Ovulatory Shifts Among Pair-Bonded Women Regarding their Extra-Pair Attraction and Self-Perceived Mate Value

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Abstract

The objective of the current research was to examine the potential influence of fertility status across the phases of the menstrual cycle (MC) on women's romantic relationship dynamics. Specifically, women's feelings and perceptions of interpersonal closeness, relationship and sexual satisfaction, commitment, investment, extra-pair attraction, attitudes toward infidelity, and self-perceived mate value were examined. In order to carry out this study, 20 pair-bonded naturally cycling women and 32 pair-bonded women currently using some form of hormonal contraception (HC) from Lakehead University and the general community of Thunder Bay were recruited to take part in the "Relationship Satisfaction Study." A within-subjects design was used to examine significant changes across romantic relationship variables between a high fertile phase (i.e., periovulatory phase) and a low fertile phase (i.e., mid to late luteal phase) of the MC. During the periovulatory phase, naturally cycling women also used midstream urine test strips to confirm the presence or absence of ovulation. Naturally cycling women were found to rate the appeal of alternative dating/relationship partners as significantly greater (i.e., greater extra-pair attraction) during the periovulatory phase; however, this only occurred for women who reported that their partners were lower in mate value. Moreover, a significant main effect of MC phase on self-perceived mate value was discovered, such that naturally cycling women during the periovulatory phase rated themselves as more desirable than during the mid to late luteal phase. These results are consistent with previous research regarding women's dual mating strategies and further contributes to our knowledge regarding purported hormonally-mediated MC phase shifts in the context of romantic relationships.

Keywords: Ovulatory shifts, dual mating, fertility, relationship satisfaction, interpersonal closeness, mate value.

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Ovulatory Shifts Among Pair-Bonded Women Regarding their Extra-Pair Attraction and Self-Perceived Mate Value

A growing body of research has demonstrated that heterosexual women experience fertility-contingent shifts in their evolved mating preferences across the phases of the menstrual cycle (MC) (reviewed in Haselton & Gildersleeve, 2011; Thornhill & Gangestad, 2008). Despite this considerable body of research, few empirical efforts have examined how differences in the likelihood of conception (i.e., fertility) across the MC may impact women's long-term romantic relationship dynamics (but see Larson, Haselton, Gildersleeve, & Pillsworth, 2013). Furthermore, previous studies examining the potential influence of fertility status on romantic relationships have produced mixed findings (e.g., Durante & Li, 2009; Gangestad, Garver-Apgar, Simpson, & Cousins, 2007; Hromatko, Tadinac, Prizmić, 2006; Larson et al., 2013). The objective of the current study is to add to this emerging literature by examining evidence of MC phase-dependent changes in pair-bonded women regarding variables relevant to their heterosexual romantic relationships, particularly in relation to markers of in-pair (e.g., feelings of interpersonal closeness and relationship satisfaction) and extra-pair (e.g., an increase in the appeal of alternative relationship partners external to the romantic dyad) attraction (Pillsworh & Haselton, 2006).

The Ovulatory Shift Hypothesis

It has been argued through the *ovulatory shift hypothesis* (Gangestad, Thornhill, & Garver-Apgar, 2005) that women experience nuanced shifts in preferences for certain traits in men cyclically over the phases of the MC as a function of fertility. Specifically, as the likelihood of conception increases toward *ovulation*—the point at which a mature ovum is released from the ovary and travels down the fallopian tube to be fertilized—women are predicted to be relatively

more attracted to men who possess characteristics putatively associated with “good genes” (i.e., a low mutation load, the presence of beneficial genes, and/or the absence of genes producing harmful effects; Gildersleeve, Haselton, & Fales, 2014a). This effect is argued to be most pronounced when evaluating a man's desirability as a short-term sexual partner and absent, or heavily attenuated, when assessing his desirability as a long-term mate (Gildersleeve et al., 2014a). This is because women may only obtain genetic benefits from a mate when fertile; however, provisioning, investment, and parental benefits can be secured throughout the cycle independent of fertility status.

In support of the ovulatory shift hypothesis (Gangestad et al., 2005), it has been demonstrated that as women approach ovulation they report an increased desire for the traits in men that connote phenotypic quality such as a mesomorphic (i.e., muscular) body type (Little, Jones, & Burriss, 2007); height (Pawlowski & Jasienska, 2005); facial (DeBruine, et al., 2010; Waynforth, Delwadia, & Camm, 2005) and vocal (Feinberg, et al., 2006) masculinity; social dominance (Lukaszewski & Roney, 2009); creative intelligence (Haselton & Miller, 2006); and low fluctuating asymmetry (i.e., high developmental stability; Gangestad, et al., 2005; Thornhill, Gangestad, Miller, Scheyd, & McCollough, 2003). These characteristics are concomitant with women’s ratings of men's sexual attractiveness and their *mate value* (i.e., their general desirability as short-term partners; Frederick & Haselton, 2007; Gildersleeve et al., 2014a).

Several lines of evidence have further pointed to the impact of fluctuating sex hormones that determine fertility status across the phases of the MC on women's physiology relevant to mating (Gildersleeve et al., 2014a). Numerous physiological changes have been shown to accompany a peak in fertility across the phase of the MC including: increased blood profusion throughout the body and circulating estrogen (Symons, 1995); increased vocal pitch (Bryant &

Haselton, 2009); pupillary dilation (Laeng & Falkenberg, 2007); and distinct changes in body odour (Miller & Maner, 2010). A myriad of fertility-dependent psychological changes have also been documented in women when they are most likely to conceive, such as increased sexual receptivity (Guéguen, 2009) and proceptivity (Röder, Brewer, & Fink, 2009); more flirtatious behaviour (Cantú et al., 2013); a more provocative gait (Guéguen, 2012); adorning more revealing and promiscuous clothing (Durante, Li, & Haselton, 2008); and engaging in a larger range of mate-retention tactics (Welling, Puts, Roberts, Little, & Burriss, 2012). Furthermore, fertile women have been shown to rate themselves as relatively higher in attractiveness and desirability as a mate in comparison to when they are in a low fertile phase of the MC, which may help to encourage greater sexual receptivity and proceptivity when most likely to conceive (Röder et al., 2009). Some studies, however, have failed to support this finding (e.g., Cobey, Buunk, Pollet, Klipping, & Roberts, 2013). Collectively, these changes may facilitate female copulation with a desired mate in order to increase her reproductive success.

A relatively recent meta-analysis conducted by Gildersleeve and colleagues (2014a) examined the pattern of fertility-dependent shifts across the phases of the MC on women's mate preferences in the context of short-term and long-term relationships. Based on the consolidated results of 50 studies (38 published and 12 unpublished), Gildersleeve et al. (2014a) concluded that the evidence to date supports "robust cycle shifts" for cues that connote ancestral genetic quality in men. However, it is important to note that another meta-analytic study conducted using very similar data failed to support robust ovulatory shifts in women's mate preferences (Wood, Kressel, Joshi, & Louie, 2014). Gildersleeve, Haselton, and Fales (2014b) commented on these discrepant meta-analytic findings and contended that Wood and colleagues' (2014) second meta-analysis was conceptually and methodologically flawed; misrepresenting the tenets of the

ovulatory shift hypothesis and having overly relaxed and problematic inclusion criteria (Gildersleeve et al., 2014b). Given this disparity in the conclusions drawn by both groups of authors, it may be prudent to jointly acknowledge that a meaningful number of studies have supported fertility-contingent shifts in line with the ovulatory shift hypothesis, but that the term "robust" may be too strong to describe the current state of the evidence.

Fertility Across the Phases of the Menstrual Cycle

Differential fertility, as a consequence of reproductive hormones that vary across the phases of the MC, is core to the predictions made through the ovulatory shift hypothesis (Gangestad et al., 2005). The typical range of women's MC length spans from 21–35 days, with an average cycle length of 28 days (Creinin, Keverline, & Meryn, 2004). The MC embodies three general phases: (1) menstrual, (2) follicular, and (3) luteal, each of which possess a distinct hormonal profile. The cycle begins in the menstrual phase (typically occurring 1–4 days into a 28-day cycle), wherein the uterine lining is shed to encourage successful pregnancy through implantation. During this phase, all levels of reproductive hormones are low (e.g., estradiol, progesterone, testosterone, luteinizing hormone [LH], follicle-stimulating hormone [FSH]; Carlson, 1991).

During the follicular phase (usually occurring between days 5–15), levels of FSH rise to promote the maturing of ovarian follicles. Some researchers (e.g., Roberts et al., 2004) have suggested that this phase can be subdivided into the early (days 1–4, including menstruation), mid (days 5–8), and late (days 9–14) follicular phases. Importantly, during the mid to late follicular phase the *periovulatory phase* occurs (approximately between days 8–15), wherein the matured follicles release enough estradiol to stimulate the release of LH. At this point, with high levels of FSH and estradiol, ovulation occurs (typically around day 14 in a 28-day cycle)

approximately 28–48 hours after a surge in LH (Guermandi et al., 2001). Here the follicular wall ruptures thereby releasing the ovum. Ovulation connotes a period of peak fertility and a point at which the likelihood of conception is at its highest (Wilcox, Weinberg, & Baird, 1995). The MC then ends with the luteal phase (occurring between days 16–28), which can be further subdivided into the early (occurring between days 16–19), mid (days 20–24), and late luteal phases (days 25–28; Speroff & Fritz, 2005). Progesterone peaks during the mid-luteal phase, which influences the endometrium to become receptive to implantation of the ovum (Havez, 1979). During the late luteal phase, if fertilization has not occurred, the endometrial lining is broken down with concomitant decreases is progesterone and estradiol to signal the beginning of menstruation and the reoccurrence of the cycle.

Women's Dual Mating Strategy and Implications for Long-Term Relationships

Several key evolutionary processes inform the ovulatory shift hypothesis and why mate-preferences for women are expected to shift around peak fertility. According to the *dual mating hypothesis* (Pillsworth & Haselton, 2006) it may have been adaptive for ancestral females to have strategically cuckolded (i.e., cheated on) their long-term partners in a systematic manner with a male that possessed indicators of genetic fitness, while simultaneously retaining her current romantic partner to benefit from his protection and provisioning (Buss, 2012; Thornhill & Gangestad, 2008). Selecting a male that had markers of genetic quality could have been advantageous for several reasons. First, women could have enhanced their probability of conceiving if in a relationship with a relatively infertile mate. Second, a short-term mate with superior phenotypic quality could have conferred better genes to the offspring of a mother, prospectively enhancing their chances of survival and reproduction (Smith, 1984). Third, due to the relation between attractiveness and traits connoting genetic fitness (Frederick & Haselton,

2007), selecting a partner with good genes could have also increased the attractiveness of one's prospective progeny, consequently increasing their reproductive success (Fisher, 1958). Last, a mate external to the dyad could have provided a meaningfully different constellation of genes, thereby increasing the genetic diversity and fitness of a woman's offspring in the face of rapid ecological changes (Buss, 2012; Smith, 1984; Thornhill et al., 2003).

Importantly, however, males vary considerably in their short-term and long-term mate quality. Consequently, not all women are able to attract and secure a male partner with both high levels of investment attractiveness (i.e., long-term desirability) and physical attractiveness (i.e., short-term desirability). Moreover, an accumulating body of evidence is beginning to show that women are actively competing with same-sex rivals for hegemony and access to high quality long-term mates (see Vaillancourt, 2013 for review). Furthermore, men of higher mate value, because of their greater levels of attractiveness, also have more bargaining power on the mate market and have been shown to be more likely to exploit a short-term sexual strategy relative to their lower mate value peers (Gomula, Nowak-Szczepanska, & Danel, 2014). As a result, there may be notable variability in how successful women are at courting and retaining quality long-term relationship partners that are higher in mate value. Ancestral women may have resolved this dilemma by using a dual mating strategy (Pillsworth & Haselton, 2006).

In-pair and extra-pair attraction. In the context of a long-term romantic relationship, if partnered with a male relatively low in markers of genetic fitness, ancestral females could have greatly enhanced their reproductive success by secretively having sexual affairs with men of high mate value. However, this would only have been advantageous when women were likely to conceive during the periovulatory phase of the MC (Gildersleeve et al., 2014a). Therefore, pair-bonded women are predicted to show an increased extra-pair attraction to genetically fit men

outside of the romantic dyad during times of peak fertility relative to low fertile points across the MC. Research has supported this prediction made through the ovulatory shift (Gangestad et al., 2005) and dual mating (Pillsworth & Haselton, 2006) hypotheses (reviewed in Gildersleeve et al., 2014a). In contrast, if partnered with a man relatively high in mate value, ancestral women may have been motivated to retain and copulate with their phenotypically fit partners during peak fertility to secure genetic benefits. One mechanism that may have facilitated this process is increased in-pair attraction (i.e., greater attraction toward one's partner) during the periovulatory phase of the MC. This prediction has also received empirical support (Gangestad et al., 2007; Gangestad, Thornhill, & Garver, 2002; Larson et al., 2013; Larson, Pillsworth, & Haselton, 2012). However, the periovulatory shifts regarding extra-pair attraction have received comparatively more empirical support than the complimentary prediction that women should experience increased in-pair attraction to their own relationship partners who are high on markers of genetic fitness when most fertile (reviewed in Larson et al., 2012).

Cycle Shifts and Romantic Relationship Dynamics

In order for ancestral women to have opportunistically copulated with genetically fit men outside of their romantic relationships, it may have been adaptive to experience a temporary cognitive, emotional, and/or behavioural disconnection from their primary partner when most likely to conceive (Kenrick, Griskevicius, Neuberg, & Schaller, 2010). This may have encouraged, or lowered the inhibitions for, committing infidelity to acquire genetic benefits from a high mate value male. However, few investigations have examined important long-term relationship differences at high compared to low fertile phases across the MC, and with mixed results. For instance, as reported by Gildersleeve and colleagues (2014a), of approximately 50 studies (38 published, 12 unpublished) assessing ovulatory shifts, six (12%) have examined for

evidence of cycle shifts in pair-bonded women's feelings of relationship satisfaction. Three of these six studies (50%) failed to find a significant effect of fertility status on relationship satisfaction (Cobey et al., 2013, Durante & Li, 2009; Hromatko et al., 2006), while three found evidence in support of this relationship (Gangestad et al., 2005, Larson et al., 2013; Larson et al., 2012).

Despite the relative scarcity of research examining shifts in reproductive hormones over the MC in relation to women's romantic relationship dynamics, several investigations within the literature have yielded some key insights. For instance, Larson and colleagues (2013) discovered that during the periovulatory phase, in comparison to the luteal phase, naturally cycling women expressed greater interpersonal closeness (i.e., greater self–other overlap; Aron, Aron, & Smollen, 1992) and felt more satisfied with their current relationships when they were sexually attracted to their partners. These authors further discovered that pair-bonded women who rated their relationship partners as relatively low in sexual desirability, felt less close to them and were more critical of them (i.e., rated that their partner had more faults) at high compared to low fertile phases of the MC. Importantly, however, these women did not express a significant decrease in feelings of commitment and investment to their romantic partners, despite their relatively lower perceived mate value (Larson et al., 2013). Collectively, in line with the tenets of the ovulatory shift (Gangestad et al., 2005) and the dual mating (Pillsworth & Haselton, 2006) hypotheses, elevated fertility during the periovulatory phase may encourage pair-bonded women to simultaneously seek out alternative short-term sex partners, while retaining their long-term investing partner. This may be achieved through the temporary severing of cognitive and emotional ties with one's relationship partner, in order to pursue a more sexually desirable male partner external to the dyad (Kenrick et al., 2010; Larson et al., 2013).

Gangestad, Garver-Apgar, Cousins, and Thornhill (2014) further discovered that women in the periovulatory phase were more focused on their own needs relative to those of their romantic partner, especially when attracted to other men. A more egoistic focus within the context of a romantic relationship may connote less interpersonal closeness with one's partner and less satisfaction within the relationship (Aron et al., 1992). Moreover, Grebe, Gangestad, Garver-Apgar, and Thornhill (2013) discovered that women who were highly invested in their romantic partners were more sexually proceptive (e.g., initiated sex more often) during the periovulatory phase as opposed to less fertile periods of the MC. These results further support the predictions made through the dual mating hypothesis (Pillsworth & Haselton, 2006), that pair-bonded women will seek out men with elevated mate value when most fertile, which may result in an increased desire to copulate with one's genetically fit partner or distancing oneself from one's partner to entertain alternative extra-pair options external to the dyad.

Absence of Cycle Shifts for Markers of Long-Term Partner Quality

Another key prediction made through the ovulatory shift hypothesis (Gangestad et al., 2005), is that women will not experience significant fertility-dependent shifts in their perceptions of characteristics associated with their partner's quality as a long-term mate (Gildersleeve et al., 2014a). Regardless of their fertility status across the MC, ancestral women may have benefitted from forming long-term pair-bonds with men who were kind, emotionally stable, good parents, and highly investing relationship partners. Several studies have confirmed that women do not experience an increase in their preference for, or a change in their perceptions of, their male partner's investment attractiveness (i.e., the presence of traits indicating good parenting skills and investment potential) as a function of fertility (Gangestad et al., 2007; Larson et al., 2013). Moreover, results from the meta-analysis conducted by Gildersleeve and colleagues (2014a)

concluded that overall studies have supported the absence of significant cycle shifts in regard to traits connoting long-term relationship partner quality.

The Present Study

The principal objective of the present study was to examine if changes in fertility status across the phases of the MC could impact women's long-term romantic heterosexual relationships. Therefore, a within-subjects design was used wherein each participant completed two testing sessions, one during the predicted periovulatory phase (i.e., the "high-fertile" window) and another during the predicted mid to late luteal phase (i.e., the "low-fertile" window). The current study assessed for the potential of MC phase to impact pair-bonded women's feelings of interpersonal closeness, relationship and sexual satisfaction, as well as their extra-pair attraction (i.e., the perceived quality of relationship alternatives). In line with the ovulatory shift hypothesis (Gangestad et al., 2005), the perceived mate value of the current relationship partner was examined as a key moderating variable of fertility-contingent changes across the periovulatory and luteal phases of the MC (Larson et al., 2013). These romantic relationship variables enabled an assessment of potential shifts in women's in-pair and extra-pair attractions as a consequence of MC phase and their perceptions of their male partner's phenotypic quality. Additionally, the current study sought to examine MC phase-dependant shifts in pair-bonded women's self-perceived mate value between the periovulatory and the luteal phases. Viewing oneself as a relatively more desirable sex partner may be part of a larger pattern of cycle shifts that enable women to successfully procure genetically fit men when most likely to conceive.

A second goal of the current investigation was to examine if fertility-related shifts would be absent when evaluating characteristics primarily associated with men's quality as a long-term

partner, or his "investment attractiveness" (DeBruine et al., 2010; Larson et al., 2013). Because women may secure emotional, social, provisioning, and material benefits from a partner across the phases of the MC, characteristics associated with a partner's investment attractiveness are predicted not to change in relation to changes in fertility status. Additionally, it is predicted that women's feelings of investment and commitment toward their partners will not significantly shift across the phases of the MC. Successfully implementing a dual mating strategy (Pillsworth & Haselton, 2006) involves simultaneously seeking out extra-pair opportunities with genetically fit men while retaining one's current relationship partner. Therefore, if women value their primary relationship partners, they should be motivated to remain invested in and committed to them regardless of their fertility status (Larson et al., 2013).

A third objective of the present study was to examine the absence of fertility-dependent shifts in romantic relationship variables (e.g., interpersonal closeness, relationship satisfaction, sexual satisfaction, etc.) driven by partner mate value, in women currently using hormonal contraception (HC) (i.e., hormonal birth control). HC use results in the termination of an LH surge which prevents ovulation from occurring, eliminating fluctuations in fertility-status across the phases of the MC. Therefore, a group of women currently taking some form of HC were included in the current investigation as a "control" group in order to detect any potential spurious effects of fertility across relationship variables. To date, few studies in the ovulatory shift literature have used a control group in relation to shifts in feelings about women's long-term relationships and their romantic partner's. Given these research objectives, two hypotheses were proposed below.

Hypothesis 1: The perceived mate value of naturally cycling women's male partners will significantly moderate feelings of interpersonal closeness, relationship satisfaction, sexual

satisfaction, and extra-pair attraction between the periovulatory ("high-fertile") and the mid to late luteal ("low-fertile") testing phases. Specifically, during the periovulatory phase, naturally cycling women partnered with higher mate value men are hypothesized to report elevated levels of interpersonal closeness, relationship satisfaction, and sexual satisfaction, as well as lower levels of extra-pair attraction and attitudes toward relationship infidelity that are more negative (i.e., less accepting of infidelity) in comparison to when they are in the luteal phase. In contrast, when in the periovulatory phase naturally cycling women partnered with lower mate value men are hypothesized to report lower levels of self–other overlap, relationship satisfaction, and sexual satisfaction, as well as higher levels of extra-pair-attraction and attitudes toward infidelity that are more positive (i.e., more accepting of infidelity) in comparison to when they are in the luteal phase. However, shifts in feelings of commitment to and investment in pair-bonded women's romantic relationships should be absent (Larson et al., 2013).

It is hypothesized that women partnered with a man high in mate value will experience an increase in interpersonal closeness, relationship satisfaction, and sexual satisfaction during the periovulatory phase, because it may enable them to strategically retain their reproductively fit mate and benefit from his good genes (i.e., increased in-pair attraction; Pillsworth & Haselton, 2006). Defecting from a relationship with a genetically fit man at peak fertility would be counterproductive to securing genetic benefits for one's offspring. Whereas naturally cycling women partnered with men lower in mate value, are predicted to report lower levels of self–other overlap and satisfaction because this pattern may aid women in strategically seeking out and potentially committing infidelity with a more genetically fit mate (Gangestad et al., 2005). Subtle forms of relational dissatisfaction in this context may have assisted in severing some emotional ties between a female and her primary partner in an effort to encourage her to philander with a

more physically attractive mate (Kenrick et al., 2010). This is also why it is expected that when fertile women with lower mate value partners may find alternative mates outside of the existing romantic dyad more appealing, potentially to encourage taking advantage of extra-pair opportunities (Gangestad et al., 2002). Although ancestral women may have benefited from subtle and temporary forms of relational dissatisfaction, a key tenet of the dual mating hypothesis (Pillsworth & Haselton, 2006) is that women are motivated to retain valued long-term relationship partners. This is why changes in pair-bonded women's feelings of commitment to and investment in their long-term relationships should remain stable across the phases of the MC.

Additionally, any significant changes related to fertility and MC phase across variables of interested should occur only in naturally cycling women and be heavily attenuated, or absent, in women currently using some form of HC. Therefore, pair-bonded women using HCs are anticipated not to experience significant MC phase-dependent changes moderated by male partner's mate value regarding feelings of interpersonal closeness, relationship satisfaction, sexual satisfaction, extra-pair attraction, and attitudes toward infidelity (Adams et al., 1978; Röder et al., 2009). Hormonal birth control regulates women's reproductive hormones across the phases of the MC, preventing the release of FSH and precluding ovulation from occurring (Daniels, Daugherty, & Jones, 2014).

Another key prediction made through the ovulatory shift hypothesis (Gangestad et al., 2005), that has received comparatively limited empirical attention, is that pair-bonded women are not more attracted to traits in men reflecting suitability as a long-term social partner and co-parent on high, relative to low, fertile phases of the MC (Gildersleeve et al., 2014). Therefore, any MC phase dependent shifts in attraction are argued to be driven by characteristics associated

with short-term partner quality (e.g., sexual attractiveness) and should be heavily attenuated, or absent, in naturally cycling women's attraction to traits associated principally with long-term partner quality. Therefore, is it logical to anticipate that naturally cycling women's perceptions of traits linked to their partner's relationship skills (e.g., kindness) and financial prospects (e.g., ambition, industry) will not shift significantly across the phase of the MC.

Hypothesis 2: Women will perceive themselves as higher in mate value when more fertile during the periovulatory phase in comparison to when they are less fertile in the mid to late luteal phase. If coupled with a lower mate value partner, perceiving oneself as attractive may enable women to more successfully procure a genetically fit male to commit infidelity with at peak fertility (Röder et al., 2009). Similarly, if coupled with a higher mate value partner, women who feel more attractive in comparison to those who feel less attractive, may engage in more proceptive (i.e., behaviour intended to initiate, maintain, or escalate a sexual interaction) and receptive (i.e., remaining open to sexual advances) sexual behaviour when the probability of conception is at its highest, thus benefiting from their partner's putative good genes (Grebe et al., 2013). Similar to Hypothesis 1, any significant shift in self-perceived mate value contingent on MC phase position should occur only in naturally cycling pair-bonded women and not in women currently using HCs.

Method

Participants

A total of 222 participants volunteered to participate in the "Relationship Satisfaction Study." Participants consisted of undergraduate students from Lakehead University and people from the general community of Thunder Bay, who were asked to complete a screening questionnaire through SONA™ and SurveyMonkey™ respectively for the current study. Of

these participants, 54.5% (n = 121) were deemed eligible to participate, while 45.5% (n = 101) were not for one of the following reasons: pertinent information was missing from the screening questionnaire (n = 15), currently using medication that could influence reproductive hormones (n = 13), significant uncertainty or irregularity associated with self-reported MC activity (n = 7), MC length outside of 21–35 days (n = 6), not in a long-term, or dating, relationship for at least two months (n = 6), identified as male (n = 5), currently dealing with a medical or psychiatric diagnosis that could impact reproductive hormones (n = 5), pregnant (n = 4), could not attend lab session (n = 2), provided incorrect contact information (n = 2), or were currently using a hormonal intrauterine device (IUD) resulting in the cessation of menses (n = 2). Importantly, several participants (n = 34) currently using HCs were also deemed ineligible to participate once an adequate level of statistical power had been reached for participants in the "control group." Of the remaining 121 participants, 62% (n = 75) scheduled a lab meeting on campus, whereas 38% (n = 47) did not. Of the remaining participants 75 participants, 5.3% (n = 5) did not attend the lab meeting, 12% (n = 9) did not complete either Survey A or Survey B, and 12% (n = 9) completed one survey but not the other. Consequently, a final sample of 52 participants was used for the current study.

The mean age of the sample was 21.85 (SD = 4.45), with a range of 18–35. Eighty-one percent (n = 42) of the sample identified as Caucasian and 10% (n = 5) as Aboriginal. In relation to religious affiliation, 42.3% (n = 22) of the participants reported that they adhered to the Christian faith, 21.2% (n = 11) identified as atheist, and 11.5% (n = 6) as unaffiliated. As a proxy of socioeconomic status (SES), participants were asked to report the level of educational attainment of both parents/caregivers. Median values for both the mother's and father's level of education corresponded to "completed college program." Of the sample, 80.8% (n = 42) of the

participants identified as exclusively heterosexual, 9.6% (*n* = 5) as "Predominantly heterosexual, only incidentally homosexual," 5.8% (*n* = 3) as "Predominantly heterosexual, but more than incidentally homosexual," and 3.8% (*n* = 2) as "Equally heterosexual and homosexual (currently with a male partner)". In regard to relationship status, 75% (*n* = 39) of the participants were in a long-term relationship, 15.4% (*n* = 8) were common law, 5.8% (*n* = 3) were married, and 3.8% (*n* = 2) were casually dating (for at least two months). Mean relationship length was 34.62 months (*SD* = 34.82, range 2–165 months). Of the sample, 69.2% percent (*n* = 36) of women indicated that they were cohabiting with their partners, whereas 30.8% (*n* = 16) were not. Only two (3.8%) women indicated that they had biological children of their own. Every participant in the current sample responded "Yes" to the question "Have you had sexual intercourse before?" and indicated that they had a monogamous relationship with their partner.

Of the 52 participants in the current sample, 38.5% (*n* = 20) indicated that they were not currently using some form of HCs. When asked how long it had been since they last used HCs, 11.5% (*n* = 6) reported that they had never taken HCs before, 3.8% (*n* = 2) had not used HCs for one to three months, 9.6% (*n* = 5) had not used HCs for four to eight months, and 13.5% (*n* = 7) had not used HCs in the past year. In contrast, 61.5% (*n* = 32) of the participants reported that they were currently using some form of HC (e.g., contraceptive pill, transdermal patch, vaginal ring, etc.). These participants using HC served as the "control group" for the current study, to ensure that significant cycle shifts were only occurring in the naturally cycling participants capable of ovulating.

All participants included in the current study reported that they were not currently pregnant, breastfeeding, lactating, or menopausal, not currently dealing with a diagnosed medical (e.g., PCOS; Eagleson et al., 2000) or psychological condition (e.g., major depressive disorder;

Accortt, Freeman, & Allen, 2008), or using medication (e.g., selective serotonin reuptake inhibitors [SSRIs]; Kennedy & Rizvi, 2009) that could influence women's reproductive hormone levels. This thesis project received approval from the Lakehead University Research Ethics Board (Appendix A).

Materials

Screening questionnaire. A screening questionnaire was created to ensure that participants met the inclusion criteria necessary to participate in the current study, which included: being a woman between the ages of 17–40 in a long-term, or dating, heterosexual relationship (for at least 2 months), not currently pregnant, breastfeeding, lactating, or menopausal, and not currently dealing with a psychiatric or medical diagnosis, or using medication, that could impact women's reproductive hormones (Larson et al., 2013; Oinonen, Jarva, & Mazmanian, 2008). A scale developed by Kinsey, Pomeroy, and Martin (1948), was also used to assess participants' sexual orientation, to ensure that participants did not identify with an exclusively or predominantly homosexual orientation, as the predictions made through the ovulatory shift hypothesis, at this point in the literature, pertain to women in heterosexual relationships (Gangestad et al., 2005).

Furthermore, embedded within the screening questionnaire were several items concerning women's MC activity. This questionnaire was intended to verify that participants did not have a cycle length less than 21 or greater than 35 days long which could be indicative of fertility-related problems (Diaz, Laufer, & Breech, 2006), and also asked about cycle regularity, current approximate MC phase position, and confidence in reported cycle length and the predicted next onset of menses. Following Phillips (2015), MC regularity was assessed with a multiple-choice question asking women to best describe the predictability of their MCs ranging from 1 (*I never*

have my period) to 5 (*My period is very predictable. I can predict within 1 day when my next period will start*). Likert-type responses for confidence in self-reported cycle length and the predicted next onset of menses ranged from 0 (*Not at all confident*) to 8 (*Very confident*; Larson et al., 2013). The complete psychometric instrument can be found in Appendix B.

Calculating MC phase position. To assess current position within the MC, a backward counting procedure called the reverse-cycle-day (RCD) method was used (see Durante, Griskevicius, Cantú, & Simpson 2014; Haselton & Gangestad, 2006; Miller, Tybur, & Jordan, 2007). The RCD method requires female participants to specify: (1) the start date of their last menstrual period, (2) the expected start date of their next menstrual period, and (3) the typical length of their MC (Durante & Arsena, 2014). Participants were given calendars to aid them in remembering their MC information, which was used to count backward from the predicted date of next menstrual onset to approximate cycle phase position. Participants were also asked to provide the actual date of their next menstrual onset in order to verify the accuracy of the MC information that they had provided in the screening questionnaire. The RCD method has been argued to be superior to the forward counting method, which uses a woman's last menstrual onset (i.e., the first day of bleeding) to estimate cycle position (Gangestad et al., 2016). The relatively greater accuracy of the RCD method is supposedly due to the larger variability in the length of the follicular phase in comparison to the luteal phase in the MC (Gangestad et al., 2016).

Detecting ovulation. In order to verify fertility status, nationally marketed and FDA-approved Wondfo™ LH Ovulation Test Strips (http://wondfousa.com/test/ ovulation-tests/) were used in the current research. This is a sensitive (detecting a level of 25 mlU/ml) midstream urine test that detects the surge in LH that occurs 24–48 hours prior to ovulation during the late

follicular phase (Wilcox, Dunson, & Baird, 2000). Positive results discovered with midstream urine test strips have been shown to be 97% concordant with ovulation confirmed ultrasonography (Guermandi et al., 2001). Using the calculated MC phase position, women were instructed to test themselves on the estimated four days leading up to and including the day of ovulation (i.e., days 10–14 in an average 28-day cycle) where the likelihood of conception is at its highest (Wilcox et al., 2000). Furthermore, women were asked to test themselves once during the mid to late luteal phase (i.e., days 20–28 in an average 28-day cycle) in order to confirm the absence of ovulation. Women were instructed to test themselves between 2:00PM–8:00PM, when levels of LH have been shown to peak (Chazal et al., 1977). Instructions on how to use the test kits can be found in Appendix C and D.

Demographic questionnaire. A demographic questionnaire was created and used in the present study, which asked participants to report their ethnicity, religious affiliation, and a proxy of socioeconomic status (parent(s), or caregiver(s), level of educational attainment). Participants were also asked about their current relationship length (in months), as well as their cohabitation status (i.e., currently cohabiting or not). Last, participants were asked whether they had any biological offspring and whether they have previously had sexual intercourse before. This questionnaire was completed during the periovulatory testing session and can be found in in Appendix E.

The Inclusion of Other in Self (IOS) Scale. The IOS Scale was designed by Aron et al. (1992) to assess interpersonal closeness and feelings of interconnectedness within the context of an intimate relationship. The IOS is a pictorial series of seven pairs of circles (each pair representing the “self” and “partner”) that overlap to varying degrees, ranging from no overlap to complete overlap. Participants were asked to think about how they had felt about their partner

over the last 48 hours in order to be sensitive to the influence of fertility status on feelings of interpersonal closeness (Larson et al., 2013). The scale has demonstrated evidence of convergent validity, correlating positively with relationship satisfaction, r = .68, and level of relational commitment, r = .44 (Frost & Forrester, 2013). Furthermore, the IOS has produced negative correlations with thoughts of breaking-up, r = -.57, and depressive symptoms, r = -.32 (Frost & Forrester, 2013). The complete psychometric instrument can be found in Appendix F.

The Couples Satisfaction Index (CSI). The CSI is a 32-item self-report instrument developed by Funk and Rogge (2007) that assesses an individual's level of satisfaction with their current romantic relationship. These authors also created an abridged 4-item version of the CSI, which possesses similar psychometric properties. In the present study, this 4-item scale was used and items were amended to reflect how the respondent had felt over the past 48 hours about their partners in relation to the questions on the CSI (Larson et al., 2013). Participants were first asked to "Please indicate the degree of happiness, all things considered, you have felt over the past 48 hours of your current relationship" and respond along a 7-point Likert-type scale ranging from 0 (*Extremely unhappy*) to 6 (*Perfect*). Participants were then presented with the statement "Over the past 48 hours, I have felt that I have a warm and comfortable relationship with my partner" and asked to respond along a 6-point Likert-type scale ranging from 0 (*Not true at all*) to 5 (*Completely true*). Last, respondents were asked how rewarding and satisfying their relationships had been over the past 48 hours, answering along a 6-point Likert-type response scale ranging from 0 (*Not at all*) to 5 (*Completely*). In the present study, the internal reliability (Cronbach's alpha) values for the CSI for the high fertile and low fertile testing sessions were .93 and .86 respectively for all women (.93 and .92 for naturally cycling women; .94 and .81 for women using HCs). The complete psychometric instrument is included in Appendix G.

Investment Model Scale (IMS). The IMS is a 37-item scale developed by Rusbult et al. (1998) to measure four constructs as part of their investment model: commitment level, relationship satisfaction, quality of relationship alternatives, and investment size. The present study used the Investment Size and the Quality of Alternatives subscales, both of which contain a set of five facet items argued to prepare (i.e., prime) respondents for answering five global items, as well as the Commitment Level subscale which contains seven global items (Rusbult et al., 1998). For the facet items, participants responded along a 4-point Likert-type response scale ranging from 0 (*Don't agree at all*) to 3 (*Agree completely*) and for the global items a 9-point Likert-type response scale was used, ranging from 0 (*Do not agree at all*) to 8 (*Agree completely*).

The Quality of Alternatives subscale measures the perceived desirability of available alternative relationship opportunities external to the current romantic dyad (e.g., "The people other than my partner with whom I might become involved with are very appealing"). In the current study, this subscale served as a measure of extra-pair attraction to examine if naturally cycling women experienced a MC phase-dependent shift in their desire for mating opportunities outside of the primary relationship (Pillsworth & Haselton, 2006). Items included in the Investment Size subscale assesses the perceived magnitude and importance of the resources directed toward one's current relationship (e.g., "I have put a great deal into our relationship that I would lose if the relationship were to end"). The Commitment Level subscale assesses the degree to which one intends to persist in their current relationship (e.g., "I want our relationship to last for a very long time"; Rusbult et al., 1998). Participants were instructed to report on how they had felt about their current relationship over the past 48 hours in response to each question. In the current study, internal consistency values (Cronbach's alpha) for the perceived quality of

alternative relationships, investment, and commitment during the high fertile session were .75, .62, and .84 respectively for all women (α = .70, α = .59, and α = .87 for naturally cycling women; α = .77, α = .66, and α = .81 for women using HCs). For the low fertility session, internal consistency values were .78, .73, and .80 for all women (α = .75, α = .67, and α = .83 for naturally cycling women; α = .83, α = .76, and α = .79 for women using HCs) regarding the quality of alternative relationships, investment, and commitment respectively in the present study. The complete psychometric instruments can be found in Appendices H–J.

The Satisfaction with Sex Life Scale (SSLS). This psychometric instrument, created by Neto (2012), is a 5-item self-report measure designed to assess a participant's level of sexual satisfaction with their current romantic partner. Examples of items include "In most ways my sex life is close to my ideal with my current partner" and "The conditions of my sex life are excellent with my current partner." Participants responded along a 7-point Likert response scale, with higher global scores representing greater sex life satisfaction (Neto, 2012). In the present study, respondents were instructed to express how they had felt about their sexual relationship with their current partner over the past 48 hours in response to the questions being asked. In the current study, the internal consistency values for the SSLS during both high fertile (α = .97 all women; α = .96 naturally cycling women; and α = .97 women using HCs) and low fertile (α = .98 for all women; α = .98 for naturally cycling women; and α = .98 women using HCs) testing sessions fell within an acceptable range (Cronbach, 1951). The complete psychometric instrument can be found in Appendix K.

The Mate Value Scale (MVS). This is a 4-item instrument developed by Edlund and Sagarin (2014) used to assess mate value of the self, one's partner, and/or of other targets. In the present research, this instrument was used to assess self-perceptions of mate value and then

perceptions of one's male partner's mate value. Perceptions of women's male partner's mate value was used as an indicator of men's genetic fitness in the present study (Fisher, Cox, Bennett, & Gavric, 2008). Participants were asked to think about how they had felt over the past 48 hours when responding to the questions on the MVS. Two of the four items on the MVS assess an individual's perceived desirability as a partner (e.g., "Over the past 48 hours, how would you rate your level of desirability as a partner?") and other members of the opposite sex (e.g., "Over the past 48 hours, how would members of the opposite sex rate your level of desirability as a partner?"). Participants responded to these two items along a 7-point Likert-type response scale ranging from 1 (*Extremely undesirable*) to 7 (*Extremely desirable*). One item addressed the participant's self-perceived desirability in comparison to others ("Over the past 48 hours, how do you believe you compare to other people in desirability as a partner?"), wherein participants responded along a 7-point Likert-type scale ranging from 1 (*Very much lower than average*) to 7 (*Very much higher than average*). The last item asked respondents to report how desirable they felt they were in general on the mate market (e.g., "Over the past 48 hours, how good of a catch do you feel you are?"), wherein participants responded along a 7-point Likert-type response scale ranging from 1 (*Very bad catch*) to 7 (*Very good catch*).

In the present study, internal consistency values for self-perceived mate value during the high fertile session ($\alpha = .79$ for all women; $\alpha = .77$ for naturally cycling women; and $\alpha = .78$ for women using HCs) and low fertile session ($\alpha = .90$ for all women; $\alpha = .93$ for naturally cycling women; and $\alpha = .86$ for women using HCs) fell within an acceptable range. Similarly, internal consistency values for partner's perceived mate value during the periovulatory phase ($\alpha = .85$ for all women; $\alpha = .84$ for naturally cycling women; and $\alpha = .84$ for women using HCs) and the luteal phase ($\alpha = .87$ for all women; $\alpha = .78$ for naturally cycling women; and $\alpha = .92$ for women

using HCs) were adequate in the present study. The complete psychometric instruments for self and partner MVS are included in Appendices L and M respectively.

Attitudes Toward Relationship Infidelity Scale (ATRIS). The ATRIS is a 5-item self-report measure developed by DeWall et al. (2011) that is intended to assess a participant's general attitudes towards infidelity within the context of a romantic relationship. Examples of items include "Cheating on my partner is morally wrong" and "Cheating on my romantic partner would not be a big deal for me." Participants respond along a 5-point Likert-type scale ranging from 1 (*Strongly disagree*) to 5 (*Strongly agree*). Lower overall scores indicate a more positive attitude toward relationship infidelity (DeWall et al., 2011). The internal consistency values for the ATRIS during the high fertile (α = .86 for all women; α = .91 for naturally cycling women; α = .83 for women using HCs) and low fertile (α = .89 for all women; α = .97 for naturally cycling women; α = .84 for women using HCs) testing sessions fell within an acceptable range for the present study. This complete psychometric instrument can be found in Appendix N.

Perceptions of Mate Quality Scale. This is a 15-item scale adapted from a measure designed by Beaulieu and Havens (2015), and is intended to assess participants' perceptions of particular qualities in their partners. Specifically, these traits relate primarily to either short-term partner quality or long-term partner quality. Five subscales are contained within this measure including: Relationship skills (e.g., kindness, loyalty, and generosity), education (e.g., cultured, educated), physical attractiveness (e.g., attractive face, sexy), good financial prospects (e.g., ambitious, industrious), and dominance (e.g., assertive, dominant, powerful). Only the dimensions relating to long-term partner characteristics (relationship skills and financial prospects) were included in the present study. This permitted an assessment of whether MC

phase-dependent shifts related solely to perceptions of short-term partner quality, a key prediction made through the ovulatory shift hypothesis (Gangestad et al., 2005).

Participants were asked "to what extent has your partner expressed these traits over the past 48 hours" and responded along a 5-point Likert type scale ranging from 1 (*Strongly disagree*) to 5 (*Strongly agree*). In the present study, the internal consistency values for relationship skills during the periovulatory (α = .66 for all women; α = .55 for naturally cycling women; and α = .70 for women using HCs) and luteal (α = .81 for all women; α = .76 for naturally cycling women; and α = .85 for women using HCs) phases of the MC were acceptable (Cronbach, 1951). Similarly, in the current study, internal consistency values for financial prospects during the high fertile (α = .74 for all women; α = .71 for naturally cycling women; and α = .75 for women using HCs) and low fertile (α = .78 for all women; α = .78 for naturally cycling women; and α = .76 for women using HCs), all fell within an acceptable range. The complete scale can be found in Appendix O.

Procedure

Participants were asked if they would like to take part in the "Relationship Satisfaction Study" through the use of student (Appendix P) and community (Appendix Q) advertisement posters, a digital recruitment message (Appendix R), a digital advertisement on Facebook and Kijiji (Appendix S), and brief class presentations at Lakehead University (see Appendix T for script). Those interested in participating were asked to complete a brief online screening questionnaire hosted through SONA™ for student participants and SurveyMonkey® for community participants, after being presented with a cover letter screen (Appendix U for SONA and Appendix V for SurveyMonkey) and a screen of informed consent (Appendix W for SONA and Appendix X for SurveyMonkey). Participants meeting the eligibility criteria were contacted

to schedule a brief lab meeting on the Lakehead University campus. During this meeting, naturally cycling women were provided with a urine test kit (Figure 1) and a detailed set of instructions for expected high-fertile testing and expected low fertile testing. In contrast, women currently using HC were given a different set of instructions for high (Appendix Y) and low (Appendix Z) "fertile" testing periods.

Figure 1. Urine test kit for naturally cycling women, which included seven midstream ovulation test strips (with the word "ovulation" covered), two sets of instructions (high-fertility and low-fertility), and a set of plastic cups.

Using the self-reported MC information provided by the participants in the screening questionnaire, cycle phase position was calculated using the RCD method (see Gangestad et al., 2016). Ovulation typically occurs 14–15 days prior to the onset of the next menstrual period and unprotected sex is most likely to result in conception on the four days leading up to and including ovulation (Wilcox et al., 1995). This "high fertile window" of the MC was designated as RCD 15–19, which corresponds to days 10–14 in a 28-day cycle during the late follicular and early luteal phases (i.e., periovulatory phase; Larson et al., 2012; Saad & Stenstrom, 2012; Wilcox et al., 1995). The "low-fertility window" was designated as RCD 4–8, which corresponds to days 21–25 in a 28-day cycle during the mid to late luteal phase. Days 1–7 (i.e., menstrual and

mid-follicular phases) and 16–18 (i.e., early luteal phase) of a 28-day cycle were excluded to avoid the influence of menstruation and to more clearly delineate fertility status.

For the predicted periovulatory phase, naturally cycling participants who were not currently using any form of HC were instructed to begin testing themselves (sometime between 2:00PM–8:00PM) at the beginning of the calculated "high fertility" testing window (RCD 15–19) once a day for up to five days or until they found a positive test result. Once they had either tested themselves once a day for five days or found a positive test result, participants were asked to access and complete "The Relationship Satisfaction Study (Survey A)." For the predicted mid to late luteal phase, participants not currently using HCs were asked to test themselves once at some point within the calculated "low fertility" testing window (RCD 4–8) and then to access and complete "The Relationship Satisfaction Study (Survey B)." Included in both Survey A and Survey B was an item that asked women to provide the result of their most recent urine test (Appendix AA). Women were asked to complete both surveys at approximately the same time of day (within three hours) in order to circumvent any potential influences of circadian rhythms on fluctuating reproductive hormone levels (Burger, 2002).

Using Wondfo™ commercial brand ovulation test strips, an LH surge was detected in 30% (n = 6) of the 20 naturally cycling women, within 14–18 days prior to the onset of their next MC, which is consistent with research of a similar vein (Gangestad et al., 2016). Given the small sample for women not using HC, in an attempt to maximize statistical power all 20 free-cycling women were included in the analyses and the results of the ovulation tests (negative or positive) during the periovulatory testing session were treated as a covariate in each within-subject statistical model. It could be reasonably argued that the result of the ovulation test should be treated as a between-subject factor as opposed to a covariate; however, treating this variable as a

covariate helped to maintain the, already low, levels of statistical power regarding the analyses for the current study. It also permitted an examination of potential interactions of ovulation test result and MC phase on variables of interest.

Prior to completing the first online survey, participants were shown a cover letter screen (Appendix BB for SONA and Appendix CC for SurveyMonkey) and a screen of informed consent (Appendix DD for SONA and Appendix EE for SurveyMonkey). As part of the first online survey, participants were asked to complete the demographics questionnaire and shown a brief debriefing screens for Survey A (Appendix FF for SONA and Appendix GG for SurveyMonkey) and Survey B (Appendix HH for SONA and Appendix II for SurveyMonkey). After the second online survey had been completed, participants were sent a detailed digital debriefing message (Appendix JJ) by e-mail. Students currently attending Lakehead University and enrolled in eligible psychology classes were compensated with partial course credit and entered into a raffle to win one of ten $10.00 Tim Horton's gift cards. Community participants were entered into a raffle for a "Dinner for Two" to win one of four $50.00 restaurant gift cards.

Data Analysis Strategy

One-way repeated measures analyses of covariance (ANCOVA; SPSS 21) were used to determine any main effects of MC phase on interpersonal closeness, relationship satisfaction, sexual satisfaction, extra-pair attraction, attitudes toward relationship infidelity, commitment, investment, perceptions of long-term partner qualities, and self-perceived mate value. MC Phase (periovulatory or luteal) was entered into each model as a within-subjects variable, whereas order of session (high-fertility session first or low-fertility session first) was treated as a between-subjects factor.

Partner's mate value was included as a covariate in several repeated measures models to examine if changes between the periovulatory and luteal phases of the MC were significantly moderated by how desirable one perceived one's partner to be as a mate (Larson et al., 2013). Specifically, significant interactions between MC phase and partner's mate value were examined in all measured variables except for traits denoting long-term partner quality and self-perceived mate value. Moreover, the result of the ovulation test (positive or negative) during the periovulatory testing phase was treated as a covariate and examined as a potential moderator of MC phase contingent effects. Importantly, partner's mate value was assessed during both the predicted high and low fertile phases of the MC to ensure that ratings would not fluctuate in relation to cycle phase. A paired samples *t*-test revealed that the ratings did not differ significantly from one another for either the naturally cycling group, $t(19) = 0.30$, $p = .768$, or the HC group, $t(31) = -0.37$, $p = .714$ (see Table 1). Therefore, partner mate value ratings for high and low fertile points were collapsed into one composite score ($M = 5.76$, $SD = 0.85$). The mean partner mate value composite score was also centered ($M = -0.003$, $SD = 0.85$) so that any potential main effects involving MC phase would be estimated at the mean levels of partner ratings (Larson et al., 2013). Following previous research (e.g., Larson et al., 2013; Larson et al., 2012), relationship length was entered into each repeated measures model as a covariate, to statistically control for its potential influence on the variables of interest.

Results

Initial Data Inspection

The EXPLORE program on SPSS was used to examine evidence of skewness and kurtosis across each measure. All of the distributions for the measures produced skewness and kurtosis values below 3 and 10 respectively, suggesting that problematic deviations from

normality were not present (Kline, 2011). The presence of univariate outliers was also examined, with scores that were three standard deviations above or below the mean being treated as outlying values (Tabachnick & Fidell, 2007). Across the entire sample, twelve univariate outliers were found and they were each brought to the next highest or lowest mean value for their respective scales in order to retain as much data as possible and increase statistical power (Larson et al., 2012). This resulted in there being no significant outlying values in the present study.

Descriptive Statistics

The self-reported MC information, such as cycle length, the length of menses, cycle regularity, and length of the menstrual phase, for the participants can be found in Table 1. This information has been separated according to whether the participants were currently using HCs or not (i.e., naturally cycling). The mean for the self-reported length of the menstrual phase fell within previously reported average ranges of similarly aged women (3–6 days; Harlow, 2000). Furthermore, as part of the RCD procedure, all women were asked to provide the actual start date of their next period via e-mail. Forty-four participants (85%) complied with this request, while eight participants did not (15%). For the women who did not indicate the actual onset of their upcoming period, values for the self-reported predicted onset of next menses (provided in the screening questionnaire) were used. Using this information, the length of time (in days) from the periovulatory and luteal testing sessions to the onset of next menses was calculated (see Table 1). The average number of days until the next onset of menses corresponded to predicted periovulatory and mid to late luteal phases of the MC. These means were also consistent with previous work examining ovulatory shifts (e.g., Larson et al., 2013).

A series of one way ANOVAs were carried out in order to examine for the presence of any significant group differences according to current HC status (naturally cycling and using HCs) concerning length of the MC and menstrual phase, as well as the time (in days) between the periovulatory and luteal testing sessions to the next onset of menses. The number of days from the high fertile session to the onset of next menses, $F(1, 50) = 8.36$, $p = .006$, as well as the number of days between the completion of the high and low fertile testing sessions, $F(1, 50) = 24.07$, $p = .000$, violated Levene's (1960) test of homogeneity of variance. Therefore, results for variances not assumed to be equal (i.e., assuming heterogeneity of variance) were interpreted for these two variables. The difference concerning the length of the MC between naturally cycling women ($M = 28.15$, $SD = 3.33$) and those using HC ($M = 26.31$, $SD = 2.76$) was found to be significant, $F(1, 50) = 4.64$, $p = .036$. Differences according to HC status concerning the length of the menstrual phase, the time between the periovulatory and luteal testing sessions to the onset of the next period, as well as the amount of time in between the high and low fertile testing sessions were all non-significant.

Chi-squared tests of group equivalence were also carried out to examine potential group differences according to HC status on the self-reported predictability of women's periods, as well as their confidence in their self-reported MC length and the onset of their next period. It was found that the groups differed significantly in terms of the predictability of their periods, $\chi^2 (3, N = 52) = 17.76$, $p = .000$, as well as their confidence in their length of their MCs, $\chi^2 (6, N = 52) = 15.27$, $p = .018$. As displayed in Table 1, it is evident that women currently using HCs rated their periods as significantly more predictable than naturally cycling women. Women using HCs also appeared to be significantly more confident in the length of their MCs in comparison to naturally cycling women (see Table 1).

Table 1

Menstrual cycle information

	Naturally Cycling (*n* = 20)		HC Group (*n* = 32)	
	M	*SD*	*M*	*SD*
Length of menstrual cycle (days)	28.15*	3.33	26.31*	2.76
Length of menstrual phase (days)	6.00	1.21	5.69	1.47
Periovulatory survey to menses (days)	15.65	1.53	16.78	3.30
Luteal survey to menses (days)	7.60	3.71	5.84	2.63
Time between Survey A and B (days)	16.15	8.66	13.66	2.95
	Frequency	Percent	Frequency	Percent
Predictability of period				
Very unpredictable	1	5	0	0
Somewhat unpredictable	5	25	0	0
Somewhat predictable	9	45	7	22
Very predictable	5	25	25	78
Confidence in MC length				
Very confident	2	10	14	43.8
Pretty confident	8	40	10	31.3
Confident	2	10	6	18.8
Moderately confident	2	10	2	6.3
Somewhat confident	3	15	0	0
Unsure	1	5	0	0
Confidence in predicted onset of menses				

Very confident	2	10	11	34.4
Pretty confident	8	40	11	34.4
Confident	2	10	4	12.5
Moderately confident	3	15	5	15.6
Somewhat confident	2	10	1	3.1

Note. Results from one way ANCOVA significant at *$p < .05$.

Descriptive statistics for each scale (for both of the MC phase testing sessions) during the predicted periovulatory and luteal phases can be found in Table 2. Measures of central tendency have been divided according to HC status. A series of paired samples *t*-tests were also carried out to detect any significant differences in scores across measures between the periovulatory to the luteal phase within both naturally cycling women ($n = 20$) and those currently using HC ($n = 32$) (see Table 2). None of the *t*-test results were statistically significant. A series of independent samples *t*-tests were also conducted to examine any group differences between naturally cycling women and those currently using HCs across variables. For the periovulatory phase, none of the variables violated Levene's test for equality of variances, suggesting that heterogeneity of variance was not a concern (Levene, 1960). Significant differences were found concerning the SSLS, $t(50) = -2.47$, $p < .05$, and self-perceived mate value, $t(50) = -2.13$, $p < .05$, with women using HC reporting greater satisfaction with their sex lives and perceiving themselves to be more desirable in comparison to naturally cycling women. For the luteal phase, partner's financial prospects violated Levene's test for equality of variances; therefore, results for variances not assumed to be equal were interpreted. Only self-perceived mate value differed significantly, $t(50) = -2.45$, $p < .05$, with women using HCs reporting higher scores on this variable (see Table 2 for means).

Table 2

Descriptive statistics for all measures for the periovulatory and luteal testing sessions

	Naturally Cycling (*N* = 20)					HC Group (*N* = 32)				
	Periovulatory		Luteal			Periovulatory		Luteal		
	M	*SD*	*M*	*SD*	*t*	*M*	*SD*	*M*	*SD*	*t*
IOS	4.85	1.57	4.60	1.85	1.05	5.22	1.74	5.28	1.44	-0.23
CSI	3.93	1.12	3.68	1.08	1.28	4.13	1.14	4.00	0.97	0.72
Extra-Pair Att.	3.73	1.54	3.24	1.62	1.63	3.24	1.68	2.88	1.61	1.55
Investment	5.59	1.15	5.57	1.22	0.10	5.55	1.33	5.84	1.34	-1.51
Commitment	7.21	1.02	7.24	1.00	-0.28	7.41	0.86	7.33	0.94	0.71
SSLS	5.26	1.66	5.41	1.68	-0.54	6.24	1.15	6.06	1.36	0.73
MV Self	4.75	1.10	4.51	1.23	1.38	5.31	0.79	5.25	0.94	0.33
MV Partner	5.56	0.76	5.51	0.96	0.30	5.87	0.90	5.92	1.04	-0.37
ATRIS	4.73	0.56	4.75	0.62	-0.22	4.81	0.51	4.79	0.47	0.30
Relat. Skills	4.56	0.42	4.58	0.49	-0.14	4.58	0.48	4.57	0.54	0.12
Financial	3.98	1.02	4.08	1.07	-0.85	4.42	0.67	4.42	0.66	0.00

Note. IOS = Inclusion of Other in Self Scale; CSI = Couples Satisfaction Index; Extra-Pair Att. = Extra-Pair Attraction; Investment = Investment Size subscale; Commitment = Commitment Level subscale; SSLS = Satisfaction with Sex Life Scale; MV = mate value; ATRIS = Attitudes toward Relationship Infidelity Scale; Relat. Skills = Relationship Skills subscale; Financial = Financial Prospects subscale. HC = hormonal contraception. None of the Paired samples *t*-tests were significant for the Naturally Cycling and HC groups. One participant in the Naturally Cycling subsample did not complete the SSLS.

The descriptive statistics were further separated among the participants not currently using HCs regarding whether they found a positive ovulation test result or not during the predicted periovulatory phase (see Table 3). A series of independent samples *t*-tests were carried out in order to examine if the groups differed significantly on any of the variables measured (see Table 3). None of the results of the *t*-tests were found to be significant.

Table 3

Descriptive statistics during the periovulatory phase divided by ovulation test result

Naturally Cycling group (n = 20)					
Periovulatory Testing Phase					
	Positive Test Result (n = 6)		Negative Test Result (n = 14)		
	M	*SD*	*M*	*SD*	*t*
IOS	4.50	1.38	5.00	1.66	0.65
CSI	3.46	1.26	4.13	1.05	1.14
Extra-Pair Att.	4.70	1.50	3.31	1.41	-1.98
Investment	5.17	1.36	5.77	1.05	1.08
Commitment	6.93	1.32	7.33	0.89	0.79
SSLS	4.77	2.01	5.49	1.51	0.88
MV Self	4.58	1.45	4.82	0.97	0.43
MV Partner	5.33	1.09	5.66	0.60	0.87
ATRIS	4.37	0.69	4.88	0.43	2.06
Relat. Skills	4.67	0.30	4.52	0.46	-0.72
Financial	4.00	1.22	3.96	0.97	-0.07

Pearson product-moment correlations were carried out between each variable for the periovulatory and luteal testing sessions, in order to examine test-retest reliability. These results have been separated by HC status and can be found in Table 4. Most positive correlations between measures were significant, ranging from $r(18) = .40$ to .91 for the participants not currently using HCs. Similarly, most positive correlations between measures for participants on HC were significant, ranging from $r(30) = .34$ to .88.

Table 4

Test-retest reliabilities for all measures divided by hormonal contraceptive status

	Naturally Cycling		HC Group	
	N	*r*	*N*	*r*
IOS	20	.82**	32	.53**
CSI	20	.69**	32	.56**
Extra-Pair Att.	20	.64**	32	.66**
Investment	20	.72**	32	.66**
Commitment	20	.84**	32	.75**
SSLS	19	.75**	32	.42*
MV Self	20	.79**	32	.34
MV Partner	20	.65**	32	.64**
ATRIS	20	.77**	32	.74**
Relation. Skills	20	.62**	32	.74**
Financial	20	.87**	32	.78**

Note. Pearson product-moment correlations significant at *$p < .05$ and **$p < .01$, two-tailed.

Hypothesis 1. Several one-way repeated measures ANCOVAs were carried out to assess the first hypothesis, that partner mate value would significantly moderate MC phase-contingent changes in women's feelings about their romantic relationships (see Table 5). Specifically, based on previous findings (e.g., Larson et al., 2013), it was hypothesized that women in the predicted periovulatory phase of the MC with relatively lower mate value partners would report lower levels of self–other overlap, relationship satisfaction, sexual satisfaction, and more positive attitudes toward infidelity, whereas women with higher mate value partners would report greater

levels of interpersonal closeness, relational and sexual satisfaction, and more negative attitudes toward infidelity. Moreover, it was hypothesized that extra-pair attraction would increase during the periovulatory testing phase in comparison to the mid to late luteal phase, but only among women partnered with relatively low mate value men (see Table 2 for means and standard deviations of variables of interest). Shifts across the MC regarding romantic relationship dynamics are argued to be driven by short-term partner quality (e.g., mate value), thus, they should be absent regarding women's perceptions of traits denoting long-term partner quality, such as those linked to relationship skills (e.g., kindness) and financial prospects (e.g., ambition). The same analyses were also run on a group of women currently using HCs, wherein changes regarding romantic relationship dynamics (e.g., relationship satisfaction) should be absent. Importantly, the result of the ovulation test (positive or negative) was removed as a covariate from analyses on women currently using HCs.

Interpersonal closeness. Error variance associated with interpersonal closeness was not significantly different between the periovulatory and luteal testing phases (i.e., Levene's test of equality of variances was non-significant; Levene, 1960). No main effect of MC phase on interpersonal closeness was found, $F(1, 15) = 0.33$, $p = .574$, $\eta^2 = .02$. The hypothesized interaction between MC phase and partner mate value also failed to achieve significance, $F(1, 15) = 0.82$, $p = .381$, $\eta^2 = .05$ (observed power = 14%). Furthermore, there were no significant interactions between MC phase and order, $F(1, 15) = 0.05$, $p = .826$, $\eta^2 = .00$, as well as MC phase and the results of the ovulation test, $F(1, 15) = 0.00$, $p = .984$, $\eta^2 = .00$.

Relationship satisfaction. Error variance associated with relationship satisfaction was not significantly different between the periovulatory and luteal testing phases. There was no main effect of MC phase on feelings of relationship satisfaction, $F(1, 15) = 0.85$, $p = .371$, $\eta^2 = .05$,

and the hypothesized interaction between partner mate value and MC phase was non-significant, $F(1, 15) = 0.94$, $p = .347$, $\eta^2 = .06$ (observed power = 15%). Moreover, there were no significant interactions between MC phase and order, $F(1, 14) = 0.07$, $p = .802$, $\eta^2 = .00$, as well as MC phase and the results of the ovulation test, $F(1, 14) = 0.66$, $p = .431$, $\eta^2 = .04$.

Satisfaction with sex life. Error variance associated with satisfaction with sex life was not significantly different between the periovulatory and luteal testing phases. There was no main effect of MC phase on feelings of satisfaction regarding one's sex life, $F(1, 15) = 0.07$, $p = .801$, $\eta^2 = .00$. The hypothesized interaction between MC phase and partner mate value also failed to achieve significance, $F(1, 15) = 0.48$, $p = .501$, $\eta^2 = .03$ (observed power = 10%). Furthermore, there were no significant interactions between MC phase and order, $F(1, 14) = 1.68$, $p = .216$, $\eta^2 = .11$, as well as MC phase and the results of the ovulation test, $F(1, 14) = 0.08$, $p = .788$, $\eta^2 = .00$.

Extra-pair attraction. Error variance associated with extra-pair attraction was not significantly different between the periovulatory and luteal testing sessions. There was no main effect of MC phase on extra-pair attraction, $F(1, 15) = 2.39$, $p = .143$, $\eta^2 = .14$ (observed power = 31%). The key predicted interaction between MC phase and partner mate value was found to be significant, $F(1, 15) = 7.18$, $p = .017$, $\eta^2 = .32$ (observed power = 71%). As shown in Figure 2, the lower the reported mate value of the participant's male partner, the more appealing they reported their potential relationship alternatives to be during the periovulatory compared to the luteal phase. There were no significant interactions between MC phase and order, $F(1, 15) = 1.92$, $p = .186$, $\eta^2 = .11$, as well as MC phase and the results of the ovulation test, $F(1, 15) = 0.00$, $p = .955$, $\eta^2 = .00$.

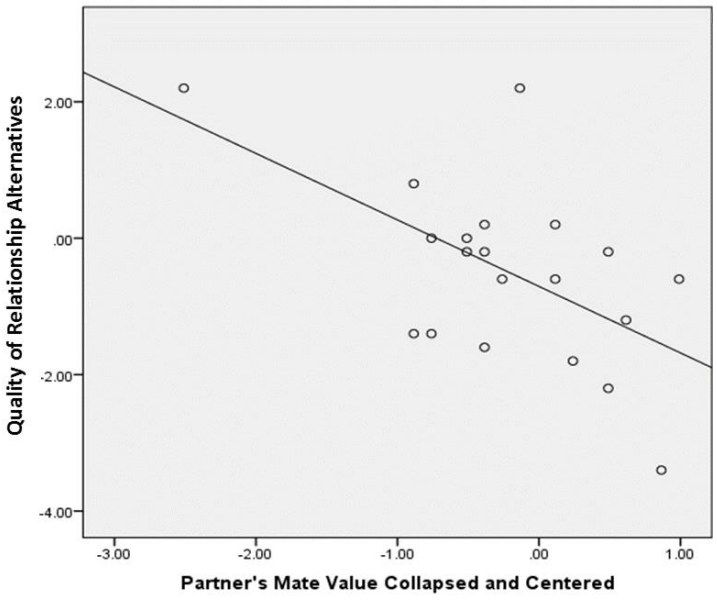

Figure 2. The scatter plot represents the relationship between changes in ratings of extra-pair attraction between the periovulatory and the luteal testing phases as a function of the male partner's mate value. Points represent mean scale score differences.

Follow-up analyses revealed that when ratings of partner's mate value were one standard deviation above the mean (recentered), women's reports of extra-pair attraction did not differ significantly between the periovulatory and luteal phases of the MC, $F(1, 15) = 0.06$, $p = .817$, $\eta^2 = .00$. However, when partner ratings were one standard deviation below the mean (recentered), women reported significantly greater extra-pair attraction during the periovulatory as opposed to the luteal phase, $F(1, 15) = 9.49$, $p = .008$, $\eta^2 = .39$ (observed power = 82%).

Attitudes toward infidelity. Error variance associated with extra-pair attraction was not significantly different between the periovulatory and luteal testing phases. No main effect of MC phase on attitudes toward infidelity between the periovulatory and luteal testing phases was found, $F(1, 15) = 0.13$, $p = .726$, $\eta^2 = .01$. Furthermore, no significant interactions were found for MC phase on partner mate value, $F(1, 15) = 0.39$, $p = .543$, $\eta^2 = .03$, order of testing, $F(1, 15) = 0.49$, $p = .493$, $\eta^2 = .03$, or the results of the ovulation test, $F(1, 15) = 1.43$, $p = .250$ $\eta^2 = .09$.

Relationship Investment. Error variance associated with relationship investment was not significantly different between the periovulatory and luteal testing phases. There was no main effect discovered of MC phase on investment between the periovulatory and luteal phases of the MC, $F(1, 15) = 0.35$, $p = .564$, $\eta^2 = .02$. Furthermore, no significant interactions were found for MC phase on partner's mate value, $F(1, 15) = 0.04$, $p = .836$, $\eta^2 = .00$, order of testing, $F(1, 15) = 0.05$, $p = .825$, $\eta^2 = .00$, or the results of the ovulation test, $F(1, 15) = 1.46$, $p = .245$ $\eta^2 = .09$.

Relationship commitment. Error variance associated with relationship commitment was not significantly different between the periovulatory and luteal testing phases. No main effect of MC phase on commitment between the periovulatory and luteal testing phases was found, $F(1, 15) = 0.20$, $p = .659$, $\eta^2 = .01$. Moreover, no significant interactions were found for MC phase on partner's mate value, $F(1, 15) = 0.21$, $p = .654$, $\eta^2 = .01$, order of testing, $F(1, 15) = 2.09$, $p = .169$, $\eta^2 = .12$, or the results of the ovulation test, $F(1, 15) = 0.50$, $p = .489$ $\eta^2 = .03$

Relationship skills. Error variance associated with relationship skills was not significantly different between the periovulatory and luteal testing sessions. There was no main effect discovered for MC phase on perceptions of relationship skills, $F(1, 15) = 0.57$, $p = .463$, $\eta^2 = .04$. Furthermore, no significant interactions were found for MC Phase on partner's mate value, $F(1, 15) = 0.26$, $p = .615$, $\eta^2 = .02$, order of testing, $F(1, 15) = 1.65$, $p = .218$, $\eta^2 = .10$, or the results of the ovulation test, $F(1, 15) = 0.40$, $p = .536$, $\eta^2 = .03$

Financial prospects. Error variance associated with financial prospects was not significantly different between the periovulatory and luteal testing sessions. No main effect of MC phase on perceptions of financial prospects between the periovulatory and luteal testing phases, $F(1, 15) = 0.07$, $p = .795$, $\eta^2 = .00$. Furthermore, no significant interactions were found

for MC phase on partner mate value, $F(1, 15) = 0.12$, $p = .737$, $\eta^2 = .01$, order of testing, $F(1, 15) = 1.08$, $p = .314$, $\eta^2 = .07$, or the results of the ovulation test, $F(1, 15) = 0.00$, $p = .974$, $\eta^2 = .00$.

Table 5

Repeated measures ANCOVA results for Hypothesis 1

	M (std. error)		Tests of within-subject effects				
DV	Periovulatory	Luteal	Source	df	*F*	partial η^2	*p*
Interpersonal Closeness	4.94 (0.35)	4.67 (0.41)	P	15	0.33	.02	.574
			P x MV	15	0.82	.05	.381
Relationship Satisfaction	3.99 (0.23)	3.72 (0.18)	P	15	0.85	.05	.371
			P x MV	15	0.94	.06	.347
Satisfaction with Sex Life	5.22 (0.29)	5.47 (0.34)	P	14	0.07	.01	.801
			P x MV	14	0.48	.03	.501
Extra-Pair Attraction	3.56 (0.31)	3.18(0.21)	P	15	2.39	.14	.143
			P x MV	15	7.18	.32	.017*
Investment	5.40 (0.21)	5.39 (0.24)	P	15	0.35	.02	.564
			P x MV	15	0.04	.00	.836
Commitment	7.17 (0.22)	7.26 (0.21)	P	15	0.20	.01	.659
			P x MV	15	0.21	.01	.654
Attitudes toward Infidelity	4.69 (0.12)	4.73 (0.11)	P	15	0.13	.01	.726
			P x MV	15	0.39	.03	.250
Relationship Skills	4.52 (0.10)	4.57 (0.12)	P	16	0.78	.05	.389
Financial Prospects	3.94 (0.25)	4.08 (0.27)	P	16	0.04	.00	.836

Note. P = menstrual cycle phase; MV = male partner's mate value centered; *M* = estimated marginal means with partner's mate value centered, relationship length, and the result of the

ovulation test as covariates. Tests of within-subject effects significant at *$p < .05$ two-tailed. Only main effects were examined for traits denoting partner's relationship skills (e.g., kindness) and financial prospects (e.g., ambition).

Analyses for women currently using birth control. A series of one-way repeated measures ANCOVAs were conducted in order to ensure the absence of any MC phase-dependant shifts moderated by male partner's mate value regarding feelings of interpersonal closeness, relationship satisfaction, sexual satisfaction, extra-pair attraction, and attitudes toward infidelity. Furthermore, the absence of a main effect of MC phase on pair bonded women's self-perceived mate value was also examined.

Among women using HCs, no significant main effect of MC phase on interpersonal closeness, $F(1, 28) = 0.51$, $p = .481$, $\eta^2 = .02$, was discovered, and no significant interaction was detected between MC phase and partner's mate value, $F(1, 28) = 0.13$, $p = .717$, $\eta^2 = .01$. Similarly, no significant main effect of MC phase on relationship satisfaction was discovered, $F(1, 28) = 0.26$, $p = .616$, $\eta^2 = .01$. Furthermore, there was no significant interaction between MC phase and partner's mate value, $F(1, 28) = 0.03$, $p = .861$, $\eta^2 = .00$. Moreover, there was no main effect of MC phase on satisfaction with sex life, $F(1, 28) = 0.01$, $p = .908$, $\eta^2 = .00$, and no significant interaction was found between MC phase and partner's mate value, $F(1, 28) = 0.51$, $p = .482$, $\eta^2 = .02$. No main effect of MC phase concerning extra-pair attraction was found; however, the result did approach significance, $F(1, 28) = 3.23$, $p = .083$, $\eta^2 = .11$. The trend indicated that women on HC in the periovulatory phase rated extra-pair opportunities as more desirable than during the luteal phase. No main interaction between MC phase and partner's mate value was found, $F(1, 28) = 0.32$, $p = .578$, $\eta^2 = .01$. Of note, the interaction between MC phase and the order of testing also approached significance, $F(1, 28) = 3.42$, $p = .075$, $\eta^2 = .11$. No main effect of MC phase on attitudes toward relationship infidelity was found, F(1, 28) =

2.17, p = .152, η^2 = .07, and no significant interaction was found between MC phase and partner's mate value, $F(1, 28) = 1.11$, $p = .30$, $\eta^2 = .04$.

Hypothesis 2. A one-way repeated measures ANCOVA was carried out to examine the second hypothesis that ratings of self-perceived mate value would differ significantly between the periovulatory and the luteal phases of the MC, regardless of partner's mate value. A main effect of MC phase on self-perceived mate value was found, $F(1, 16) = 6.85$, $p = .019$, $\eta^2 = .30$ (observed power = 69%), with women in the periovulatory phase (marginal $M = 4.81$, $SD = 0.27$) reporting significantly higher levels of self-perceived mate value in comparison to the luteal phase (marginal $M = 4.62$, $SD = 0.30$) (see Figure 3). Significant interactions were not found between fertility and order of testing, $F(1, 16) = 1.14$, $p = .302$, $\eta^2 = .07$, or between fertility and the ovulation test result, $F(1, 16) = 2.43$, $p = .139$, $\eta^2 = .13$.

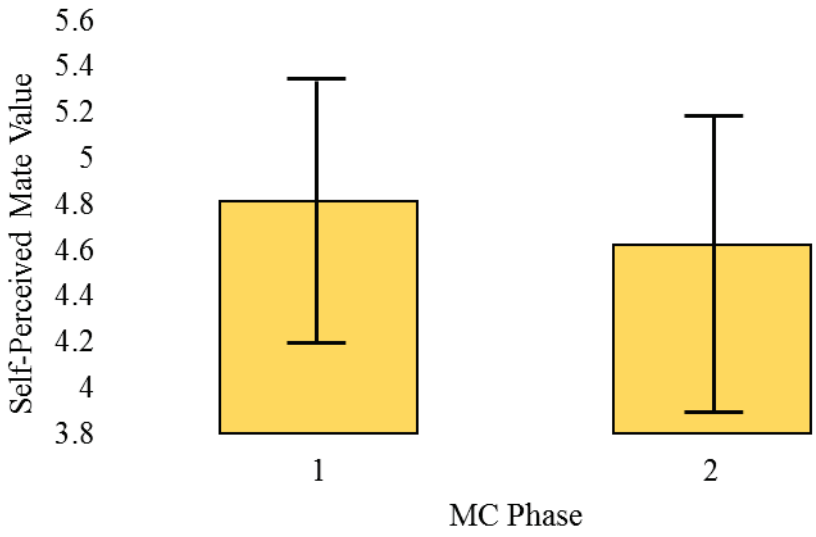

Figure 3. The chart above represents changes in ratings of self-perceived mate value across the phases of the MC (1 = periovulatory phase and 2 = luteal phase). Points represent estimated marginal means controlling for relationship length and order. As displayed in the graph, pair-bonded women's ratings of their self-perceived mate value was significantly higher during the periovulatory phase (marginal $M = 4.81$, $SD = 0.27$) in comparison to the luteal phase (marginal $M = 4.62$, $SD = 0.30$). Whiskers represent upper (Periovulatory phase = 5.38; Luteal phase = 5.26) and lower (Periovulatory phase = 4.24; Luteal phase = 3.99) bounds for the 95% confidence intervals for estimated marginal means.

A final one-way repeated measures ANCOVA was carried out with women currently using HCs concerning their self-perceived mate value. No main effect of MC phase on self-perceived mate value was found, $F(1, 29) = 0.07$, $p = .799$, $\eta^2 = .13$, and no significant interaction between MC phase and testing order, $F(1, 29) = 0.02$, $p = .890$, $\eta^2 = .00$, or MC phase and relationship length, $F(1, 29) = 0.47$, $p = .500$, $\eta^2 = .02$.

Discussion

Several studies have documented systematic shifts in women's evolved mate preferences across the phases of the MC in relation to fertility status (reviewed in Gangestad & Thornhill, 2008; Gildersleeve et al., 2014a). Specifically, guided by the ovulatory shift hypothesis (Gangestad et al., 2005), at peak fertility during the periovulatory phase women have been shown to express an increased attraction to heritable traits putatively associated with genetic fitness in men, such as facial masculinity (DeBruine, et al., 2010; Perrett et al., 2013; Waynforth et al., 2005), vocal masculinity (Feinberg et al., 2006), height (Pawlowski & Jasienska, 2005) and a mesomorphic (i.e., muscular) body type (Little et al., 2007). The vast majority of this research, however, has not examined how MC phase-contingent shifts in evolved preferences may affect long-term romantic relationship dynamics (Larson et al., 2013). Although most women appear to use contraception at some point throughout their reproductive lives, approximately 38% of American teenage girls and women between the ages of 15–44 are not currently using hormonal birth control (Daniels et al., 2014). Therefore, fluctuations in reproductive hormones across the phases of the MC may significantly impact a non-trivial percentage of pair-bonded females in long-term romantic relationships, particularly in cultural circumstances where contraceptive methods for women are not widely available and used (i.e., less economically developed nations). Women may also decide not to use HCs if trying to

conceive a child or perhaps due to concerns associated with the negative side effects associated with HC use (Guendelman, Denny, Mauldon, & Chetkovich, 2000).

The present study found, in partial support of the first hypothesis, a MC phase-contingent shift in extra-pair attraction that depended on naturally cycling women's assessment of their own partner's desirability as a mate to members of the opposite sex (i.e., their mate value; Edlund & Sagarin, 2014). Specifically, women who rated their partners as lower in mate value reported relationship alternatives to be significantly more appealing (i.e., greater extra-pair attraction) during the periovulatory (high fertile), in comparison to the luteal (low fertile) testing phase. In contrast, no significant shift was documented in women who rated their partners as higher in mate value. This finding accords with the dual mating hypothesis (Pillsworth & Haselton, 2006), through which it is argued that ancestral women may have enhanced their reproductive success by experiencing periodic shifts in attraction to potential mates outside of the romantic dyad (i.e., extra-pair attraction) when most likely to conceive, while concurrently maintaining their valued long-term relationships (Larson et al., 2013; Larson et al., 2012). Employing a dual mating strategy may have enabled ancestral women to simultaneously benefit from the provisioning and investment of a romantic partner, while mating opportunistically with a higher mate value male to acquire genetic benefits for prospective offspring (Thornhill & Gangestad, 2008). The present finding is also partly consistent with research documenting a greater level of extra-pair attraction in partnered women (Gangestad et al., 2002; Larson et al., 2012; Pillsworth & Haselton, 2006a), increased fantasizing about men other than one's primary romantic partner (Grammer, Juette, & Fischmann, 1997), as well as more extra-dyadic activities (i.e., infidelity; Baker & Bellis, 2014) during the high, relative to low, fertile phases of the MC

There were, however, no significant shifts in the present study for women's feelings of interpersonal closeness, relationship satisfaction, and the satisfaction of their sex lives with their current mates as a function of their partner's mate value. In contrast, previous work by Larson and colleagues (2013) found significant interactions between fertility status and partner's mate value on self–other overlap and relationship satisfaction, such that women partnered with higher mate value men felt closer to their partners and more satisfied with their relationships at high relative to low fertility. Conversely, the less desirable women rated their partners to be, the less interpersonal closeness they felt toward them. In line with the dual mating hypothesis, a decrease in feelings of satisfaction and intimacy during the periovulatory phase when partnered with a less desirable male, may help to motivate pair-bonded women to seek out alternative higher mate value men (Kenrick et al., 2010; Larson et al., 2013). Although we were unable to replicate these findings in the present study, it is important to state that, in comparison to the study by Larson et al. (2013), we had much lower levels of statistical power to detect the presence of significant interactions between fertility and partner's mate value on romantic relationship variables of interest.

As expected, we failed to discover any significant MC phase-dependent shifts moderated by partner's mate value in feelings of relationship investment and commitment. Remaining invested in and committed to a valued long-term relationship partner is a key component of the dual mating hypothesis (Pillsworth & Haselton, 2006), despite the fact that women may still strategically take advantage of extra-pair opportunities with more genetically fit men when most fertile. However, we failed to find a significant shift in women's attitudes toward relationship infidelity across the phases of the MC. The salient social sanctions surrounding infidelity, as well as the potential reputational costs and physical retaliation that may face the perpetrator (Arnocky,

Sunderani, Gomes, & Vaillancourt, 2015; Wilson & Daly, 1996), likely render this attitude structure less susceptible to the influence of fertility status. However, the self-report measure of attitudes toward infidelity used in the current study (ATRIS; DeWall et al., 2011) taps into participants' explicit, rather than their implicit, attitudes concerning relationship infidelity (example item: "Cheating on my partner is morally wrong"). Future investigations could examine whether implicit, in comparison to explicit, attitudes toward infidelity are more amenable to the impact of fertility across the MC, as a function of partner's mate vale. Attitudes toward relationship infidelity could also be particularly context-dependent, perhaps if experimentally primed with attractive relationship alternatives women may experience an increase in how morally permissible they perceive infidelity to be.

No effect of MC phase, moderated by partner's mate value, on women's perceptions of their partner's long-term mate characteristics associated with relationship skills (e.g., being kind and understanding) and financial prospects (e.g., having ambition and industry) were discovered between the periovulatory and the luteal phases of the MC. Through the ovulatory shift hypothesis (Gangestad et al., 2005), it is predicted that fertility-dependent shifts in women's mate preferences will be restricted to characteristics associated with short-term, rather than long-term, partner quality. This is because women may obtain material benefits throughout the phases of the MC regardless of fertility status; however, it is only possible to obtain genetic benefits at times of peak fertility (Gildersleeve et al., 2014a). Our results support this key tenet of the ovulatory shift hypothesis; however, it is important to state that it is women's attraction to traits associated with long-term partner quality that are predicted to be independent of MC phase and not perceptions of how much men have embodied particular traits associated with romantic partner quality (Gildersleeve et al., 2014a). Nevertheless, it is logical to presume that differential

shifts in attraction regarding particular traits in men would be accompanied by a concomitant change in women's perception of those traits.

As predicted, for women currently using some form of hormonal birth control no significant effects of MC phase, moderated by partner's mate value, were found on levels of interpersonal closeness, relationship satisfaction, sexual satisfaction, and extra-pair attraction. HCs act on the endocrine system to prevent ovulation (i.e., the release of an ovum from an ovary) through the release of synthetic reproductive hormones (e.g., progestins) into the bloodstream (Hel, Stringer, & Mestecky, 2010). The absence of ovulation and the stabilization of reproductive hormones in women currently using HCs should therefore erase any influence of fertility-contingent shifts on women's romantic relationship dynamics. The lack of significant shifts found in the current study are in line with previous work using a similar "control group" (e.g., Röder, 2009) and help to support the tenets of the ovulatory shift hypothesis (Gangestad et al., 2005). It is important to note, however, that several studies have shown the effect of HC use on variables relevant to relationship satisfaction, such as a greater frequency and intensity of jealousy and mate guarding behaviour among users in comparison to non-users (Welling et al., 2012). Unfortunately, in the current investigation we were unable to examine any potential between-subject differences regarding HC status on romantic relationship variables, such as interpersonal closeness and satisfaction, due to our small sample sizes.

In support of the second hypothesis, a main effect of MC phase was discovered among women in regard to their self-perceived desirability as a mate. Specifically, women felt significantly more desirable during the periovulatory phase in comparison to the luteal phase. This result is consistent with previous work (e.g., Haselton & Gangestad, 2006; Röder et al., 2009; Schwarz & Hassebrauck, 2008); however, some studies have failed to support a similar

finding (e.g., Beaulieu, 2007; Cobey et al., 2013). It has been found that women attempt to increase their attractiveness during times of peak fertility (i.e., epigamic display), by wearing more revealing and sexier clothing (Schwarz & Hassebrauck, 2008) and adorning more cosmetic products designed to enhance their appearance (Guéguen, 2012). Women also rate their own attractiveness as significantly more important to their self-concept at high compared to low fertility phases in their MC (Beaulieu, 2007). Furthermore, men may strategically try to lower the mate value of their female partner's with verbal insults as a mate guarding technique when women are most fertile (Gangestad et al., 2002; McKibbin et al., 2007). It is possible that an increase in self-perceived mate value may encourage greater proceptive and/or receptive sexual behaviour, self-efficacy, and/or greater sociability in order to attract members of the opposite sex into an in-pair or extra-pair opportunity (Schwarz & Hassebrauck, 2008). Perhaps then, women's documented increases in sexual desire (Pillsworth, Haselton, & Buss, 2004), arousal (Slob, Bax, Hop, & Rowland, 1996), and behaviour (Bullivant et al., 2004) during the periovulatory relative to the luteal phase, may, in part, be driven by their self-perceived mate value. Future researchers could test this speculation.

Alternatively, however, Beaulieu (2007) has argued that ovulatory shifts should extend to both short-term and long-term mating characteristics. As the potential reproductive cost associated with pregnancy varies according to fertility status across the phase of the MC, women may have evolved "reproductive safeguards" that become activated when fertile to discourage poor mating decisions (i.e., the *ovulatory reproductive safeguards hypothesis*; Beaulieu, 2007). Therefore, women should become "more demanding" in their mate selection when most fertile to avoid becoming pregnant with a male low in both investment and physical attractiveness. In support of this position, Beaulieu and Havens (2015) discovered that women "demanded" more

of potential partners in regard to short-term (e.g., physical attractiveness) and long-term (e.g., relationship skills) qualities across relationship contexts (e.g., single date, steady dating, marriage). These authors asked women to report their minimum preference criteria regarding short-term and long-term mating traits between high and low fertility. In contrast, in the present study we asked participants to self-report to what extent their partners had embodied theoretically important long-term partner qualities over the last 48 hours. Therefore, we were unable to directly test the prediction that ovulatory safeguards become activated at peak fertility, which may influence women's minimum preference for both short-term and long-term qualities (Beaulieu, 2007; Beaulieu & Havens, 2015).

Strengths and Limitations

The current investigation had several notable strengths that have been promoted and encouraged among researchers examining the presence of ovulatory shifts (Gangestad et al., 2016). In heeding these recommendations, a within-subjects design was used on a mixed sample of university and community participants, the RCD method to estimate cycle-phase position, confirmed the presence, or absence, of ovulation during the predicted periovulatory phase using commercial ovulation midstream urine test strips, and recruited a sample of partnered women currently using HC to serve as a "control group" thereby ensuring that fertility-dependent shifts were only occurring in naturally cycling women. Moreover, the vast majority of studies examining predictions made through the ovulatory shift hypothesis (Gangestad et al., 2005) have focused on women's preferences for putative markers associated with genetic quality (e.g., facial masculinity; DeBruine, et al., 2010; Perrett et al., 2013; Waynforth et al., 2005); however, few have investigated how MC phase may implicate romantic relationships (e.g., Larson et al., 2013). Furthermore, in most of these studies single women, in comparison to partnered women, are

overrepresented and the influence of relationship status is statistically controlled for (e.g., Röder et al., 2009) and rarely given serious consideration. Last, few studies have tested for the absence of MC phase-contingent changes in pair-bonded women's perception of long-term partner qualities in their mates (Beaulieu & Havens, 2015). Therefore, the present work represents a meaningful addition to an area of empirical inquiry that has not been studied to a great extent in the past.

Given these strengths, there are some important limitations associated with the present study that need to be addressed. First, the use of a relatively small sample of women not currently using HC (n = 20) to examine the principal hypotheses, significantly reduced the statistical power (i.e., the probability of finding a statistically significant result; Cohen, 1992) of our analyses. Given the lack of power in the present study, it is noteworthy that significant results were still detected in the predicted manner regarding extra-pair attraction (η^2 = .32, observed power = 71%) and self-perceived mate value (η^2 = .30, observed power = 69%), with both results producing large effect sizes (> .26, Cohen, 1988).

Furthermore, although urine test strips were used to confirm the presence of ovulation in naturally cycling partnered women, all participants were included in the final analyses regardless of a positive or negative test result during the periovulatory testing phase. Moreover, there were too few participants who reported a positive test result (30%, n = 6 of 20) to examine its influence as a between-subjects factor in the repeated measures models (Tabachnick, & Fidell, 2007); however, the results of the urine tests were treated as a covariate in each model and failed to significantly interact with any of the other variables of interest. Nonetheless, it is evident from the descriptive statistics separated by urine test result (Table 3), that there were meaningful mean differences for several variables between women reporting a positive and those reporting a

negative ovulation test result, which may be due, in part, to the result of the test. In general, women confirming ovulation were less satisfied in their relationships and viewed alternative relationship prospects as more appealing during the periovulatory phase in comparison to the luteal phase. Therefore, it is very possible that with a larger sample of women confirming the presence of ovulation, that the effect of fertility on feelings of interpersonal closeness and relationship satisfaction may have been significantly moderated by partner's mate value, similar to the findings by Larson and colleagues (2013).

Despite including women who failed to ovulate, denoting the lack of an LH surge prior to the release of a matured ovum from the ovary, in the current sample, research to date suggests that several interrelated hormonal mechanisms that vary across the phases of the MC may work in concert to guide women's reproductive decisions in an adaptive manner. For instance, estradiol levels, which peak during the periovulatory phase and rise slightly in the luteal phase, have been positively associated with a preference for more masculine male faces (Roney & Simmons, 2008). And levels of FSH, which rise during the follicular phase (Carlson, 1991), have been positively associated with a preference for dominance and short-term sexual partners (Lukaszewski & Roney, 2009). Moreover, oxytocin, a key neuropeptide of sexual and affiliative behaviour (Campbell, 2008), may fluctuate across the phases of the MC, peaking during the periovulatory phase and showing a trough in the luteal phase (Salonia et al., 2005). Dopaminergic pathways associated with reward, as well as romantic love, are rich with oxytocin and vasopressin receptors and become activated when viewing pictures of one's relationship partner (Bartels & Zeki, 2004; Fisher, Aron, & Brown, 2006). Additionally, the steroid testosterone, which has been strongly associated with mating effort (Archer, 2006), has been shown to increase mid-cycle and to remain elevated until the mid luteal phase (Rothman et al.,

2011). Therefore, it may be possible that changes in, or interactions between, varying hormones and neurohormones are collectively responsible for MC phase shifts in women's perceptions of themselves, their romantic relationships, and the appeal of alternatives extra-pair mates (Larson et al., 2013).

Another potential shortcoming of the current study relates to the length of the designated "high fertile window" (five days), which was a day shorter than most studies examining ovulatory shifts, with predicted high fertile testing phases typically ranging from six to nine days (Gildersleeve et al., 2014a). Although a six day fertile window has been encouraged among some researchers (e.g., Wood et al., 2014), simulation work by Gangestad and colleagues (2016) demonstrated that longer designated fertile windows (e.g., 8–9 days in length) tend to outperform shorter windows (6–7 days), as longer windows are more likely to contain the day of ovulation. Moreover, it had been recommended by researchers in the ovulatory shift literature (e.g., Gidlersleeve et al., 2014a) to treat fertility status as a continuous variable, as opposed to a dichotomous, variable. Researchers examining fertility as continuous make use of conception likelihood estimates (Wilcox et al., 2000); however, because of the small number of participants detecting the presence of ovulation (n = 6 out of 20) we did not feel that it was appropriate to assign participants conception likelihood estimates in the present study.

Conclusion

Evidence to date favours the argument that naturally cycling women express evolved mating preferences that fluctuate systematically across the phases of the MC in relation to fertility status, the ultimate evolutionary function of which is to enhance their reproductive success (Gildersleeve et al., 2014a; Haselton & Gildersleeve, 2011; Thornhill & Gangestad, 2008). These hormonally-mediated shifts may allow women to jointly benefit from the

provisioning of a high investing partner while simultaneously reaping genetic benefits from a male with high mate value, which could be the primary relationship partner or someone external to the romantic dyad. Therefore, ovulatory shifts may meaningfully impact women's long-term romantic relationships in potentially positive or negative ways, varying primarily as a function of one's partner's mate value. Previous research has shown that naturally cycling women partnered with relatively less attractive men experience a decrease in in-pair attraction to their primary partner and an increase in extra-pair attraction to those outside of the romantic dyad when they are most likely to conceive (Larson et al., 2012). Moreover, women with relatively less attractive male partners appear to experience less interpersonal closeness and less relationship satisfaction during the periovulatory phase at peak fertility in comparison to low fertile points in the MC (e.g., the luteal phase; Larson et al., 2013).

In the present investigation, a MC phase-contingent shift in pair-bonded women's extra-pair attraction was found, but only when they were partnered with men who were lower mate value. This relationship held true regardless of the order in which participants had completed their testing sessions (i.e., low fertile or high fertile first), the length of their relationships, as well as whether they reported a positive or negative ovulation test result during the periovulatory phase. Significant cycle shifts in feelings of interpersonal closeness, relational satisfaction, and sexual satisfaction with one's current relationship partner, however, were not discovered. Although self–other overlap and relationship satisfaction have been shown to shift between low and high MC phases in previous research, both producing downward trends (i.e., a decrease) during times of peak fertility (e.g., Larson et al., 2013); the findings of the current investigation, nonetheless, accord with the tenets of the ovulatory shift hypothesis. Specifically, our results indicate that partnered women displayed no indicators of dissatisfaction with their current

partners driven by MC phase position; however, they did display an enhanced proclivity to entertain alternative relationship options external to the dyad when partnered with a lower mate value male when most likely to conceive. This shift could arguably facilitate potentially committing infidelity on one's romantic partner in order to acquire relatively greater genetic benefits, while simultaneously ensuring that one's current romantic relationship is secure (Gildersleeve et al., 2014a).

Moreover, a main effect of MC phase on women's self-perceived mate value was discovered. This relationship also held true regardless of testing session order, relationship length, and the results of the ovulation urine tests. Although there are mixed findings in the literature regarding this relationship (e.g., Cobey et al., 2013; Hill & Durante, 2009; Röder, 2009), research has documented increases in sexual desire (Pillsworth et al., 2004), arousal (Lob et al., 1996), fantasizing (Dawson, Suschinsky, & Lalumière, 2012), and sexual behaviour (Bullivant et al., 2004) when women are more fertile across the phases of the MC. Women are also perceived as significantly more attractive by men during the periovulatory phase, in comparison to less fertile phases, of the MC (see Haselton & Gildersleeve, 2014a for review). It is then logical to presume that changes in self-perceived attractiveness could also accompany these shifts during peak fertility, functioning to encourage greater proceptive and receptive sexual behaviour among partnered women. Despite the fact that our results support this argument, future research is sorely needed to address the relationship between women's self-perceptions in relation to fertility status and MC phase position, as well as how HC use may impact these perceptions (e.g., Cobey et al., 2013).

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Appendix A

Institutional Research Ethics Board Approval

Lakehead UNIVERSITY

Research Ethics Board
t: (807) 343-8283
research@lakeheadu.ca

March 10, 2016

Principal Investigator: Dr. Mirella Stroink
Student Investigator: Adam Davis
Health and Behavioural Sciences\Psychology
Lakehead University
955 Oliver Road
Thunder Bay, ON P7B 5E1

Dear Dr. Stroink and Mr. Davis:

Re: REB Project #: 129 15-16 / Romeo File No: 1465035
Granting Agency: N/A
Granting Agency Project #: N/A

On behalf of the Research Ethics Board, I am pleased to grant ethical approval to your research project titled, "Ovulatory Shifts and Feelings of Interpersonal Closeness, Commitment, and Relationship Satisfaction across the Menstrual Cycle".

Ethics approval is valid until March 10, 2017. Please submit a Request for Renewal to the Office of Research Services via the Romeo Research Portal by February 10, 2017 if your research involving human participants will continue for longer than one year. A Final Report must be submitted promptly upon completion of the project. Access the Romeo Research Portal by logging into myInfo at:

https://erpwp2.lakeheadu.ca/

During the course of the study, any modifications to the protocol or forms must not be initiated without prior written approval from the REB. You must promptly notify the REB of any adverse events that may occur.

Best wishes for a successful research project.

Sincerely,

Dr. Lori Chambers
Chair, Research Ethics Board

/scw

Appendix B

Screening Questionnaire

1. Sex (please select one):

□ Male
□ Female
□ Other

2. Age: _____.

3. Sexual orientation (please select the one that you identify with best):

- □ Exclusively heterosexual
- □ Predominantly heterosexual, only incidentally homosexual
- □ Predominantly heterosexual, but more than incidentally homosexual
- □ Equally heterosexual and homosexual
- □ Predominantly homosexual, but more than incidentally heterosexual
- □ Predominantly homosexual, only incidentally heterosexual
- □ Exclusively homosexual

Note: The following questions relate to your relationship with your current partner.

4. Please select the option that best describes your current relationship:

□ Casually dating
□ Long-term relationship
□ Common law
□ Engaged
□ Married

5. Approximately how long have you and your partner been in your relationship together (in years/months)?

Years: _____ Months: _____.

6. Is your current relationship primarily:

□ Monogamous (relationship comprised of one woman and one man)
□ Polyandrous (relationship comprised of one women and several men)
□ Polygynous (relationship comprised of one man and several women)

7. Have you had sexual intercourse before?

□ Yes
□ No

8. Have you engaged in sexual intercourse with your current partner?

□ Yes
□ No

9. Are you currently living with your current relationship partner in the same place of residence (i.e., cohabiting)?

□ Yes
□ No

10. Do you have any children with your current partner? If so how many (select 0 if you do not have any children with your current partner):

□ 0
□ 1
□ 2
□ 3
□ 4
□ 5+

11. Do you have any children that are not biologically related to your current partner?

□ Yes
□ No

12. Are you currently pregnant?

□ Yes
□ No
□ Unsure

13. Are you currently breastfeeding?

□ Yes
□ No

14. Are you currently lactating?

□ Yes
□ No

15. Are you menopausal?

□ Yes
□ No

Note: The following questions relate to your medical history and medication usage.

16. Have you **ever** taken any form of hormonal contraceptive (e.g., contraceptive pill, patch, or ring, IUD, Depo-Provera)? **If yes**, how many years and months has it been since you last took hormonal contraceptives?

□ Yes
□ No

17. If yes, approximately how long has it been since you last took a hormonal contraceptive (please select the option that best applies to you)?

☐ Between 1 and 3 months ago
☐ Between 4 to 8 months ago
☐ Between 8 to 12 months ago
☐ More than a year ago
☐ I am currently taking a hormonal contraceptive
☐ I have never taken a hormonal contraceptive before

18. Please list any medication(s) that you are currently taking:
_____
_____
_____.

□ Not applicable

19. Please list any medical or psychological condition(s) that you are currently diagnosed with:
_____
_____
_____.

□ Not applicable

Note: The following questions relate to your menstrual cycle activity.

20. What is the typical average length (in days) of your menstrual cycle (i.e., how many days are there between the first day of one period to the first day of the next period)—most cycles are between 24 to 35 days:
Days: _____

21. Using the scale below, please select your level of confidence in your reported menstrual cycle length:

____1. Not at all confident
____2. Not confident
____3. Unsure
____4. Somewhat unsure
____5. Somewhat confident
____6. Moderately confident
____7. Confident
____8. Pretty confident
____9. Very confident

22. Please select the statement that best describes your menstrual cycle right now:

a) I never have my period.
b) My period is **very unpredictable**. Sometimes very few days pass before I get my next period, sometimes months pass before I get my next period.
c) My period is **somewhat unpredictable**. I usually get my period within 4 to 7 days of when I expect it.
d) My period is **somewhat predictable**. I usually get my period within 2 or 3 days of when I expect it.
e) My period is **very predictable**. I can predict within 1 day when my next period will start.

Section 2

Note. The next few questions ask about the dates of your last period and your next upcoming period. Please use the calendars provided to help you remember/predict you menstrual cycle.

SEPTEMBER						
S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

OCTOBER						
S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

NOVEMBER						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

DECEMBER						
S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

JANUARY						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

FEBRUARY						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

MARCH						
S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

APRIL						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

MAY						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

JUNE						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

JULY						
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

AUGUST						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

1. When did your last period start? Month: _____ Day: _____.

2 When did your last period end? Month: _____ Day: _____

3. When do you expect your next period to begin? Month: _____ Day: _____.

4. How confident are you that your period will begin on that day?

____1. Not at all confident
____2. Not confident
____3. Unsure
____4. Somewhat unsure
____5. Somewhat confident
____6. Moderately confident
____7. Confident
____8. Pretty confident
____9. Very confident

In order to confirm whether you are eligible or not to participate in the present study, we will need to contact you by e-mail. Your e-mail will also be used to identify you as a participant throughout the study. This information will remain confidential and will only be viewed by members of the research team. All personally identifying information will also be deleted once the study is complete.

1. E-mail address: _____.

Appendix C

Ovulation Test Kit Instructions **High-Fertility** Testing [LU logo] for Naturally Cycling Women

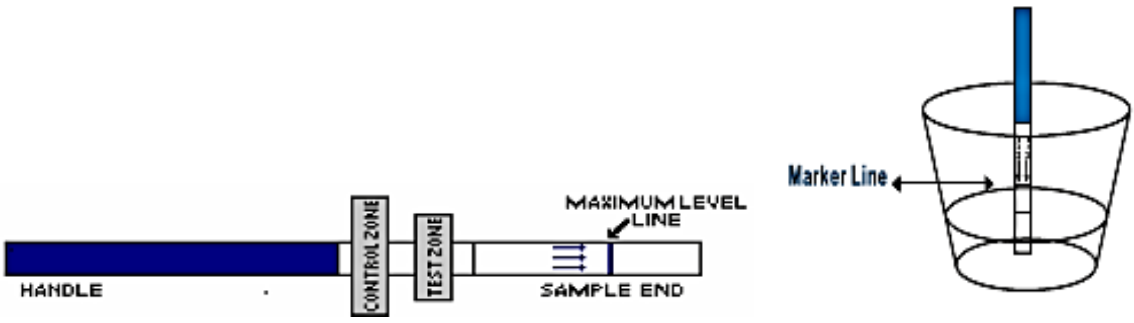
Please begin using the urine tests from: _____.

Please Follow these Instructions:

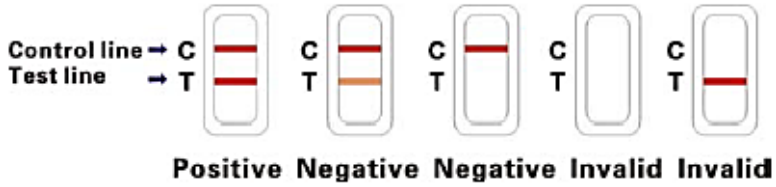
- Testing should take place between **2:00pm to 8:00pm**.
- Please try to test at roughly the **same time each day**.
- You will be asked to do **one test a day for five days straight** OR until you find a **positive test result**.
- Please try to **limit drinking** any fluids about two hours prior to your urine test. Liquids will dilute your urine and the test may not perform properly.
- Please do **NOT** open the sealed pouch containing the test sticks until you are ready to test.
- If you run out of test strips, please contact Adam Davis using the information below.

Testing

1. Collect a sample of your urine in one of the clean and dry plastic cups provided to you.
2. Remove the test strip from the sealed pouch.
3. Immerse the strip into the urine with the arrow pointing **towards** the urine.
    a. Important: Do not submerge the test strip passed the **MAX** marker line, otherwise the test will not be performed properly.
4. Take the strip out after about 3 seconds and lay the strip down flat on a clean, dry, non-absorbent surface (e.g., the mouth of the urine container, back into the pack that the test came in).
    a. Do **NOT** place the test onto an absorbent surface such as a tissue.
5. After **5 minutes** you should be able to read the results.
    a. It is important to read after 5 minutes as the results could change if given more time.



How to Read the Results



- For each test that you do, there should be one solid line that appears each time closest to the handle. This is the **control line**. This just ensures that the test is working properly.
- The important line is the **test line**, which will appear just below the control line.
- **Negative result**: If only the control line appears on the test strip, or the test line appears distinctly lighter than the control line, this means that you have a negative result.
- **Positive result**: If two coloured lines are visible, and the test line is equal to or darker than the control line, this means that you have a positive result.
- **Invalid**: If no visible lines appear at all then there is something wrong with the test strip. Please try another test strip. If the second also fails then please get in touch with the student research Adam Davis as soon as possible.

Logging On to Complete the Survey

- **For Lakehead University student on SONA**. Once you either see a **positive result** (i.e., the test line is equal to or darker than the control line) **OR** you have **tested yourself for up to five days**: Please log onto the SONA survey system (https://lupsych.sona-systems.com) to complete the online survey entitled **"The Relationship Satisfaction Study (Survey A)"**
- **For Community Participants on SurveyMonkey**. Once you either see a **positive result** (i.e., the test line is equal to or darker than the control line) **OR** you have **tested yourself for up to five days**: Please log onto and complete the SurveyMonkey survey entitled **"The Relationship Satisfaction Study (Survey A)"** (https://www.surveymonkey.com/r/JF955DQ).

Difficulty in Reading Test Result

If you are having trouble reading your test results, please take a picture of the test strip and e-mail the photo to Adam Davis at the contact information listed below. Please ensure that you take the photo roughly 5 minutes after testing.

If you have any questions or concerns, please get in touch with Adam Davis using the contact information below. Thank you very much for your continued participation.

Adam C. Davis, H.BA.
M.Sc. Psychological Science student
Department of Psychology, Lakehead University
Phone: (807) 633-2844
Email: adavis1@lakeheadu.ca

Ovulation Test Kit Instructions **Low-Fertility** Testing [LU logo] for Naturally Cycling Women

Please use the urine test and complete the SONA (or SurveyMonkey) survey between: _____.

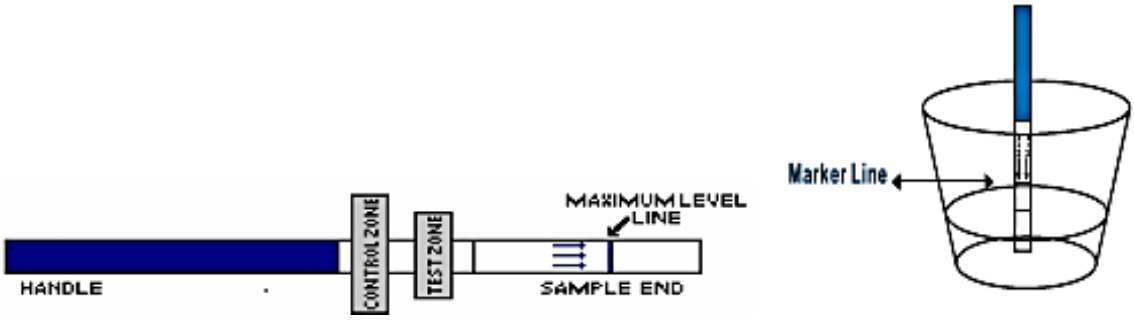
Please Follow these Instructions:

- Testing should take place between **2:00pm to 8:00pm**.
- You will be asked to do **one test** on the stated date at the top of this form.
- Please do **NOT** open the sealed pouch containing the test sticks until you are ready to test.
- Please try to **limit drinking** any fluids about two hours prior to your urine test. Liquids will dilute your urine and the test may not perform properly.
- If you run out of test strips, please contact Adam Davis using the information below.

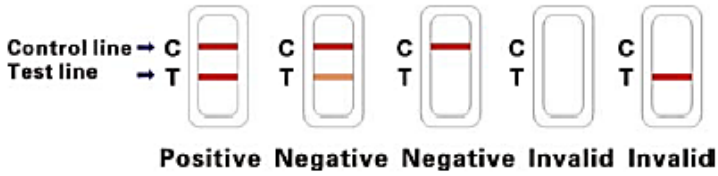
Testing

1. Collect a sample of your urine in one of the clean and dry plastic cups provided to you.
2. Remove the test strip from the sealed pouch.
3. Immerse the strip into the urine with the arrow pointing **towards** the urine.
    b. Important: Do not submerge the test strip passed the **MAX** marker line, otherwise the test will not be performed properly.

4. Take the strip out after about 3 seconds and lay the strip down flat on a clean, dry, non-absorbent surface (e.g., the mouth of the urine container, back into the pack that the test came in).
    c. Do **NOT** place the test onto an absorbent surface such as a tissue.
5. After **5 minutes** you should be able to read the results.
    d. It is important to read after 5 minutes as the results could change if given more time.



How to Read the Results



- For each test that you do, there should be one solid line that appears each time closest to the handle. This is the **control line**. This just ensures that the test is working properly.
- The important line is the **test line**, which will appear just below the control line.
- **Negative result**: If only the control line appears on the test strip, or the test line appears distinctly lighter than the control line, this means that you have a negative result.
- **Positive result**: If two coloured lines are visible, and the test line is equal to or darker than the control line, this means that you have a positive result.
- **Invalid**: If no visible lines appear at all then there is something wrong with the test strip. Please try another test strip. If the second also fails then please get in touch with the student research Adam Davis as soon as possible.

Logging On to Complete the Survey

- **For Lakehead University student on SONA**. Once you have a result from your test, please log onto the SONA survey system (https://lupsych.sona-systems.com) to complete the online survey entitled **"The Relationship Satisfaction Study (Survey B)"**
    - Please remember to contact Adam Davis by e-mail (adavis1@lakeheadu.ca) once you start your next period (i.e., begin menstruating) using the phrase "Relationship Satisfaction Survey B Cycle Phase Information" in the **subject line** and the phrase "I began my period today at [insert approximate time]" in the **e-mail message**. This information will allow us to double-check that your menstrual cycle information that you provided is correct.
- **For Community Participants on SurveyMonkey**. Once you have a result from your test, please log onto and complete the SurveyMonkey survey entitled **"The Relationship Satisfaction Study (Survey B)"** (https://www.surveymonkey.com/r/J3PKK5T).
    - Please remember to contact Adam Davis by e-mail (adavis1@lakeheadu.ca) once you start your next period (i.e., begin menstruating) using the phrase "Relationship Satisfaction Survey B Cycle Phase Information" in the **subject line** and the phrase "I began my period today at [insert approximate time]" in the **e-mail message**. This information will allow us to double-check that your menstrual cycle information that you provided is correct.

If you have any questions or concerns, please get in touch with Adam Davis using the contact information below. Thank you for your continued participation.

Adam C. Davis, H.BA.
M.Sc. Psychological Science student
Department of Psychology, Lakehead University
Phone: (807) 633-2844
Email: adavis1@lakeheadu.ca

Appendix E

Demographic Questionnaire

Instructions: Below are some questions relating to demographic characteristics. These are important variables to take into account because they may influence the other things that we are assessing in the survey like relationship satisfaction.

1. How would you describe your ethnicity (e.g., Canadian, Aboriginal, Chinese, British, Finnish, etc.)?
_____.

2. How would you describe your religious affiliation or system of belief (e.g., Christianity, Islam, Buddhism, Agnosticism, Atheism, etc.)?
_____.

3. What is the highest level of education **your mother** (or caregiver) completed?

□ Some elementary
□ Completed grade 8
□ Some high-school
□ Completed high-school
□ Some college
□ Complete college program
□ Some university
□ Completed a university degree
□ Some graduate studies
□ Completed a graduate degree

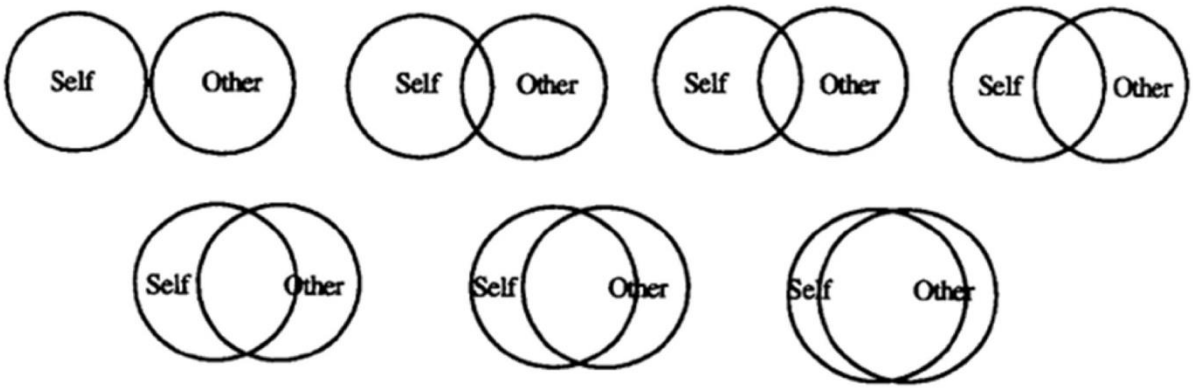
4. What is the highest level of education **your father** (or caregiver) completed?

□ Some elementary
□ Completed grade 8
□ Some high-school
□ Completed high-school
□ Some college
□ Completed college program
□ Some university
□ Completed a university degree
□ Some graduate studies
□ Completed a graduate degree

Appendix F

The Inclusion of Other in Self (IOS) Scale

Instructions: Please circle the picture below which best describes how you have felt about your relationship partner over the last 48 hours.



Appendix G

4-Item Couples Satisfaction Index (CSI)

Instructions: Using the scales below, please indicate how you have felt about your current relationship and relationship partner over the past 48 hours:

1. Please indicate the degree of happiness, all things considered, you have felt over the past 48 hours of your current relationship:

0	1	2	3	4	5	6
Extremely unhappy	Fairly unhappy	A little unhappy	Happy	Very happy	Extremely happy	Perfect

□ Extremely unhappy
□ Fairly unhappy
□ A little unhappy
□ Happy
□ Very happy
□ Extremely happy
□ Perfect

2. Over the past 48 hours, I have felt that I have a warm and comfortable relationship with my partner:

0	1	2	3	4	5
Not true at all	A little true	Somewhat true	Mostly true	Almost completely true	Completely true

□ Not true at all
□ A little true
□ Somewhat true
□ Mostly true
□ Almost completely true
□ Completely true

3. How rewarding has your relationship with your current partner been over the past 48 hours:

0	1	2	3	4	5
Not at all	A little	Somewhat	Mostly	Almost completely	Completely

□ Not at all
□ A little
□ Somewhat
□ Mostly
□ Almost completely
□ Completely

4. In general how satisfied have you been with your current relationship over the past 48 hours:

□ Not at all
□ A little
□ Somewhat
□ Mostly
□ Almost completely
□ Completely

Appendix H

Quality of Relationship Alternatives Scale

Facet Items

Instructions: Using the scale below, please indicate how you have felt about the fulfillment of your alternative relationships (e.g., by another dating partner, friends, and family) over the past 48 hours:

1	2	3	4
Don't agree at all	Agree slightly	Agree moderately	Agree completely

1. My needs to intimacy (e.g., sharing personal thoughts, secrets).
2. My needs for companionship (e.g., enjoying each other's company).
3. My sexual needs (e.g., holding hands, kissing) could be fulfilled in alternative relationships.
4. My needs for security (e.g., feeling trusting, comfortable in a stable relationship) could be fulfilled in alternative relationships.
5. My needs for emotional involvement (e.g., feeling emotionally attached, feeling good when another feels good) could be fulfilled in alternative relationships.

Global Items

Instructions: Using the scale below, please indicate how you have felt about the fulfillment of your alternative relationships (e.g., by another dating partner, friends, and family) over the past 48 hours:

0	1	2	3	4	5	6	7	8
Do not agree at all				Agree somewhat				Agree completely

1. The people other than my partner with whom I might become involved with are very appealing to me.
2. My alternatives to our relationship are close to ideal (e.g., dating another, spending time with friends).
3. If I weren't dating my partner, I would do fine—I would find another appealing person to date.
4. My alternatives are attractive to me (e.g., dating another, spending time with friends)
5. My needs for intimacy and companionship could easily be fulfilled in an alternative relationship.

Appendix I

Investment Size Scale

Facet Items

Instructions: Please indicate how you have felt over the past 48 hours regarding your current relationship using the scale below:

1	2	3	4
Don't agree at all	Agree slightly	Agree moderately	Agree completely

1. I have invested a great deal of time in our relationship.
2. I have told my partner many private things about myself (e.g., I disclose secrets to him)
3. My partner and I have an intellectual life together that would be difficult to replace.
4. My sense of personal identity (i.e., who I am) is linked to my partner and our relationship.
5. My partner and I share many memories.

Global Items

Instructions: Please indicate how you have felt over the past 48 hours regarding your current relationship using the scale below:

0	1	2	3	4	5	6	7	8
Do not agree at all				Agree somewhat				Agree completely

1. I have put a great deal into our relationship that I would lose if the relationship were to end.
2. Many aspects of my life have become linked to my partner (e.g., recreational activities), and I would lose all of this if we were to break up.
3. I feel very involved in our relationship—like I have put a great deal into it.
4. My relationships with friends and family members would be complicated if my partner and I were to break up (i.e., my partner is friends with people I care about).
5. Compared to other people I know, I have invested a great deal in my relationship with my partner.

Appendix J

Commitment Level Scale

Instructions: Please indicate how you have felt over the past 48 hours regarding your current relationship using the scale below:

0	1	2	3	4	5	6	7	8
Do not at all agree				Agree somewhat				Agree completely

1. I want our relationship to last for a very long time.

2. I am committed to maintaining my relationship with my partner.

3. I would not feel very upset if our relationship were to end in the near future. (R)

4. It is likely that I will date someone other than my partner within the next year. (R)

5. I feel very attached to our relationship and very strongly linked to my partner.

6. I want our relationship to last forever.

7. I am oriented toward the long-term future of my relationship (e.g., I imagine being with my partner several years from now).

Appendix K

The Satisfaction with Sex Life Scale

Instructions: Please indicate how you have felt about your sexual relationship with your current partner over the past 48 hours using the scale below:

1	2	3	4	5	6	7
Strongly disagree	Moderately disagree	Slightly disagree	Neutral	Slightly agree	Moderately agree	Strongly agree

1. In most ways my sex life is close to my ideal with my current partner.

2. The conditions of my sex life are excellent with my current partner.

3. I am satisfied with my sex life with my current partner.

4. So far I have gotten the important things I want in my sex life with my current partner.

5. If I could live my sex life over, I would change almost nothing with my current partner.

Appendix L

The Mate Value Scale (MVS) – Self

1. Over the past 48 hours, how would you rate your level of desirability as a partner on the following scale?

____1. Extremely undesirable
____2.
____3.
____4.
____5.
____6.
____7. Extremely desirable

2. Over the past 48 hours, how would members of the opposite sex rate your level of desirability as a partner on the following scale?

____1. Extremely undesirable
____2.
____3.
____4.
____5.
____6.
____7. Extremely desirable

3. Over the past 48 hours, how do you believe you compare to other people in desirability as a partner on the following scale?

____1. Very much lower than average
____2. Lower than average
____3. Slightly lower than average
____4. Average.
____5. Slightly higher than average
____6. Higher than average
____7 Very much higher than average

4. Over the past 48 hours, how good of a catch do you feel you are?

____1. Very bad catch
____2. Bad catch
____3. Somewhat of a bad catch
____4. Average catch
____5. Somewhat of a good catch
____6. Good catch
____7. Very good catch

Appendix M

The Mate Value Scale (MVS) – Partner Assessment

1. Over the past 48 hours, how would you rate your partner's level of desirability as a partner on the following scale?

____1. Extremely undesirable
____2.
____3.
____4.
____5.
____6.
____7. Extremely desirable

2. Over the past 48 hours, how would members of the opposite sex rate your partner's level of desirability as a partner on the following scale?

____1. Extremely undesirable
____2.
____3.
____4.
____5.
____6.
____7. Extremely desirable

3. Over the past 48 hours, how do you believe your partner compares to other people in desirability as a partner on the following scale?

____1. Very much lower than average
____2. Lower than average
____3. Slightly lower than average
____4. Average.
____5. Slightly higher than average
____6. Higher than average
____7 Very much higher than average

4. Over the past 48 hours, how good of a catch do you feel your partner is?

____1. Very bad catch
____2. Bad catch
____3. Somewhat of a bad catch
____4. Average catch
____5. Somewhat of a good catch
____6.Good catch
____7. Very good catch

Appendix N

Attitudes toward Relationship Infidelity Scale

Instructions: Using the scale below, please indicate how you have felt about your current relationship and current relationship partner over the past 48 hours regarding the questions provided:

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly agree

1. Cheating on my partner is morally wrong.

2. If I could get away with it, I would cheat on my partner. (R)

3. Being faithful to my romantic partner is important to me.

4. Cheating on my romantic partner would not be a big deal. (R)

5. I would cheat on my romantic partner if I was given the opportunity. (R)

Appendix O

Perceptions of Mate Quality Scale

Instructions: Provided below are several partner characteristics. Using the scale provided below, please rate the extent to which you feel your partner possessed these characteristics over the past 48 hours:

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly agree

____1. My partner is kind.
____2. My partner is understanding.
____3. My partner has an attractive face.
____4. My partner is loyal.
____5. My partner has an attractive body.
____6. My partner is generous.
____7. My partner is intelligent.
____8. My partner is sexy.
____9. My partner is ambitious.
____10. My partner is dominant.
____11. My partner is assertive (i.e., confident).
____12. My partner is industrious (i.e., hardworking)
____13. My partner is powerful.
____14. My partner is educated.
____15. My partner is cultured.

Relationship Skills subscale: 1, 2, 4, 6
Education subscale: 7, 14, 15
Physical Attractiveness subscale: 3, 5, 8
Good Financial Prospects subscale: 9, 12
Dominance subscale: 10, 11, 13

Appendix P

University Advertising Poster

Lakehead UNIVERSITY

Department of Psychology

The Relationship Satisfaction Study

Who is Eligible?

- Female undergraduate psychology students in heterosexual relationships, between the ages of 17–40.

What will be Required?

- Completion of a screening questionnaire.
- A brief lab meeting.
- Completing an online survey twice and monitoring hormone levels

How will you be Compensated?

- **1.5 bonus points** (0.25 for the screening questionnaire, 0.25 for the lab meeting, and 0.5 per survey) and a chance to win **1 of 10 $10.00 Time**

How do I Participate?

- Visit [insert SONA™ link] for more information and to complete the screening questionnaire.

If you have any questions please contact:

Adam C. Davis
MSc. Psychological Science Student
Department of Psychology, Lakehead University
Email: adavis1@lakeheadu.ca

Appendix Q

Community Advertisement Poster

The Relationship Satisfaction Study

Win a Dinner for Two!

Lakehead UNIVERSITY
Department of Psychology, Faculty of Health and Behavioural Sciences
955 Oliver Road, P7B5E1

Adam C. Davis, H.BA
M.Sc. Psychological Science candidate

Who is Eligible?

- Women in long-term heterosexual relationships (at least 3 months) between the ages of 18–40

What will be Required?

- Completing a screening questionnaire (SQ)
- A 10 minute lab meeting at Lakehead University
- Completing a 25 minute online survey twice and some participants will be asked to perform brief urine tests at home during certain points in the study

How will you be Compensated?

- For completing the study, you will be entered into a raffle to win **1 of 4 $50.00 restaurant gift cards** at a restaurant of your choosing

How do I Participate?

- Visit: https://www.surveymonkey.com/r/WJLRK2Q to complete the SQ or contact Adam C. Davis at adavis1@lakeheadu.ca for further details

Adam C. Davis	Adam C. Davis	Adam C. Davis	Adam C. Davis	Adam C. Davis	Adam C. Davis	Adam C. Davis	Adam C. Davis	Adam C. Davis	Adam C. Davis
Email Adavis1@lakeheadu.ca SQ Survey Link: https://www.surveymonkey.com/r/WJLRK2Q	Email Adavis1@lakeheadu.ca SQ Survey Link: https://www.surveymonkey.com/r/WJLRK2Q	Email Adavis1@lakeheadu.ca SQ Survey Link: https://www.surveymonkey.com/r/WJLRK2Q	Email Adavis1@lakeheadu.ca SQ Survey Link: https://www.surveymonkey.com/r/WJLRK2Q	Email Adavis1@lakeheadu.ca SQ Survey Link: https://www.surveymonkey.com/r/WJLRK2Q	Email Adavis1@lakeheadu.ca SQ Survey Link: https://www.surveymonkey.com/r/WJLRK2Q	Email Adavis1@lakeheadu.ca SQ Survey Link: https://www.surveymonkey.com/r/WJLRK2Q	Email Adavis1@lakeheadu.ca SQ Survey Link: https://www.surveymonkey.com/r/WJLRK2Q	Email Adavis1@lakeheadu.ca SQ Survey Link: https://www.surveymonkey.com/r/WJLRK2Q	Email Adavis1@lakeheadu.ca SQ Survey Link: https://www.surveymonkey.com/r/WJLRK2Q

Appendix R

University Digital Recruitment Message [LU Logo]

Greetings potential participants,

Women in heterosexual relationships between the ages of 18–40 are invited to participate in a study entitled "**The Relationship Satisfaction Study**" being conducted by myself, Adam C. Davis, under the supervision of Dr. Mirella L. Stroink. The Research Ethics Board number for this project is #129.

This study will involve completing an online screening questionnaire to determine if you are eligible to participate. If eligible, there will be a brief lab meeting lasting about 10 minutes. You will then be asked to complete an online survey twice (25 minutes per survey) at two different points on relationship satisfaction, intimacy, and sexual attitudes and behaviours, and some participants will be asked to monitor their hormone levels for roughly six days (taking about 5 minutes each day).

Participants will be eligible to receive a total of **1.5 bonus marks** toward a psychology class of their choosing for completing the entire study. Also, if you complete both surveys you will be entered into a raffle to win **1 of 10 $10.00 Tim Horton's gift cards**.

If you are interested in participating, please follow the link below which will direct you to the SONA™ online survey platform. Here you will be able to find our study at the bottom of the list of available and active research projects. Please select the **"Relationship Satisfaction Study (Screening Questionnaire)"** first.

https://lupsych.sona-systems.com

If you have any questions regarding the current study, please feel free to get in touch with me at the contact information listed below:

Adam C. Davis, H.BA.
M.Sc. Psychological Science candidate
Dep. of Psychology, Lakehead University
Email: adavis1@lakeheadu.ca

Dr. Mirella L. Stroink, Ph.D.
Associate Professor
Dept. of Psychology, Lakehead University
Email: mstroink@lakeheadu.ca

Appendix S

University Facebook and Kijiji Recruitment Message for Community Participants

Are you interested in winning a dinner for two for you and your relationship partner? Researchers within the Department of Psychology are looking to recruit women in heterosexual relationships, who are between the ages of 18–40 to participate in the "**Relationship Satisfaction Study**." Participants will be asked to complete a 15 minute screening questionnaire to determine eligibility, attend a brief 10 minute meeting on the Lakehead University, complete a 25 minute online survey at two different time points, and some participants will be asked to monitor their hormone levels with home urine tests. For completing the entire study, you will be entered into a raffle to win **1 of 4 $50.00 restaurant gift cards** at a restaurant of your choosing. If interested, please visit https://www.surveymonkey.com/r/WJLRK2Q to complete the "**Relationship Satisfaction Study - Screening Questionnaire**" or e-mail Adam C. Davis at adavis1@lakeheadu.ca for further details.

Thank you

Appendix T

University Classroom Presentation Script

Hello my name is Adam Davis, I am a second year M.Sc. In Psychological Science student at Lakehead University. I am conducted a study under the supervision of Dr. Mirella L. Stroink on relationship satisfaction. I am looking for partnered heterosexual women between the ages of 17–40. The study involves completing a screening questionnaire to determine eligibility, a brief lab meeting, completing an online survey at two different time points, and monitoring hormone levels. For each survey that you complete you will be awarded with 0.5 bonus point for a class of your choosing (if eligible), for a total of 1.5 bonus points. Also, once you have completed both surveys you will be entered into a raffle to win 1 of 10 $10.00 Tim Horton's gift cards. If you are interested please contact me at adavis1@lakeheadu.ca.

Appendix U

University (SONA) Screening Questionnaire Cover Letter Screen [LU Logo]

Dear Potential Participant,

My name is Adam C. Davis and I am an M.Sc. Psychological Science student at Lakehead University. I would like to invite you to participate in a study being conducted by myself under the supervision of Dr. Mirella L. Stroink within the Department of Psychology. This study is intended to examine predictors of relationship satisfaction, intimacy, commitment, sexual attitudes and behaviours, self/partner attractiveness and hormones in heterosexual couples. First, to determine eligibility you will be asked to complete a screening questionnaire including some questions regarding demographics, relationship, and medical information, as well as your menstrual cycle activity. The survey should take approximately 15 minutes to complete.

You will be contacted through your Lakehead e-mail to let you know whether you met the eligibility criteria or not for inclusion in the study. If eligible, you will be asked to come onto the Lakehead University campus for a brief meeting where we will provide you with a urine test kit to monitor hormone levels. This will take about five minutes a day for up to six days. We will then ask you to complete a 25 minute online survey at two different time points on relationship satisfaction, intimacy, and sexual attitudes and behaviours. Undergraduate psychology students will be eligible to receive **1.5 bonus points** for completing the study (0.25 for the screening questionnaire, 0.25 for the meeting, and 0.5 for each survey completed). If participants complete the entire study, they will be entered into a raffle to 1 of 10 $10.00 Tim Horton's gift cards.

All data gathered will be securely held on a computer in Dr. Stroink's lab at Lakehead University, and will be stored for at least five years. To ensure confidentiality, only those authorized to view the data will be given permission to do so. You have the right to withdraw and/or decline to respond to any questions throughout the study without penalty. Since your contact information will be needed to keep in touch throughout the study, we cannot ensure anonymity throughout the research. However, once you have completed the study, all identifying information will be stripped from the data that you provide. This research study has been reviewed and approved by the Lakehead University Research Ethics Board. If you have any questions please contact the Research Ethics Board at 807-343-8283 or research@lakeheadu.ca.

Your voluntary participation in this study is greatly appreciated, and if you wish to learn more about this study please use the contact information below—thank you.

Adam C. Davis, HBA
M.Sc. Psych. Science student
Dept. of Psychology,
Lakehead University
Email: adavis1@lakeheadu.ca

Dr. Mirella L. Stroink, PhD
Associate Professor
Dept. of Psychology,
Lakehead University
Email: mstroink@lakeheadu.ca

Gabriela Coccimiglio
HBSc Psychology student
Dept. of Psychology
Lakehead University
Email:ggcoccim@lakeheadu.ca

Appendix V

Community (SurveyMonkey) Screening Questionnaire Cover Letter Screen [LU Logo]

Dear potential participant,

My name is Adam C. Davis and I am an M.Sc. Psychological Science student at Lakehead University. I would like to invite **women between the ages of 18–40, who are currently in a long-term heterosexual relationship** to participate in a study being conducted by myself, under the supervision of Dr. Mirella L. Stroink entitled "**The Relationship Satisfaction Study**." This study is intended to examine predictors of relationship satisfaction, intimacy, commitment, sexual attitudes and behaviour, and hormones in heterosexual couples. First, to determine eligibility you will be asked to complete a screening questionnaire including some questions regarding relationship and medical information, as well as your menstrual cycle activity. The survey should take approximately 15 minutes to complete.

You will be contacted by e-mail to let you know whether you met the eligibility criteria or not for inclusion in the study. If eligible you will be asked to come onto the Lakehead University campus for a brief 10 minute meeting. During this meeting some participants will be provided with a set of instructions and a urine test kit to monitor hormone levels, whereas others will be provided with just a set of instructions. Eligible participants will be asked to complete two 20 minute online surveys at two different time points. Participants who complete both surveys will be entered into a raffle to win **1 of 4 $50.00 gift cards** for a **dinner for two** at a restaurant of your choosing.

All data gathered will be securely held on a computer in Dr. Stroink's lab at Lakehead University for at least five years. To ensure confidentiality, only those authorized to view the data will be given permission to do so. You have the right to withdraw and/or decline to respond to any questions throughout the study without penalty. Since your contact information will be needed to keep in touch throughout the study, we cannot ensure anonymity throughout the research. However, once you have completed the study, all identifying information will be stripped from the data that you provide. This research study has been reviewed and approved by the Lakehead University Research Ethics Board. If you have any questions please contact the Research Ethics Board at 807-343-8283 or research@lakeheadu.ca.

Your voluntary participation in this study is greatly appreciated, and if you wish to learn more about this study please use the contact information below—thank you.

Adam C. Davis, H.BA.
M.Sc. Psychological Science candidate
Dep. of Psychology, Lakehead University
Email: adavis1@lakeheadu.ca

Dr. Mirella L. Stroink, Ph.D.
Associate Professor
Dept. of Psychology, Lakehead University
Email: mstroink@lakeheadu.ca

Appendix W

University (SONA) Screening Questionnaire Screen of Informed Consent [LU Logo]

Through this research, our goal is to explore the associations between relationship satisfaction, intimacy, commitment level, sexual attitudes and behaviours, and hormones. You will be asked to complete a screening questionnaire relating to demographics, relationship, medical, and menstrual cycle activity information. I, Adam C. Davis, am conducting this research under the supervision of Dr. Mirella L. Stroink within the Department of Psychology.

Upon completion of the screening questionnaire you will be contacted through your Lakehead e-mail to indicate whether you met the eligibility criteria to complete the rest of the study. If eligible, you will be asked to schedule a prospective lab session to complete the next two parts of the study.

By clicking next I am indicating that:

1. I have willingly volunteered to participate in this research study.
2. I have the right to withdraw at any point without penalty.
3. I have the right to decline to answer any question(s) throughout the study.
4. I will not be at any risk of physical harm.
5. I may be exposed to a minimal risk of psychological harm.
6. The information that I provide will remain confidential and will be stored at University for a period of 5 years.
7. I have the right to inquire about further details pertaining to the research in question.
8. I have the right to earn 0.25 of a bonus point toward an eligible a psychology class of my choosing.
9. I understand that once study is complete, all identifying information will be stripped from the responses that I provide.

By clicking the “next” button I am indicating that I have fully read and understand the information, and that I wish to participate in this research study.

Appendix X

Community (SurveyMonkey) Screening Questionnaire Screen of Informed Consent [LU Logo]

Through this research, our goal is to explore the associations between relationship satisfaction, intimacy, commitment level, sexual attitudes and behaviours, and hormones. You will be asked to complete a screening questionnaire relating to demographics, relationship, medical, and menstrual cycle activity information. I, Adam C. Davis, am conducting this research under the supervision of Dr. Mirella L. Stroink within the Department of Psychology.

Upon completion of the screening questionnaire you will be contacted through the e-mail that you provided to indicate whether you met the eligibility criteria to complete the rest of the study. If eligible, you will be asked to schedule a prospective lab session to complete the next two parts of the study.

By clicking next I am indicating that:

1. I have willingly volunteered to participate in this research study.
2. I have the right to withdraw without penalty at any point but can only withdraw my responses prior to the completion of the study.
3. I have the right to decline to answer any question(s) throughout the study.
4. I will not be at any risk of physical or psychological harm.
5. The information that I provide will remain confidential and will be stored at University for a period of 5 years.
6. I have the right to inquire about further details pertaining to the research in question.
7. I understand that once the study is complete, all identifying information will be stripped from the responses that I provide.
8. I understand that my responses may be accessed by US law enforcement without my knowledge in accordance with the USA Patriot Act for the purpose of anti-terrorism investigations as SurveyMonkey hosts its information on a server in the United States.

Your voluntary participation in this study is greatly appreciated, and if you wish to learn more about this study please use the contact information below—thank you.

By clicking the “next” button I am indicating that I have fully read and understand the information, and that I wish to participate in this research study.

Appendix Y

"**High-Fertility**" Testing Instructions – HC Users [Lu logo]

The Relationship Satisfaction Study – Instructions

Please complete the SONA (or SurveyMonkey) survey sometime between: _____.

Please Follow these Instructions:

- Testing should take place between **2:00pm to 8:00pm**.
  - **For Lakehead University student on SONA**. Please access the SONA survey system (https://lupsych.sona-systems.com) during this time to complete the online survey entitled **"The Relationship Satisfaction Study (Survey A)"**
  - **For Community Participants on SurveyMonkey**. Please access the SurveyMonkey survey system (https://www.surveymonkey.com/r/JF955DQ) during this time to complete the online survey entitled **"The Relationship Satisfaction Study (Survey A)"**
  - You will also be sent an e-mail containing this survey link at the beginning of the testing period.

If you have any questions or concerns, please do not hesitate to get in touch with Adam Davis using the contact information on the back of this form.

Thank you for your continued participation.

Appendix Z

"**Low-Fertility**" Testing Instructions – HC Users [Lu logo]

Please complete the SONA (or SurveyMonkey) survey sometime between: _____.

Please Follow these Instructions:

- Testing should take place between **2:00pm to 8:00pm**.
    - **For Lakehead University student on SONA**. Please access the SONA survey (https://lupsych.sona-systems.com) during this time to complete the online survey entitled **"The Relationship Satisfaction Study (Survey B)"**
    - **For Community Participants on SurveyMonkey** Please access the SurveyMonkey survey (https://www.surveymonkey.com/r/J3PKK5T) during this time to complete the online survey entitled **"The Relationship Satisfaction Study (Survey B)"**
    - You will also be sent an e-mail containing this survey link at the beginning of the testing period.
- Please try to complete the survey in privacy away from your relationship partner.

IMPORTANT: Please remember to contact Adam Davis by e-mail (adavis1@lakeheadu.ca) once you start your next period (i.e., begin menstruating) using the phrase "Relationship Satisfaction Survey B Cycle Phase Information" in the **subject line** and the phrase "I began my period today at [insert approximate time]" in the **e-mail message**. This information will allow us to double-check that your menstrual cycle information that you provided is correct.

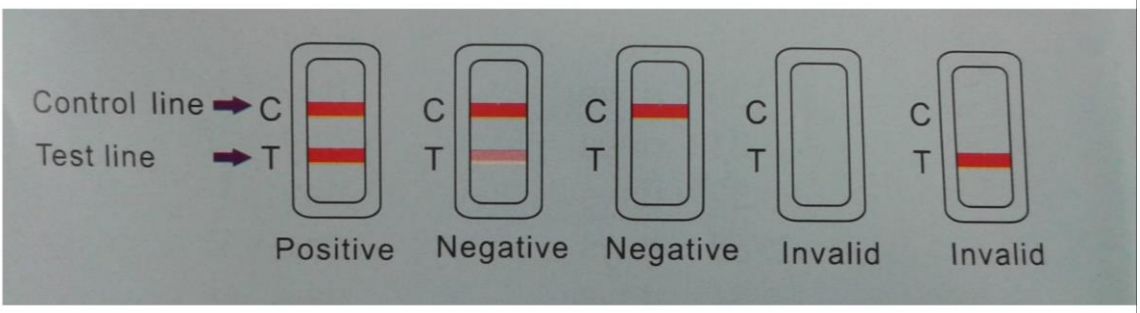
If you have any questions or concerns, please do not hesitate to get in touch with Adam Davis using the contact information below

Thank you for your continued participation.

Appendix AA

Urine Test Results

Instructions: Using the following diagram to help you, please answer the following question concerning the results of your most recent urine test.



1. Please select the result of your urine test from the options listed below.

☐ Positive: Test line is equal to or darker than the control line
☐ Negative: Test line is lighter than the control line
☐ Invalid: Either no lines appeared or only the test or control line appeared
☐ I was not asked to perform a urine test

Appendix BB

University (SONA) Survey Cover Letter for both Survey A and Survey B [LU logo]

Dear potential participant,

My name is Adam C. Davis and I am an M.Sc. in Psychological Science student at Lakehead University. I would like to invite you to participate in a study being conducted by myself under the supervision of Dr. Mirella L. Stroink within the Department of Psychology at Lakehead University. This study is intended to examine predictors of relationship satisfaction, intimacy, commitment, sexual attitudes and behaviours and hormones in heterosexual couples.

You will be asked to complete an online survey hosted by SONA™ assessing relationship satisfaction, intimacy, commitment level, and sexual attitudes and behaviours. The survey should take approximately 25 minutes to complete. When you have completed the first online survey (either Survey A or Survey B depending on your instructions) you will awarded 0.5 bonus point if eligible. If you continue on with the study and complete the second online survey you will be awarded 0.5 bonus point and be entered into a raffle to win 1 of 10 $10.00 Tim Horton's gift cards.

All data gathered will be securely held on a computer in Dr. Stroink's lab at Lakehead University for at least five years. To ensure confidentiality, only those authorized to view the data will be given permission to do so. You have the right to withdraw and/or decline to respond to any questions throughout the study without penalty. Because we need to remain in contact with you using your personal Lakehead e-mail, anonymity cannot be ensured throughout the research. However, once the study has been completed all identifying information will be stripped from the data. This research study has been reviewed and approved by the Lakehead University Research Ethics Board. If you have any questions please contact the Research Ethics Board at 807-343-8283 or research@lakeheadu.ca.

Your voluntary participation in this study is greatly appreciated, and if you wish to learn more about this study please use the contact information below—thank you.

Adam C. Davis, H.BA.
M.Sc. Psychological Science, Candidate
Dept. of Psychology Lakehead University
Telephone: (807) 633-2844
Email: adavis1@lakeheadu.ca

Dr. Mirella L. Stroink, Ph.D.
Associate Professor
Dept. of Psychology, Lakehead University
Telephone: (807) 346-7874
Email: mstroink@lakeheadu.ca

Appendix CC

Community (SurveyMonkey) Survey Cover Letter for Survey A and Survey B [LU logo]

Dear potential participant,

My name is Adam C. Davis and I am an M.Sc. Psychological Science student at Lakehead University. I would like to invite you to participate in a study being conducted by myself under the supervision of Dr. Mirella L. Stroink entitled the "**Relationship Satisfaction Study**." This study is intended to examine predictors of relationship satisfaction, intimacy, commitment, sexual attitudes and behaviour and hormones in heterosexual couples.

You will be asked to complete two online surveys in total hosted by SurveyMonkey assessing these variables, which should take approximately 25 minutes to complete each. Specifically, this survey is entitled "**Relationship Satisfaction Study (Survey A) or (Survey B)**." As this is a **two-part study**, for some participants this will be the first survey that you complete, whereas for others it may be the second survey that you finish. Once you have completed both **Survey A** and **Survey B**, you will be entered into a raffle to win **1 of 4 $50.00 gift cards** for a dinner for two at a restaurant of your choosing.

All data gathered will be securely held on a computer in Dr. Stroink's lab at Lakehead University for at least five years. To ensure confidentiality, only those authorized to view the data will be given permission to do so. You have the right to withdraw and/or decline to respond to any questions throughout the study without penalty. Because we need to remain in contact with you using your e-mail, anonymity cannot be ensured throughout the research. However, once the study has been completed all identifying information will be stripped from the data. This research study has been reviewed and approved by the Lakehead University Research Ethics Board. If you have any questions please contact the Research Ethics Board at 807-343-8283 or research@lakeheadu.ca.

It is our intention to present these findings at academic conferences and to complete a manuscript for submission to a scholarly journal. Any identifying information tied to your responses will be stripped in order to ensure that your identity remains anonymous.

Your voluntary participation in this study is greatly appreciated, and if you wish to learn more about this study please use the contact information below—thank you.

Adam C. Davis, H.BA.
M.Sc. Psychological Science candidate
Dep. of Psychology, Lakehead University
Email: adavis1@lakeheadu.ca

Dr. Mirella L. Stroink, Ph.D.
Associate Professor
Dept. of Psychology, Lakehead University
Email: mstroink@lakeheadu.ca

Appendix DD

University (SONA) Letter of Informed Consent for both Survey A and B [LU logo]

The goal of this research is to explore the associations between demographic factors, relationship satisfaction, intimacy, commitment level, sexual attitudes and behaviours, and hormones. You will be asked to complete an online survey that will take approximately 30 minutes. I, Adam C. Davis, am conducting this research under the supervision of Dr. Mirella L. Stroink within the Department of Psychology.

In order to keep in touch during the course of the research we will need your Lakehaed e-mail address, thus anonymity cannot be ensured. However, once the study is complete, all of the data that you provide will be stripped of any identifying information. Furthermore, only the research team, consisting of myself and Dr. Stroink, will be permitted access to this data to ensure confidentiality. You will be awarded 0.5 bonus point after completing each survey (Survey A and Survey B), for a total of 1.0 bonus point toward a class of your choosing if eligible. If you complete the entire study you will also be entered into a raffle to win 1 of 10 $10.00 Tim Horton's gift cards.

Potential student participants stand to benefit from participation in the proposed study by being introduced to some research findings, terminology, and relevant literature within the sub-disciplinary branches of social and evolutionary psychology. They will become more familiar with self-report survey methodology and how, using this method, quantitative data may be gathered. Student participants also stand to benefit from the potential acquisition of partial course credit.

By clicking next I am indicating that:

1. I have willingly volunteered to participate in this research study.
2. I have the right to withdraw my responses without penalty prior to the completion of the study.
3. I have the right to decline to answer any question(s) throughout the study.
4. I will not be at risk of any physical harm.
5. I may be exposed to a minimal risk of psychological harm.
6. The information that I provide will remain confidential, and will be stored at University for a period of 5 years.
7. I will receive 0.5 bonus point for each survey that I complete for a total of 1.0 bonus point.
8. If I complete both surveys, I will be entered into a raffle to win 1 of 10 $10.00 Tim Horton's gift cards.
8. I have the right to inquire about further details pertaining to the research in question.
10. If my results are published or used in any presentations they will be stripped of any identifying information.

By clicking "next" I am indicating that I have fully read and understand the information and that I wish to participate in this research study.

Appendix EE

(SurveyMonkey) Screen of Informed Consent for both Survey A and B [LU logo]

The goal of this research is to explore the associations between demographic factors, relationship satisfaction, intimacy, commitment level, sexual attitudes and behaviours, and hormones. You will be asked to complete an online survey that will take approximately 20 minutes. I, Adam C. Davis, am conducting this research under the supervision of Dr. Mirella L. Stroink.

In order to keep in touch during the course of the research we will need your name and e-mail address, thus anonymity cannot be ensured. However, once the study is complete, all of the data that you provide will be stripped of any identifying information. Furthermore, only the research team, consisting of myself and Dr. Stroink, will be permitted access to this data to ensure confidentiality.

Potential participants stand to benefit from participation in the proposed study by being introduced to some research findings, terminology, and relevant literature within the sub-disciplinary branches of social and evolutionary psychology. They will become more familiar with self-report survey methodology and how, using this method, quantitative data may be gathered.

By clicking **next** I am indicating that:

1. I have willingly volunteered to participate in this research study.
2. I have the right to withdraw without penalty at any point but can only withdraw my responses prior to the completion of the study.
3. I have the right to decline to answer any question(s) throughout the study.
4. I will not be at risk of any physical harm.
5. I will be exposed to a minimal risk of psychological harm because of the personal nature of some of the questions I will be asked that could be distressing (e.g., relationship satisfaction, attitudes toward infidelity).
6. The information that I provide will remain confidential, and will be stored at University for a period of 5 years.
8. If I complete both surveys, I will be entered into a raffle to win 1 of 4 $50.00 restaurant gift cards.
9. I have the right to inquire about further details pertaining to the research in question.
10. If my results are published or used in any presentations they will be stripped of any identifying information.
11. I understand that my responses may be accessed by US law enforcement without my knowledge in accordance with the USA Patriot Act for the purpose of anti-terrorism investigations as SurveyMonkey hosts its information on a server in the United States.

By clicking "**next**" I am indicating that I have fully read and understand the information and that I wish to participate in this research study.

Appendix FF

Brief Debriefing Screen for Survey A – Lakehead University (SONA) [LU logo]

Dear Participant,

Thank you for completing the online survey entitled "The Relationship Satisfaction Study Survey A." By completing this survey you have earned 0.5 bonus point toward an eligible psychology class of your choosing.

If this is the first survey that you have completed as part of the two-part study, please refer to the second set of instructions given to you during the initial lab meeting on campus. At the top of the page you will see a date listed that we would like you use the urine test on again. Similarly, once you have completed the urine test we would like you to log onto the SONA system and complete the next only survey entitled "The Relationship Satisfaction Study Survey B."

If however this is the second survey that you have completed as part of the two-part research project, then you have completed the entire study. If this is the case then you will now be entered into a raffle to win 1 of 10 $10.00 Tim Horton's gift cards. Furthermore, you will soon be sent a detailed debriefing form to your Lakehead e-mail that will contain a thorough description of the research in its entirety.

If you have any questions please feel free to get in touch with either myself, Adam C. Davis, or some from the research team using the contact information listed below.

We thank you for your participation – it is greatly appreciated.

Adam C. Davis, HBA
M.Sc. Psych. Science student
Dept. of Psychology,
Lakehead University
Email: adavis1@lakeheadu.ca

Dr. Mirella L. Stroink, PhD
Associate Professor
Dept. of Psychology,
Lakehead University
Email: mstroink@lakeheadu.ca

Gabriela Coccimiglio
HBSc Psychology student
Dept. of Psychology
Lakehead University
Email:ggcoccim@lakeheadu.ca

Appendix GG

Brief Debriefing Screen for Survey A – Community Participants (SurveyMonkey) [LU logo]

Dear Participant,

Thank you for completing the online survey entitled "**The Relationship Satisfaction Study Survey A**." If this is the **first survey** that you have completed as part of the two-part study, please refer to the second set of instructions given to you during the initial lab meeting on campus.

For participants who were asked to perform a urine test prior to completing the surveys:

At the top of the page you will see a date listed that we would like you to use the urine tests on again. You will be sent an e-mail message at the beginning of this date range with a link to the next survey that we would like you to complete entitled "**The Relationship Satisfaction Study (Survey B)**." We ask that you please complete this survey shortly after finishing your urine test.

For participants who were NOT asked to perform a urine test prior to completing the surveys:

At the top of the page you will see a date listed that we would like you to complete the next online survey entitled "**The Relationship Satisfaction Study (Survey B)**." At the beginning of listed date range, you will be sent an e-mail message with a link to this survey through SurveyMonkey. We ask that you please complete this survey at some point within the listed date range.

For **both groups** of participants, if this is the **second survey** that you have completed as part of the two-part study, then you have completed the entire study. If this is the case then you will now be entered into a raffle to win **1 of 4 $50.00 restaurant gift cards** for a dinner for two at a restaurant of your choosing. Furthermore, you will soon be sent a detailed debriefing form to your Lakehead e-mail that will contain a thorough description of the research in its entirety.

If you have any questions please feel free to get in touch with either myself, Adam C. Davis, or Dr. Mirella L. Stroink at the contact information listed below.

We thank you for your participation – it is greatly appreciated.

Adam Davis, HBA
MSc Psych. Science student
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Dr. Mirella L. Stroink, PhD
Associate Professor
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Lakehead University
Email: mstroink@lakeheadu.ca

Appendix HH

Brief Debriefing Screen for Survey B – Lakehead University (SONA) [LU logo]

Dear Participant,

Thank you for completing the online survey entitled "The Relationship Satisfaction Study B." By completing this survey you have earned 0.5 bonus point toward a class of your choosing if eligible.

If this is the first survey that you have completed as part of the two-part study, please refer to the second set of instructions given to you during the initial lab meeting on campus. At the top of the page you will see a date listed that we would like you use the urine test on again. Similarly, once you have completed the urine test we would like you to log onto the SONA system and complete the next only survey entitled "The Relationship Satisfaction Study Survey A."

If however this is the second survey that you have completed as part of the two-part research project, then you have completed the entire study. If this is the case then you will now be entered into a raffle to win 1 of 10 $10.00 Tim Horton's gift cards. Furthermore, you will soon be sent a detailed debriefing form to your Lakehead e-mail that will contain a thorough description of the research in its entirety.

If you have any questions please feel free to get in touch with either myself, Adam C. Davis, or Dr. Mirella L. Stroink at the contact information listed below.

We thank you for your participation – it is greatly appreciated.

Adam C. Davis, HBA
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Dr. Mirella L. Stroink, PhD
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HBSc Psychology student
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Appendix II

Brief Debriefing Screen for Survey B – Community Participants (SurveyMonkey) [LU logo]

Dear Participant,

Thank you for completing the online survey entitled "**The Relationship Satisfaction Study Survey B**." If this is the **first survey** that you have completed as part of the two-part study, please refer to the second set of instructions given to you during the initial lab meeting on campus.

For participants who were asked to perform a urine test prior to completing the surveys:

At the top of the page you will see a date listed that we would like you to use the urine tests on again. You will be sent an e-mail message at the beginning of this date range with a link to the next survey that we would like you to complete entitled "**The Relationship Satisfaction Study (Survey A)**." We ask that you please complete this survey shortly after finishing your urine test.

For participants who were NOT asked to perform a urine test prior to completing the surveys:

At the top of the page you will see a date listed that we would like you to complete the next online survey entitled "**The Relationship Satisfaction Study (Survey A)**." At the beginning of listed date range, you will be sent an e-mail message with a link to this survey through SurveyMonkey. We ask that you please complete this survey at some point within the listed date range.

For **both groups** of participants, if this is the **second survey** that you have completed as part of the two-part study, then you have completed the entire study. If this is the case then you will now be entered into a raffle to win **1 of 4 $50.00 restaurant gift cards** for a dinner for two at a restaurant of your choosing. Furthermore, you will soon be sent a detailed debriefing form to your Lakehead e-mail that will contain a thorough description of the research in its entirety.

IMPORTANT: Regardless of whether this is the first or second survey that you have completed, please contact Adam C. Davis by e-mail (adavis1@lakeheadu.ca) once you start your next period (i.e., begin menstruating) using the phrase "Relationship Satisfaction Survey B Cycle Phase Information" in the subject line and the phrase "I began my period today at [insert approximate time]" in the e-mail message. This information will allow us to double-check that your menstrual cycle information that you provided is correct.

If you have any questions please feel free to get in touch with either myself, Adam C. Davis, or Dr. Mirella L. Stroink at the contact information listed below.

We thank you for your participation – it is greatly appreciated.

Adam Davis, HBA
M.Sc. Psych. Science student
Depart. of Psychology
Lakehead University
Email: adavis1@lakeheadu.ca

Dr. Mirella L. Stroink, PhD
Associate Professor
Depart. of Psychology
Lakehead University
Email: mstroink@lakeheadu.ca

Appendix JJ

Final Debriefing Message [LU logo]

Dear Participant,

Thank you for participating in the research entitled "The Relationship Satisfaction Study." Your responses will help in observing whether there are shifts in feelings of relationship satisfaction, commitment, investment and intimacy across the phases of the menstrual cycle. Some research has found that relationship satisfaction decreases when partnered heterosexual women are in the high-fertile phase of their menstrual cycles. However, this only seems to occur for women who are not as physically attracted to their partners. In fact, the exact opposite outcome seems to happen for women partnered with men they find very attractive—that is an increase in relationship satisfaction and intimacy during times of peak fertility. Included below are some references for important research in this area for your viewing interest:

Gangestad, S. W., Thornhill, R., & Garver-Apgar, C. E. (2005). Women's sexual interests across the ovulatory cycle depend on primary partner developmental instability. *Proceedings of the Royal Society B: Biological Sciences, 272,* 2023–2027

Larson, C. M., Haselton, M. G., Gildersleeve, K. A., & Pillsworth, E. G. (2013). Changes in women's feelings about their romantic relationships across the ovulatory cycle. *Hormones and behavior*, *63*(1), 128-135.

If you would like a summary of the research findings upon completion of data collection and analysis, or if you have any questions or concerns about the present study, please feel free to contact either myself or Dr. Mirella L. Stroink at the contact information listed below. It is our intention to present these findings at academic conferences and to complete a manuscript for submission to a scholarly journal. Any identifying information tied to your response will be stripped in order to ensure that your identity remains anonymous.

If you have any questions related to the ethics of the research and would like to speak to someone outside of the research team, please contact the Research Ethics Board at 807-343-8283 or research@lakeheadu.ca.

We thank you for your time and participation – it is greatly appreciated.

Adam C. Davis, H.BA.
M.Sc. Psychological Science, Candidate
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