approached significance. In the full sample, the emotional jealousy scale was positively correlated with the short-term attractiveness/social visibility subscale, and the long-term interest rating. It was also negatively related to the SOI, the short-term interest rating, the extra-pair desire scale, and the masculinity scale. The relationship between the behavioural jealousy scale and the SOI approached significance in the subsample. In the full sample, the behavioural jealousy scale was correlated with the long-term attractiveness/social visibility subscale and the long-term interest rating.

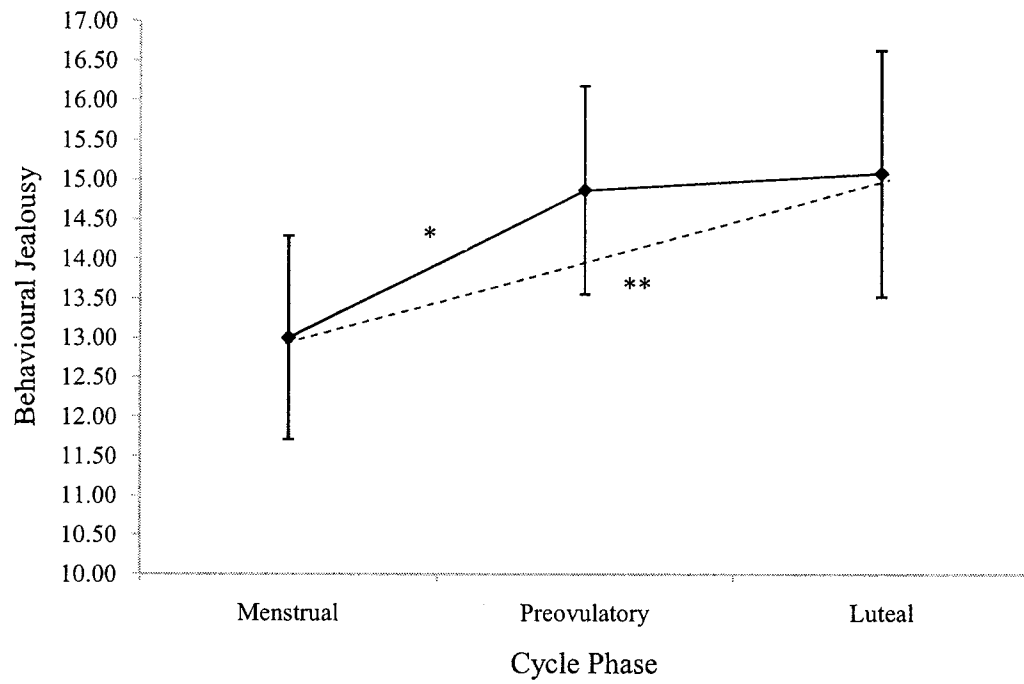


Figure 4. Mean scores on behavioural jealousy as a function of menstrual cycle phase. Error bars represent standard error of the mean.

* $p < .05$. ** $p < .01$.

Table 9

Subsample Correlations between the Supplementary Variables and the Main Variables (n = 14)

Variable	Jealousy scale			
	Total	Cognitive	Emotional	Behavioural
Sociosexual Orientation Inventory	.45	.37	.07	.48 [†]
Short-term				
Interest rating	.36	.33	.13	.27
Personal/parenting subscale	-.14	.48 [†]	-.52 [†]	-.25
Attractiveness/social subscale	.30	.19	.10	.34
Long-term				
Interest rating	.25	-.08	.27	.33
Personal/parenting subscale	.67**	.25	.69**	.36
Attractiveness/social subscale	.28	.16	.18	.23
Extra-pair desire scale	-.31	.03	-.67*	.03
2D:4D				
Left	-.19	-.17	.05	-.29
Right	.30	.28	.04	.28
Mean	.06	.06	.06	-.01
Masculinity scale	-.47 [†]	-.32	-.31	-.30

[†] $p < .09$. * $p < .05$. ** $p < .01$.

Table 10

Full Sample Correlations between the Supplementary Variables and the Main Variables (n = 213)

Variable	Jealousy Scale			
	Total	Cognitive	Emotional	Behavioural
Sociosexual Orientation Inventory	-.02	.11	-.18**	.03
Short-term				
Interest rating	.02	.24**	-.21**	-.07
Personal/parenting subscale	-.02	-.04	.02	-.07
Attractiveness/social subscale	.11	-.04	.17*	.12
Long-term				
Interest rating	.13	-.06	.23**	.17*
Personal/parenting subscale	.05	-.05	.13	.03
Attractiveness/social subscale	.09	-.02	.08	.14*
Extra-pair desire scale	-.02	.23**	-.35**	.08
2D:4D				
Left	.01	-.02	-.002	.04
Right	.07	.04	.03	.07
Mean	.05	.02	.01	.06
Masculinity scale	-.13	-.04	-.20**	-.04

* $p < .05$. ** $p < .01$.

Given the different correlations between the main variables and the types of jealousy, the relationships among the MJS scales were assessed. In the subsample, the total jealousy scale was positively correlated with the cognitive, $r(14) = .578, p = .031$, emotional, $r(14) = .59, p = .026$, and behavioural, $r(14) = .84, p < .000$, subscales. The dimensions were not significantly correlated with one another. In the full sample, the total jealousy scale was again positively correlated with the cognitive, $r(210) = .76, p < .000$, emotional, $r(210) = .69, p < .000$, and behavioural, $r(210) = .78, p < .000$, subscales. The relationship between the cognitive subscale and the emotional subscale was weak but significant, $r(210) = .19, p = .005$. The behavioural subscale was positively related to the cognitive, $r(210) = .45, p < .000$, and the emotional, $r(210) = .40, p < .000$, subscales.

Exploratory Analyses

Short- and long-term partner attributes. To further investigate possible PSTSs, all individual items of the short- and the long-term RPAI were entered into 2 between (SOI group) x 3 within (phase) repeated measures ANOVAs. The means, standard deviations, and results of the 15 ANOVAs for the short-term RPAI are presented in Appendix I. There were no significant main group or phase effects, or group x phase interactions. However, the main effect of group on “similar values and beliefs” approached significance, $F(1, 12) = 3.71, p = .078$, partial $\eta^2 = .24$. The low SOI group had a mean importance rating of 5.86 ($SD = 1.68$), while the high SOI group rated the trait as relatively less important with a mean of 4.24 ($SD = 1.46$). The group effect on “quality of health” also approached significance, $F(1, 12) = 3.85, p = .073$, partial $\eta^2 = .24$. The means for the low and high SOI groups were 4.57 ($SD = 2.13$) and 6.86 ($SD = 2.73$), respectively.

The means, standard deviations, and results of the 15 ANOVAs for the long-term RPAI items are displayed in Appendix J. All group effects and group x phase interactions failed to reach significance. The main effect of group on “fun and exciting personality” approached significance, $F(1, 12) = 3.47, p = .087$, partial $\eta^2 = .22$. The mean for the low SOI group was 7.76 ($SD = 0.83$), while that of the high SOI group was 6.62 ($SD = 1.39$). The main effect of phase on this attribute also approached significance, $F(2, 24) = 3.05, p = .092$, partial $\eta^2 = .20$. Follow-up paired samples t -tests revealed a significance difference between the preovulatory phase ($M = 7.50, SD = 1.45$) and the luteal phase ($M = 6.86, SD = 1.51$), $t(13) = 4.84, p < .001$. The mean at the menstrual phase was 7.21 ($SD = 1.12$).

There was a significant main effect for phase on “responsibility,” $F(2, 24) = 3.58, p = .044$, partial $\eta^2 = .23$. Based on follow-up paired samples t -tests, “responsibility” was rated as more important at the preovulatory phase ($M = 8.36, SD = 0.94$) than the luteal phase ($M = 7.86, SD = 1.35$), $t(13) = 2.88, p = .013$. The mean at the menstrual phase was 8.07 ($SD = 1.14$). The effect of phase on “sense of humour” was also significant, $F(2, 24) = 6.55, p = .017$, partial $\eta^2 = .35$. This attribute was rated as more important at the preovulatory phase ($M = 7.71, SD = 1.33$) than the menstrual phase ($M = 7.43, SD = 1.45$) and the luteal phase ($M = 7.14, SD = 1.66$), $t(13) = -2.28, p = .040$ and $t(13) = 2.83, p = .014$. The difference between the menstrual phase and the luteal phase was also significant, $t(13) = -2.28, p = .040$.

Pearson-product moment correlations for the short- and long-term RPAI items were computed with SOI, 2D:4D, and the masculinity scale. With respect to the short-term items, there were no significant correlations in the free-cycling subsample. However, the relationship between “similar beliefs and values” and SOI approached significance, $r(14) = -.49, p = .074$. Correlations between the masculinity scale and “kindness and understanding”, and “faithfulness”

approached significance as well, $r(14) = -.52, p = .057$ and $r(14) = -.53, p = .053$, respectively. In the full sample, SOI and the masculinity scale were inversely related to “kindness and understanding,” “faithfulness,” “stable personality,” “responsibility,” and “desire for children.” SOI was also negatively correlated with “financial resources,” “sense of humour,” “qualities of a good parent,” and “intelligence”, and positively related to “sex appeal.” The full sample correlations involving SOI and the masculinity scale are presented in Table 11.

SOI was not significantly correlated with any long-term RPAI items in the subsample. The masculinity scale was negatively correlated with “responsibility,” $r(14) = -.56, p = .036$. In the full sample, SOI and the masculinity scale were negatively related to “kindness,” “faithfulness,” and “desire for children.” SOI was negatively correlated with “similar values and belief.” In addition, the masculinity scale was inversely related to “responsibility,” “financial resources,” and “qualities of a good parent.” The full sample correlations involving SOI and the masculinity scale are also presented in Table 11.

Left, right, and mean 2D:4D were not significantly related to any partner attributes in the context of a short-term relationship. However, there were several significant positive correlations with long-term attributes in the full sample. “Financial resources” was correlated with left 2D:4D, $r(211) = .14, p = .044$. “Sense of humour” was correlated with right, $r(211) = .15, p = .29$, and mean, $r(211) = .14, p = .048$. “Desire for children” was correlated with left, $r(211) = .19, p = .006$, and mean, $r(211) = .14, p = .040$, 2D:4D. “Qualities of a good parent” was also related to left, $r(211) = .020, p = .003$, and mean, $r(211) = .15, p = .028$. On the other hand, “quality of health” was related to right, $r(211) = .15, p = .035$, and mean, $r(211) = .14, p = .037$, 2D:4D. Finally, “intelligence” was correlated with right 2D:4D, $r(211) = .14, p = .049$. Thus,

Table 11

Full Sample Correlations for the Short-term, Long-term, and Averaged RPAI Items (N = 213)

Variable	SOI			Masculinity scale		
	ST	LT	M	ST	LT	M
Kindness and understanding	-.22**	-.18*	-.23**	-.18**	-.23**	-.22**
Sex appeal	.21**	.10	.17*	.05	-.06	-.01
Faithfulness and loyalty	-.28**	-.15*	-.28**	-.19**	-.26**	-.23**
Physical attractiveness	.10	.07	.09	-.03	-.10	-.08
Stable personality	-.14*	-.05	-.13	-.17*	-.10	-.17*
Social status	-.04	.05	.004	-.01	-.12	-.07
Responsibility	-.24**	-.09	-.22**	-.14*	-.21**	-.19**
Financial Resources	-.22**	-.04	-.15*	-.12	-.20**	-.18*
Sense of humour	-.15*	-.01	-.11	-.06	-.09	-.09
Fun and exciting personality	-.06	-.01	-.05	-.02	-.08	-.06
Similar values and beliefs	-.34**	-.18*	-.33**	-.12	-.10	-.13
Desire for children	-.26**	-.17*	-.24**	-.16*	-.20**	-.21**
Qualities of a good parent	-.25**	-.09	-.20**	-.13	-.15*	-.17*
Quality of health	-.13	-.06	-.11	-.02	-.12	-.07
Intelligence	-.17*	.06	-.09	-.05	-.02	-.04

Note. RPAI = Romantic Partner Attribute Index. SOI = Sociosexual Orientation Inventory. ST = Short-term. LT = Long-term. M = Averaged.

* $p < .05$. ** $p < .01$.

left and right 2D:4D were statistically related to the importance of three long-term attributes each. Mean 2D:4D correlated with four such attributes.

Averaged partner attributes. The short- and long-term RPAI subscales and items were averaged in order to examine partner preferences apart from context. To further investigate possible PSTSs, all averaged subscales and items were entered into 2 (SOI group) x 3 within (phase) repeated measures ANOVAs. The means, standard deviations, and results of the 17 ANOVAs can be found in Appendix K. There were no main effects for group or group x phase interactions. However, the group effect on “similar values and beliefs” approached significance, $F(1, 12) = 3.77, p = .076$, partial $\eta^2 = .24$. The mean for the low SOI group was 6.79 ($SD = 0.98$), while that of the high SOI group was 5.83 ($SD = 0.85$). The effect of group on “quality of health” also approached significance, $F(1, 12) = 3.45, p = .087$, partial $\eta^2 = .23$. The means for the low and high SOI groups were 5.71 ($SD = 1.44$) and 7.10 ($SD = 1.33$), respectively.

Four possible phase effects were revealed. The main effect of phase on the averaged personal/parenting subscale was significant, $F(2, 24) = 3.50, p = .046$, partial $\eta^2 = .23$. Follow-up paired samples t -tests showed the difference between the luteal phase ($M = 44.36, SD = 4.50$) and the menstrual phase ($M = 46.93, SD = 5.17$) approached significance, $t(13) = -1.95, p = .073$, as did the difference between the luteal phase and the preovulatory phase ($M = 47.68, SD = 5.77$), $t(13) = 2.20, p = .046$. The phase effect on “fun and exciting personality” was significant, $F(2, 24) = 3.97, p = .032$, partial $\eta^2 = .25$. This attribute was rated as more important at the preovulatory phase ($M = 7.29, SD = 1.38$) than the luteal phase ($M = 6.86, SD = 1.38$), $t(13) = 3.38, p = .005$. The difference between the luteal phase and the menstrual phase ($M = 7.25, SD = 1.05$) approached significance, $t(13) = -2.07, p = .059$.

The main effect of phase on “similar values and beliefs” was significant, $F(2, 24) = 5.43$, $p = .011$, partial $\eta^2 = .31$. This attribute was rated as less important at the luteal phase ($M = 5.86$, $SD = 0.91$) than the preovulatory phase ($M = 6.64$, $SD = 1.35$) and the menstrual ($M = 6.43$, $SD = 1.14$), $t(13) = 3.08$, $p = .009$, and $t(13) = -2.83$, $p = .014$, respectively. Lastly, the phase effect on “sense of humour” approached significance, $F(2, 24) = 2.91$, $p = .074$, partial $\eta^2 = .20$. The difference between the luteal phase ($M = 6.57$, $SD = 1.66$) and the preovulatory phase ($M = 7.07$, $SD = 1.40$) approached significance, $t(13) = 1.80$, $p = .095$, as did the difference between the luteal phase and the menstrual phase ($M = 7.00$, $SD = 1.19$), $t(13) = -1.94$, $p = .075$.

Pearson-product moment correlations between the averaged RPAI subscale and items were computed with SOI, 2D:4D, the masculinity scale. In the subsample, the masculinity subscale was negatively correlated with the personal/parenting subscale, “kindness and understanding,” and “faithfulness,” and SOI with “values.” In the full sample, SOI and the masculinity scale were inversely related to “kindness and understanding,” “faithfulness,” “stable personality,” “responsibility,” “financial resources,” “similar values and belief,” “desire for children,” and “qualities of a good parent.” SOI was positively correlated with “sex appeal.” The full sample correlations for the averaged items are presented in Table 11. In addition, left 2D:4D was positively correlated with “desire for children,” $r(211) = .16$, $p = .018$, and “qualities of a good parent,” $r(211) = .16$, $p = .021$.

Sociosexuality across the menstrual cycle. Similar to Oinonen, Klemencic, et al. (2008), a 2 between (SOI group) x 3 within (phase) repeated measures ANOVA was conducted on SOI. The mean SOI score for the Low SOI group was 10.71 ($SD = 6.13$) at the menstrual phase, 12.00 ($SD = 7.26$) at the preovulatory phase, and 12.71 ($SD = 6.40$) at the luteal phase. The mean SOI score for the High SOI group was 42.00 ($SD = 12.20$) at the menstrual phase, 40.57 ($SD = 18.37$)

at the preovulatory phase, and 40.43 ($SD = 18.09$) at the luteal phase. As mentioned previously, the main effect of group was significant, $F(1, 12) = 14.62, p = .002$, partial $\eta^2 = .55$. However, the main effect of menstrual cycle phase and the phase x group interaction did not reach significance, $F(2, 11) = .006, p = .994$, partial $\eta^2 = .00$ and $F(2, 11) = 0.24, p = .792$, partial $\eta^2 = .02$.

Discussion

Summary of the Findings

The primary aim of the present study was to add to the existing literature on human female sexuality across the menstrual cycle. Sociosexuality, short- and long-term relationship interest and mate preferences, extra-pair desire, and romantic jealousy were examined. The role of gender identity in strategy deployment was of interest as well. Recent research indicates that both unrestricted/long-term and restricted/short-term mating strategies may have adaptive value yet disparate evolutionary histories. A connection between sociosexuality and biological sex has been demonstrated in numerous studies (Buss & Schmidt, 1993). However, the strategic pluralism model (SPM) argues that there is more within- than between-sex variation, which several lines of research substantiate (Gangestad & Simpson, 2000). For example, Oinonen, Klemencic, et al. (2008) provided evidence of a periovulatory sociosexuality tactic shift (PSTS). Restricted (low SOI) women shifted towards unrestrictiveness, while unrestricted (high SOI) women shifted towards restrictiveness, in the periovulatory phase. There seems to be a relationship between sociosexuality and masculinity as well as prenatal androgen exposure (i.e., 2D:4D; Clark, 2004).

The possibility of PSTSs in relationship interest, mate preferences, and extra-pair desire was examined. Participants were tested in each of three menstrual cycle phases: menstrual,

preovulatory, and luteal. Results of the main analyses did not support hypothesis 1 and therefore hypothesis 2 could not be tested. That is, there were no significant SOI group by menstrual cycle phase interactions. However, three patterns indicative of phase effects were found. Women tended to rate the short- and long-term personal/parenting subscales as more important during the preovulatory and menstrual phases than the luteal phase. Interest in a long-term mate was rated higher in luteal phase than the preovulatory phase. (The overall ANOVAs for the short-term personal/parenting subscale and interest in a long-term mate merely approached significance.) Exploratory analyses involving short-term, long-term, and averaged mate attributes resulted in seven possible menstrual phase effects: long-term “fun and exciting,” “responsibility,” “sense of humour,” the averaged personal/parenting subscale, and averaged “fun and exciting,” “similar values and beliefs,” and “sense of humour.” (Long-term “fun and exciting” just showed a non-significant trend towards a phase effect.) Women tended to rate these characteristics as more important in the preovulatory phase than the luteal phase.

Since there was little evidence of PSTSs, correlations between sociosexuality, masculinity, 2D:4D, and the other variables of the study were computed as supplementary analyses in replace of hypothesis 2. In the full sample, sociosexuality and masculinity were related to each other as well as to numerous mate preferences, particularly those on the personal/parenting subscale, in the expected directions. Also, sociosexuality was positively correlated with extra-pair desire. The findings partially supported the assumptions of hypothesis 2 such that self-perceived masculinity was positively correlated with sociosexual unrestrictiveness, and negatively correlated with interest in a long-term relationship and the importance placed on personal/parenting qualities in a prospective mate. However, 2D:4D was correlated with few variables. Left, right, or mean 2D:4D was significantly positively correlated

with long-term “financial resources,” “sense of humour,” “desire for children,” “qualities of a good parent,” “quality of health,” and “intelligence.” Left had five, right had three, and mean 2D:4D had four significant correlations with partner attributes.

Supplementary analyses involving romantic jealousy were completed. The question of whether jealousy fluctuates across the menstrual cycle was posed. Results revealed a significant effect of phase on behavioural jealousy but not on cognitive or emotional jealousy. Behavioural jealousy was higher in the luteal phase than the menstrual phase.

Lastly, the question as to how jealousy may relate to sociosexuality and putative measures of gender (as opposed to biological sex) was investigated. In the full sample, women’s cognitive jealousy tended to increase with their interest in a short-term relationship and extra-pair desire. In contrast, emotional jealousy was positively correlated with the importance of attractiveness/social visibility in a short-term partner and interest in a long-term relationship. Women’s emotional jealousy tended to decrease with higher levels of sociosexuality, masculinity, extra-pair desire, and short-term interest. Behavioural jealousy increased with interest in a long-term relationship as well as preference for attractiveness/social visibility in a long-term partner.

Tactic Shifts

Measurable changes in women’s relationship interest and partner preferences across the menstrual cycle were expected to occur in the context of a short-term relationship. First, it was hypothesized that restricted women would shift towards greater (a) interest in a short-term relationship, (b) preference for qualities of attractiveness/social visibility, and (c) extra-pair desire at the preovulatory phase. Conversely, unrestricted women were expected to shift towards diminished (a) interest in a short-term relationship and (b) extra-pair desire, and greater (c)

preference for personal/parenting qualities. Essentially, a repertoire of mating strategies probably evolved among women due to sexual selection but tactic use may be influenced by hormonal fluctuations, and therefore fertility, across the menstrual cycle. However, the results of the present study did not support the PSTS hypothesis. There were no significant group by menstrual phase interactions for the main dependent variables, short-term, long-term, or averaged mate attributes, or sociosexuality.

There are several explanations as to why support for the PSTS predictions was not found. First of all, the free-cycling subsample was fairly small, about half the size of Oinonen, Klemencic, et al.'s (2008) sample. This is almost certainly because all volunteers were invited to participate in the present study, resulting in a large sample, while strict criteria were used to screen people out of the menstrual cycle analyses. In contrast, Oinonen, Klemencic, et al. used a screening questionnaire at the beginning of their study. Despite the subsample size, the within-subjects design used in the present study is relatively sensitive. Moreover, an examination of the phase means actually suggests a pattern opposite to the PSTS for the short-term attractiveness/social visibility and personal/parenting subscales as well as for extra-pair desire. Thus, even if the power of the study had been greater, most of the predictions of hypothesis 1 would not have been supported.

Failure to demonstrate a PSTS may be due to differences in sample between the present study and Oinonen, Klemencic, et al. (2008). However, the mean age of the participants included in the menstrual phase comparisons of Oinonen, Klemencic, et al. was 23.09 years, while that of the current sample was 23.06 years. Education between the studies' full samples differed by 0.03 years. Furthermore, the studies were conducted at the same university and involved similar participant exclusion criteria for the phase comparisons.

The only group by phase interaction to near significance was for interest in a short-term relationship. However, exploratory repeated measures ANOVAs failed to reveal any trends towards menstrual cyclicity for either SOI group, though the direction of the means was consistent with a PSTS. It may be that the PSTS is specific to changes in short-term relationship interest as Oinonen, Klemencic, et al. (2008) premised it on one-night stand interest and sociosexuality. This means that restricted and unrestricted women may not display different patterns of menstrual cyclicity in mate preferences and extra-pair desire. That being said, the results of the present study did not provide evidence of a PSTS for sociosexuality as the means for each SOI group remained extremely close across the phases of the menstrual cycle. Also, extra-pair relationships tend to be short-term relationships and mate preferences are arguably entwined with sociosexuality.

Another possibility is that the low reliability of the SOI affected the results. The Cronbach's alpha for the SOI was .64 in the present study, while it was .73 in the original PSTS sample (Oinonen, Klemencic, et al., 2008). In the subsample, the internal consistency of the SOI in the preovulatory phase was very weak with a Cronbach's alpha of .37. If the scale was performing poorly, the 50th percentile split of SOI scores may have inadequately categorized women into groups and/or attenuated changes in sociosexuality across the menstrual cycle. This might also explain why there were no significant group effects for any of the dependent variables. Interestingly, research recent has called the psychometrics and thus utility of the SOI into question (e.g., Jackson & Kirkpatrick; Webster & Bryan, 2007). Shortly after the present study began, Penke and Asendorpf (2008b) published a nine-item, revised SOI with consistent response scales, norms, and three facets: behaviour ($\alpha = .85$), attitude ($\alpha = .87$), and desire ($\alpha = .86$).

Three additional differences between the current study and Oinonen, Klemencic, et al. (2008) centre around methodology. First, Oinonen, Klemencic, et al. used the periovulatory phase of the menstrual cycle, which can be defined as the days bracketing ovulation (i.e., days 8 to 15 or -20 to -13). The preovulatory phase was targeted in the present study, the days leading up to ovulation (i.e., days 10 to 14 or -19 to -15). The preovulatory phase is the most fertile (Gordon & Speroff, 2001) and the studies reviewed herein tend to report shifts at this time (e.g., Gangestad et al., 2005; Krug et al., 1996). Second, women in the original PSTS study were tested during the periovulatory phase and either the menstrual or luteal phase. The periovulatory (high fertility) phase was compared to the menstrual and luteal (low fertility) phases. Lastly, Oinonen, Klemencic, et al. had women rate male faces in terms of one-night stand and long-term relationship interest. Perhaps measures that are strictly “paper-and-pencil,” such as the RPAI, are not as sensitive to small but real group differences and changes cross the menstrual cycle.

While evidence for the PSTS was weak, menstrual cyclicity in several of the dependent variables was supported. Since there were some concern about power, phase effects that approached significance were explored as well. Three potential phase effects were found in the main analyses and twelve overall. The effect of phase on the importance of personal/parenting qualities in a long-term relationship was significant. The importance that a woman placed on long-term personal/parenting qualities was higher in the preovulatory phase than the less fertile menstrual and luteal phases. While the mean rating at the menstrual phase was 55.64 compared to 53.77 at the luteal phase, the difference between the two phases was not significant.

Interestingly, the effect of phase on the importance of personal/parenting qualities in a short-term partner approached significance. Women tended to place more importance in these characteristics during the menstrual and preovulatory phases than the luteal phase. The mean for

the preovulatory phase appeared to be somewhat higher but was not significantly different from that of the menstrual phase. A possible explanation for these findings is that women may be more interested in short-term relationships when they are fertile but they may also be evaluating their mates in terms of personal/parenting characteristics at this time. Alternatively, it could be that the short-term RPAI did not effectively measure anything above and beyond the long-term RPAI.

The effect of time (or repeated exposure) on the short-term personal/parenting subscale was significant. Women tended to place more importance on personal/parenting qualities in a short-term mate at the first session compared to the second and third sessions, though it is unclear as to why. How this finding may affect the interpretation of the non-significant trend towards a phase effect for the short-term personal/parenting subscale is ambiguous. It is arguable that an effect of time does not preclude a menstrual cycle phase effect.

The short- and long-term scales were averaged to obtain general indices of mate preferences. The averaged personal/parenting scale was significantly affected by phase. Again, personal/parenting qualities were more important during the menstrual phase than the luteal phase. Although the mean in the preovulatory phase was 44.36 and that in the menstrual phase was 46.93, the difference was in fact not statistically significant.

Exploratory results indicated that the importance of several qualities from the RPAI's personal/parenting subscale changed across the cycle. The effect of phase on the importance of a "fun and exciting" long-term mate approached significance. Women reported a greater preference for this trait in the preovulatory phase compared to the luteal phase. The difference between the menstrual phase and the preovulatory phase was not significant, though the mean at the preovulatory phase appeared to be slightly higher. The exact same pattern of results was

found for long-term “responsibility,” and “sense of humour,” except the ANOVAs were significant. Also, “sense of humour” was more important to women when they were in the preovulatory phase than the menstrual phase.

The effect of phase on the following averaged attributes was significant: “fun and exciting,” “similar values and belief,” and “sense of humour.” Women tended to place more emphasis on these qualities in the preovulatory and menstrual phases than the luteal phase. This is similar to the pattern described for the characteristics rated in the context of a long-term relationship. Thus, although the type I error rate was high in these exploratory analyses, the convergent findings imply that a menstrual phase effect whereby women’s personal/parenting mate preferences increase from the luteal phase to the menstrual and preovulatory phases is probable.

However, the results of Oinonen, Klemencic, and Mazmanian (2004) are not really congruent with the ones presented here. As part of a larger study (Oinonen, 2003), Oinonen et al. (2004) examined women’s ratings on the RPAI between the preovulatory phase and the menstrual or luteal phase. “Financial resources,” an attribute on the attractiveness/social visibility scale, was more important in the low fertility phases than the preovulatory phase. Women ranked “stable personality” and “social status” as more desirable when in the preovulatory phase however. In the current study, there was no evidence of a shift in women’s preferences for traits of attractiveness/social visibility. The studies differ slightly, however, such that Oinonen et al. did not specify whether participants were rating traits of a short- or long-term partner.

Nonetheless, the results of the current study and Oinonen et al. (2004) do not support the ovulatory shift hypothesis, which states that menstrual cycle changes should be particular to

short-term mating (Gangestad et al., 2005). In fact, evolutionary theory would expect that traits indicative of evolutionary fitness, “attractiveness” and “sex appeal” in particular, would be preferred at the preovulatory phase (by women in general). Several explanations can be offered for why such results were not found in either study. The ovulatory shift hypothesis could be inaccurate and evolutionary theory may not be fully developed in the area of mate preferences.

Also, both samples consisted of undergraduate students at a relatively small university in Northern Ontario. The results may not be generalizable to women with less education and/or more relationship experience. For example, women’s interest in a long-term relationship was significantly higher than their short-term interest in the present study. Interest in a short-term relationship was relatively low at all three phases of the menstrual cycle. Though there is little evidence that the sample differed from those of other studies, about 64% of the free-cycling subsample had a primary romantic partner. Thus, the subsample may have had a restricted range of SOI. It is unfortunate that the SOI is scored differently across studies as this makes sample comparisons very difficult.

Moreover, men and women in university are more likely to have the same level of wealth and thus such women may place less emphasis on potential mates’ social visibility (Oinonen et al., 2004). As Oinonen et al. pointed out, many items on the RPAI could be important to either or both heredity and offspring investment. That is to say that the RPAI may not be sensitive enough to distinguish between short- and long-term strategies. For example, women might prefer some characteristics, such as “intelligence,” “stable personality,” and “social status,” because they can be passed on to offspring—and are relevant to effective child rearing. In fact, Oinonen et al. constructed a “good genes” and a “good parent” subscale out of the RPAI, but the scores did not change across the menstrual cycle. While the attractiveness/social visibility scales did not change

in the present study, the personal/parenting subscales, which unlike Oinonen et al.'s "good parent" scale included several personal qualities, shifted across the menstrual cycle.

Taken together, the studies suggest that the only preferences which noticeably change across the cycle are those that reflect personal qualities and are therefore most applicable to both good genes and parental investment. For instance, preferences for parenting qualities such as "kindness and understanding," "desire for children," and "qualities of a good parent" in a prospective mate were not found to change. The importance of the seemingly more personal attributes of the personal/parenting subscale tended to increase at the preovulatory phase (e.g., "fun and exciting" and "sense of humour"). That being said, "responsibility" and "similar values and beliefs" were among the long-term attributes whose importance shifted and they may be central to parenting. Thus, it is possible that the young women in this study were simply not yet worried about the precise parenting abilities of their partners.

Lastly, the effect of phase on women's interest in a long-term relationship approached significance. Women were more interested in a long-term relationship at the luteal phase than in the other two phases. The difference between the preovulatory phase and the menstrual phase was not significant. However, the mean for the preovulatory phase appeared slightly higher, which is a consistent finding in the present study. The fact that interest was highest in the luteal phase fits with evolutionary theory such that women should be more interested in a long-term relationship when fertility is low. It is plausible that long-term interest diminishes with increasing fertility across the menstrual cycle. That is, it may be high in the luteal phase, following an increased chance of conception in the preovulatory phase, when fertility is at its lowest. If this is the case, it is likely that the higher level of progesterone in the luteal phase

compared to the menstrual phase has an effect on long-term interest. Conversely, this phase effect may be a type I error and thus not exist in the population.

Most of the variables that demonstrated menstrual cyclicity showed this effect in the context of a long-term relationship. This is contrary to the prediction, based on Gangestad and Simpson's (2000) SPM, that long-term interest and preferences would remain relatively stable in comparison to short-term interest and preferences. The same reasons as to why several personal/parenting attributes in a partner shifted at the preovulatory phase but those suggestive of attractiveness/social visibility did not apply here. The sample consisted of young women in university who may or may not represent most women, or compare to other samples, in terms of mate preferences, sociosexuality, and relationship experience. Then again, this area of SPM and other evolutionary theories may need to be re-examined.

Taken together, the menstrual cycle findings suggest that the importance women place on personal/parenting characteristics, particularly in a long-term mate, may increase steadily with estrogen and/or LH to peak with conception risk just prior to ovulation. The results also indicate that there may be some significant differences in relationship interest and mate preferences between the two relatively less fertile phases of menstrual cycle (i.e., the luteal phase and the menstrual phase). The implication for menstrual cycle research in psychology may be that all three main phases should be considered as opposed to high fertility versus low fertility. This way, the mechanisms of change (e.g., relative hormone levels and conception risk) are more likely to be differentiated.

Mate Preferences

Evolutionary theory would predict that women low in sociosexuality would value personal/parenting characteristics in their mates, while those high in sociosexuality would prefer

attractiveness/social visibility (e.g., Cunningham & Russell, 2004; Simpson & Gangestad, 1992). While significant group differences in the subscales of the RPAI were not found, the group effect on several individual attributes approached significance. As would be expected, the low SOI group tended to rate “similar values and beliefs” in a short-term mate, “fun and exciting” in a long-term mate, and averaged “similar values and beliefs” as more important than the high SOI group. The high SOI group preferred “quality of health,” arguably an indicator of fitness, in a short-term partner and in general.

While these results merely approached significance, numerous correlations supported them. In the full sample, women who scored relatively high on the SOI (unrestricted women) tended to rate the short- and long-term personal/parenting subscales as less important than those who scored lower. In the context of a short-term relationship, women who scored relatively high on the SOI tended to rate “kindness and understanding,” “faithfulness and loyalty,” “stable personality,” “responsibility,” “desire for children,” “similar values and beliefs,” “sense of humour,” “qualities of a good parent,” and “intelligence” as less important compared to those who scored lower. They also rated “financial resources,” an attribute on the attractiveness/social visibility subscale, as less important, suggesting that this trait may relate to parenting as well. In the context of a long-term relationship, sociosexuality was inversely related to “kindness and understanding,” “faithfulness and loyalty,” “desire for children,” and “similar values and beliefs.” Also, women who were somewhat sociosexually unrestrictive tended to report more interest in a short-term relationship and that “sex appeal” was more important in a short-term relationship than those who were more restricted. These findings fit with Simpson and Gangestad’s (1992) original conceptualization of sociosexuality and romantic partner choice

such that unrestricted women cared less than restricted women about personal/parenting attributes.

Masculinity

The hypothesis that self-perceived masculinity and 2D:4D would be implicated in any PSTSs could not be tested. However, in concordance with several studies, this hypothesis suggests that masculinity and 2D:4D, a recognized proxy of masculinization, are related (Beech & Mackintosh, 2005; Csathó et al., 2003; Wilson, 1983). In the subsample, women who reported greater masculinity tended to have lower 2D:4Ds, but masculinity and 2D:4D were not significantly associated in the full sample. These results fit with those of Lippa (2006), Schmukle et al. (2007), and Rammsayer and Troche (2007), which imply that self-perceived masculinity and 2D:4D are unrelated among women. Furthermore, the effect sizes of 2D:4D reported by Manning and colleagues tend to be very low (see Manning, 2008). Thus, the fairly unique method used to measure 2D:4D in the present study may be at fault for the null findings or may be more accurate.

Interestingly, left, right, and mean 2D:4D were associated with several different mate preferences. Higher left 2D:4Ds tended to be associated with the importance of “financial resources,” “desire for children,” and “qualities of a good parent” in a long-term mate as well as averaged “desire for children” and “qualities of a good parent.” This suggests that left 2D:4D is related to partner traits conducive to parenting. Research has suggested that right 2D:4D tends to be dominant and results in more significant correlations than left 2D:4D (e.g., Clark, 2004). However, right 2D:4D was only correlated with a few personal qualities in a long-term mate: “sense of humour,” “quality of health,” and “intelligence.” Mean 2D:4D was related to “sense of humour,” “desire for children,” “qualities of a good parent,” and “quality of health,” two mate

preferences associated with each of left and right. Correlations between the variables of interest and all three 2D:4Ds were in the expected directions such that women with more masculine ratios tended to care less about these personal/parenting characteristics than women with relatively feminine ratios. These results are comparable to those of Oinonen, Jarva, et al. (2008) and Clark (2004) regarding sociosexuality and 2D:4D, yet similar to Putz et al. (2004) as a direct relationship between the latter two variables was not found.

On the other hand, self-perceived masculinity increased with sociosexuality and decreased with self-perceived femininity in the full sample of women. These findings provide some corroboration for the measure of gender identity created in part for this study. Women who reported a higher degree of masculinity tended to rate the importance of personal/parenting characteristics in a short- and a long-term relationship as less important than those who were presumably less masculine. “Masculine” women also tended to rate attractiveness/social visibility in a long-term partner as less important than less masculine women, probably because they were not as interested in a long-term relationship.

Self-perceived masculinity was negatively correlated with numerous short- and long-term mate preferences, four and six respectively, from the personal/parenting subscale. It is notable that sociosexuality was negatively related to all seven short-term, and four long-term, mate preferences on the personal/parenting scale as well as short-term “financial resources” and “intelligence.” These results are in agreement with strategic pluralism among women and suggest that mating strategy may be influenced by gender identity. Indeed, different reproductive strategies may be used between sociosexually unrestricted and restricted women as well as between self-ascribed masculine and feminine women. The results suggest that gender, more specifically self-reported sociosexuality and masculinity, is associated with mate selection

criteria. Overall, this study supports Simpson and Gangestad's SPM and, to some degree, Oinonen, Klemencic, et al.'s (2008) PSTS theory of female mating strategy across the menstrual cycle.

Romantic Jealousy

A supplementary goal of the present study was to examine three types of romantic jealousy: cognitive, emotional, and behavioural. It was expected that jealousy would change across the menstrual cycle, though it was unclear as to how. Previous research has focused on women's responses to imagined emotional versus sexual infidelity across the menstrual cycle and the results have been inconclusive. Results of the present study indicated that women reported the least behavioural jealousy during the menstrual phase. The difference between the preovulatory and luteal phases was not significant, albeit the mean behavioural jealousy score at the preovulatory phase appeared to be a little lower. Behavioural jealousy may increase steadily from the menstrual phase to the preovulatory phase, when conception risk is high, and the luteal phase, as pregnancy is uncertain until next menses. Women may have evolved strategies to express jealousy when conception and prior impregnation are most probable but still indefinite and hence to retain their mates.

It is intriguing that cognitive and emotional jealousy did not show menstrual cyclicity. Arguably, these two types are closely associated with the definition of jealousy in that they consist of intrusive thoughts about, and reactions to, interplay between one's mate and romantic rivals. Behavioural jealousy, as defined by the MJS, may be analogous to mate guarding as it involves tactics such as checking on one's partner and monitoring his or her exchanges with members of the opposite sex. Haselton and Gangestad (2006) as well as Pillsworth and Haselton (2006) found that pair-bonded women reported mid-cycle increases in their partner's use of

retention tactics (though the relationship was moderated by male and female physical attractiveness). However, there does not appear to be any research looking at women's use of mate guarding across the menstrual cycle.

In the full sample, the three types of jealousy were differentially associated with the main variables of the study, adding credence to the position that jealousy consists of multiple dimensions (e.g., Pfeiffer & Wong, 1989). Women who reported greater cognitive jealousy tended to have more interest in a short-term relationship and more extra-pair desire than those who were less cognitively jealous. Women who scored higher on emotional jealousy were less interested in short-term relationships, had less extra-pair desire, were more sociosexually restricted, and perceived themselves as less masculine than those who scored lower. They were also interested in a long-term relationship but rated the importance of attractiveness/social visibility in a short-term mate as relatively important. Lastly, behavioural jealousy increased with long-term interest and attractiveness/social visibility. It seems as though women who have a propensity for short-term mating experience more cognitive jealousy, while those with an inclination for long-term mating report more emotional and behavioural jealousy.

Strengths and Limitations

It is important to note the limitations of this study, including the type I error rate and subsample size. Since fifteen partner attributes were included in several sets of exploratory analyses, some significant results using a cut-off of .05 could have been obtained by chance (i.e., a type I error). However, the results of the menstrual cycle analyses, and most of the correlational analyses, tended to converge. A consistent pattern whereby women placed more importance on personal/parenting mate attributes during the preovulatory phase and menses than the luteal phase emerged from the data. Interestingly, the luteal phase is the least fertile

menstrual cycle phase (Guerrero, 1978). This pattern was seen despite the limited number of free-cycling participants who did not meet exclusion criteria. Although 14 women were included in the analyses of menstrual cyclicity, the size of the full sample was very large and included 204 women, with various reproductive histories, who completed all three phases of the study.

Another limitation of this study is the homogeneity of the participants in terms of age, ethnicity, education, socioeconomic status and thus life experience. The majority of the sample consisted of unmarried first- and second-year Caucasian undergraduate students, some of whom may not yet have had a romantic relationship. Indeed, younger participants had a restricted range of sexual experience compared to older participants. The results may not adequately capture the situation among most women, particularly those who are sexually mature or married. For example, it may be that most university students are in the process of determining their mate preferences and are not yet interested in a permanent long-term relationship (e.g., marriage) or procreation. Nonetheless, women's interest in short-term relationships was significantly lower than their long-term interest. The women in the present study may be in a period in the life span just before sociosexual differentiation.

One last limitation is the relatively weak internal consistency of the primary measure, the SOI, across the menstrual cycle and averaged. Given that SOI score was the grouping variable for many analyses, the women may not have been accurately classified as sociosexually restricted or unrestricted. The low reliability of the SOI could have affected the results pertaining to PSTSs and correlates of sociosexuality. Also, the median split of SOI scores was used and thus the heterogeneity between the two groups may have been limited. This limitation may be related to the lack of sexual experience among the participants since the SOI involves three estimates of sociosexual activity. Indeed, only one significant difference between the groups on

these estimates was found (i.e., “number of partners in the past year”), while the sociosexual attitudes of the high SOI group were significantly higher than those of the low SOI group. In comparison, Oinonen, Klemencic, et al. (2008) found that their low and high SOI groups significantly differed on every item of the SOI. Oinonen, Klemencic, et al.’s high SOI group appears to have foreseen having sex with more partners in the next five years and to have reported more one-night stands than that of the present study.

The current study also had a number of strengths. For instance, a sensitive, mixed ANOVA design was utilized and the results were largely consistent. It could be argued that a larger sample size would have increased the statistical power of the study, but the means of most of the null effects were not in the predicted directions. Thus, it is unlikely that a larger subsample size would have supported the PSTS hypothesis. Secondly, the study was guided by large bodies of research on mating strategies and the menstrual cycle as well as a distal theoretical framework, evolutionary psychology. Parsimonious, thematic explanations for the findings could therefore be offered.

Another strength of the study is that strict exclusion criteria were used. Although data was collected from 92 free-cyclers, many of those women were excluded due to possible hormonal anomalies that could affect the ovarian cycle. This was done to reduce noise in the analyses of cyclicity. Unfortunately, many researchers in this area do not disclose what, if any, criteria they use (e.g., Gangestad et al., 2007; Haselton, Mortezaie, Pillsworth, Blekse-Rechek, & Frederich, 2007) and thus it unknown how the present sample compares to that of most other studies. Some studies have even included HC users in menstrual cycle analyses (see Gaulin et al., 1997; Scarbrough and Johnston, 2005; cf. Oinonen & Mazmanian, 2007).

Also, each participant in the present study completed all measures at each of three main menstrual cycle phases, which is somewhat rare. The attrition rate was low despite the fact that participation in the study spanned the length of one menstrual cycle, approximately one month, and involved four stages (one laboratory session and three online questionnaires). Most related research studies in psychology include between-subjects analyses or within-subjects analyses of the fertile preovulatory phase and a less fertile period (the menstrual and luteal phases).

Although within-subjects designs are relatively sensitive, studies that examine fewer than three distinct phases may be misleading or incomplete. For example, the current study suggests that there may be differences in the mating psychology of women between the menstrual phase and the luteal phase.

Directions for Future Research

Future research in this area should further examine the possibility of PSTSs and attempt to replicate the findings of Oinonen, Klemencic, et al. (2008). While the present study failed to find direct evidence of a PSTS, the results seem to reflect different reproductive tactics between sociosexually unrestricted and restricted women. In general, this study suggests that sociosexuality and self-ascribed masculinity are associated with one another as well as with mate selection criteria. It is therefore likely that organizational effects of hormones influence women's primary strategies, though correlations with putative measure of androgen exposure in utero tended to be inconsistent and weak. Furthermore, tactic switching due to activational effects was demonstrated in several mate preferences as well as in behavioural jealousy. More sensitive measures of sociosexuality and partner preferences should be utilized, such as Penke and Asendorpf's (2008b) SOI-R, as it has improved psychometric properties, and picture ratings. Also, reproductive hormones may have greater organizational effects on sex drive than

sociosexuality and thus sex drive may be related to gender identity, mating strategy, and tactic switching. For instance, when sex drive is high, SOI score may be limited by “number of sex partners” (D. Mazmanian, personal communication, May, 2009).

Another area in evolutionary mating psychology that warrants further exploration is gender identity. First, it appears as though there is no simple, psychometrically sound, and peer-reviewed measure of this concept. Second, future studies should examine the relationships between mating strategies, organizational hormonal effects, femininity, and androgyny (Teatero, Mazmanian, & Oinonen, 2009).

As mentioned previously, there do not appear to be any published studies on general romantic jealousy across the menstrual cycle. The present study may have been the first to look into hormonal effects on a measure of potentially pathological relationship jealousy. In contrast, responses to sexual versus emotional infidelity have been studied at length. While behavioural jealousy seemed to change over the cycle, cognitive and emotional jealousy did not. Given that the measure of behavioural jealousy used may reflect mate guarding, future studies should be conducted on mate retention across the menstrual cycle and on its possible correlates. General romantic jealousy may not be, while women’s sensitivity to emotional infidelity relative to sexual infidelity may be, affected by the menstrual cycle. Conversely, the relationship between romantic jealousy and activational steroidal effects may be mediated or moderated by other variables, likely candidates being attractiveness and mate value (Buss & Shackelford, 2008; Riese & Wright, 1996).

Finally, it has become apparent that methods of examining menstrual cyclicality in psychological research are far from uniform. Researchers do not always report criteria or statistics relevant to the hormonal statuses of their participants, including HC use, mental health,

and menstrual regularity. Furthermore, target days of the menstrual cycle and techniques for determining phase (e.g., backward versus forward counting) vary across studies. This makes it difficult to compare samples and results. A methodological review of menstrual cycle research in psychology may prove useful in advancing the field (see Hampson & Young, 2008 for a summary of methods for monitoring the menstrual cycle).

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Appendix A

Personal Information and Background Questionnaire

1) Today's date: _____
 Day of week (e.g., Monday) Day of month (e.g., 1) Month (e.g., May)

2) Age: _____ years and _____ months

3) Sex (Circle one answer):

MALE FEMALE

4) What is your ethnic background? (Check one box).

- | | |
|---|---|
| <input type="checkbox"/> Caucasian/White | <input type="checkbox"/> Middle Eastern |
| <input type="checkbox"/> African-Canadian/Black | <input type="checkbox"/> East Indian |
| <input type="checkbox"/> Native-Canadian/Aboriginal | <input type="checkbox"/> European |
| <input type="checkbox"/> Hispanic/Latino | <input type="checkbox"/> Other (please specify) _____ |
| <input type="checkbox"/> Asian | |

5) Please use the following scale to indicate which hand you use for each activity:

Left		Both		Right
1	2	3	4	5

Write the number beside each item.

- | | |
|---------------------------------|-------|
| A) Writing | _____ |
| B) Throwing | _____ |
| C) Using scissors | _____ |
| D) Using a toothbrush | _____ |
| E) Using a knife without a fork | _____ |
| F) Using a spoon | _____ |
| G) Striking a match | _____ |

6) For the following questions, please circle one number each.

A) I feel that I am . . .

Not at all masculine										Very masculine
1	2	3	4	5	6	7	8	9	10	

B) I feel that I am . . .

Not at all feminine										Very feminine
1	2	3	4	5	6	7	8	9	10	

C) Most of my friends would consider me to be . . .

Not at all masculine										Very masculine
1	2	3	4	5	6	7	8	9	10	

D) Most of my friends would consider me to be . . .

Not at all feminine										Very feminine
1	2	3	4	5	6	7	8	9	10	

7) Years of Education (years from grade 1 to 12 + years of university/college): _____

8) What subject(s) are/were you majoring in if you are/were in school (e.g., Psychology, Philosophy)?:

9) What degree(s) are/were you working towards if you are/were in school (e.g., BA, BSc)?:

10) Please list any degrees/diplomas that you have obtained: _____

11) Are you currently taking any medications (other than birth control pills)? (Circle one answer).

YES NO

If YES, what medications are you taking? (Please list).

12) Please list any medical conditions that you have been diagnosed with (e.g., hypothyroidism, asthma, cancer, diabetes, etc.).

13) Please list any psychiatric, emotional, or psychological conditions that you have been diagnosed with (e.g., depression, anxiety disorder, eating disorder, substance abuse, etc.).

14) Do you think that any of your biological relatives (i.e., parents, siblings, grandparents, aunts/uncles) have had any psychiatric problems (e.g., depression, anxiety, mood problems, schizophrenia, eating disorder, alcoholism, panic attacks)? (Circle one answer).

YES NO MAYBE

15) How often do you normally consume alcohol? (Circle one number).

never	once or twice a month	once or twice a week	three to four times a week	almost every day
0	1	2	3	4

16) How often do you use illegal drugs (i.e., marijuana, hash, cocaine, LSD, etc.)? (Circle one number).

never	once or twice a month	once or twice a week	three to four times a week	almost every day
0	1	2	3	4

22) Is your relationship long distance? (Circle one answer).

YES NO

23) Are you currently pregnant? (Circle one answer).

YES NO MAYBE

24) Are you currently taking hormonal contraceptives (i.e., birth control pill, patch, injection)? (Circle one answer).

YES NO

25) If you ARE NOT currently taking hormonal contraceptives (i.e., birth control pill, patch, injection),

A) Have you ever taken hormonal contraceptives in the past? (Circle one answer).

YES NO

B) If you have taken hormonal contraceptives in the past, how many years and months has it been since you stopped taking hormonal contraceptives?

_____ years and _____ months

26) If you ARE currently taking hormonal contraceptives (i.e., birth control pill, patch, injection),

A) For how many years and months have you been taking hormonal contraceptives?

_____ years and _____ months

B) Do you still experience a menstrual period? (Circle one answer).

YES NO

C) If you still experience a menstrual period, how frequently do you experience this period? (Circle one answer AND elaborate).

- 1 Rarely _____
- 2 Regularly _____
- 3 Frequently _____

D) Please put a check beside the type of hormonal contraceptive you are currently taking:

Oral Contraceptives:

- Alesse
- Brevicon 0.5/35
- Brevicon 1/35
- Cyclen
- Demulen 30
- Loestrin 1.5/30
- Marvelon
- MinEstrin 1/20
- Min-Ovral
- Norinyl
- Ortho 1/35
- Ortho 0.5/35
- Other (Please specific): _____

- Ortho-Cept
- Ortho 7/7/7
- Ortho 10/11
- Synphasic
- Tri-Cyclen
- Triphasil
- Triquilar
- Demulen 50
- Norlestin 1/50
- Ovral
- Ortho-Novum 1/50

Injected Contraceptives:

- Depo-Provera
- Lunelle
- Other (Please specific): _____

Contraceptive Patch:

- Ortho-Evra
- Other (Please specific): _____

Vaginal Ring:

- NuvaRing
- Other (Please specific): _____

27) What is the average length (in days) of your menstrual cycle (i.e., how many days are there from the first day of one period to the first day of your next period)?

_____ days

28) What is your average length of menstruation (i.e., how many days does your period last)?

_____ days

29) Check the statement that BEST describes your menstrual cycle. If you do not currently experience a menstrual period due to hormonal contraceptives, indicate the statement that BEST describes your menstrual cycle prior to using hormonal contraceptives.

- I have not had my period in the last three months.
- Some months I get my period and some months I don't.
- I usually get my period every month, but it is irregular and I cannot predict when it will start.
- I usually get my period within two to three days of when I expect it.
- My period is like clockwork and the same number of days elapse between periods each month.

30) How old were you when you first started menstruating?

_____ years old

31) Using a calendar, please indicate the first day of your last menstrual period:

_____ Day of week (e.g., Monday)

_____ Day of Month (e.g., 1)

_____ Month (e.g., May)

**32) How confident are you that your last menstrual period started on the day indicated above?
(Circle the best response).**

0% 25% 50% 75% 100%
0 1 2 3 4 5 6 7 8

33) Using a calendar, please indicate the day that you believe your next menstrual period will start:

_____ Day of week (e.g., Monday) _____ Day of Month (e.g., 1) _____ Month (e.g., May)

**34) How confident are you that your next menstrual period will start on the day indicated above?
(Circle the best response).**

0% 25% 50% 75% 100%
0 1 2 3 4 5 6 7 8

35) Are you menstruating (i.e., on your period) today? (Circle one answer).

YES NO

A) If YES, for how many days (including today) have you been menstruating (i.e., on your period)?

_____ days

36) Please answer all of the following questions honestly. For the questions dealing with behaviour, WRITE your answers in the blank spaces provided. For the questions dealing with thoughts and attitudes, CIRCLE the appropriate number on the scales provided.

A) With how many different partners have you had sex (sexual intercourse) within the past year?

B) With how many different partners have you had sex (sexual intercourse) in your entire lifetime?

**C) How many different partners do you foresee yourself having sex with during the next five years?
(Please give a SPECIFIC, REALISTIC estimate)**

D) With how many different partners have you had sex ON ONE and ONLY ONE occasion?

E) How often do (did) you fantasize about having sex with someone other than your current (most recent) dating partner? (If you have not been in a dating relationship then leave this question blank).

1. Never
2. Once every two or three months
3. Once a month
4. Once every two weeks
5. Once a week
6. A few times each week
7. Nearly every day
8. At least once a day

F) Sex without love is OK.

I Strongly Disagree									I Strongly Agree
1	2	3	4	5	6	7	8	9	

G) I can imagine myself being comfortable and enjoying “casual” sex with different partners.

I Strongly Disagree									I Strongly Agree
1	2	3	4	5	6	7	8	9	

H) I would have to be closely attached to someone (both emotionally and psychologically) before I could feel comfortable and fully enjoy having sex with him or her.

I Strongly Disagree									I Strongly Agree
1	2	3	4	5	6	7	8	9	

I) How frequently do you think about sex?

Virtually Never									Almost all of the time
1	2	3	4	5	6	7	8	9	

J) During the past year, with how many different partners have you had only one occasion of sexual contact (i.e., hands to genitals, hands to breasts, oral-genital) that did not include sexual intercourse?

For Researcher Use ONLY

Height: _____ (feet and inches) or _____ (cm) **Weight:** _____ (pounds) or _____ (kg)

Waist: _____ (inches) or _____ (cm) **Hips:** _____ (inches) or _____ (cm)

Hands Scanned? YES NO

8) Are you menstruating (i.e., on your period) today? (Circle one answer).

YES NO

If YES, for how many days (including today) have you been menstruating (i.e., on your period)?

_____ days

9) For the following questions, please circle one number each.

A) I feel that I am . . .

Not at all masculine										Very masculine
1	2	3	4	5	6	7	8	9	10	

B) I feel that I am . . .

Not at all feminine										Very feminine
1	2	3	4	5	6	7	8	9	10	

C) Most of my friends would consider me to be . . .

Not at all masculine										Very masculine
1	2	3	4	5	6	7	8	9	10	

D) Most of my friends would consider me to be . . .

Not at all feminine										Very feminine
1	2	3	4	5	6	7	8	9	10	

10) On the following scale, please rate how attractive you consider yourself to be. (Circle one number).

Not at all attractive										Extremely attractive
1	2	3	4	5	6	7	8	9	10	

11) How attractive do you feel TODAY, compared with how attractive you normally feel? (Circle one number).

I feel much less attractive than I normally do	1	2	3	4	5	6	7	8	9	I feel much more attractive than I normally do
--	---	---	---	---	---	---	---	---	---	--

12) Please indicate the degree to which you agree or disagree with each statement. Circle the appropriate number on the scales provided. (Circle one number for each item).

A) Members of the opposite sex that I like, tend to like me back.

Disagree							Agree
1	2	3	4	5	6		7

B) Members of the opposite sex notice me.

Disagree							Agree
1	2	3	4	5	6		7

C) I receive many compliments from members of the opposite sex.

Disagree							Agree
1	2	3	4	5	6		7

D) Members of the opposite sex are not very attracted to me.

Disagree							Agree
1	2	3	4	5	6		7

E) I receive sexual invitations from members of the opposite sex.

Disagree							Agree
1	2	3	4	5	6		7

F) Members of the opposite sex are attracted to me.

Disagree							Agree
1	2	3	4	5	6		7

G) I can have as many sexual partners as I choose.

Disagree							Agree
1	2	3	4	5	6		7

19) How attracted do you feel toward your primary current partner TODAY, compared with how attracted you normally feel? (Circle one number).

I feel much less attracted than I normally do	I feel much more attracted than I normally do
1 2 3 4 5 6 7 8	9 10

20) In the past two days (i.e., over the last 48 hours) I have . . . (Circle one number for each item).

A) felt strong sexual attraction toward my primary current partner

Not at all	Once	A few times	More than a few times
0	1	2	3

B) fantasized about sex with my primary current partner

Not at all	Once	A few times	More than a few times
0	1	2	3

C) had sex with my primary current partner

Not at all	Once	A few times	More than a few times
0	1	2	3

21) Relative to other days, in the past two days (i.e., over the last 48 hours), how much has your primary current partner . . . (Circle one number for each item).

A) given you attention?

Far less than usual	Average	Far more than usual
0 1 2 3	4 5 6 7	8

B) expressed commitment to you?

Far less than usual	Average	Far more than usual
0 1 2 3	4 5 6 7	8

C) expressed feelings of love to you?

Far less than usual	Average	Far more than usual
0 1 2 3	4 5 6 7	8

D) expressed sexual attraction to you?

Far less than usual Average Far more than usual
 0 1 2 3 4 5 6 7 8

E) acted jealous about your casual interactions with people?

Far less than usual Average Far more than usual
 0 1 2 3 4 5 6 7 8

F) monopolized your time?

Far less than usual Average Far more than usual
 0 1 2 3 4 5 6 7 8

G) acted possessive of you?

Far less than usual Average Far more than usual
 0 1 2 3 4 5 6 7 8

22) Please answer all of the following questions honestly. For the questions dealing with behaviour, WRITE your answers in the blank spaces provided. For the questions dealing with thoughts and attitudes, CIRCLE the appropriate number on the scales provided.

A) With how many different partners have you had sex (sexual intercourse) within the past year?

B) With how many different partners have you had sex (sexual intercourse) in your entire lifetime?

C) How many different partners do you foresee yourself having sex with during the next five years? (Please give a SPECIFIC, REALISTIC estimate)

D) With how many different partners have you had sex ON ONE and ONLY ONE occasion?

E) How often do (did) you fantasize about having sex with someone other than your primary current (most recent) romantic partner? (If you have not been in a dating relationship then leave this question blank).

1. Never
2. Once every two or three months
3. Once a month
4. Once every two weeks
5. Once a week
6. A few times each week
7. Nearly every day
8. At least once a day

F) Sex without love is OK.

I Strongly Disagree									I Strongly Agree
1	2	3	4	5	6	7	8	9	

G) I can imagine myself being comfortable and enjoying “casual” sex with different partners.

I Strongly Disagree									I Strongly Agree
1	2	3	4	5	6	7	8	9	

H) I would have to be closely attached to someone (both emotionally and psychologically) before I could feel comfortable and fully enjoy having sex with him or her.

I Strongly Disagree									I Strongly Agree
1	2	3	4	5	6	7	8	9	

I) How frequently do you think about sex?

Virtually Never									Almost all of the time
1	2	3	4	5	6	7	8	9	

J) During the past year, with how many different partners have you had only one occasion of sexual contact (i.e., hands to genitals, hands to breasts, oral-genital) that did not include sexual intercourse?

23) For the following questions, please circle TRUE if the statement describes you **AT THE PRESENT TIME** and FALSE if it does not describe you **AT THE PRESENT TIME**.

- | | | |
|---|------|-------|
| A) I have never ridden in an automobile. | TRUE | FALSE |
| B) I try to get at least some sleep every night. | TRUE | FALSE |
| C) I have attended school at sometime in my life. | TRUE | FALSE |

24) In the past two days (i.e., over the last 48 hours) I have . . . (Circle one number for each item).

A) felt strong feelings of sexual desire in general

Not at all	Once	A few times	More than a few times
0	1	2	3

B) fantasized about sex with a stranger or acquaintance

Not at all	Once	A few times	More than a few times
0	1	2	3

C) fantasized about sex with a past partner

Not at all	Once	A few times	More than a few times
0	1	2	3

D) felt strong sexual attraction toward someone (other than a primary current partner)

Not at all	Once	A few times	More than a few times
0	1	2	3

E) felt sexually aroused by the sight of someone very physically attractive (other than a primary current partner)

Not at all	Once	A few times	More than a few times
0	1	2	3

F) felt sexually aroused by the scent of someone (other than a primary current partner)

Not at all	Once	A few times	More than a few times
0	1	2	3

G) had sex with someone (other than a primary current partner)

Not at all	Once	A few times	More than a few time
0	1	2	3

H) flirted with someone (other than a primary current partner)

Not at all	Once	A few times	More than a few times
0	1	2	3

25) Please consider the following hypothetical situation:

You are looking for the type of person who would be attractive in a short-term relationship. This implies that the relationship may not last a long time. Examples of this type of relationship would include a single date accepted on the spur of the moment, an affair within a long-term relationship, and the possibility of a one-night stand.

A) How interested are you in these types of SHORT-TERM relationships right now (today)? (Please circle one number).

Not at all interested										Extremely interested
1	2	3	4	5	6	7	8	9	10	

B) Circle the number that BEST describes the importance of these traits in a SHORT-TERM romantic partner. (Circle one number for each item).

	Not at all Important								Extremely Important
Kindness and understanding	1	2	3	4	5	6	7	8	9
Sex appeal	1	2	3	4	5	6	7	8	9
Faithfulness and loyalty	1	2	3	4	5	6	7	8	9
Physical attractiveness	1	2	3	4	5	6	7	8	9
Stable personality	1	2	3	4	5	6	7	8	9
Social status	1	2	3	4	5	6	7	8	9
Responsibility	1	2	3	4	5	6	7	8	9
Financial resources	1	2	3	4	5	6	7	8	9
Sense of humour	1	2	3	4	5	6	7	8	9

	Not at all Important								Extremely Important
	1	2	3	4	5	6	7	8	9
Fun and exciting personality	1	2	3	4	5	6	7	8	9
Similar values and beliefs	1	2	3	4	5	6	7	8	9
Desire for children	1	2	3	4	5	6	7	8	9
Qualities of a good parent	1	2	3	4	5	6	7	8	9
Quality of health	1	2	3	4	5	6	7	8	9
Intelligence	1	2	3	4	5	6	7	8	9
Facial attractiveness	1	2	3	4	5	6	7	8	9
Masculinity	1	2	3	4	5	6	7	8	9
Femininity	1	2	3	4	5	6	7	8	9
Height	1	2	3	4	5	6	7	8	9
Eye colour	1	2	3	4	5	6	7	8	9
Hair colour	1	2	3	4	5	6	7	8	9
Body type	1	2	3	4	5	6	7	8	9
Clothing style	1	2	3	4	5	6	7	8	9

26) Please consider the following hypothetical situation:

You are looking for the type of person who would be attractive in a long-term relationship. Examples of this type of relationship would include someone you may want to move in with, someone you may consider leaving a current partner to be with and someone you may, at some point, wish to marry (or enter into a relationship on similar grounds as marriage).

A) How interested are you in these types of LONG-TERM relationships right now (today)? (Circle one number).

Not at all interested									Extremely interested
1	2	3	4	5	6	7	8	9	10

B) Circle the number that BEST describes the importance of these traits in a LONG-TERM romantic partner. (Circle one number for each item).

	Not at all Important					Extremely Important			
	1	2	3	4	5	6	7	8	9
Kindness and understanding	1	2	3	4	5	6	7	8	9
Sex appeal	1	2	3	4	5	6	7	8	9
Faithfulness and loyalty	1	2	3	4	5	6	7	8	9
Physical attractiveness	1	2	3	4	5	6	7	8	9
Stable personality	1	2	3	4	5	6	7	8	9
Social status	1	2	3	4	5	6	7	8	9
Responsibility	1	2	3	4	5	6	7	8	9
Financial resources	1	2	3	4	5	6	7	8	9
Sense of humour	1	2	3	4	5	6	7	8	9
Fun and exciting personality	1	2	3	4	5	6	7	8	9
Similar values and beliefs	1	2	3	4	5	6	7	8	9
Desire for children	1	2	3	4	5	6	7	8	9
Qualities of a good parent	1	2	3	4	5	6	7	8	9
Quality of health	1	2	3	4	5	6	7	8	9
Intelligence	1	2	3	4	5	6	7	8	9
Facial attractiveness	1	2	3	4	5	6	7	8	9
Masculinity	1	2	3	4	5	6	7	8	9
Femininity	1	2	3	4	5	6	7	8	9
Height	1	2	3	4	5	6	7	8	9
Eye colour	1	2	3	4	5	6	7	8	9

	Not at all Important						Extremely Important		
Hair colour	1	2	3	4	5	6	7	8	9
Body type	1	2	3	4	5	6	7	8	9
Clothing style	1	2	3	4	5	6	7	8	9

27) Think of a person with whom you are having, or have had in the recent past, a strong romantic relationship. This person will be referred to as X in the following questions. (Circle one number for each item).

How often do you have the following thoughts about X?

A) I suspect that X is secretly seeing someone of the opposite sex.

Never								All the time
1	2	3	4	5	6	7		7

B) I am worried that some member of the opposite sex may be chasing after X.

Never								All the time
1	2	3	4	5	6	7		7

C) I suspect that X may be attracted to someone else.

Never								All the time
1	2	3	4	5	6	7		7

D) I suspect X may be physically intimate with another member of the opposite sex behind my back.

Never								All the time
1	2	3	4	5	6	7		7

E) I think that some members of the opposite sex may be romantically interested in X.

Never								All the time
1	2	3	4	5	6	7		7

F) I am worried that someone of the opposite sex is trying to seduce X.

Never								All the time
1	2	3	4	5	6	7		7

G) I think that X is secretly developing an intimate relationship with someone of the opposite sex.

Never						All the time
1	2	3	4	5	6	7

H) I suspect that X is crazy about members of the opposite sex.

Never						All the time
1	2	3	4	5	6	7

How would you emotionally react to the following situations?

A) X comments to you on how great looking a particular member of the opposite sex is.

Very pleased						Very upset
1	2	3	4	5	6	7

B) X shows a great deal of interest or excitement in talking to someone of the opposite sex.

Very pleased						Very upset
1	2	3	4	5	6	7

C) X smiles in a very friendly manner to someone of the opposite sex.

Very pleased						Very upset
1	2	3	4	5	6	7

D) A member of the opposite sex is trying to get close to X all the time.

Very pleased						Very upset
1	2	3	4	5	6	7

E) X is flirting with someone of the opposite sex.

Very pleased						Very upset
1	2	3	4	5	6	7

F) Someone of the opposite sex is dating X.

Very pleased						Very upset
1	2	3	4	5	6	7

G) X hugs and kisses someone of the opposite sex.

Very pleased						Very upset
1	2	3	4	5	6	7

H) X works very closely with a member of the opposite sex (in school or office).

Very pleased							Very upset
1	2	3	4	5	6		7

How often do you engage in the following behaviours?

A) I look through X's drawers, handbag, or pockets.

Never							All the time
1	2	3	4	5	6		7

B) I call X unexpectedly, just to see if he or she is there.

Never							All the time
1	2	3	4	5	6		7

C) I question X about previous or present romantic relationships.

Never							All the time
1	2	3	4	5	6		7

D) I say something nasty about someone of the opposite sex if X shows an interest in that person.

Never							All the time
1	2	3	4	5	6		7

E) I question X about his or her telephone calls.

Never							All the time
1	2	3	4	5	6		7

F) I question X about his or her whereabouts.

Never							All the time
1	2	3	4	5	6		7

G) I join in whenever I see X talking to a member of the opposite sex.

Never							All the time
1	2	3	4	5	6		7

H) I pay X a surprise visit just to see who is with him or her.

Never							All the time
1	2	3	4	5	6		7

28) For the following questions, please circle TRUE if the statement describes you AT THE PRESENT TIME and FALSE if it does not describe you AT THE PRESENT TIME. (Circle one answer)

- | | | |
|--|------|-------|
| A) I could easily count from one to twenty-five. | TRUE | FALSE |
| B) I have never talked to anyone by telephone. | TRUE | FALSE |
| C) I make all my own clothes and shoes. | TRUE | FALSE |
| D) Things with sugar usually taste sweet to me. | TRUE | FALSE |
| E) I have never had any hair on my head. | TRUE | FALSE |

Appendix C

Hormone Detection Test Results

Day 1: _____
 Day of week (e.g., Monday) Day of month (e.g., 1st) Month (e.g., May)

What was the result of your hormone detection test TODAY? (Check the BEST response).

- _____ Positive (two [2] coloured bands present)
 _____ Negative (one [1] coloured bands present)
 _____ Unclear (was unable to interpret the results)
 _____ Unavailable (was unable to use a testing strip today)

If POSITIVE, how confident are you that the result of the hormone detection test was positive (i.e., two [2] coloured bands appeared) TODAY? (Circle one number).

0%		25%		50%		75%		100%
0	1	2	3	4	5	6	7	8

If POSITIVE, please contact the experimenters at psystudy@lakeheadu.ca. Let them know that you've had a positive test result. Discontinue use of the hormone detection strips.

Day 2: _____
 Day of week (e.g., Monday) Day of month (e.g., 1st) Month (e.g., May)

What was the result of your hormone detection test TODAY? (Check the BEST response)

- _____ Positive (two [2] coloured bands present)
 _____ Negative (one [1] coloured band present)
 _____ Unclear (was unable to interpret the results)
 _____ Unavailable (was unable to use a testing strip today)

If POSITIVE, how confident are you that the result of the hormone detection test was positive (i.e., two [2] coloured bands appeared) TODAY? (Circle one number)

0%		25%		50%		75%		100%
0	1	2	3	4	5	6	7	8

If POSITIVE, please contact the experimenters at psystudy@lakeheadu.ca. Let them know that you've had a positive test result. Discontinue use of the hormone detection strips.

Day 3:

_____ Day of week (e.g., Monday)

_____ Day of month (e.g., 1st)

_____ Month (e.g., May)

What was the result of your hormone detection test TODAY? (Check the BEST response)

_____ Positive (two [2] coloured bands present)

_____ Negative (one [1] coloured band present)

_____ Unclear (was unable to interpret the results)

_____ Unavailable (was unable to use a testing strip today)

If POSITIVE, how confident are you that the result of the hormone detection test was positive (i.e., two [2] coloured bands appeared) TODAY? (Circle one number)

0%		25%		50%		75%		100%
0	1	2	3	4	5	6	7	8

If POSITIVE, please contact the experimenters at psystudy@lakeheadu.ca. Let them know that you've had a positive test result. Discontinue use of the hormone detection strips.**Date 4:**

_____ Day of week (e.g., Monday)

_____ Day of month (e.g., 1st)

_____ Month (e.g., May)

What was the result of your hormone detection test TODAY? (Check the BEST response)

_____ Positive (two [2] coloured bands present)

_____ Negative (one [1] coloured band present)

_____ Unclear (was unable to interpret the results)

_____ Unavailable (was unable to use a testing strip today)

If POSITIVE, how confident are you that the result of the hormone detection test was positive (i.e., two [2] coloured bands appeared) TODAY? (Circle one number)

0%		25%		50%		75%		100%
0	1	2	3	4	5	6	7	8

If POSITIVE, please contact the experimenters at psystudy@lakeheadu.ca. Let them know that you've had a positive test result. Discontinue use of the hormone detection strips.

Date 5: _____
 Day of week (e.g., Monday) Day of month (e.g., 1st) Month (e.g., May)

What was the result of your hormone detection test TODAY? (Check the BEST response)

_____ Positive (two [2] coloured bands present)

_____ Negative (one [1] coloured band present)

_____ Unclear (was unable to interpret the results)

_____ Unavailable (was unable to use a testing strip today)

If POSITIVE, how confident are you that the result of the hormone detection test was positive (i.e., two [2] coloured bands appeared) TODAY? (Circle one number)

0%		25%		50%		75%		100%
0	1	2	3	4	5	6	7	8

If POSITIVE, please contact the experimenters at psystudy@lakeheadu.ca. Let them know that you've had a positive test result. Discontinue use of the hormone detection strips.

Appendix D

COVER LETTER

Thank you for your interest in our study on Reproductive Hormones and Sociosexuality. This research project is being conducted by Dr. D. Mazmanian, Dr. K. Oinonen, Vasilinka Tsar, and Missy Teatero with the Department of Psychology at Lakehead University. The purpose of this research is to examine the effects of reproductive hormones on sociosexual attitudes and behaviours. Broadly, sociosexuality refers to differences in human mating strategies. Your participation in this project will provide us with a better understanding of human mating strategies and how they may be influenced by reproductive hormones.

You will be required to attend one of several Introductory Laboratory Sessions as well as complete three Online Phase Questionnaires within one month (approximately 25 days) that will be sent to you via e-mail. You have the option of completing paper-and-pencil versions of the Phase Questionnaires if you would prefer or if you do not have internet access. Each lab session and online phase will take approximately 20 to 40 minutes to complete. You will be asked to respond to questions of a personal and sexual nature that include, but are not limited to, the following: health, menstrual cycle, sex, mate preferences, romantic relationships, and mood. Please be assured that all answers will be accepted and will remain completely anonymous.

Attached is a written consent form that will be kept in a file separate from the study results in order to maintain confidentiality and anonymity. You may withdraw from the study at any time without explanation or penalty. The information obtained from the questionnaires will be coded, analyzed and securely stored at Lakehead University by Dr. D. Mazmanian for seven years. All records of your participation will be kept in strict confidence, and there will be no way to identify you as a participant in any subsequent reports.

A summary of the research findings will be presented at the Annual Lakehead University Psychology Research Poster Session in April 2008. Manuscripts documenting the research findings may also be submitted for publication. If you would like information on the results of the study, you can make a request via e-mail to the address below or by telephone and a summary will be sent to you at the end of the study.

If you have any questions or concerns regarding this study, please contact Missy Teatero and Vasilinka Tsar at psystudy@lakeheadu.ca. You may also contact Lakehead University's Research Ethics Board at 343-8283.

Sincerely,

Dwight Mazmanian, Ph.D., C. Psych.
dmazmani@lakeheadu.ca
807-343-8257

Kirsten Oinonen, Ph.D., C. Psych.
koinonen@lakeheadu.ca
807-343-8096

Vasilinka Tsar, H.B.Sc. Candidate

Missy Teatero, B.A. (Hons.), M.A. Candidate

Appendix E

CONSENT FORM

I, _____ (please print), have read and understood the covering letter for the research project entitled "Reproductive Hormones and Sociosexuality" being conducted by Dr. D. Mazmanian, Dr. K. Oinonen, Vasilinka Tsar, and Missy Teatero with the Department of Psychology at Lakehead University. My signature on this page indicates that I agree to participate in this research and understand the following:

I have received an explanation about the nature of the research project, its purpose, and procedures.

The study consists of an Introductory Laboratory Session and three Online Phase Questionnaires within one month (approximately 25 days). Paper-and-pencil versions of the Phase Questionnaires are available upon request. Each session and phase will take between 20 to 40 minutes and will be approximately ten days apart.

I will be asked to respond to questions of a personal and sexual nature that may cause feelings of discomfort. I can choose to skip any question that I am not comfortable answering.

At the Introductory Laboratory Session, I will complete a Personal and Background Information Questionnaire. Also, a female researcher will take measurements of my height, weight, waist, and hips and scan my hands.

I will be invited to use urine hormone detection tests for five consecutive days within one month (approximately 25 days) as specified by the researchers.

For the duration of the study, the researchers and I will have ongoing communication via the e-mail address(es) or telephone number I have provided below.

If I am a student in Introductory Psychology (Psychology 1100), I will be able to receive up to three bonus marks added to my final grade (1 for the initial session, 2 for completion of the 3 phase sessions). All other participants will have their names entered into a draw for a \$50 gift card at Intercity Mall.

I am a volunteer and can withdraw at any time from this study without explanation or penalty.

All records of my participation will be kept in strict confidence and any reports of the research project will not identify me as a participant.

As per university requirements, the data I provide will be securely stored for seven years by Dr. D. Mazmanian at Lakehead University and will remain anonymous and confidential.

There are no known physical or psychological risks associated with participation in this study.

Signature of Participant (18 years or older): _____ Date: _____

Phone Number (if completing pencil-and-paper version of the study): _____

Primary E-Mail Address: _____

Secondary E-mail Address: _____

Appendix F

Instructions Sheet

You will receive an e-mail from psystudy@lakeheadu.ca that will indicate when to start using the strips.

Step 1

Collect urine in one of the paper cups provided. Open the bag containing the strips when ready.

Step 2

Immerse one (1) strip in the urine, holding the pink coloured end of the strip. Do not immerse past the MAX line. Take the strip out after 5 seconds and lay it flat on a clean, dry, non-absorbent surface. Do not immerse for longer than 7 seconds.

Step 3

Wait for coloured bands to appear (40 seconds to 10 minutes). Either one (1) band or two (2) bands will appear.

Step 4

Once a test result shows two (2) coloured bands, please contact the experimenters:

psystudy@lakeheadu.ca

Please follow these instructions: Testing should not occur in the morning. Best results will occur after 2 p.m. Please test at the same time every day (i.e., before beginning to test, think about what time of day would be the best for you in terms of being able to consistently test at the same time). The two (2) coloured bands should be about the same shade in appearance. For example, if one (1) band is significantly darker than the other, please keep testing until the bands are about the same shade. If you run out of strips before you see two (2) lines, please contact the experimenters. Keep the unused strips away from moisture and direct sunlight.

Thank you for your participation. If you have any questions or concerns, please do not hesitate to contact the experimenters at the e-mail address provided above.

Appendix G

DEBRIEFING FORM

Thank you for participating in this research project on Reproductive Hormones and Sociosexuality. Your participation will provide us with a better understanding of human mating strategies and how they may be influenced by reproductive hormones across the female menstrual cycle. The measurements that were taken at the Introductory Laboratory Session were used to determine your body mass index (BMI) and waist-to-hip ratio (WHR); your hands were scanned to obtain the ratio between your 2nd and 4th digits (2D:4D). Each phase questionnaire included a measure of sociosexuality, self-perceived attractiveness, self-perceived mate value, partner attractiveness, extra-pair desire, romantic jealousy, mate preferences, mood, and gender identity. Moreover, the dates of the Online Phase Questionnaires were intended to coincide with three menstrual cycle phases: menstrual, preovulatory and luteal. Urine luteinizing hormone (LH) tests were used in a subsample of participants to assess the accuracy of the backward counting method of determining menstrual cycle phase.

Please be assured that your name and e-mail address(es) will be removed from the data collected and there will be no way to identify your responses. All of your responses will be coded to conceal your identity on the questionnaires and all data will remain anonymous. Portions of this research constitute an Honours Thesis by Vasilinka Tsar. If you would like information on the results of this project, you may make a request via e-mail to psystudy@lakeheadu.ca and an electronic summary will be sent to you following the completion of the project. You may telephone the researchers if you do not have internet access. Lastly, the draw for a \$50 gift card at Intercity Mall will take place by the end of April 2008; only the participant who has won the draw will be contacted.

If you are interested in research in this area, below are two related articles:

Clark, A. P. (2004). Self-perceived attractiveness and masculinization predict women's sociosexuality. *Evolution and Human Behavior*, 25, 113-124.

Simpson, J. A., & Gangestad, S. W. (1991). Individual differences in sociosexuality: Evidence for convergent and discriminant validity. *Journal of Personality and Social Psychology*, 60(6), 870-883.

Sincerely,

Dwight Mazmanian, Ph.D., C Psych.
dmazmani@lakeheadu.ca
807-343-8257

Kirsten Oinonen, Ph.D., C Psych.
koinonen@lakeheadu.ca
807-343-8096

Vasilinka Tsar, H.B.Sc. Candidate

Missy Teatero, B.A. (Hons.), M.A. Candidate

Appendix H

Summary of the Independent-Samples t-tests for SOI Item Means

Means, Standard Deviations, and Independent-Samples t-tests for SOI Item Means by SOI Group

Item	Low SOI (<i>n</i> = 7)	High SOI (<i>n</i> = 7)	<i>t</i> (12)	<i>p</i>
Number of partners in the past year	0.21 (0.39)	1.14 (0.81)	-2.72	.019*
Number of partners foreseen (5 years)	1.11 (0.64)	1.89 (0.85)	-1.95	.075
Number of one-night stands	0.14 (0.38)	1.71 (2.37)	-1.73	.109
Mean of three attitudinal items	4.57 (1.55)	12.36 (4.07)	-4.73	.000**
Frequency of sexual (extra-pair) fantasy ^a	1.25 (0.42)	2.21 (1.00)	-2.18	.052

Note. SOI = Sociosexual Orientation Inventory.

^aItem not included in the calculation of SOI as it was not applicable to women who had never dated.

p* < .05. *p* < .001.

Appendix I

Summary of the Short-term Attribute ANOVAS

Means and Standards Deviations of the Short-term RPAI Items for the Low SOI Group by Menstrual Cycle Phase (n =7)

Item	Menstrual	Preovulatory	Luteal
Kindness and understanding	6.00 (3.00)	6.57 (2.37)	6.00 (2.38)
Sex appeal	6.86 (5.86)	5.86 (2.27)	6.43 (2.37)
Faithfulness and loyalty	5.71 (2.56)	7.00 (2.31)	5.00 (2.16)
Physical attractiveness	7.14 (2.27)	6.86 (1.57)	7.14 (1.57)
Stable personality	6.43 (1.72)	6.71 (2.14)	5.86 (1.86)
Social status	4.57 (1.72)	4.86 (2.12)	4.14 (2.19)
Responsibility	6.57 (2.51)	6.43 (2.99)	5.86 (2.41)
Financial resources	4.43 (2.22)	4.57 (2.37)	4.57 (2.30)
Sense of humour	6.43 (1.51)	6.86 (2.27)	5.86 (2.55)
Fun and exciting personality	7.29 (1.80)	7.29 (1.98)	6.86 (2.34)
Similar values and beliefs	5.86 (2.19)	6.71 (1.98)	5.00 (1.53)
Desire for children	1.71 (1.50)	2.00 (1.29)	1.71 (1.11)
Qualities of a good parent	2.14 (1.86)	2.57 (1.90)	1.71 (1.11)
Quality of health	4.57 (2.51)	4.86 (2.27)	4.29 (1.46)
Intelligence	6.57 (1.62)	6.71 (1.89)	6.29 (2.30)

Note. RPAI = Romantic Partner Attribute Index. SOI = Sociosexual Orientation Inventory.

Means and Standards Deviations of the Short-term RPAI Items for the High SOI Group by Menstrual Cycle Phase (n = 7)

Item	Menstrual	Preovulatory	Luteal
Kindness and understanding	6.43 (0.79)	6.71 (1.50)	6.00 (1.63)
Sex appeal	7.14 (7.43)	7.43 (1.72)	7.00 (2.31)
Faithfulness and loyalty	5.29 (1.98)	5.57 (3.16)	5.71 (2.29)
Physical attractiveness	7.86 (0.90)	7.86 (1.07)	7.71 (0.76)
Stable personality	7.43 (1.27)	6.43 (1.62)	6.14 (1.46)
Social status	5.00 (2.16)	4.43 (3.26)	4.29 (2.22)
Responsibility	6.56 (1.40)	5.86 (2.61)	5.71 (1.98)
Financial resources	3.57 (2.64)	4.86 (3.08)	4.29 (2.43)
Sense of humour	6.71 (1.60)	6.00 (1.82)	6.14 (1.57)
Fun and exciting personality	7.29 (1.50)	6.68 (1.77)	6.86 (1.57)
Similar values and beliefs	4.57 (1.81)	4.29 (2.14)	3.86 (1.86)
Desire for children	2.29 (1.98)	1.57 (1.51)	1.57 (1.13)
Qualities of a good parent	2.71 (1.80)	1.71 (1.50)	1.43 (0.79)
Quality of health	6.86 (2.80)	6.57 (2.64)	7.14 (1.46)
Intelligence	6.00 (2.83)	6.14 (1.77)	6.43 (1.27)

Note. RPAI = Romantic Partner Attribute Index. SOI = Sociosexual Orientation Inventory.

Between Subjects (SOI Group) Univariate Statistics for the Short-term RPAI Items

Source	df	<i>F</i>	partial η^2	<i>p</i>
Kindness and understanding	1, 12	0.04	.003	.847
Sex appeal	1, 12	0.64	.05	.438
Faithfulness and loyalty	1, 12	0.13	.01	.724
Physical attractiveness	1, 12	1.16	.09	.302
Stable personality	1, 12	0.23	.02	.640
Social status	1, 12	0.002	.000	.964
Responsibility	1, 12	0.05	.004	.823
Financial Resources	1, 12	0.06	.01	.809
Sense of humour	1, 12	0.01	.001	.919
Fun and exciting personality	1, 12	0.02	.002	.883
Similar values and beliefs	1, 12	3.71	.24	.078
Desire for children	1, 12	0.00	.000	1.00
Qualities of a good parent	1, 12	0.08	.01	.786
Quality of health	1, 12	3.85	.24	.073
Intelligence	1, 12	0.16	.01	.697

Note. RPAI = Romantic Partner Attribute Index.

Within Subjects (Menstrual Cycle Phase) Univariate Statistics for the Short-term RPAI Items

Source	df	<i>F</i>	partial η^2	<i>p</i>
Kindness and understanding	2, 24	0.98	.08	.389
Sex appeal	2, 24	0.29	.02	.753
Faithfulness and loyalty	2, 24	1.13	.09	.339
Physical attractiveness	2, 24	0.13	.01	.876
Stable personality	2, 24	1.69	.12	.206
Social status	2, 24	0.51	.04	.606
Responsibility	2, 24	0.78	.06	.468
Financial Resources	2, 24	0.72	.06	.499
Sense of humour	2, 24	1.07	.08	.359
Fun and exciting personality	2, 24	1.86	.13	.177
Similar values and beliefs	2, 24	2.29	.16	.123
Desire for children	2, 24	0.51	.04	.606
Qualities of a good parent	2, 24	2.37	.17	.115
Quality of health	2, 24	0.00	.000	1.00
Intelligence	2, 24	0.03	.002	.971

Note. RPAI = Romantic Partner Attribute Index.

Group x Phase Interaction Univariate Statistics for the Short-term RPAI Items

Source	df	<i>F</i>	partial η^2	<i>p</i>
Kindness and understanding	2, 24	0.11	.01	.897
Sex appeal	2, 24	0.92	.07	.414
Faithfulness and loyalty	2, 24	1.30	.10	.291
Physical attractiveness	2, 24	0.31	.03	.736
Stable personality	2, 24	0.80	.06	.461
Social status	2, 24	0.28	.02	.762
Responsibility	2, 24	0.11	.01	.895
Financial Resources	2, 24	0.45	.04	.642
Sense of humour	2, 24	1.32	.10	.287
Fun and exciting personality	2, 24	0.62	.05	.546
Similar values and beliefs	2, 24	0.92	.07	.411
Desire for children	2, 24	1.05	.08	.366
Qualities of a good parent	2, 24	1.61	.12	.222
Quality of health	2, 24	0.68	.05	.516
Intelligence	2, 24	0.25	.02	.781

Note. RPAI = Romantic Partner Attribute Index.

Appendix J

Summary of Long-term Attribute ANOVAs

Means and Standards Deviations of the Long-term RPAI Items for the Low SOI Group by Menstrual Cycle Phase (n = 7)

Item	Menstrual	Preovulatory	Luteal
Kindness and understanding	8.29 (1.50)	8.57 (1.13)	8.83 (0.79)
Sex appeal	6.57 (1.81)	6.00 (1.16)	6.71 (1.11)
Faithfulness and loyalty	8.43 (0.79)	8.57 (1.13)	8.29 (0.76)
Physical attractiveness	6.43 (1.51)	6.57 (1.62)	6.57 (1.51)
Stable personality	7.43 (0.79)	7.57 (1.27)	7.29 (1.38)
Social status	4.71 (1.70)	5.14 (1.86)	4.71 (1.98)
Responsibility	7.86 (1.46)	8.29 (1.11)	7.86 (1.57)
Financial resources	6.71 (1.11)	6.71 (1.50)	6.57 (1.27)
Sense of humour	7.86 (1.07)	8.29 (0.76)	7.71 (1.38)
Fun and exciting personality	7.57 (0.79)	8.14 (1.07)	7.57 (0.98)
Similar values and beliefs	7.86 (1.22)	8.00 (0.58)	7.29 (1.38)
Desire for children	5.71 (2.50)	5.43 (2.82)	5.00 (2.83)
Qualities of a good parent	6.00 (2.45)	5.71 (2.75)	6.00 (2.52)
Quality of health	6.86 (1.07)	6.86 (1.77)	6.86 (1.35)
Intelligence	7.57 (1.27)	7.43 (1.27)	7.29 (1.38)

Note. RPAI = Romantic Partner Attribute Index. SOI = Sociosexual Orientation Inventory.

Means and Standards Deviations of the Long-term RPAI Items for the High SOI Group by Menstrual Cycle Phase (n = 7)

Item	Menstrual	Preovulatory	Luteal
Kindness and understanding	8.29 (0.76)	8.71 (0.49)	8.43 (0.54)
Sex appeal	6.57 (2.37)	6.14 (1.86)	6.14 (2.19)
Faithfulness and loyalty	9.00 (0.00)	9.00 (0.00)	8.71 (0.49)
Physical attractiveness	6.29 (1.60)	6.00 (1.83)	6.29 (1.70)
Stable personality	8.14 (1.07)	8.43 (.13)	8.14 (1.07)
Social status	4.29 (2.36)	4.29 (3.15)	4.86 (1.77)
Responsibility	8.29 (0.76)	8.43 (0.79)	7.86 (1.22)
Financial resources	6.00 (2.00)	6.71 (1.50)	6.00 (1.92)
Sense of humour	7.00 (1.73)	7.14 (1.57)	6.57 (1.81)
Fun and exciting personality	6.86 (1.35)	6.86 (1.57)	6.14 (1.68)
Similar values and beliefs	7.43 (1.27)	7.57 (0.79)	7.29 (0.76)
Desire for children	6.71 (2.36)	7.14 (1.95)	7.14 (2.19)
Qualities of a good parent	7.00 (2.45)	7.00 (1.92)	7.29 (1.70)
Quality of health	7.14 (1.07)	7.29 (1.11)	7.57 (0.79)
Intelligence	8.00 (0.58)	7.57 (1.27)	7.71 (0.95)

Note. RPAI = Romantic Partner Attribute Index. SOI = Sociosexual Orientation Inventory.

Between Subjects (SOI Group) Univariate Statistics for the Long-term RPAI Items

Source	df	<i>F</i>	partial η^2	<i>p</i>
Kindness and understanding	1, 12	0.01	.001	.917
Sex appeal	1, 12	0.03	.002	.876
Faithfulness and loyalty	1, 12	2.46	.17	.143
Physical attractiveness	1, 12	0.16	.01	.694
Stable personality	1, 12	2.46	.17	.143
Social status	1, 12	0.13	.01	.727
Responsibility	1, 12	0.10	.01	.756
Financial Resources	1, 12	0.29	.02	.600
Sense of humour	1, 12	1.97	.14	.186
Fun and exciting personality	1, 12	3.47	.22	.087
Similar values and beliefs	1, 12	0.37	.03	.366
Desire for children	1, 12	1.63	.12	.225
Qualities of a good parent	1, 12	1.04	.01	.730
Quality of health	1, 12	0.65	.05	.436
Intelligence	1, 12	0.34	.03	.570

Note. RPAI = Romantic Partner Attribute Index.

Within Subjects (Menstrual Cycle Phase) Univariate Statistics for the Long-term RPAI Items

Source	df	<i>F</i>	partial η^2	<i>p</i>
Kindness and understanding	2, 24	1.70	.12	.204
Sex appeal	2, 24	1.30	.10	.291
Faithfulness and loyalty	2, 24	1.59	.12	.224
Physical attractiveness	2, 24	0.18	.02	.836
Stable personality	2, 24	0.59	.05	.564
Social status	2, 24	0.25	.02	.784
Responsibility	2, 24	3.58	.23	.044*
Financial Resources	2, 24	1.74	.13	.197
Sense of humour	2, 24	6.55	.35	.017*
Fun and exciting personality	2, 24	3.05	.20	.092
Similar values and beliefs	2, 24	2.02	.14	.155
Desire for children	2, 24	0.25	.02	.781
Qualities of a good parent	2, 24	0.30	.03	.741
Quality of health	2, 24	0.38	.03	.691
Intelligence	2, 24	1.30	.10	.292

Note. RPAI = Romantic Partner Attribute Index.

* $p < .05$.

Group x Phase Interaction Univariate Statistics for the Long-term RPAI Items

Source	df	<i>F</i>	partial η^2	<i>p</i>
Kindness and understanding	2, 24	0.09	.01	.915
Sex appeal	2, 24	0.70	.06	.506
Faithfulness and loyalty	2, 24	0.12	.01	.885
Physical attractiveness	2, 24	0.42	.03	.662
Stable personality	2, 24	0.05	.004	.956
Social status	2, 24	0.70	.06	.507
Responsibility	2, 24	0.68	.05	.517
Financial Resources	2, 24	1.18	.09	.325
Sense of humour	2, 24	0.55	.04	.587
Fun and exciting personality	2, 24	1.05	.08	.343
Similar values and beliefs	2, 24	0.47	.04	.633
Desire for children	2, 24	1.75	.13	.195
Qualities of a good parent	2, 24	0.10	.01	.904
Quality of health	2, 24	0.38	.03	.691
Intelligence	2, 24	0.34	.03	.726

Note. RPAI = Romantic Partner Attribute Index.

Appendix K

Summary of the Averaged Attribute ANOVAs

Means and Standards Deviations of the Averaged RPAI Subscales by Group and Menstrual Cycle Phase

Variable	Menstrual	Preovulatory	Luteal
	Low SOI (<i>n</i> = 7)		
Personal/parenting subscale	46.43 (6.85)	48.93 (7.37)	44.07 (4.46)
Attractiveness/social subscale	23.71 (5.27)	23.29 (5.10)	23.43 (4.86)
	High SOI (<i>n</i> = 7)		
Personal/parenting subscale	47.43 (3.22)	46.43 (3.78)	44.64 (4.89)
Attractiveness/social subscale	23.26 (4.41)	23.86 (5.01)	23.29 (4.11)

Note. SOI = Sociosexual Orientation Inventory.

*Summary of Repeated Measures (Menstrual Cycle Phase) Analyses of Variance for Averaged**RPAI Subscales*

Source	df	<i>F</i>	partial η^2	<i>p</i>
Personal/parenting subscale				
Between subjects				
SOI group (G)	1	0.02	.001	.900
G within-group error	12	(60.49)		
Within subjects				
Phase (P)	2	3.50	.23	.046*
P X G	2	1.05	.08	.365
P X G within group error	24	(12.13)		
Attractiveness/social subscale				
G	1	0.00	.000	.992
G within-group error	12	(63.24)		
P	2	0.40	.003	.961
P X G	2	0.18	.02	.838
P X G within group error	24	(4.66)		

Note. Values enclosed in parentheses represented mean square errors. SOI = Sociosexual

Orientation Inventory.

* $p < .05$.

*Means and Standards Deviations of the Averaged RPAI Items for the Low SOI Group by
Menstrual Cycle Phase (n =7)*

Item	Menstrual	Preovulatory	Luteal
Kindness and understanding	7.14 (2.04)	7.57 (1.62)	7.21 (1.32)
Sex appeal	6.71 (1.65)	5.93 (1.34)	6.57 (1.48)
Faithfulness and loyalty	7.07 (1.57)	7.79 (1.47)	6.64 (1.18)
Physical attractiveness	6.79 (1.75)	6.71 (1.50)	6.86 (1.49)
Stable personality	6.93 (1.10)	7.14 (1.49)	6.57 (1.30)
Social status	4.64 (1.63)	5.00 (1.91)	4.23 (2.05)
Responsibility	7.12 (1.70)	7.36 (1.80)	6.86 (1.52)
Financial resources	5.57 (1.40)	5.64 (1.55)	5.57 (1.72)
Sense of humour	7.14 (1.07)	7.57 (1.13)	6.79 (1.80)
Fun and exciting personality	7.43 (0.93)	7.71 (0.99)	7.21 (1.29)
Similar values and beliefs	6.86 (1.31)	7.36 (1.14)	6.14 (0.75)
Desire for children	3.71 (1.38)	3.71 (1.41)	3.36 (1.49)
Qualities of a good parent	4.07 (1.54)	4.14 (1.70)	3.86 (1.38)
Quality of health	5.71 (1.63)	5.86 (1.60)	5.57 (1.64)
Intelligence	7.07 (1.40)	7.07 (1.48)	6.79 (1.60)

Note. RPAI = Romantic Partner Attribute Index. SOI = Sociosexual Orientation Inventory.

*Means and Standards Deviations of the Averaged RPAI Items for the High SOI Group by
Menstrual Cycle Phase (n = 7)*

Item	Menstrual	Preovulatory	Luteal
Kindness and understanding	7.36 (0.38)	7.71 (0.91)	7.21 (0.95)
Sex appeal	6.86 (2.32)	6.79 (1.44)	6.57 (1.97)
Faithfulness and loyalty	7.14 (0.99)	7.29 (1.58)	7.21 (1.35)
Physical attractiveness	7.07 (1.06)	6.93 (1.10)	7.00 (1.12)
Stable personality	7.79 (1.04)	7.43 (0.98)	7.14 (1.03)
Social status	4.64 (1.89)	4.36 (3.18)	4.57 (1.88)
Responsibility	7.43 (0.98)	7.14 (1.31)	6.79 (1.50)
Financial resources	4.79 (2.14)	5.79 (2.18)	5.14 (1.93)
Sense of humour	6.86 (1.38)	6.57 (1.54)	6.36 (1.63)
Fun and exciting personality	7.07 (1.21)	6.86 (1.46)	6.50 (1.47)
Similar values and beliefs	6.00 (0.82)	5.93 (1.21)	5.57 (1.02)
Desire for children	4.50 (1.47)	4.36 (1.07)	4.36 (1.21)
Qualities of a good parent	4.86 (1.46)	4.36 (1.44)	4.36 (1.07)
Quality of health	7.00 (1.78)	6.93 (1.43)	7.36 (0.94)
Intelligence	7.00 (1.41)	6.86 (1.07)	7.07 (0.89)

Note. RPAI = Romantic Partner Attribute Index. SOI = Sociosexual Orientation Inventory.

Between Subjects (SOI Group) Univariate Statistics for the Averaged RPAI Items

Source	df	<i>F</i>	partial η^2	<i>p</i>
Kindness and understanding	1, 12	0.04	.003	.850
Sex appeal	1, 12	0.15	.01	.708
Faithfulness and loyalty	1, 12	0.01	.001	.937
Physical attractiveness	1, 12	0.09	.01	.765
Stable personality	1, 12	1.42	.11	.256
Social status	1, 12	0.03	.002	.874
Responsibility	1, 12	0.001	.000	.973
Financial Resources	1, 12	0.15	.01	.708
Sense of humour	1, 12	0.61	.05	.448
Fun and exciting personality	1, 12	1.02	.08	.322
Similar values and beliefs	1, 12	3.77	.24	.076
Desire for children	1, 12	1.48	.11	.248
Qualities of a good parent	1, 12	0.56	.05	.469
Quality of health	1, 12	3.45	.23	.087
Intelligence	1, 12	0.00	.000	1.00

Note. RPAI = Romantic Partner Attribute Index.

Within Subjects (Menstrual Cycle Phase) Univariate Statistics for the Averaged RPAI Items

Source	df	<i>F</i>	partial η^2	<i>p</i>
Kindness and understanding	2, 24	1.33	.10	.284
Sex appeal	2, 24	0.94	.07	.404
Faithfulness and loyalty	2, 24	1.40	.10	.267
Physical attractiveness	2, 24	0.26	.02	.776
Stable personality	2, 24	1.21	.09	.317
Social status	2, 24	0.09	.01	.916
Responsibility	2, 24	1.17	.09	.327
Financial Resources	2, 24	2.02	.14	.155
Sense of humour	2, 24	2.91	.20	.074
Fun and exciting personality	2, 24	3.97	.25	.032*
Similar values and beliefs	2, 24	5.43	.31	.011*
Desire for children	2, 24	0.59	.05	.563
Qualities of a good parent	2, 24	0.77	.06	.476
Quality of health	2, 24	0.07	.01	.936
Intelligence	2, 24	0.05	.004	.948

Note. RPAI = Romantic Partner Attribute Index.

* $p < .05$.

Group x Phase Interaction Univariate Statistics for the Averaged RPAI Items

Source	df	<i>F</i>	partial η^2	<i>p</i>
Kindness and understanding	2, 24	0.07	.01	.933
Sex appeal	2, 24	1.08	.08	.356
Faithfulness and loyalty	2, 24	1.03	.08	.372
Physical attractiveness	2, 24	0.09	.01	.919
Stable personality	2, 24	0.34	.03	.718
Social status	2, 24	0.44	.04	.653
Responsibility	2, 24	0.19	.02	.827
Financial Resources	2, 24	1.49	.11	.246
Sense of humour	2, 24	1.42	.11	.261
Fun and exciting personality	2, 24	1.16	.09	.329
Similar values and beliefs	2, 24	1.57	.12	.229
Desire for children	2, 24	0.29	.02	.753
Qualities of a good parent	2, 24	0.48	.04	.623
Quality of health	2, 24	0.75	.06	.485
Intelligence	2, 24	0.30	.02	.744

Note. RPAI = Romantic Partner Attribute Index.