

WOMEN ON HORMONAL CONTRACEPTION: A BEHAVIORAL BIOPSYCHOSOCIAL
PERSPECTIVE

A THESIS

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ABSTRACT

Normally cycling females experience natural cyclic shifts in their physical appearance and in various psychological traits (Haselton & Gildersleeve, 2011; Alvergne & Lummaa, 2009). When women use hormonal contraception (HC), these natural cyclical changes are no longer present (Welling et al., 2012; Miller, Tybur, & Jordan, 2007). Many physical differences between hormonal contraception users and non-users have been examined (Shulman, 2011). However, far fewer psychological and behavioral traits that are likely associated with hormonal contraceptive use have been studied. My goal was to examine relevant dispositional and behavioral traits that differ in hormonal contraceptive users and non-users. The variables examined include life history strategy, sociosexuality, intrasexual competition, social support and risk-taking behavior. One's life history strategy is indicative of one's mating pattern among other attitudes and behavior relevant to reproductive success. Sociosexuality is an individual's tendency to engage in promiscuous behavior. Intrasexual competition is the competition among members of the same sex over mates and status. I included these variables based on the broad prediction that a lack of ovulation leads women to spend a higher proportion of time in a state of long-term mating (with the idea that these women do not experience the ovulatory state so well-noted for leading to various short-term mating tactics). Thus, women on HC were predicted to show markers of a relatively slow life history and a relatively restricted sociosexuality, coupled with low levels of both intrasexual competition and risky behavior. HC users reported to engage in between-group competition risk-taking more heavily compared to non-users in their ovulatory phase. HC users reported a more restricted sociosexuality in terms of the desire facet compared to non-users. HC users reported to receive higher levels of social support compared to normally

cycling women. Lastly, HC users reported to be more intrasexually competitive compared to normally cycling women in their ovulatory phase.

Keywords: hormonal contraception, life history strategy, sociosexuality, intrasexual competition, female social support, risk-taking behavior

INTRODUCTION

Concealed Ovulation in Naturally Cycling Women

Evolutionary psychologists have long debated the veracity of concealed ovulation in human females. The prominent theories in opposition to and in support of the viability of concealed ovulation are supported by the scientific observations of obvious sexual signals present in many female primate species during times of sexual receptiveness (Burt, 1992). An example of a conspicuous signal of fertility can be found in female chimpanzees. According to Burt (1992), their “sexual swellings are ‘visible from hillside to hillside, attracting any male in sight’ when they are fertile (p. 4). Human females have also been found to display physical signs of fertility (discussed later), just not as noticeably. The fact that women do not display such obvious physical signs of fertility (e.g., swelled genitals) is also used in support of the concept of concealed ovulation (Burt, 1992). Most researchers have theorized that concealed ovulation is a result from sexual selection (Provost, Quinsey, & Troje, 2008). In comparison to many other species, humans are sexually active during all parts of the cycle, not just during times of ovulation. Researchers believe this fact to be a feature in the concealment of fertility. However, there is a sufficient amount of evidence that defies the concept of concealed ovulation (Haselton & Gildersleeve, 2011).

Markers of Fertility in Naturally Cycling Women

While women do not present swelled genitals near ovulation as other primates do, they do present a variety of more subtle physical markers of fertility during estrus (Haselton & Gildersleeve, 2011). Naturally cycling women (those not using hormonal contraception) are evaluated as having more attractive faces when ovulating than non-

ovulating women by both men and women (Roberts, Havlicek, Flegr, Hruskova, Little, Jones, et al., 2004). Miller and Maner (2010) also discovered that single men rate a normally cycling woman as more attractive when she is in her fertile phase. Various female body odors, including vaginal secretions and upper body sweat, are rated as more attractive and/or pleasant among high-fertility samples than low-fertility samples (Doty et al., 1975; Thornhill et al., 2003). Naturally cycling women are also considered more attractive when near ovulation because they have a decreased waist-to-hip ratio (Kirchengast & Gartner, 2002). Female voices are rated as more attractive during times of high-fertility versus female voices heard during infertile phases (Pipitone & Gallup, 2008). While choice of dress is not a natural phenomenon, it's also of importance to note that near ovulation, naturally cycling women have been found to dress in more revealing clothing and are consequently perceived as trying to appear sexier and more attractive than women not near ovulation (Durante, Li, & Haselton, 2008). These outward displays of fertility do not only challenge the notion of concealed ovulation, but also have obvious implications for human mating patterns.

Women on Hormonal Contraception (HC)

The cyclic changes and markers of fertility that appear in normally cycling women have not been found to be present in women who are on hormonal contraceptives (HC). Mosher and Jones (2010) reported that 82% of American women had used an oral contraceptive between the years of 2006 and 2008. According to the researchers, “contraceptive use in the United States is virtually universal among women of reproductive age” (Mosher & Jones, 2010, p. 15). Wright (2003) reported that more than 100 million women use hormonal contraception worldwide. Many of the behavioral and

physical features found to be true of naturally cycling women are not present in women who are using hormonal contraceptives. A woman's body on HC is in a mimicked state of pregnancy. Consequently, there are significant changes in a woman's physicality, personality, behavior, cognition and sexuality.

Why is Research on Hormonal Contraception Use Important?

According to the female quality hypothesis "women have evolved to signal their overall quality so that they can compete with other women for male attention and investment" (Haselton & Gildersleeve, 2011, p. 91). Hormonal contraception effectively eradicates this evolved mechanism of intrasexual competition and takes female HC users "out of the mating game." According to Welling et al. (2012), hormonal contraceptives may very well "detrimentally influence mate preferences and mate choice" (p. 115) due to their influence on the natural ovulatory cyclic changes. The population of women using hormonal contraceptives is increasing internationally. There is an abundant amount of information available to users and potential users in terms of the physical side effects and benefits of hormonal contraception. Many researchers have reported that women on hormonal contraceptives are vulnerable to changes in mood (Oinonen & Mazmanian, 2002), changes in levels of jealousy regarding a mate (Cobey et al., 2012), and changes in sexual function and fluctuations in sexual interest (Adams, Gold, & Burt, 1978). The majority of the psychological research examining hormones in the female body uses naturally cycling women as participants and excludes those on hormonal contraception. While this research is unquestionably necessary, it is no longer representative of many of the women in the developed world. Women on hormonal contraceptives and potential HC users are given information concerning their hormonal birth control from their doctors,

their prescribed contraceptive's information pamphlet and the media. This information usually concerns potential physical symptoms such as breast tenderness and decreased menstrual flow (Shulman, 2011). What about the vital information concerning the disappearance of the natural cyclical changes a woman's body experiences?

My main goal was to increase the wealth of information about hormonal contraception that is available to women. According to Shulman (2011), "it is the patient who best knows the type of contraceptive regimen that she is likely to use correctly and gain the maximal contraceptive and noncontraceptive benefits..." (p. S10). Women receive the most benefit from hormonal contraception when they are educated about the various options' actions and effects. Education about the significant consequences of HC is imperative when it comes to women's physical, sexual and mental health.

Hormonal Contraception: Action and Variations

Hormonal contraceptives were first introduced in 1960 (Rice & Thompson, 2006). There are currently many options available in terms of the physical method, hormonal agent and hormonal dose. Due to the potential side effects, contraindications and risk factors of each kind of hormonal contraceptive, it's important to consider the patient's history and preference before choosing a specific type to use. The physical forms of available hormonal contraceptives include transdermal, intravaginal, intrauterine, subcutaneous, oral and intramuscular methods (Frye, 2006). Formulations can consist of estrogen-only hormones, progestin-only hormones or a combination of the two (Frye, 2006). Both hormones act to prevent ovulation. There are two varieties of estrogen used in hormonal contraceptives (Rice & Thompson, 2006). Estrogen prevents ovulation by inhibiting the release of the follicle-stimulating hormone (FSH) (Frye, 2006). The various

forms of progestin used in hormonal contraceptives are often classified into one of four different generations. Progestin-only contraceptives function to prevent ovulation by causing endometrial atrophy through the creation of an antagonistic cervical environment (Rice & Thompson, 2006).

Pre-existing Factors in Hormonal Contraceptive Users

It is important to consider the pre-existing differences between hormonal contraceptive users and non-users when examining the effects hormonal contraception has on women. A relatively early review of adolescent birth control behavior reported that contraceptive use among adolescents is associated with self-esteem and locus of control (Morrison, 1985). Significant effects for these personality factors were found in only some studies and were rather small. Also, depending on the study, birth control use was positively correlated with high self-esteem *or* low self-esteem and external locus of control *or* internal locus of control. The direction of the correlation varied across all studies. More recently, it was discovered that hormonal contraceptive users and non-users differ across dimensions of sexuality, sexual satisfaction and sexual experience (Bancroft et al., 1991 Part I).

Economic and Social Implications of Hormonal Contraception

Miller, Tybur, and Jordan (2007) discovered that naturally cycling women's incomes change according to where they are in their menstrual cycle. It was reported that naturally cycling women made significantly more money when giving private lap dances when ovulating. Conversely, women on hormonal contraceptives saw no such fluctuations of income. According to the researchers, "this is the first direct economic

evidence for the existence of estrus in contemporary human females” (Miller, Tybur, & Jordan, 2007, p. 379).

Mating Behavior and Preferences

A naturally cycling female’s mating behavior and mate preferences consistently and systematically vary throughout the menstrual cycle (Alvergne & Lummaa, 2009). When a woman reaches peak fertility (mid-cycle), she prefers men with masculine physical features; including a masculine face, body and voice (Welling, Jones DeBruine, Conway, Law Smith, Little, Feinberg, Sharp, & Al-Dujaili, 2007; Little, Jones, & Burriss, 2007), men who possess various talents and display dominance through intrasexual competitiveness (Gangestad, Thornhill, & Garver-Apgar, 2005). Gangestad et al. (2004) found this to be true of normally cycling women in a short-term mating context (Gangestad, Simpson, Cousins, Garver-Apgar, & Christensen, 2004). In an innovative study, Guéguen (2009) discovered that women in the fertile phase of their cycle were more agreeable in accepting invitations to dance from potential mates at a dance club. Such changes in preference during ovulation can be easily explained by the ovulatory-shift hypothesis. According to this hypothesis, the change in preferences near ovulation likely serves as an adaptation for women to mate with the fittest men; men who have “good genes” (Gangestad, Thornhill, & Garver-Apgar, 2005). Phenotypic features can be effective indicators of whether someone possesses healthy genes, such as a symmetrical face. This preference for physical markers of masculinity in potential mates during the fertile phase disappears in women who use hormonal contraception (Little et al., 2007). Unlike naturally cycling women, HC users do not display a shift in preferences across the

menstrual cycle. Research has supported a causal relationship between the use of hormonal contraception and a change in mate preference (Roberts et al., 2008).

Olfactory Cues and Mating

Olfactory cues have been shown to be important signals of fertility (Roberts, Gosling, Carter, & Petrie, 2008). Men rate normally cycling women's odors as most attractive mid-cycle. This effect disappears for women who use hormonal contraceptives. Seppo et al. subsequently posited that "oral contraceptives demolish the cyclic attractiveness of odors" (2004, p. 579). It's noteworthy that hormonal contraceptive users' odors were not found to be significantly different from nonusers' odors in terms of attractiveness. What was found to be significantly different between naturally cycling women and hormonal contraceptive users was the *cyclic change* of attractiveness of bodily odors. If body odor is indeed a factor in mate choice, Roberts et al. (2008) posit that "contraceptive pill use could disrupt disassortative mate preferences" (p. 2,715).

Relationships

Research on the effects of hormonal contraceptive use on relationships has produced valuable information in mating research. Normally cycling women prefer mates who have MHC-dissimilar odors (Wedekind, Seebeck, Bettens, & Paepke, 1995). The major histocompatibility complex (MHC) expresses an individual's genotype in the form of an odor. The more MHC-dissimilar one is from his or her mate, the higher the benefits to their offspring in terms of resistance to disease (Potts & Wakeland, 1993). Women using hormonal contraception prefer males who have more MHC-similar odors when compared to naturally cycling women (Wedekind et al., 1995). Consequently, women who meet their partner while using hormonal contraception report less sexual satisfaction

and less attraction to their mate. Interestingly, however, women who meet their partner while using hormonal contraception report more satisfaction with the *non-sexual* factors of their relationship, such as a partner's financial holdings (Roberts, Klapilova, Little, Burriss, Jones, DeBruine, Petrie, & Havlicek, 2011). Such findings beg the question, "Should single women be using hormonal contraception when looking for a mate?"

Mate-retention Behavior

Fertility cues in naturally cycling women also bring about changes in committed sexual partners. Male romantic partners have been found to use more mate-guarding behaviors when their normally cycling female partners are near ovulation (Gangestad, Thornhill, & Garver, 2002). Interestingly, men in relationships with women using hormonal contraception display higher levels of mate retention behavior than men partnered with non-users. In an interesting twist, HC users have been found to use higher levels of mate retention tactics than non-users (Welling, Puts, Roberts, Little, & Burriss, 2012).

Sexuality: Behaviors and Attitudes

Naturally cycling women are more likely to initiate sexual activities (Harvey, 1987), show higher levels of interest in sexual activities (Laeng & Falkenberg, 2007), show higher levels of attention to sexual stimuli (Laeng & Falkenberg, 2007) and display an increase in sexual fantasizing during estrus. Hormonal contraception has often been documented as the culprit for sexual dysfunction, sexual dissatisfaction, and a decrease in sexual desire, sexual activity and sexual arousal in female users (Adams, Gold, & Burt, 1978; Caruso, Agnello, Intelisano, Farina, Di Mari & Cianci, 2004; Wallwiener et al., 2010; Graham & Sherwin, 1993). Many researchers believe the decline in sexual

satisfaction and function associated with hormonal contraception use to be due to the changes in androgenic and estrogenic hormones (Adams, Gold, & Burt, 1978; Schaffir, 2006). There is conflicting research that reports no change in sexual activity due to HC (Reichelt, 1978) or an increase in sexual activity, sexual desire, sexual fantasy and/or function due to HC (Bancroft, Sherwin, Alexander, Davidson, & Walker, 1991; Guida et al., 2005; Guillermo, Manlove, Gray, Zava, & Marrs, 2010). Much of the research examining HC use and sexuality has been criticized due to poor study control and lack of consideration for social, psychological and cultural factors (Schaffir, 2006). In a 2006 review of hormonal contraception and sexuality, Schaffir wrote that the negative effects on sexuality from HC are not readily identifiable and correspond to a minority of users. Also, since the introduction of hormonal contraception, there have been many variations in the hormones, dosages and physical methods available. Therefore, it is unrealistic to generalize results from dated studies that examined HCs that are either no longer used or used by a smaller population (Graham & Sherwin, 1993). Many researchers took this criticism into consideration and have employed stricter methodologies than were utilized in the past (Guida et al., 2005). Nevertheless, in a 2012 review of HC and female sexuality, Burrows et al. reported that there is still no consistent conclusion that can be made in regard to the effect of hormonal contraception on a female's libido. The researchers use the same assumptions that were stipulated in previous critiques to support their position on HC; the "female libido is complex, and it is therefore difficult to reliably predict how it may be affected by COC [combined oral contraceptive], or any other hormonal contraceptive" (p. 2,220). Burrows et al. (2012) do point out that while the

findings are mixed in terms of negative or positive action; the majority of the population is unaffected.

Jealousy

Relationship jealousy has been proposed as an evolved mechanism for protecting reproductive interests, such as paternal investment (Buss et al., 1992). This notion has been supported by data gathered on normally cycling women throughout their menstrual phase. Naturally cycling women display higher levels of jealousy during the fertile phase, no matter their relationship status. It gets interesting when we observe the levels of jealousy in women using hormonal contraception. Single HC users exhibit similar levels of jealousy response to those of non-users. HC users in relationships, however, report levels of jealousy comparable to the high levels of jealousy experienced by non-users during the fertile phase (Cobey et al., 2012). These findings support past research which found that women on HC report higher levels of sexual jealousy and stronger emotional responses to partner unfaithfulness than non-users (Geary, DeSoto, Hoard, Sheldon, & Cooper, 2001). These differences in reported jealousy among users and non-users are likely due to the synthetic hormones released by hormonal contraceptives. Hormonal contraceptive users display lower levels of testosterone than naturally cycling women (Liening et al., 2010). When considering the levels of steroid hormones in hormonal contraception, there is a positive correlation between levels of ethinyl estradiol (a synthetic version of estrogen found in many hormonal contraceptives) and levels of jealousy (Cobey et al., 2011). This information has important implications in the realm of research on aggression and intrasexual competition.

Aggression

Aggressive behavior has been suggested to be motivated by mating goals (Griskevicius, Tybur, Gangestad, Perea, Shapiro & Kenrick, 2009). Female rhesus monkeys engage in more mild aggressive behavior (e.g., gestures) during the follicular stage of the menstrual cycle than any other phase (Mallow, 1981). This finding falls in line with Michael and Zumpe's (1970) hypothesis that estrogens and aggression share a positive relationship. It's important to note that aggression is not merely a product of hormones, but also of social context (Walker et al., 1983). This is likely the reason why Mallow (1981) did not find a connection between cycle phase and overt aggressive behavior (e.g., biting) in female rhesus monkeys. Walker et al. (1983) also found that aggression in female rhesus monkeys increases during the ovulatory phase in the menstrual cycle. The researchers reported that the increase in aggressive behavior was due to the social context of mating rather than ovarian hormone fluctuations. In a more recent study which used women as participants, it was found that naturally cycling women *inconsistently* display significantly higher levels of plasma testosterone around ovulation. However, it was also found from the same study that a positive correlation exists between plasma testosterone levels and aggressive responses *only* in the midfollicular phase (Dougherty, Bjork, Moeller, & Swann, 1997). It seems that there is no clear conclusion to be drawn from research on hormone levels and displays of aggression.

Hormones and Behavior

A valid criticism of research in this area pertains to the fact that various classes of HC have been lumped together in the grouping of participants. As discussed earlier, there

are several forms of hormonal contraception available. Perhaps the two most important variations to consider in this line of research include the hormonal agent and the hormone dosage. Many psychological, behavioral and physical effects that have been found to be true of estrogen-only hormonal contraceptives have not been found to be true of progestin-only hormonal contraceptives and vice versa. Several examples are discussed below. I therefore believe it is necessary to consider the type of hormonal contraceptives used by the participants (in regard to hormonal agent and hormone dosage). To account for differences found across the various HC classes, I will be controlling for them in data analysis.

There are intriguing relationships between several steroid hormones (e.g., testosterone) and hormonal contraceptives that I would like to incorporate into the current study. It is important to note that there is individual variation in regard to the sensitivity a woman experiences to the levels of testosterone in her body (Graham, Bancroft, Doll, Greco, & Tanner, 2007). According to Schultheiss et al. (2003), various hormonal contraceptives “downregulate normal steroid release in the ovaries (as indicated by the attenuated T, E, and P levels observed in OC women) and may thus interfere with normal endocrine responses to motivationally arousing stimuli” (p. 300). While it has been reported that HC users’ preferences for masculinity in potential mates does not fluctuate (since there is no longer a fertile phase), this finding does have a caveat. There is a direct relationship between levels of testosterone in a woman’s saliva and her preference for physical displays of masculinity in potential mates (Welling et al., 2007). Liening et al. (2010) replicated past results and reported that women using oral contraceptives have lower levels of testosterone compared to naturally cycling non-users. It therefore cannot

be concluded that the changes in mate preferences in HC users result only from the eradication of the natural cycle. These changes are also likely due to the specific compositions of different hormonal contraceptives. Therefore, there is likely variation among all HC users in regard to testosterone levels, and consequently, mate preferences.

There is a direct relationship between levels of synthetic estradiol and levels of jealous behavior in women. The dosage of synthetic estradiol “positively predicts mate retention-behavior frequency” in HC users (Welling et al., 2012, p. 114). Interestingly, there is no relationship between progestin and levels of jealousy *or* levels of mate retention-behavior in HC users. Cobey et al. (2011) reported that women on HC that contain comparatively high levels of ethinyl estradiol display high levels of self-reported jealousy. This relationship has not been found for combined HC (estrogen and progestin).

The Present Study

There are significant questions about women on hormonal contraceptives that have yet to be directly examined. Also, since the research on the connection between hormonal contraception and sexuality and aggression has produced mixed results, I strived to examine those relationships in a more specific context. I hypothesized that women on hormonal contraceptives would display a constellation of dispositional and behavioral traits that are different from those of normally cycling women. The traits I was specifically interested in examining included life history strategy, sociosexuality, intrasexual competition, social support and risk-taking behavior. I chose these specific variables due to the vague results of past research. The connections between HC and aggression, sexuality, etc. remain unclear. I believe the variables I chose to study (e.g., sociosexuality) are more manageable compared to the broader traits examined in previous

research (e.g., sexuality). For example, sociosexuality is very definable and is one core aspect of an individual's sexuality. A female's sexuality is multifaceted. It includes elements such as libido, sexual orientation, sexual health and function. Past research on sexuality has been criticized due to not having strict enough controls in order to account for such complexity. I examined one factor of one's sexuality (sociosexuality), so as not to make one general statement about the broader trait of sexuality. My hypotheses can be found in Appendix A. For all of my hypotheses, I predicted that the largest and most significant differences would be found between HC users that are not menstruating and non-users that are ovulating.

Life History Strategy

According to life history theory, the allocation of an individual's resources and energy are indicative of one's mating patterns, sociosexuality, social support systems and risky behavior. All reproducing species can be categorized as either K-selected or R-selected. *K-selected* implies a species requires high parental investment in order to be reproductively successful. Conversely, *R-selected* implies a species has high reproductive rates and that low paternal investment is required for offspring to reach sexual maturity. Humans are highly K-selected, for the most part. To account for individual variation among humans, the K is broken down further into the *Differential K*. People can either have a low-K life history strategy or have a high-K life history strategy. A low-K is indicative of impulsive behavior, a short-term mating pattern, a relatively unrestricted sociosexuality, little social support and a higher display of risky behavior when compared to high-K individuals. High-K is indicative of selective and long-term mating patterns, a relatively restricted sociosexuality and high social support. An individual's life history

strategy is dependent upon the amount of paternal investment that is necessary to produce offspring who will be able to successfully reproduce (Figueredo et al., 2006). Relevant past research led me to hypothesize that women using HC will present a slower life-history strategy (High-K) than non-users. The following variables have a direct connection to life-history strategy.

Sociosexuality

Sociosexuality can be defined as the tendency an individual has to engage in casual, unattached sexual behavior with many partners (Simpson & Gangestad, 1991). I hypothesized that HC users would display a relatively restricted sociosexuality in comparison to non-users. My position stemmed from the previous research findings of HC users displaying higher levels of jealousy compared to non-users, higher levels of mate-retention behavior compared to non-users and the disappearance of peak fertility preferences for masculinity. One's sociosexuality can be broken down into three separate components- attitude, behavior and desire.

Intrasexual Competition

Intrasexual competition can be defined as the competition among same-sex individuals over status (Griskevicius et al., 2009) and potential mates. Women are more apt to use indirect forms of aggression (e.g., social exclusion) rather than direct aggression (e.g., punching). According to an evolutionary perspective, the use of indirect aggression by women when competing against other women is more cost-effective than using direct aggression (Griskevicius et al., 2009). When competing for a mate with other females, a woman is likely to try to improve her appearance (Buss, 1988). Intrasexual

competition is directly related to jealousy and aggression, and was therefore an appropriate measure to include in the current study.

Social Support

Social support can be viewed as the support one receives from his or her family, friends and significant other (Zimet, Dahlem, Zimet & Farley, 1988). Previous research has found that HC users report having a larger number of sexual partners compared to naturally cycling women (Welling et al., 2012; Little, Jones, Penton-Voak, Burt & Perrett, 2002). It is therefore possible that HC users are more likely to be in a romantic relationship when compared to non-users. Consequently, HC users would likely report having more social support relative to non-users. To my knowledge, the potential difference in perceived social support among HC users and non-users has never been examined and was therefore included as a measure in the current study.

Risk-taking Behavior

Naturally cycling women display decreased levels of risk-taking behavior during estrus (Bröder & Hohmann, 2003). The researchers reported that women on hormonal contraception did not display changing levels of risk-taking behavior. To more thoroughly examine the relationship between risk-taking behavior and HC use, I wanted to use measures that tap reproductively-relevant behaviors. Recent research has posited that risk-taking behavior is domain specific (Kruger, Wang, & Wilke, 2007). The same “risky behavior” can hold different costs and benefits to a man versus a woman due to sex-differentiated reproductive strategies. Therefore, Kruger et al. developed a risk-taking scale for five separate *evolutionarily valid* domains. These measures include a within-group competition risk-taking scale, a between-group competition risk-taking scale, a

mating and resource allocation for mate attraction risk-taking scale, an environmental risks risk-taking scale and a fertility risks risk-taking scale. These scales were used in the current study to examine the relationship between HC use and evolutionarily relevant risky behavior.

Implications

This research has led to a taxonomy of relationships between hormonal contraceptive use and important psychological outcomes. I wanted to determine if there are statistically significant differences between HC users and non-users regarding the aforementioned traits. Having a high proportion of females who are on hormonal birth control can lead to various societal outcomes, such as changes in social support systems and interactions, social networks and levels of conflict, competition, and aggression in interpersonal relationships.

Additional Research Question

An important background variable, penetrative vaginal intercourse (PVI), was included in this research as it may potentially relate to the primary hypotheses. Given the research design, it was feasible to examine the independent effects of this variable as it relates to the suite of dependent variables. In the results, a post-hoc analysis designed to examine this variable and its relationship to the dependent variables was conducted.

METHOD

Participants

A total of 641 participants took the survey. After filters were utilized in analyses, 435 participants were included in the current study. All subjects were at least 18 years old and female. All data collected was anonymous.

Measures

The survey included questions regarding the gender, sexuality, sexual history, hormonal contraception use, non-hormonal birth control use, relationship status and medication use of the participants. These questions can be seen in Appendix B. The following scales were also included in the survey. The mini-K from the Arizona K-Battery (Figueredo, 2007) ($\alpha = .70$) can be found in Appendix C. This measure examines life-history strategy. The Revised Sociosexual Orientation Inventory (SOI-R) (Penke & Asendorpf, 2008) ($\alpha = .83$) can be found in Appendix D. This scale examines three different components of one's sociosexuality; including relevant behavior, desire and attitude. The Scale for Intrasexual Competition (Buunk & Fisher, 2009) ($\alpha = .88$) can be found in Appendix E. This scale is reliable cross-culturally in measuring individual variation in intrasexual competition. The Multidimensional Scale of Perceived Social Support (Zimet, Dahlem, Zimet & Farley, 1988) ($\alpha = .88$) can be found in Appendix F and examines participants' social support systems. The various domain-specific risk-taking scales (Kruger et al., 2007) can be found in Appendix G. By using these measurements, I was able to appropriately examine specific domains of risk-taking behavior.

Procedures

Participants accessed the survey on the website SurveyMonkey® (surveymonkey.com). Participants were recruited through SUNY New Paltz campus listservs, email solicitations, and social media (including Facebook®). The survey took about 20-30 minutes to complete.

RESULTS

The data collected from SurveyMonkey[®] were analyzed with SPSS/PASW[®] Version 18. Analyses are presented in the following manner: First, (a) a one-way ANOVA was computed with an 8-level independent variable; next, (b) a one-way ANOVA was computed with a 3-level independent variable; next, (c) for each dependent variable, with hormonal contraception use as the independent variable, an independent-samples t-test was computed; next, (d) for each dependent variable, with hormonal contraception use and ovulatory phase as the independent variable, an independent-samples t-test was computed; and lastly, (e) for each dependent variable, with penetrative vaginal intercourse as the independent variable, an independent-samples t-test was computed.

Dependent Variables

All dependent variables were converted to composite scores based on the scoring algorithms provided by the authors of each measure. The full list of dependent variables can be seen in Table 1.

Table 1: Dependent Variables

Dependent Variable	Number of Items	Range of Actual Scores
Life History Strategy¹	20	60-140
Sociosexuality (Composite)	9	9-71
SOI-R Behavior Facet	3	3-24
SOI-R Attitude Facet	3	3-27
SOI-R Desire Facet	3	3-27
Objective Mate Value	8	8-56
Perceived Social Support	12	12-84
Intrasexual Competition	12	12-73
Environmental Risks Subscale	3	3-15
Fertility Risks Subscale	3	3-15
Mating and Resource Allocation Risks Subscale	3	3-12
Within Group Competition Risks	3	3-15
Between Group Competition Risks Subscale	3	3-15

For all variables except for life history strategy, relatively high scores correspond to more of the construct;

¹For the life history strategy measure, higher scores correspond to a relatively slow life history approach.

Reliability

To check for internal consistency in the scales used, I analyzed each scale for Cronbach's alpha. If Cronbach's alpha is about .7 or higher for a scale, based on conventions within the field, we can assume that the measures have internal consistency.

The values can be seen in Table 2.

Table 2: Cronbach's Alpha for Dependent Variables

Scale	Number of Items	Format	α
Mini-K	20	7 point Likert scale	$\alpha = .73$
SOI-R Inventory	9	9 point scale	$\alpha = .62$
SOI-R Behavior Facet	3	7 point Likert scale	$\alpha = .76$
SOI-R Attitude Facet	3	7 point Likert scale	$\alpha = .83$
SOI-R Desire Facet	3	7 point Likert scale	$\alpha = .87$
Objective Mate Value	8	7 point Likert scale	$\alpha = .51$
Intrasexual Competition	12	7 point Likert scale	$\alpha = .90$
Perceived Social Support	12	7 point Likert scale	$\alpha = .92$
Evolutionarily-relevant Risk-taking	15	5 point Likert scale	$\alpha = .83$
Environmental Risks Subscale	3	5 point Likert scale	$\alpha = .43$
Fertility Risks Subscale	3	5 point Likert scale	$\alpha = .78$
Mating and Resource Allocation Risks Subscale	3	5 point Likert scale	$\alpha = .42$
Within Group Competition Risks	3	5 point Likert scale	$\alpha = .50$
Between Group Competition Risks Subscale	3	5 point Likert scale	$\alpha = .59$

Filters

Various filters were used in all analyses. Pregnant women, breastfeeding women, menopausal, pre-menopausal and peri-menopausal women were filtered out of the analyses. Any participant who did not report gender as female was filtered out. Any participant who reported having had a hysterectomy, tubal ligation, or any other form of surgery that would prevent ovulation was filtered out. In regards to women who were using hormonal contraception at the time that the survey was taken, those who had been on HC for less than 3 months or have changed their HC in the past three months or who do not regularly take their HC were filtered out. Women who reported that their menstrual cycle is unpredictable or usually irregular were filtered out. To further control

for cycle normality, I also filtered out women who reported that they normally experience less than 22 days or more than 34 days in between their menstrual cycles.

Hormonal Status Variable (8-Level Version): One-way ANOVA

Participants' menstrual cycle positions were calculated using the forward count method (Chavanne & Gallup, 1998). This method places participants in one of eight groups; HC user who is menstruating and in the normal cycle length range, HC user who is not menstruating and in the normal cycle length range, HC user who is not menstruating and not in the normal cycle length range, Non-HC user who is menstruating and in the normal cycle length range, Non-HC user who is postmenstrual and in the normal cycle length range, Non-HC user who is in the ovulatory phase and in the normal cycle length range, Non-HC user who is premenstrual and in the normal cycle length range, and Non-HC user who is not in the normal cycle length range.

Once these eight levels were created, one-way ANOVAs were performed for each dependent variable. There was one independent variable, HC use and menstrual cycle position (according to the forward count method) with eight levels (listed above). The dependent variables used can be seen in Table 1. A one-way ANOVA was the appropriate test to see how participants differed on the dependent variables according to their menstrual cycle position and HC use. It was hypothesized that HC users would display a relatively slow life history strategy, restricted sociosexuality, a lower level of intrasexual competition and less risky behavior when compared to naturally cycling women. It was also predicted that these differences would appear as subtly different throughout the phases of the menstrual cycle. Specifically, naturally-cycling women in the ovulatory phase were predicted to be the most different from HC users. There was

one significant result from this analysis. Non-HC users who were in the ovulatory phase scored lower ($M = 5.56, SD=2.30$) than non-HC users who were in the postmenstrual phase ($M = 7.70, SD = 3.21$) on the Between-Group Competition Subscale of the Evolutionarily Valid Domain-Specific Risk-Taking Scale $F(7, 406) = 2.064, p < .05$. From the Tukey Post-Hoc test, this relationship was significant at $p < .05$. All results can be seen in Table 3.

Table 3: One-way ANOVA Results

Dependent Variable	Independent Variable	n	Mean	Standard Deviation	df	F
Life History Strategy	HC M	34	108.41	10.17	7, 402	.45
	HC not M	151	106.92	11.24		
	HC not M not NCLR	22	106.23	13.84		
	Non HC M	33	105.88	11.98		
	Non HC Post M	37	106.54	13.24		
	Non HC Ovul	35	105.37	11.96		
	Non HC Pre M	60	105.70	11.99		
	Non HC not NCLR	38	104.00	15.68		
SOI-R Inventory	HC M	34	34.97	13.21	7, 416	.74
	HC not M	153	31.97	12.40		
	HC not M not NCLR	22	29.23	12.08		
	Non HC M	35	32.26	12.45		
	Non HC Post M	40	34.50	13.73		
	Non HC Ovul	38	32.42	14.63		
	Non HC Pre M	64	34.53	15.19		
	Non HC not NCLR	38	33.89	12.15		
SOI-R Desire Facet	HC M	35	10.80	5.36	7, 426	1.42
	HC not M	157	9.43	5.46		
	HC not M not NCLR	23	7.83	4.36		
	Non HC M	36	10.14	5.10		
	Non HC Post M	40	9.88	5.84		
	Non HC Ovul	38	10.63	6.29		
	Non HC Pre M	65	11.32	6.12		
	Non HC not NCLR	40	9.85	5.56		
SOI-R Attitude Facet	HC M	35	15.77	7.01	7, 427	.32
	HC not M	157	15.00	6.66		
	HC not M not NCLR	23	14.78	7.19		
	Non HC M	36	14.75	6.04		
	Non HC Post M	41	16.10	7.67		
	Non HC Ovul	38	14.08	7.17		
	Non HC Pre M	65	15.15	7.21		
	Non HC not NCLR	40	15.33	7.16		
SOI-R Behavior Facet	HC M	34	7.97	4.30	7, 421	.54
	HC not M	155	7.38	4.16		
	HC not M not NCLR	22	7.14	4.38		
	Non HC M	35	7.31	3.74		
	Non HC Post M	41	8.15	5.16		
	Non HC Ovul	38	7.71	4.68		

	Non HC Pre M	64	8.09	4.68		
	Non HC not NCLR	40	8.50	4.64		
Objective Mate Value	HC M	34	37.26	10.84	7, 415	.62.
	HC not M	153	36.84	10.38		
	HC not M not NCLR	23	36.52	11.87		
	Non HC M	34	38.62	11.19		
	Non HC Post M	41	38.15	10.39		
	Non HC Ovul	38	34.61	9.92		
	Non HC Pre M	62	35.69	11.33		
	Non HC not NCLR	38	35.63	11.22		
	Perceived Social Support	HC M	32	73.88	9.56	7, 393
HC not M		141	71.50	11.57		
HC not M not NCLR		22	72.23	10.80		
Non HC M		31	67.10	12.59		
Non HC Post M		40	71.10	13.94		
Non HC Ovul		33	68.12	16.58		
Non HC Pre M		63	69.98	12.95		
Non HC not NCLR		39	72.26	12.89		
Intrasexual Competition	HC M	34	37.38	13.42	7, 404	1.23
	HC not M	146	34.99	13.30		
	HC not M not NCLR	22	33.95	9.38		
	Non HC M	33	31.70	13.87		
	Non HC Post M	40	34.43	14.31		
	Non HC Ovul	37	30.32	15.43		
	Non HC Pre M	63	32.71	14.29		
	Non HC not NCLR	37	37.14	15.85		
Environmental Risks Subscale	HC M	33	9.58	2.56	7, 405	.72
	HC not M	146	9.69	2.49		
	HC not M not NCLR	22	9.00	2.35		
	Non HC M	33	10.21	2.52		
	Non HC Post M	39	9.05	2.70		
	Non HC Ovul	36	9.53	2.73		
	Non HC Pre M	64	9.72	2.63		
	Non HC not NCLR	40	9.55	2.99		
Fertility Risks Subscale	HC M	33	4.33	2.65	7, 405	.71
	HC not M	146	4.71	2.45		
	HC not M not NCLR	22	4.91	2.65		
	Non HC M	33	4.06	1.73		
	Non HC Post M	39	5.10	2.99		
	Non HC Ovul	36	4.83	2.26		
	Non HC Pre M	64	4.88	2.43		
	Non HC not NCLR	40	5.00	2.67		
Mating and Resource Allocation Risks Subscale	HC M	33	5.21	2.22	7, 401	1.24
	HC not M	144	4.97	2.07		
	HC not M not NCLR	22	4.45	2.20		
	Non HC M	33	4.33	1.57		
	Non HC Post M	40	5.58	2.34		
	Non HC Ovul	36	5.28	2.08		
	Non HC Pre M	63	5.00	2.45		
	Non HC not NCLR	38	4.95	1.77		
Within Group Competition Risks Subscale	HC M	32	10.94	2.42	7, 402	1.47
	HC not M	145	10.17	2.49		
	HC not M not NCLR	22	9.32	2.36		
	Non HC M	33	11.06	2.76		
	Non HC Post M	38	10.32	2.33		
	Non HC Ovul	36	10.25	2.49		

	Non HC Pre M	64	10.44	2.34		
	Non HC not NCLR	40	10.75	2.59		
Between Group Competition Risks Subscale	HC M	33	7.24	2.82	7, 406	2.06*
	HC not M	147	6.72	2.77		
	HC not M not NCLR	22	6.00	2.27		
	Non HC M	32	6.59	2.31		
	Non HC Post M	40	7.70	3.21		
	Non HC Ovul	36	5.56	2.30		
	Non HC Pre M	64	6.52	2.83		
	Non HC not NCLR	40	6.60	2.99		

Key:

HC user who is menstruating and in the normal cycle length range labeled as *HC M*

HC user who is not menstruating and in the normal cycle length range labeled as *HC not M*

HC user who is not menstruating and not in the normal cycle length range labeled as *HC not M not NCLR*

Non-HC user who is menstruating and in the normal cycle length range labeled as *Non HC M*

Non-HC user who is postmenstrual and in the normal cycle length range labeled as *Non HC Post M*

Non-HC user who is in the ovulatory phase and in the normal cycle length range labeled as *Non HC Ovul*

Non-HC user who is premenstrual and in the normal cycle length range labeled as *Non HC Pre M*

Non-HC user who is not in the normal cycle length range labeled as *Non HC not NCLR*

* indicates $p < .05$

** indicates $p < .01$

*** indicates $p < .001$

Hormonal Status Variable (3-Level Version): One-way ANOVA

I condensed the eight levels discussed above into three levels to create a new independent variable. These new three levels include HC user, Non-HC user in the ovulatory phase, and Non-HC user not in the ovulatory phase. I called this new variable the Simple Categorical Variable. One-way ANOVAs were performed for each dependent variable. All dependent variables listed in Table 1 were used in these analyses. Because this independent variable has three levels, a one-way ANOVA was necessary to use to observe any existing differences among these three groups. There was one significant finding from this analysis. Normally cycling women in the ovulatory phase scored lower ($M = 5.56, SD = 2.3$) than both normally cycling women not in the ovulatory phase ($M = 6.82, SD = 2.89$) and HC users ($M = 6.73, SD = 2.74$) on the Between-Group Competition Subscale of the Evolutionarily Valid Domain-Specific Risk-Taking Scale $F(7, 406) = 2.064, p < .05$. I used the Tukey as a Post Hoc test. On the Between-Group Competition Subscale of the Evolutionarily Valid Domain-Specific Risk-Taking Scale, the

relationship between the Non-HC user in the ovulatory phase and the HC user approached significance, $p = .052$. The relationship between the Non-HC user in the ovulatory phase and the Non-HC user not in the ovulatory phase was significant at $p < .05$. All results can be seen in Table 4.

Recall that I predicted partnered HC users would display *higher* levels, and single HC users would display *lower* levels in intrasexual competition when compared to non-users. The one-way ANOVA addressing hormonal status and intrasexual competition was not significant (See Table 4). However, a follow-up factorial ANOVA, with hormonal status (three levels) and relationship status (partnered or not) as independent variables and intrasexual competition as the dependent variable revealed that hormonal status, in the context of this analysis, did have a significant main effect on intrasexual competition ($F(2, 382) = 3.12, p < .05$). This effect primarily stems from the fact that HC users ($M = 35.23, SD = 12.97$) and non-HC users not in the ovulatory phase ($M = 34.23, SD = 14.43$) were greater than the means for the non-HC users in the ovulatory phase ($M = 30.32, SD = 15.43$).

Table 4: One-way ANOVA Results

Dependent Variable	Independent Variable	n	Mean	Standard Deviation	df	F
Life History Strategy	HC User	207	107.09	11.33	2, 407	.88
	Non HC O	35	105.37	11.96		
	Non HC Not O	168	105.54	13.09		
SOI-R Inventory	HC User	209	32.17	15.53	2, 421	.89
	Non HC O	38	32.42	14.63		
	Non HC Not O	177	33.94	13.64		
SOI-R Desire Facet	HC User	215	9.48	5.37	2, 431	1.71
	Non HC O	38	10.63	6.29		
	Non HC Not O	181	10.44	5.74		
SOI-R Attitude Facet	HC User	215	15.10	6.75	2, 432	.51
	Non HC O	38	14.08	7.17		
	Non HC Not O	182	15.32	7.05		
SOI-R Behavior Facet	HC User	211	7.45	4.20	2, 426	.88
	Non HC O	38	7.71	4.68		
	Non HC Not O	180	8.04	4.60		
Objective Mate Value	HC User	210	36.88	10.57	2, 420	.76
	Non HC O	38	34.61	9.92		

	Non HC Not O	175	36.82	11.06		
Perceived Social Support	HC User	195	71.97	11.16	2,398	1.77
	Non HC O	33	68.12	16.58		
	Non HC Not O	173	70.24	13.11		
Intrasexual Competition	HC User	202	35.28	12.93	2,409	2.11
	Non HC O	37	30.32	15.43		
	Non HC Not O	412	33.86	14.57		
Environmental Risks Subscale	HC User	201	9.60	2.49	2,410	.02
	Non HC O	36	9.53	2.73		
	Non HC Not O	176	9.63	2.72		
Fertility Risks Subscale	HC User	201	4.67	2.50	2,410	.17
	Non HC O	36	4.83	2.26		
	Non HC Not O	176	4.80	2.52		
Mating and Resource Allocation Risks Subscale	HC User	199	4.95	2.11	2,406	.35
	Non HC O	36	5.28	2.08		
	Non HC Not O	174	4.99	2.16		
Within Group Competition Risks	HC User	199	10.20	2.49	2,407	1.25
	Non HC O	36	10.25	2.49		
	Non HC Not O	175	10.60	2.47		
Between Group Competition Risks Subscale	HC User	202	6.73	2.74	2,411	3.21*
	Non HC O	36	5.56	2.30		
	Non HC Not O	176	6.82	2.89		

Key

HC user is labeled as *HC User*

Non-HC user in the ovulatory phase is labeled as *Non HC O*

Non-HC user not in the ovulatory phase is labeled as *Non HC Not O*

* indicates $p < .05$

** indicates $p < .01$

*** indicates $p < .001$

Hormonal Status Variable (2 Level; A): Independent Samples T-test

To further examine if any differences exist between hormonal contraception users and naturally-cycling women, I performed an independent samples t-test. The independent variable was hormonal contraception use and had two levels, HC use and non-use. All dependent variables listed in Table 1 were used in this analysis. An independent-samples t-test was the appropriate analysis for this comparison because there was only one independent variable with two levels. There were two significant findings for this analysis. HC users scored lower ($M = 9.48$, $SD = 5.37$) than normally cycling women ($M = 10.47$, $SD = 5.82$) on the SOI-R Desire Facet subscale; $t(432) = -1.84$, $p < .05$ (one-tailed). $d = .18$. HC users scored higher ($M = 71.97$, $SD = 11.16$) than normally

cycling women ($M = 69.90$, $SD = 13.70$) on the Perceived Social Support scale; $t(399) = 1.66$, $p < .05$ (one-tailed). $d = .17$. All results can be seen in Table 5.

Table 5: Independent t-test Results

Dependent Variable	Independent Variable	n	Mean	Standard Deviation	df	t	d
Life History Strategy	HC User	207	107.09	11.33	408	1.32	.13
	Non-HC User	203	105.51	12.88			
SOI-R Inventory	HC User	209	32.17	12.53	422	-1.17	.11
	Non-HC User	215	33.67	13.80			
SOI-R Desire Facet	HC User	215	9.48	5.37	432	-1.84*	.18
	Non-HC User	219	10.47	5.82			
SOI-R Attitude Facet	HC User	215	15.10	6.75	433	-.01	.00
	Non-HC User	220	15.11	7.07			
SOI-R Behavior Facet	HC User	211	7.45	4.20	427	-1.26	.12
	Non-HC User	218	7.99	4.60			
Objective Mate Value	HC User	210	36.88	10.57	421	.43	.04
	Non-HC User	213	36.43	10.87			
Perceived Social Support	HC User	195	71.97	11.16	399	1.66*	.17
	Non-HC User	206	69.90	13.70			
Intrasexual Competition	HC User	202	35.28	12.93	410	1.49	.15
	Non-HC User	210	33.24	14.75			
Environmental Risks Subscale	HC User	201	9.60	2.49	411	-.05	.00
	Non-HC User	212	9.61	2.71			
Fertility Risks Subscale	HC User	201	4.67	2.50	411	-.57	.06
	Non-HC User	212	4.81	2.47			
Mating and Resource Allocation Risks Subscale	HC User	199	4.95	2.11	407	-.42	.04
	Non-HC User	210	5.04	2.15			
Within Group Competition Risks	HC User	199	10.20	2.49	408	-1.38	.14
	Non-HC User	211	10.54	2.47			
Between Group Competition Risks Subscale	HC User	202	6.73	2.74	412	.45	.05
	Non-HC User	212	6.60	2.84			

* indicates $p < .05$

** indicates $p < .01$

*** indicates $p < .001$

Hormonal Status Variable (2 Level; B): Independent Samples T-test

To further examine if any differences exist between hormonal contraception users and naturally-cycling women who are in the ovulatory phase, I performed an independent samples t-test among HC users and non-users in the ovulatory phase. The independent variable was hormonal contraception use and menstrual cycle position for non-users. It

had two levels, HC use and non-HC use in the ovulatory phase. All dependent variables listed in Table 1 were used in this analysis. An independent-samples t-test was the appropriate analysis for this comparison because there was only one independent variable with two levels. There were two significant findings from this analysis. HC users scored higher ($M = 35.28$, $SD = 12.93$) than normally cycling women in the ovulatory phase ($M = 30.32$, $SD = 15.43$) on the Intrasexual Competition Measure; $t(237) = 2.078$, $p < .05$. $d = 0.35$. HC users scored higher ($M = 6.73$, $SD = 2.74$) than normally cycling women in the ovulatory phase ($M = 5.56$, $SD = 2.30$) on the Between-Group Competition Risk-taking subscale; $t(236) = 2.42$, $p < .05$. $d = .46$. All results can be seen in Table 6.

Table 6: Independent t-test Results

Dependent Variable	Independent Variable	n	Mean	Standard Deviation	df	<i>t</i>	<i>d</i>
Life History Strategy	HC User	207	107.09	11.33	240	.82	.15
	Non-HC User	35	105.37	11.96			
	Ovul						
SOI-R Inventory	HC User	209	32.17	12.53	245	-.11	.02
	Non-HC User	38	32.42	14.63			
	Ovul						
SOI-R Desire Facet	HC User	215	9.48	5.37	251	-1.18	.20
	Non-HC User	38	10.63	6.29			
	Ovul						
SOI-R Attitude Facet	HC User	215	15.10	6.75	251	.85	.15
	Non-HC User	38	14.08	7.17			
	Ovul						
SOI-R Behavior Facet	HC User	211	7.45	4.20	247	-.35	.06
	Non-HC User	38	7.71	4.68			
	Ovul						
Objective Mate Value	HC User	210	36.88	10.57	246	1.23	.03
	Non-HC User	38	34.61	9.92			
	Ovul						
Perceived Social Support	HC User	195	71.97	11.16	226	1.70*	.27
	Non-HC User	33	68.12	16.58			
	Ovul						
Intrasexual Competition	HC User	202	35.28	12.93	237	2.08*	.35
	Non-HC User	37	30.32	15.43			
	Ovul						
Environmental Risks Subscale	HC User	201	9.60	2.49	235	.15	.03
	Non-HC User	36	9.53	2.73			
	Ovul						
Fertility Risks Subscale	HC User	201	4.67	2.50	235	-.38	.07
	Non-HC User	36	4.83	2.26			
	Ovul						

Mating and Resource Allocation Risks Subscale	HC User	199	4.95	2.11	233	-.85	.16
	Non-HC User	36	5.28	2.08			
	Ovul						
Within Group Competition Risks	HC User	199	10.20	2.49	233	-.11	.02
	Non-HC User	36	10.25	2.49			
	Ovul						
Between Group Competition Risks Subscale	HC User	202	6.73	2.74	236	2.42*	.46
	Non-HC User	36	5.56	2.30			
	Ovul						

Key

HC User in ovulatory phase labeled as *Non HC User Ovul*

* indicates $p < .05$

** indicates $p < .01$

*** indicates $p < .001$

Post-Hoc Analyses of Ancillary Independent Variable: Penetrative Vaginal Intercourse
(PVI)

To examine if any differences exist between virgins and non-virgins among the dependent variables, I performed an independent samples t-test. The independent variable was penetrative vaginal intercourse. It had two levels, virgin and non-virgin. All dependent variables listed in Table 1 were used in this analysis. An independent-samples t-test was the appropriate analysis for this comparison because there was only one independent variable with two levels. There were various significant findings from this analysis. Virgins scored lower ($M = 25.59, SD = 10.76$) than non-virgins ($M = 33.63, SD = 13.25$) on the SOI-R Inventory, $t(417) = 3.58, p < .001, d = 0.67$. Virgins scored lower ($M = 8.65, SD = 2.47$) than non-virgins ($M = 9.73, SD = 2.59$) on the Environmental Risks Subscale of the Evolutionarily Valid Domain-Specific Risk-Taking Scale, $t(406) = 2.42, p < .05, d = 0.43$. Virgins scored lower ($M = 4.24, SD = 1.66$) than non-virgins ($M = 5.07, SD = 2.16$) on the Mating and Resource Allocation Risks Subscale of the Evolutionarily Valid Domain-Specific Risk-Taking Scale, $t(402) = 2.27, p < .01, d = 0.43$. All results can be seen in Table 7.

Table 7: Independent t-test Results

Dependent Variable	Independent Variable	n	Mean	Standard Deviation	df	<i>t</i>	<i>d</i>
Life History Strategy	Virgins	39	108.69	12.46	403	-1.23	.20
	Non-Virgins	366	106.19	12.05			
SOI-R Inventory	Virgins	37	25.59	10.76	417	3.58***	.67
	Non-Virgins	382	33.63	13.25			
SOI-R Desire Facet	Virgins	38	10.39	5.77	427	-.475	.08
	Non-Virgins	391	9.94	5.61			
SOI-R Attitude Facet	Virgins	40	11.13	6.06	428	3.87***	.67
	Non-Virgins	390	15.49	6.86			
SOI-R Behavior Facet	Virgins	41	3.66	2.30	422	6.52***	1.29
	Non-Virgins	383	8.17	4.37			
Objective Mate Value	Virgins	39	27.64	11.98	416	5.76***	.90
	Non-Virgins	379	37.66	10.18			
Perceived Social Support	Virgins	36	67.28	15.99	394	1.91	.29
	Non-Virgins	360	71.41	11.95			
Intrasexual Competition	Virgins	37	34.49	14.05	405	-.046	.01
	Non-Virgins	370	34.38	13.92			
Environmental Risks Subscale	Virgins	37	8.65	2.47	406	2.42*	.43
	Non-Virgins	371	9.73	2.59			
Fertility Risks Subscale	Virgins	37	4.73	2.05	406	.02	.00
	Non-Virgins	371	4.74	2.53			
Mating and Resource Allocation Risks Subscale	Virgins	37	4.24	1.66	402	2.27*	.43
	Non-Virgins	367	5.07	2.16			
Within Group Competition Risks	Virgins	35	9.77	2.47	403	1.54	.27
	Non-Virgins	370	10.45	2.48			
Between Group Competition Risks Subscale	Virgins	36	6.36	2.49	407	.73	.14
	Non-Virgins	373	6.72	2.81			

* indicates $p < .05$

** indicates $p < .01$

*** indicates $p < .001$

DISCUSSION

This research was generally designed to examine differences in behavioral and dispositional traits among hormonal contraceptive users and naturally cycling women. To address these concepts, several dependent variables, which represent facets of life history and mating strategies, were included. The general predictions were that HC users would display traits indicative of a slower life history strategy.

Life History Strategy

I hypothesized that women on HC would display a slower life history approach than naturally cycling women. The data were trending in this direction, but no results were significant. Given the large sample size included here, this general pattern suggests that life history strategy, measured via self-report means, may not relate importantly to levels of hormonal contraception use.

Sociosexuality

I hypothesized that HC users would display a more restricted sociosexuality relative to naturally cycling women. This hypothesis was somewhat supported by the results. HC users reported having a more restricted sociosexuality on the Desire subscale of the Sociosexuality Inventory when compared to non HC users. This implies that naturally cycling women have a higher desire in terms of their sociosexuality.

In a controlled study, Graham et al. (2007) found that women on a specific hormonal contraceptive (a blend of norgestimate and progestagen) experienced negative effects on their sexual desire from hormonal contraceptive use. Interestingly, it was only desire that was affected and not actual sexual behavior. The authors explained this

specific effect to be due to the fact that androgens in females affect only sexual desire and not sexual responses. This finding is consistent with the finding of the current study.

When examining sociosexuality, it is imperative to consider the various roles of hormones. A recent review of 36 studies examining combined oral contraceptive (OC) use and sexual desire reported that HC users' libido decreased only when the users were specifically using birth control pills containing 15 mg ethinylestradiol (Pastor, Holla, & Chmel, 2013). While most combined OC users did not display a significant change in their sexual desire, the authors report that in most studies they reviewed, a decline in the plasma levels of free testosterone in combined OC users was detected. This decline is caused by the increasing level of sex hormone binding globulin. One would assume that this specific change in hormones would decrease a combined OC user's libido. However, it cannot be said whether or not this is the case. The exact action of free testosterone levels on a woman's sexuality is still unclear (Dougherty et al., 1997). However, when the level of free testosterone drops to a specific point, there is a direct effect on a female's sexual desire (Pastor, Holla & Chmel, 2013). Interestingly, levels of testosterone can also be affected by one's sociosexuality. In a recent study, men and women who reported a relatively restricted sociosexuality displayed lower levels of testosterone compared to those who reported a relatively unrestricted sociosexuality (Edelstein, Chopik, & Kean, 2011). This finding is an important aspect to consider when making connections between HC use and sexuality. Such a finding is also a good reminder of just how complex sociosexuality is. According to Goldey and van Anders (2011), "women can influence their T levels by simply thinking sexual thoughts" (p. 760). The authors were referring to their finding that naturally cycling women displayed an increase in their testosterone

levels after thinking sexual thoughts versus stressful thoughts. Surprisingly, the authors reported that HC users saw the reverse happen- a decrease in testosterone levels after thinking sexual thoughts versus stressful thoughts.

Intrasexual Competition

I hypothesized that partnered HC users would display higher levels of intrasexual competition when compared to naturally cycling women. I also predicted that single HC users would display lower levels of intrasexual competition relative to non-users. Overall, women using HC reported to be more intrasexually competitive compared to normally cycling women in the ovulatory phase.

As discussed earlier in the introduction, HC users display a higher frequency of mate retention tactics than naturally cycling women (Welling et al., 2012; Geary et al., 2001). Partnered HC users also report to have higher levels of jealousy than non-users (Cobey et al., 2012). This information may help explain the finding from the current study. It's possible that HC users reported to be more intrasexually competitive than non-users partly due to their relatively high levels of jealousy and greater utilization of mate-retention tactics.

Griskevicius et al. (2009) reported that aggressive behavior is context-specific. Once potential costs and benefits are determined, the 'correct' aggressive behavior will be implemented. For example, the researchers reported that women displayed direct aggression when competing for scarce resources. When women were competing for status, though, indirect aggression was used. Direct aggression is more costly than indirect aggression for females. Therefore, the female participants determined that direct

aggressive behavior was necessary in order for the benefits to outweigh the costs in the first situation mentioned above.

Sociosexuality is greatly related to intrasexual competition. Guillermo, Manlove, Gray, Zava and Marrs (2010) discovered that women using oral hormonal contraceptives reported consistently *higher* levels of physical attraction, social attraction, general attraction, social interest and sexual interest across the menstrual cycle compared to naturally cycling women. Such results fall in line with Welling et al.'s (2012) finding that women using oral hormonal contraceptives displayed a higher desire to participate in short-term sexual relationships across the cycle when compared to non-HC users. Welling et al. (2012) and Little, Jones, Penton-Voak, Burt and Perrett (2002) reported that HC users reported having a larger number of sexual partners when compared to non-users. If women who are using HC are more interested in engaging in sexual flings than naturally cycling women, it could be implied that HC users would be seeking a higher frequency of mates compared to normally cycling women. Therefore, it would make sense that HC users would display a higher level of intrasexual competition when compared to non-HC users.

Intrasexual competition among females also serves aspects of behavior not related to mating. For example, Rosvall (2011) reports that when food is scarce, female intrasexual aggression is observed more frequently. The author posits that pregnant women and mothers may especially be affected by food scarcity due to maternal investment. Observations of other mammals support this notion. Among various mammals, aggression among females is highest when females are pregnant or lactating.

HC users are in a state of mimicked pregnancy. This may partly explain why HC users in the current study reported to be more intrasexually competitive than non-users.

Social Support

I posited that HC users would report having better social support systems when compared to non-users. This prediction was supported by the results. Part of my reasoning for this hypothesis stemmed from the past finding that HC users report having had more sexual partners than non-users (Welling et al., 2012; Little, Jones, Penton-Voak, Burt & Perrett, 2002). Having more sexual partners could lead to more romantic relationships which in turn could imply the potential for more social support. It is also possible that women who have had more sexual partners are more extroverted. Being more extroverted implies having a larger social network. Extroversion, therefore, may act as a mediator between HC use and social support.

There is also the question of a priori differences among HC users and non-users. As mentioned in the introduction, past research has found inconsistent results in regard to pre-existing differences in personality traits among HC users and naturally cycling women. In a study that examined discontinued HC use, it was found that once-users who chose to discontinue their HC use differed from those women who chose to stay on their hormonal contraceptive on various psychological traits (Borgström, Odland, Ekselius & Sundström-Poromaa, 2008). Women who chose to stop their HC use were more *mistrustful* and *detached* than those women who stayed on their hormonal birth control. Both of these traits fall under the larger domain of neuroticism (in the Swedish universities Scales of Personality). This finding sheds some light on the current study's result that HC users reported to have better social support systems than non-users.

Risk-taking Behavior

It was hypothesized that HC users would display less risky behavior when compared to non-users. Interestingly, HC users displayed higher levels of between-group competition risk-taking when compared to normally cycling women in the ovulatory phase. Among naturally cycling women, those in the ovulatory phase scored lower on this same measure relative to naturally cycling women *not* in the ovulatory phase. Between-group competition serves to protect oneself and one's in-group from any out-group threat (Kruger & Wilke, 2007). The more risky an individual is in this domain, the more likely she will engage in between-group competition.

Cross (2010) reported that "risky impulsivity" may likely be a "common cause" of both intrasexual aggression and sociosexuality. Cross posited that due to selective pressures, men and women's risky impulsivity developed differently. The author conjectured that females may have adapted to display low levels of impulsivity compared to males. Behaving less impulsively would lead to lower levels of intrasexual competition which would result in a more restricted sociosexuality. Such behavior could be considered beneficial in our evolutionary past since it would put women in less dangerous situations. This notion sheds some light on the current study. Naturally cycling women reported to engage in less between-group competition risky behavior compared to HC users. Naturally cycling women (in the ovulatory phase) also reported to engage in less intrasexual competition compared to HC users. However, naturally cycling women reported having a higher sociosexual desire when compared to HC users. It could be inferred that the use of hormonal contraception may alter the adaptive qualities of certain dispositional and behavioral tendencies that have developed over our evolutionary

history. Little et al.'s (2002) research supports this notion. As discussed earlier, preferences for masculinity in potential male mates is considered adaptive. This preference for masculinity is not present in hormonal contraceptive users. The authors therefore posit that the "use of oral contraception appears to disrupt potentially adaptive preferences" (p. 1,099).

Post-Hoc Analysis of Ancillary Independent Variable: Penetrative Vaginal Intercourse
(PVI)

Participants who reported never engaging in penetrative vaginal intercourse (virgins) scored significantly lower on the SOI-R Inventory, SOI-R Attitude Facet and SOI-R Behavior Facet compared to those participants who have engaged in penetrative vaginal intercourse (non-virgins). These results are rather obvious due to the nature of the predictor variable. Another obvious yet interesting finding from the current study is that those who have not engaged in penetrative vaginal intercourse scored lower on the objective mate value measure compared to those who have engaged in penetrative vaginal intercourse. In other words, virgins in the current study perceived themselves to be as less valuable potential mates compared to non-virgins.

According to Buss (1988), one of the four elements of intrasexual competition among humans is the ability to locate potential mates. In order to find a mate, a woman must venture into environments that are often visited by men. It can be assumed that at one point, these environments are new to the mate-searching female. In other words, these mate-populated areas were previously never visited before. It can therefore be inferred that the women that venture into these new territories are engaging in riskier behavior when compared to women who are not adventuring into these new areas. This

notion adds clarity to the finding of the current study in which virgins reported to being less risky in both the environmental risks domain and the mating and resource allocation risks domain when compared to non-virgins.

Implications Regarding Society

To reiterate, my main goal was to add to the existing information available on hormonal contraception and relevant behavioral and psychological traits associated with HC use. Ovulatory status and hormonal contraception use may not affect such major variables as life history strategy as much as predicted. However, the desire component of one's sociosexuality, one's perceived social support and intrasexual competitive behavior appear to be somewhat related to hormonal contraception use and ovulatory status. While these variables are potentially also somewhat associated with a priori differences among HC users and non-users, the findings of the current study are significant in that they add to the existing literature on hormonal contraception use and their association with psychological and behavioral traits.

Strengths and Limitations

A limitation to the current study is the between-subjects design. Research on women and the ovulatory cycle is criticized for its assumption that all women share the proposed 'normal cycle' so often referred to in relevant literature (Harris & Vitzthum, 2013). The current study would have greatly benefitted from a within subjects design. The current study would have also benefited from the use of biological specimens. All data were gathered from self-report measures. This is a rather crude method to pinpoint where a woman is in her cycle. Relying on the self-reports of women to gauge where they are in their menstrual cycle has been criticized for being unreliable. Also, due to the

nature of the statistical analyses utilized when using ovulatory cycle position as a grouping variable, only women who fall into the defined “normal” range can be used in analyses. While this makes for a useable data set, it removes women who are not deemed as “normal,” while they are in fact just as normal as the women used. Consequently, the female participants examined in this line of research are not as representative of a real-world sample as they could be.

I had originally planned on examining the role of the different hormonal agents (progestin, estrogen and a combination of the two) among HC users. However, the vast majority of the HC users were using a combined hormonal contraceptive. Consequently, there was not enough variability in the different kinds of HC to address the three different groups. This was therefore a limitation in the current study.

When a measure has a Cronbach’s alpha of about .7 or higher, the scale is considered to have internal consistency. While the measures used in the current study were found to be validated and reliable in prior studies, several of these scales’ internal consistency scores fell below .70 in the current study. These values can be seen in Table 2. While these relatively low alphas can be considered a limitation to the current study, it is important to consider the statistical procedure known as correction for attenuation. According to this concept, correlations with variables that are low in internal reliability may actually represent larger “real world” correlations (as low scale reliability has the effect of, overall, lowering correlations between variables with one another).

A strength in the current study is the large sample size. I was able to use rather strict filters and still use most participants’ data. Women who fell into a ‘normal’ cycle length (as deemed by most past research) were the only participants used.

Implications and Future Research

As mentioned earlier, it would be beneficial to replicate the current study using a within-subjects design. I had also been interested in examining how pregnant women and post-menopausal women would compare to HC users and reproductively-able naturally cycling women. The number of participants that fit those characteristics, however, was too small to do any analyses. I believe it would be of great interest to examine these populations among HC users and naturally cycling women in the future.

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APPENDICES

Appendix A

Specific Variables and Predictions of Women on Hormonal Contraception

<i>Variable</i>	<i>Prediction</i>	<i>Basis</i>	<i>Scale</i>
Life History Strategy	I predicted HC users would display a slower life history strategy (High-K) than non-users.	Possible decreased sexuality	Arizona K-Battery (Figueredo, 2007)
Sociosexuality	I predicted HC users would display lower levels of sociosexuality when compared to non-users.	Peak preferences for masculinity disappears in HC users, higher levels of jealousy and mate retention behavior in HC users than non-users, possible decreased sexuality	Revised Sociosexual Orientation Inventory (SOI-R) (Penke & Asendorpf, 2008)
Intrasexual Competition	I predicted <u>partnered</u> HC users would display <i>higher</i> levels, and <u>single</u> HC users would display <i>lower</i> levels in intrasexual competition when compared to non-users.	Higher levels of jealousy, higher levels of mate retention behavior	Scale for Intrasexual Competition (Buunk & Fisher, 2009)
Female Social Support	I predicted HC-users would report better social support systems than non-users.	High-K, High levels of jealousy in HC users	Multidimensional Scale of Perceived Social Support (Zimet, Dahlem, Zimet & Farley, 1988)
Risk-taking Behavior	I predicted HC users would display lower levels of risky behavior than non-users.	Slower life history strategy	Evolutionary Psychology Relevant Risk-taking Scale (Kruger et al., 2007)

Appendix B

Questions given to all participants (answer options are shown in parentheses and italicized):

1. Which country do you currently reside in? (*The United States of America, Canada, Israel, Other*)
2. What is your nationality? (*American, Israeli, Canadian, Other*)
3. Which language do you consider to be your primary language? (*English, Hebrew, Other*)
4. Please indicate your age (in years). (*18-100*)
5. Are you currently a college student? (*Yes, No*)
6. Are you currently employed? (*No, Yes I am employed full-time, Yes I am employed part-time*)
7. Please indicate your current relationship status. (*Single, In an uncommitted sexual relationship, In a committed romantic relationship, Engaged, Married, Separated/Divorced, Widowed, Other*)
8. Please indicate your sexual orientation. (*Heterosexual, Homosexual, Bisexual, Asexual, I choose not to answer this question, Other*)
9. Please indicate your sex. (*Male, Female, I choose not to answer this question, Other*)
10. Do you have any children? (*Yes I have a biological child/children, Yes I have a stepchild/children, Yes I have an adopted child/children, No I do not have any children*)
11. Are you pregnant? (*Yes I am pregnant, No I am not pregnant, I am not sure*)
12. If you are pregnant, how many WEEKS are you INTO your pregnancy? If you are NOT pregnant, please select the answer “Not pregnant.” (*Not pregnant, 1-42*)
13. Are you currently breastfeeding? (*Yes I am breastfeeding, No I am not breastfeeding*)
14. Have you gone through menopause, or are pre or peri menopausal? (*Yes, No*)
15. Have you had a hysterectomy, tubal ligation, or any other forms of surgery that would prevent ovulation/pregnancy? (*Yes, No*)
16. Using the calendar provided, please try to identify the FIRST DAY (the start) of your last menstrual cycle. It is very important that you are as ACCURATE as possible. (e.g., February 10, 2013) (If you are currently menstruating, report the date that you STARTED menstruating). (*open-ended*)
17. Using the calendar provided, please try to estimate when you expect your next menstrual cycle TO START. (e.g., March 16, 2013). (*open-ended*)
18. Are you currently menstruating? (*Yes I am currently menstruating, No I am not menstruating, Yes but I am at the very beginning of the menstruating, Yes but I am at the very end of menstruating*)
19. Is your menstrual cycle regular? (*(1) it is unpredictable, (2) it is usually irregular, (3) it is regular most of the time, (4) it is highly regular*)

20. On average, what is the average length in days IN BETWEEN your menstrual cycles? (22-36, *option of other*)
21. How old were you when you first had your period? (7-17, *option of other*)
22. Are you on any of the following medications or have you used any of the following medications in the last 6 months? Please choose as many as are applicable to you. (*Antibiotics, Anti-depressants, Anti-epileptics, Mood stabilizers, Steroids, Thyroid medication, None of the above*)
23. Have you taken any medication in the past 6 months that may affect your mood (NOT including hormonal contraception)? (*Yes, No*)
24. If you answered yes to the previous question, please specify which medication(s) you have taken in the past 6 months which may affect your mood. (*open-ended*)
25. In the last 2 years, what PERCENTAGE of that time would you say you using a hormonal contraceptive? (e.g., 25%) (*0%-100%*)
26. Please indicate whether you have used each of these methods. (You may select all that apply) (*Male condoms, Female condoms, Diaphragm caps or shields, Spermicides, Intrauterine device (IUD), Dental dams, Fertility awareness method, Withdrawal, Outercourse, Partner has had a vasectomy (male sterilization), I have had a tubal ligation (female sterilization), Other*)
27. Have you engaged in vaginal intercourse? (*Yes, No, Unsure, Other*)
28. If you answered YES to the last question, meaning you HAVE engaged in vaginal intercourse, please answer the following question. What age were you when you first had vaginal intercourse? (Please answer in terms of YEARS, e.g., 12 years) (*open-ended*)
29. How many people have you engaged in vaginal intercourse with? (*0-100, more than 100*)
30. In the last 2 years, what PERCENTAGE of that time would you say you were in a committed romantic relationship? (e.g., 10%) (*0%-100%*)
31. Are you currently using hormonal contraception? (such as: birth control pills (combined hormone), progestin-only birth control pills (POPs), the patch (Ortho-Evra), the ring (NuvaRing), the shot (Depo-Provera) and implants (Norplant). NOTE: condoms are not a form of hormonal contraception) (*Yes, No, I do not want to answer this*)
32. To the best of your knowledge, have you ever been cheated on by your partner while in a relationship? (*Yes, No, I have never been in a relationship, Other*)
33. Have you ever cheated with another person while in a relationship? (*Yes, No, I have never been in a relationship, Other*)
34. If you HAVE cheated on a partner in a relationship, were you caught cheating by your partner? (*Yes, No, I confessed that I cheated, I have never cheated, I have never been in a relationship, Other*)
35. Across all partners in your relationship history, on roughly how many occasions did you engage in cheating behavior? If you have never been in a relationship, choose "Not Applicable." (*Not Applicable, 0-100, More than 100*)

Questions for HC Users (answer options are shown in parentheses and italicized):

1. What type of hormonal birth control are you currently on (brand name, e.g., NuvaRing)? (*Alesse®*, *Aviane®*, *Brevicon®*, *Camilla®*, *Cerazette®*, *Cyclessa®*, *Demulen 1/35®*, *Demulan 1/50®*, *Depo Provera®*, *Errin®*, *Jolessa®*, *Jolivette®*, *Estring®*, *Levlen®*, *Levora®*, *Loestrin®*, *Loestrin Fe®*, *Lo-Ovral®*, *Low-Ogestrel®*, *Lybrel®*, *Micronor®*, *Mircette®*, *Mirena IUD®*, *Modicon®*, *Necon 1/35®*, *Necon 1/50®*, *Nelova 1/50®*, *Norinyl 1+50®*, *Norplant®*, *NuvaRing®*, *Ogestral®*, *Ortho-Cept®*, *Ortho-Cyclen®*, *Ortho Evra Patch®*, *Ortho-Micronor®*, *Ortho-Novum 1/35®*, *Ortho-Novum 1/50®*, *Ortho-Novum 7/7/7®*, *Ortho-Novum 10/11®*, *Ortho Tri-Cyclen®*, *Ortho Tri-Cyclen Lo®*, *Ovcan-50®*, *Ovral®*, *Ovrette®*, *Quasense®*, *Seasonale®*, *Seasonique®*, *Triphasil or Tri-Leven 21®*, *Yasmin®*, *Yaz®*, *Zovia 1/35®*, *Zovia 1/50®*)
2. How many MONTHS have you been on your current birth control for? (*Less than 1 month, 1-36, more than 3 years*)
3. Have you changed your type of birth control during the last 3 months- for example, by switching brands or dosage levels? (*Yes, No*)
4. Do you regularly take your hormonal birth control? (*Yes, No*)
5. About how many TIMES have you missed a dose of your hormonal birth control in the last 6 months (please answer with a whole number; e.g., 5)? (*0-100, more than 100*)
6. Have you tried other brands of hormonal birth control before? (*Yes, No*)
7. If you answered yes to the previous question, which hormonal contraceptive(s) have you used in the past (e.g., Loestrin)? (*Alesse®*, *Aviane®*, *Brevicon®*, *Camilla®*, *Cerazette®*, *Cyclessa®*, *Demulen 1/35®*, *Demulan 1/50®*, *Depo Provera®*, *Errin®*, *Jolessa®*, *Jolivette®*, *Estring®*, *Levlen®*, *Levora®*, *Loestrin®*, *Loestrin Fe®*, *Lo-Ovral®*, *Low-Ogestrel®*, *Lybrel®*, *Micronor®*, *Mircette®*, *Mirena IUD®*, *Modicon®*, *Necon 1/35®*, *Necon 1/50®*, *Nelova 1/50®*, *Norinyl 1+50®*, *Norplant®*, *NuvaRing®*, *Ogestral®*, *Ortho-Cept®*, *Ortho-Cyclen®*, *Ortho Evra Patch®*, *Ortho-Micronor®*, *Ortho-Novum 1/35®*, *Ortho-Novum 1/50®*, *Ortho-Novum 7/7/7®*, *Ortho-Novum 10/11®*, *Ortho Tri-Cyclen®*, *Ortho Tri-Cyclen Lo®*, *Ovcan-50®*, *Ovral®*, *Ovrette®*, *Quasense®*, *Seasonale®*, *Seasonique®*, *Triphasil or Tri-Leven 21®*, *Yasmin®*, *Yaz®*, *Zovia 1/35®*, *Zovia 1/50®*)
8. If you have used other hormonal contraceptive(s) in the past other than the one you are currently on, when was the last time (in MONTHS) you took a hormonal birth control different from the one you're currently on? If you have NOT used other hormonal contraceptives in the past, choose "Not Applicable" (*Not Applicable, 1-36, more than 3 years*)
9. Do you experience any side effects that you believe to be due to the hormonal birth control you are presently on? (*Yes, No*)
10. If yes, which category/ies do they fall into? If no, please select "Not Applicable." (*Mood, Physical, Sexual thoughts/Behavior/Function, Not Applicable, Other*)

11. What encouraged you to start taking hormonal birth control? (*Medical reasons e.g. premenstrual symptoms, I was sexually active, I was in a romantic relationship, Other*)

Questions for non-users (answer options are shown in parentheses and italicized):

1. Have you EVER used hormonal contraception in the past? (*Yes, No*)
2. If you HAVE NOT used hormonal birth control in the past, why? If you HAVE used hormonal birth control in the past, choose “Not Applicable.” (*I’m not sexually active, It would interfere with other medication I am/was on, I did not want to use hormonal birth control, My health insurance would not cover it/ I could not afford it, Religious reasons, Not Applicable, Other*)
3. If you HAVE used hormonal birth control in the past, what type(s) of hormonal birth control did you try (brand name(s); e.g., NuvaRing)? (*Alesse®*, *Aviane®*, *Brevicon®*, *Camilla®*, *Cerazette®*, *Cyclessa®*, *Demulen 1/35®*, *Demulan 1/50®*, *Depo Provera®*, *Errin®*, *Jolessa®*, *Jolivette®*, *Estring®*, *Levlen®*, *Levora®*, *Loestrin®*, *Loestrin Fe®*, *Lo-Ovral®*, *Low-Ogestrel®*, *Lybrel®*, *Micronor®*, *Mircette®*, *Mirena IUD®*, *Modicon®*, *Necon 1/35®*, *Necon 1/50®*, *Nelova 1/50®*, *Norinyl 1+50®*, *Norplant®*, *NuvaRing®*, *Ogestral®*, *Ortho-Cept®*, *Ortho-Cyclen®*, *Ortho Evra Patch®*, *Ortho-Micronor®*, *Ortho-Novum 1/35®*, *Ortho-Novum 1/50®*, *Ortho-Novum 7/7/7®*, *Ortho-Novum 10/11®*, *Ortho Tri-Cyclen®*, *Ortho Tri-Cyclen Lo®*, *Ovcan-50®*, *Ovral®*, *Ovrette®*, *Quasense®*, *Seasonale®*, *Seasonique®*, *Triphasil or Tri-Leven 21®*, *Yasmin®*, *Yaz®*, *Zovia 1/35®*, *Zovia 1/50®*)
4. When is the last time (in MONTHS) you used a form of hormonal birth control (including Plan B or the 48 hour pill)? If you have never used hormonal birth control, select “I have never used it.” (*I have never used it, Less than 1 month ago, 1-36, more than 3 years ago*)
5. If you have used a hormonal birth control in the past, what was/were your reason/s for discontinuing use? If you have NEVER used a hormonal birth control in the past, select “I have never used it.” (*I experienced negative physical side effects (e.g., weight gain), I experienced a decrease in sexual behavior and/or thought, I felt that it was negatively affecting my mood, I exited a relationship, Religious reasons, I have never used it, Other*)

Appendix C

The mini-K from the Arizona K-Battery (Figueredo, 2007)

Please indicate how strongly you agree or disagree with the following statements. Use the scale below and write your answers in the spaces provided. For any item that does not apply to you, please enter “0”.

Disagree Strongly	Disagree Somewhat	Disagree Slightly	Don't Know/ Not Applicable	Agree Slightly	Agree Somewhat	Agree Strongly
-3	-2	-1	0	+1	+2	+3

	1. I can often tell how things will turn out
	2. I try to understand how I got into a situation to figure out how to handle it.
	3. I often find the bright side to a bad situation.
	4. I don't give up until I solve my problems.
	5. I often make plans in advance.
	6. I avoid taking risks.
	7. While growing up, I had a close and warm relationship with my biological mother.
	8. While growing up, I had a close and warm relationship with my biological father.
	9. I have a close and warm relationship with my own children.
	10. I have a close and warm romantic relationship with my sexual partner.
	11. I would rather have one than sexual relationships at a time.
	12. I have to be closely attached to someone before I am comfortable having sex with them.
	13. I am often in social contact with my blood relatives.
	14. I often get emotional support and practical help from my blood relatives.
	15. I often give emotional support and practical help to my blood relatives.
	16. I am often in social contact with my friends
	17. I often get emotional support and practical help from my friends.
	18. I often give emotional support and practical help to my friends.
	19. I am closely connected to and involved in my community.
	20. I am closely connected to and involved in my religion.

Appendix D

The Revised Sociosexual Orientation Inventory (SOI-R) (Penke & Asendorpf, 2008)

Please respond honestly to the following questions:

1. With how many different partners have you had sex within the past 12 months?

-
- 0 1 2 3 4 5-6 7-9 10-19 20 or more

2. With how many different partners have you had sexual intercourse on one and only one occasion?

-
- 0 1 2 3 4 5-6 7-9 10-19 20 or more

3. With how many different partners have you had sexual intercourse without having an interest in a long-term committed relationship with this person?

-
- 0 1 2 3 4 5-6 7-9 10-19 20 or more

4. Sex without love is OK.

- 1 2 3 4 5 6 7 8 9
- Strongly disagree Strongly agree

5. I can imagine myself being comfortable and enjoying "casual" sex with different partners.

- 1 2 3 4 5 6 7 8 9
- Strongly disagree Strongly agree

6. I do not want to have sex with a person until I am sure that we will have a long-term, serious relationship.

- 1 2 3 4 5 6 7 8 9
- Strongly disagree Strongly agree

7. How often do you have fantasies about having sex with someone you are not in a committed romantic relationship with?

- 1 – never

- 2 – very seldom
- 3 – about once every two or three months
- 4 – about once a month
- 5 – about once every two weeks
- 6 – about once a week
- 7 – several times per week
- 8 – nearly every day
- 9 – at least once a day

8. How often do you experience sexual arousal when you are in contact with someone you are not in a committed romantic relationship with?

- 1 – never
- 2 – very seldom
- 3 – about once every two or three months
- 4 – about once a month
- 5 – about once every two weeks
- 6 – about once a week
- 7 – several times per week
- 8 – nearly every day
- 9 – at least once a day

9. In everyday life, how often do you have spontaneous fantasies about having sex with someone you have just met?

- 1 – never
- 2 – very seldom
- 3 – about once every two or three months
- 4 – about once a month
- 5 – about once every two weeks
- 6 – about once a week
- 7 – several times per week
- 8 – nearly every day
- 9 – at least once a day

Appendix E

The Scale for Intrasexual Competition (Buunk & Fisher, 2009)

Response scale for all items:

1	2	3	4	5	6
7					
Not at all applicable					Completely
applicable					

Please indicate how much the following statements apply to you. Circle the number that corresponds to the answer of your choice.

1. I can't stand it when I meet another woman who is more attractive than I am.
2. When I go out, I can't stand it when men pay more attention to a friend of mine than to me.
3. I tend to look for negative characteristics in attractive women.
4. When I'm at a party, I enjoy it when men pay more attention to me than to other women.
5. I wouldn't hire a very attractive woman as a colleague.
6. I just don't like very ambitious women.
7. I tend to look for negative characteristics in women who are very successful.
8. I wouldn't hire a highly competent woman as a colleague.
9. I like to be funnier and more quick-witted than other women.
10. I want to be just a little better than other women.
11. I always want to beat other women.
12. I don't like seeing other women with a nicer house or a nicer car than mine.

Appendix F

Multidimensional Scale of Perceived Social Support (Zimet, Dahlem, Zimet & Farley, 1988)

Instructions: Read each statement carefully. Indicate how you feel about each statement.

Circle the “1” if you Very Strongly Disagree

Circle the “2” if you Strongly Disagree

Circle the “3” if you Mildly Disagree

Circle the “4” if you are Neutral

Circle the “5” if you Mildly Agree

Circle the “6” if you Strongly Agree

Circle the “7” if you Very Strongly Agree

- | | | | | | | | | |
|-----|--|---|---|---|---|---|---|---|
| 1. | There is a special person who is around when I am in need. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2. | There is a special person with whom I can share my joys and sorrows. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3. | My family really tries to help me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4. | I get the emotional help and support I need from my family. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 5. | I have a special person who is a real source of comfort to me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 6. | My friends really try to help me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 7. | I can count on my friends when things go wrong. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8. | I can talk about my problems with my family. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 9. | I have friends with whom I can share my joys and sorrows. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 10. | There is a special person in my life who cares about my feelings. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 11. | My family is willing to help me make decisions. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 12. | I can talk about my problems with my friends. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Appendix G

Evolutionary psychology relevant risk-taking scale (Kruger, Wang, & Wilke, 2007)

For each of the following statements, please indicate your **likelihood** of engaging in each activity or behavior from **very unlikely** to **very likely**.

	Very unlikely	Unlikely	Not sure	Likely	Very likely
Chasing a bear out of your wilderness camp site area while banging pots and pans	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Participating in medical research that pays \$10,000 but has some chance of making you sterile.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Frequently trying risky projects at work that might get you promoted quickly, but could also get you fired.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Going on an exciting group safari without the assistance of local guides.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Applying for jobs that pay very well but have a high layoff rate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Getting sterilized so you cannot have children but have more leisure time and more financial flexibility.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exposing yourself to chemicals for a high paying job which might lead to birth defects.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Not getting vaccinated before traveling to exotic places.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
During a sport competition, sabotaging the opposing team's banner in their locker room at night.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

-
- Taking a loan to buy land near where a new golf course might be built and property could increase in value.
-
- During a camping trip, drinking water from a stream without filtering it.
-
- Eating expired food products that still 'look ok'.
-
- Spending a large portion of your salary to buy a sporty new convertible.
-
- Eating unhealthy but tasteful food whenever available.
-
- Standing up to your boss in front of other co-workers when your boss is being unfair.
-
- Sitting in the section for fans of the opposing team with a group of friends while wearing your team's colors.
-
- Lending a month's income to a friend.
-
- Physically intervening between two friends that are aggressively pushing each other, to prevent a fight.
-
- Driving to a rival university at night and stealing the school's flag from the flagpole in the center of campus.
-
- Encouraging a friend to drive 90 mph for fun while sitting in the front passenger seat.
-
- Swimming far out from shore to reach a diving platform.

- | | | | | | |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Adamantly defending the honor of your local team against a fan from a different sporting team even if it might cause a fight. | <input type="radio"/> |
| Challenging people who get in the way of your goals | <input type="radio"/> |
| Visiting an exciting foreign city while a World Health Organization travel warning is still in effect. | <input type="radio"/> |
| Engaging in unprotected sex during a one-night-stand. | <input type="radio"/> |
| Running against a popular candidate in a student assembly election. | <input type="radio"/> |
| Crashing a big house party where the residents have a rivalry with you and your friends. | <input type="radio"/> |
| Trying to take a leadership role in any peer group you join. | <input type="radio"/> |
| Maintaining long-term romantic relationships with more than one partner. | <input type="radio"/> |
| Exploring an unknown city or section of town. | <input type="radio"/> |