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Examining Sex Differences in the Coolidge Effect

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College Honors

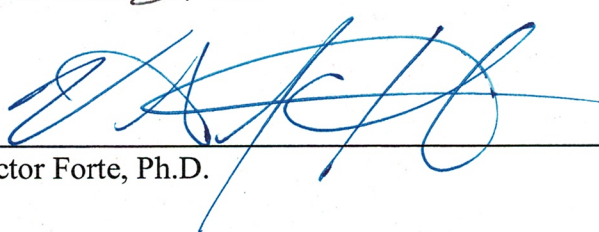
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Examining Sex Differences in the Coolidge Effect Among Humans

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Abstract

Although the Coolidge Effect is a well-documented phenomenon seen in mammals in which males exhibit a heightened sexual arousal toward novel females (Tlachi-Lopez et al.,2012), few studies have investigated this effect in humans. Across four different studies, we experimentally tested whether men, more than women, preferred novelty and sexual variety as it relates to the Coolidge Effect. In the first study, men were more likely than women to assign mating opportunities across a variety of potential mates regardless of the targets' attractiveness and age. In the second study, we examined visual interest toward novel and familiar faces that were repeatedly exposed, and found that eye gaze patterns were dependent upon the gender of viewer, the gender of target stimuli, and the attractiveness level of the stimuli. In the third study, men were more likely to choose novel women to date in a hypothetical, short-term dating task, while women preferred to date men to which they were repeatedly exposed. In our last study, both sexes rated the opposite-sex faces as less attractive with repeated exposure. Each of these studies lends support to the idea that the Coolidge Effect is also a part of the repertoire of human mating strategies.

Examining Sex Differences in the Coolidge Effect Among Humans

Cross culturally, men more than women, express increased interest in short-term sexual encounters and desire a greater number of lifetime partners (Buss & Schmitt, 1993; Clark & Hatfield; Schmitt et al., 2003). According to evolutionary theory, men who opportunistically mate with a greater number of partners increases the chances of fertilization, and in turn, increase the number of possible offspring (Buss & Schmitt, 1993). For example, men who have 3 or more spouses have 19% more children than men with only one spouse, whereas the number of spouses beyond the first spouse for women was not associated with higher fitness (Jokela, Rotkirch, Rickard, Pettay, & Lummaa, 2010). Men's preferences for sexual variety are further displayed by their preferences for novel sexual partners. If men prefer to mate with novel women over previously mated partners, this would increase the likelihood of gaining multiple partners (Archer & Elgar, 1999). Such increased preferences for novel mates over previously mated ones is often referred to as the Coolidge Effect (Dewsbury, 1981).

The Origin of the Coolidge Effect

The Coolidge Effect is the term originally attributed to US President Calvin Coolidge and his wife, Grace (Bermant, 1976), and was coined by Frank A. Beach in 1955 (Dewsbury, 2000). President Coolidge and his wife were visiting a government farm one day and were given separate tours. When Mrs. Coolidge passed the chicken pen, she noticed a rooster vigorously and frequently copulating. Mrs. Coolidge asked the farm attendant how often the rooster copulated, and the guide replied, "Dozens of times each day." Mrs. Coolidge insidiously told the guide to mention this fact to her husband when he later tours the pen. When the President later passed the pen and was told of Mrs. Coolidge's comment, he inquired, "Always with the same hen every

time?” The guide replied, “Oh, no, Mr. President, a different hen every time.” Mr. Coolidge then remarked, “Tell *that* to Mrs. Coolidge” (Hatfield & Walster, p. 75, 1978).

This neologism, “The Coolidge Effect,” has become a well-documented phenomenon seen in many mammals in which males exhibit a heightened sexual arousal in the face of sexual variety (Tlachi-Lopez, Eguibar, Fernandez-Guasti & Lucio, 2012). In other words, males tend to show a renewed sexual interest when introduced to novel females even after copulating with prior but still available sexual partners. The evolutionary explanation for this phenomenon observed in males might be explained by sperm allocation and sperm competition. A male’s repeated mating with the same female after copulation would be a waste of reproductive effort because his sperm could be distributed more evenly with available novel females, thereby increasing his net reproductive potential via fertilizing multiple females (Steiger et al., 2008). In fact, men may allocate and deposit even more sperm into novel females that have recently mated with other males as a form of sperm competition (Joseph, Sharma, Agarwal, & Sirot, 2015). Thus, males in most mammalian species have an urge to seek variety in their sexual partners and show a preference and arousal toward novel mates.

There is some evidence that the Coolidge Effect exists in females, as well, albeit not as pronounced as in males. Females may also prefer novel males due to genetic benefits such as inbreeding avoidance (Hosken & Blanckenhorn, 1999) and gaining diversity among her offspring (i.e., mating with rare genotypes, Cheetham, Thom, Beynon & Hurst, 2007; Fox & Rauter, 2003). For instance, in wild guppy populations, males with rare color patterns (i.e., relatively novel) acquired more mates, sired more offspring, and had higher rates of survival than more commonly colored, familiar males (Hughes, Houde, Price & Rodd, 2013). However, female preference for novel males, as explained by “rare male effect,” is different from male

preference for novelty, as explained by the Coolidge Effect, in that these preferences for novelty are not driven by renewed sexual interest for novelty after repeatedly mating with the same partner to increase a female's reproductive net yield. Rather, female preferences for novel mates would be better explained by "good sperm hypothesis" (i.e., females' increased probability of the egg fertilization by the competing sperms from multiple novel partners within a short period of time (Kekäläinen, et al., 2010.)

There are some reports of the Coolidge Effect occurring in female hamsters (Lisk & Baron, 1982). Similarly, Ventura-Acquino, Baños-Araujo, Fernández-Guasti and Paredes (2016) reported that female rats spent more time with the novel males than with familiar males whom they have previously mated. At least among laboratory mice, the Coolidge Effect in females may be counteracted by the Bruce Effect, a phenomenon whereby the exposure of pheromones from a novel unfamiliar male rodent, either block or disrupt the establishment of pregnancy in previously mated female mice (Bruce, 1960; Ochiogu, Ogoejiolor, & Okafor, 2012). Reasons for novelty preferences in female rodents is debated, and most studies have primarily focused on testing the Coolidge Effect with male mammals.

Evidence of the Coolidge Effect in Mammals

The earliest evidence of The Coolidge Effect came from the experiments with laboratory rats in the 1960's (Fisher, 1962; Cherney & Bermant, 1970). In these experiments, male rats were paired with females to copulate until the male stopped mounting the female within the given timeframe. Sexually satiated males were then later paired with novel females and the original female; the results from these studies showed that male rats attained a significantly higher number of intromissions and ejaculations with novel females than the original females. These findings have been replicated in several mammalian species, and has been documented in

Guinea-pigs (Grunt & Young, 1952), rats (Wilson, Kuehn, & Beach, 1963), cattle (Hale, 1966), sheep (Beamer, Bermant, & Clegg, 1969), hamsters (Bunnell et al., 1977), meadow voles (Gray & Dewsbury, 1975), and cats (Whalen, 1963). Although these results vary somewhat across animals depending upon the experimental paradigm used (Dewsbury, 1981), this phenomenon is considered a widespread mammalian trait (Buss, 2016).

Male preferences toward novel females have also been found in nonhuman primates such as chimpanzees and rhesus monkeys (Allen, 1981; Michael & Zumpe, 1978). Among male rhesus monkeys, Michael and Zumpe (1978) showed that the number of ejaculations decreased, and latency to the first mounting time increased when males were paired with continually receptive females who were ovariectomized and given daily injections of estradiol. When the repeatedly-paired females were replaced by new ovariectomized females (similarly given daily injections of estradiol), males showed an increased number of ejaculations and decreased time to begin mounting. Male sexual vigor deteriorated again once the new females were replaced with original females who were paired with male monkeys for years.

Evidence of the Coolidge Effect in Humans

One of the best indications that the Coolidge Effect exists in humans can be derived from studies that examine men's sexual arousal patterns in response to novel sexual stimuli. For instance, Joseph et al. (2015) measured the ejaculations of undergraduate male students when viewing pornographic films over the course of two weeks. The men viewed pornographic films of the same actress engaging in different sexual behaviors for six different sessions and a pattern of habituation was found in terms of the men's ejaculate volume, time to ejaculation, and sperm motility. However, when a novel woman was introduced in the film of the seventh session, the

men's ejaculate volume and the total number of motile sperm counts significantly increased, while latency time to ejaculate significantly decreased.

Although Joseph et al. (2015) did not find the difference in the decreased sperm quality over the two weeks of testing, previous studies reported that men become habituated to the same sexually explicit stimulus over time. For instance, male sexual arousal, measured by penile tumescence, significantly decreased with the repeated exposure to the same sexual stimuli and the sexual habitation occurs regardless of the time frame, whether within short time periods (less than 60 minutes; Koukounas & Over, 2000) or longer time periods (between 3-6 weeks; Plaud, Gaither, Henderson, & Devitt, 1997). However, decreased sexual arousal can be reinstated with novelty. Likewise, Koukounas and Over (2000) also found that repeated display of the same erotic film segment resulted in the man's progressive decline in sexual arousal and attention, but by replacing the film with a novel segment, men's sexual arousal and attention increased. Therefore, the effect of habituation can be mitigated by introducing sexual novelty to men.

Unlike men, women might differ in their responses to sexual novelty. Kelley and Musialowski (1986) found that women had an increased sexual arousal in response to same actors engaging in different activities while men had increased sexual arousal in response to different actors engaging in the same activity.

Even outside of the context of sexual arousal, men show more of a preference for novel, opposite-sex faces than women do. For instance, Little, DeBruine, and Jones, (2014) showed the same set of male and female faces twice to the participants, and men's ratings of women's sexiness and attractiveness for short-term relationships decreased with repeated exposure to the face, while women's ratings for men increased the more times they viewed their picture.

Sex Differences in Preferences for Sexual Variety

Previous studies suggest that men are universally more interested in sexual variety than women. A cross-cultural study conducted across 52 nations, 6 continents, and 13 islands showed that sex differences in the desire for sexual variety is culturally universal and men pursued more short-term mates more than women (Schmitt et al., 2003). Another large-scale survey of 4,767 people in U.K. of different ages showed that among participants who reported not having enough sex at the moment, men wanted to have more sexual partners or more exciting sexual variations with their partner, while women wanted more sex with their spouse or steady partner (Wilson, 1981).

Schmitt, Shackelford, Duntley, Tooke, and Buss, (2001) reported that, over a lifetime, men desired an average of approximately 14 sexual partners, whereas women reported desiring an average of just over two partners. Men, more than women, also reported having a greater number of sexual fantasies that involved multiple partners at once (Wilson, 1987), greater numbers of sexual partners during an average day, and were more likely to report having had sexual fantasies about more than 1,000 different people in their lives (Ellis & Symons, 1990). A survey conducted by Hughes, Harrison and Gallup (2004) showed that over twice as many males (78%) than females (32%) reported that they would copulate with multiple concurrent sex partners (i.e., participate in threesomes). Clark and Hatfield (1989) reported that 75% of male college students agreed to have sex with a complete stranger, whereas none of the female students agreed to such.

Sex differences in preferences for sexual variety can be explained by underlying fundamental, biological differences between the sexes. In humans, men have lower parental investment than women (Trivers, 1972), longer reproductive lifespans, and the potential for having a greater number of offspring (Buss, 1989). Accordingly, variance in numbers of partners

and offspring is expected to be greater in men than women, and sexual selection would have selected males that were less discriminate and more eager to seek sexual variety than their female counterparts (Jokela et al., 2010), a concept that is known as Bateman's principle. The existence of Bateman's principle has been documented across the animal kingdom (Janicke, Häderer, Lajeunesse, & Anthes, 2016). Among humans, such sex differences in adaptive sexual desire toward partner novelty are further evident in from empirical studies regarding pornography use and sexual fantasies.

Sex Differences in Pornography Consumption and Fantasies

Male preferences for sexual variety and novelty are also reflected in their consumption of pornography. Overall rates of pornography consumption are higher in men than women (Malamuth, Addison, & Koss, 2000) and porn is mainly produced for and used by men (Dines, Jensen, & Ruso, 1998). Several studies have documented these sex differences in pornography. For instance, one study reported that Australian male participants were about 7 times more likely to visit Internet sex sites and about 2.5 times more likely to watch pornographic videos than female participants in the previous year (Richters, Visser, Rissel, Grulich, & Smith, 2008). Carroll, Padilla-Walker, Nelson, Olson, Barry and Madsen, (2008) reported that 87% of American college men have viewed pornography as opposed to the 31% of college women. Additionally, only 3.2% of women reported to use pornography every week, while almost half of all male participants in their sample reported watching porn weekly. A sample of heterosexual Danish men also reported to spend an average of 80.8 minutes watching pornography per week as compared to the average of 21.9 minutes by Danish women (Hald, 2006). Similarly, Boies (2002) reported that male University students were three times more likely than women to watch sexually explicit pornographic materials.

In addition to the quantity of porn consumed by men compared to women, the content of the pornographic material consumed by men reveals male preferences for sexual variety. Male preferences for variety seem to extend beyond just the desire for novel partners and apply to desires for deviant/ novel sexual behaviors. For instance, it has been shown that men preferred viewing pornographic film that included anal sex, oral sex, and lesbians more than had women (Hald, 2006). Men also reported viewing more pornographic images related to group sex, sexual activity involving bondage, sexual acts between people and animals, sexual acts involving urine or feces, sexual pictures of children, and rape or violent sex (González-Ortega, & Orgaz-Baz, 2013). Men were more likely to engage in masturbation and report sexual excitement by viewing such pornographic materials while more women showed avoidance, disgust, and even concern by watching such images.

Beyond pornography consumption, sex differences in deviant sexual fantasies also exist. Male participants reported to have more dominant sexual fantasies than female participants (Zurbriggen & Yost, 2004). Ninety-five percent of 103 non-offender male participants reported at least one deviant sex fantasy: 58% reported having at least one fetish fantasy, 62% sadism, 62% bondage, 83% voyeurism, and 72% frotteurism (Williams, Cooper, Howell, Yuille, & Paulhus, 2009). Likewise, Ahlers, Schaefer, Mundt, Roll, Engiert, Willich & Beier (2011) collected a sample of 367 men aged 40-79 years in year 1915 and found that paraphilia-associated sexual arousal patterns (PASAP) were quite common. Among those men, 30% reported having some fetishistic fantasy, 15.8% had some masochistic fantasy, 21.8% sadistic fantasy, 34.9% voyeuristic fantasy, 13.4 % frotteuristic fantasy, and 9.5% had pedophilic fantasy. Because men may not be “satisfied” with having fewer sexual partners in reality, they may show desire for variations in sexual behaviors. In other words, men may have a preference

to engage not only in non-procreative sexual behaviors such as oral and anal sex but also prefer sexually deviant behaviors due to their desires to satisfy their need for sexual variety. Male preferences for more kinky/novel sexual behaviors could be an artifact of the Coolidge effect.

Relationship Satisfaction

The idea behind the Coolidge Effect would allow one to predict that being in a long-term relationship with the same individual would be associated with decreased relationship satisfaction over time. Indeed, Klusmann (2002) found that sexual activity and sexual satisfaction declined in both men and women with increased relationship duration, but sexual desire only declined in women. Several studies have also reported that marital duration is associated with decreased sexual activity, independent of other factors such as age (Call, Sprecher, & Schwartz, 1995; Karraker & DeLamater, 2013). On the other hand, remarriage has been shown to increase marital sex and lower odds of sexual inactivity (Call et al., 1995; Karraker & DeLamater, 2013). Even married women have reported a declined sexual desire toward their husbands but not with other men (Durr, 2009; Sims & Meana, 2010). Nevertheless, men reported to engage in extramarital affairs more than women (Atkins, Baucom, & Jacobson, 2001; Mark, Janseen, & Milhausen, 2011). On average, men appear to have stronger preferences for novelty and are more likely to show decreased sexual arousal and desire toward their familiar partners (For a review, see Morton & Gorzalka, 2015).

Current Studies

While there is a large body of research documenting the Coolidge effect in animals (especially in male mammals), to our knowledge, few studies have experimentally tested the existence of the Coolidge Effect in humans to examine if sex differences in preferences for sexual variety exist. Researchers have argued that although findings from the Coolidge Effect in

nonhuman species had been extrapolated to human situations, very little work has been done (Dewsbury, 1981; Morton & Gorzalka, 2015). This lack of human research may be partly due to obvious ethical concerns, whereby directing mating behaviors of humans analogous to the methods employed with nonhuman species are unlikely to happen. Our studies aimed to examine sex differences for preferences in sexual variety as related to the concept of the Coolidge Effect in humans by employing more ethically tolerant experimental methods.

Across four experimental studies, we examined sex differences in preferences for sexual variety and novelty. Specifically, we wanted to determine if men were more likely to disperse their sexual opportunities across novel individuals than women, and were more likely to prefer sexual variety and new partners when given a choice. We also considered whether personal variables such as attractiveness, age, and self-perceived mate value would influence these preferences. Further, we examined if men, more than women, show a preference for novel faces when examining visual fixation patterns, when presented in a hypothetical dating choice task, and when rating the attractiveness of faces that are repeatedly exposed. Detailed aims and hypotheses for each study are outlined below.

General Method

Overview

Across four different studies, we experimentally tested whether men, more than women, preferred novelty and sexual variety as it relates to the concept of the Coolidge Effect. In the first experiment, participants viewed different facial pictures and were asked to assign mating opportunities across the faces shown. The second experiment examined fixation patterns recorded by eye-tracking equipment when participants viewed novel versus repeatedly exposed faces that varied in attractiveness. The third experiment examined hypothetical dating choices

between novel and familiar faces. The fourth experiment examined how attractiveness ratings for novel and repeatedly exposed faces differ when faces were shown for brief moments of time.

Facial Stimuli

Facial picture stimuli used in all 4 experiments were obtained from the *Chicago Face Database* (Ma, Correll, & Wittenbrink, 2015) and *Facity* (www.facity.com; Caspar, 2010), where all facial images were standardized in size and camera angle. We collected images of individuals that were Caucasian, and aged between 18-30 years as indicated from the databases. The Chicago Face Database provided independent attractiveness ratings for faces, and we selected pictures that matched our demographic criteria and sorted the distribution of pictures into three groups: attractive, average-looking, and unattractive. For the pictures obtained from *Facity*, 10 independent raters (half men and women) rated the pictures and were asked to place the faces in each of the three attractiveness groups. We only selected pictures where all 10 raters were in complete agreement that a picture belonged in one of the three attractiveness categories. We also included a set of Caucasian men and women from *Facity* that were between the ages of 45-55 to use for one of our experimental tasks (Study 1) who were also rated and placed into one of the attractiveness categories by independent raters.

Participants

All procedures were approved by the local institutional review board. All participants gave informed consent, and parental consent was also given for the few participants who were aged 17. Participants for the first study were solicited online, while participants in the second, third, and fourth studies were solicited through the Psychology Department Participant Pool at Albright College, Pennsylvania. Participants in the latter studies earned extra credit for the psychology courses at the discretion of their professors.

Study 1

Aims and Hypotheses

The aim of this study was to examine if there is a sex difference in human preferences for sexual variety by experimentally testing the Coolidge Effect. We designed an experimental task where participants were given a hypothetical 10 times to copulate and were shown pictures of various individuals among whom they could disperse these copulations as desired. In this picture task, we manipulated certain characteristics of the persons shown such as attractiveness and age. We hypothesized that given the different mating scenarios, men would show a more varied preference for mates, assigning the number of mating opportunities more evenly across pictures. Specifically, we wanted to determine if male participants would be more likely to select a variety of women in each condition. However, we expected smaller dispersion of choices by men when selecting between a variety of older women or unattractive women. On the other hand, we predicted that women would distribute the number of mating opportunities more unevenly, showing specific, rather than varied mating preferences across all conditions.

Our survey also sought to assess whether women tended to modify their physical appearance often in order to present novelty for male partners. Women might unknowingly cater to male desires for mating variety by engaging in more appearance modification (e.g., hair color, outfits, hair style, etc.) than men in order to provide novel looks that keep their mate interested. Thus, we hypothesized that women in relationships, compared to both single women and to men (single or in relationships) would be more likely to engage in changing their overall appearance because changing their appearance might unknowingly signal novelty and keep their men interested. On the other hand, men more than women, would be more likely to find committed partners who frequently changed their appearance as appealing.

Method

Participants

This study included 634 participants (281 men and 353 women) who reported having a heterosexual orientation. The mean age of the participants was 30.4 ($SD = 11.5$, range = 18-72). Participants were solicited from *Amazon Mechanical Turk* sampling ($n = 341$) and by postings on social media and through snowball email sampling of colleagues and acquaintances of the investigators across the nation ($n = 293$).

The majority of the participants reported being Caucasian/White (73.5%), followed by Hispanic/Latino (8.7%), African American/Black (7.9%), Asian/Pacific Islander (7.6%), and other (2.4%). Participants reported their current marital status with 69% of the participants reported being single (never married), 22.6% reported being married, 7.7% reported being divorced or separated, 0.6% reported being widowed, 0.1% reported being other. The majority of the respondents reported that they did not have children (74.6%). Of the 25.4% of respondents who had reported having children, the mean number of children was 2.06 ($SD = 1.36$, range = 0-9).

There was 57% of the sample who indicated they were currently in an exclusive, committed romantic relationship, while 43% were not. Those in the committed relationship were also asked to report the length of their relationship with their current partner. Only 2.8% of participants reported their relationship to be less than 1 month, 7.5% reported 1-6 months, 8.6% reported 7-11 months, 41.8% reported 1-5 years, 12.8% reported 6-10 years, and 26.5% reported over 10 years. The number of exclusive, committed romantic relationships participants had in their lifetime varied: 7.1% answered none, 43.7% answered 1-2, 39.6% answered 3-5, 7.9% answered 6-10, and 1.7% answered 11 or more partners.

To see if certain traits influenced responses, two established personality inventory measures, the revised Sociosexual Orientation Inventory (SOI-R) (Penke & Asendorpf, 2008) and Mate Value Inventory (MVI-7) (Krisner et al., 2003) were administered along with the task. There was no significant difference in MVI-7 scores between men ($M = 5.21$, $SD = 0.89$) and women ($M = 5.28$, $SD = 0.80$), $t(571) = 0.99$, $p = .322$, as rated on a 7-point scale. . However, men ($M = 41.10$, $SD = 14.66$) had significantly higher SOI-R scores than women ($M = 32.67$, $SD = 14.45$), $t(569) = 6.88$, $p < .001$.

Materials and Procedure

This study was distributed as an anonymous online survey using *Qualtrics* software program. We solicited respondents through *Amazon Mechanical Turk* and via snowball sampling of email announcements and online posts on social media sites. Because the experimental task posed hypothetical mating questions, participants were first asked to indicate the gender to which they preferred having sex, and then were shown only pictures of that gender for this task. Only those indicating that they would prefer to have sexual relations with the opposite-sex and indicated holding a predominantly heterosexual orientation were included in the analyses.

We created an experimental picture task where participants were to select individuals they would copulate with in different mating scenarios. Participants were given a hypothetical 10 times to copulate and were shown pictures of various individuals among whom they could disperse their 10 copulations as they wished, (i.e., they could chose as a many or as few different partners as they wanted). The task comprised of a total of 12 hypothetical situations where respondents had to select sexual partners. For 10 of the situations, 10 facial pictures were displayed, and for two of the situations, only three pictures were displayed. In all scenarios,

respondents were asked to distribute 10 mating opportunities across the pictures and were given the following instructions:

Hypothetical. You only have 10 opportunities to have sex. Please distribute those 10 times across the following 10 individuals by placing a number next to each picture for how many times you would have sex with that person out of the 10. For example, you can have sex with each of them once, you can have sex with one of them 10 times, you can have sex three times with one person and seven times with another person, etc., but your total number must sum to 10. Each box should have a number, and a zero indicates you would not have sex with that person.

Two variables were manipulated in the picture distributions: 1) attractiveness level (attractive, average-looking, and unattractive groups) and 2) age (younger group aged 18-30, and older group aged 45-55). Altogether, there seven different experimental conditions: 1) 10 pictures of all attractive, younger individuals, 2) 10 pictures of average-looking younger individuals, 3) 10 pictures of unattractive younger individuals, 4) 10 pictures that included three attractive, four average-looking, and three unattractive younger individuals, 5) 10 pictures that included three attractive, four average-looking, and three unattractive older individuals, 6) three pictures that included one attractive, one average, and one unattractive younger individuals, and 7) three pictures that included one attractive, one average, one unattractive older individuals. There were two sets for first 5 conditions that displayed 10 pictures, and only one set shown for the two conditions displaying only three pictures, yielding a total of 12 hypothetical scenarios presented to each respondent (see Appendix A for a schematic representation of the first experimental condition).

In order to keep picture size and camera angle consistent, pictures from each condition used were all either from *Chicago Face Database* or all from *Facity*. All photos were counterbalanced within each display and the order in which each scenario was presented was also randomized by the survey presentation software.

In addition, participants were asked to rate how often they changed their overall appearance (e.g., fashion style, hair style, facial hair, make-up, overall look) using a 10-point rating scale (1 = not at all, 10 = very often). Then they were asked specific questions regarding how often they changed their hair color, got hair highlights/low-lights, changed their hair style, bought new clothes, changed their fashion style, lost noticeable weight, and gained noticeable weight using the same scale. Lastly, participants were also asked to rate how appealing they would find it if their committed partner changed their overall appearance frequently on a 10-point rating scale (1 = not at all, 10 = extremely).

Results

Mating Opportunity Task

A 3(Attractiveness Level of Picture) X 2(Sex of Respondent) mixed model ANOVA was used to examine the pattern of mating distributions (i.e., 10 opportunities to have sex) participants assigned for the first three conditions involving a display of 10 younger individuals. The dependent variable was a dispersion score of how variable the selections were across the picture choices calculated as a standard deviation. In this case, the lower the *SD*, the higher the dispersion score (e.g., respondents placed a 1 for each picture in the selection), while the higher the *SD*, the lower the dispersion score (e.g., respondents placed a 10 for one person, and 0 for all others in the selection).

There was a main effect for the attractiveness level of pictures, $F(2, 1202) = 595.75, p < .001, \eta^2 = .498$. All pairwise comparisons of attractiveness level groups were significantly different from one another. The dispersion of mating opportunities across individuals was highest when all 10 pictures were attractive ($M = 1.58, SE = 0.03$), second highest when all 10 pictures were average ($M = 2.0, SE = 0.03$), and lowest when all 10 pictures were unattractive ($M = 2.51, SE = 0.03$). There was also main effect for sex of the respondents, $F(1, 601) = 67.72, p < .001$, whereby men distributed a higher number of mating opportunities across individuals ($M = 1.82, SE = 0.04$) than women ($M = 2.23, SE = 0.03$).

There was a significant interaction between the attractiveness level of pictures and sex of the participants, $F(2, 1202) = 14.46, p < .001, \eta^2 = .023$. Post hoc independent t-tests were used to examine the interaction effect and there were significant sex differences found across each of the conditions. When all 10 pictures were attractive, men ($M = 1.30, SE = 0.80$) significantly distributed higher number of mating opportunities across the pictures than women ($M = 1.87, SE = 0.67$), $t(606) = -9.54, p < .001$. Likewise, when all 10 pictures were average, men ($M = 1.81, SE = 0.78$) significantly distributed higher number of mating opportunities across the pictures than did women ($M = 2.19, SE = 0.66$), $t(611) = -6.71, p < .001$. Even when all 10 pictures were unattractive, men ($M = 2.37, SE = 0.79$) also significantly distributed higher number of mating opportunities across the pictures than did women ($M = 2.65, SE = 0.63$), $t(604) = -4.87, p < .001$.

Table 1 provides mean differences in dispersion scores between men and women in each of the experimental conditions. We also considered an aggregate of all conditions consisting of younger pictures with 10 choices. Across all conditions, men's dispersion scores were significantly higher than women with the exception of the one condition that displayed only three pictures of older individuals.

Mate Value and Sociosexual Orientation

Table 2 shows partial correlations between the dispersion scores and respondent scores on the MVI-7, Global SOI and three SOI sub-scores (Behavior, Attitude, and Desire) when controlling for the respondents' age. Men with higher self-perceived mate value were less likely to disperse their mating opportunities amongst unattractive and older women. For women, their mate value did not relate to their mating opportunity choices. Several SOI measures correlated with dispersion scores on the mating opportunity task for both men and women (see Table 2), whereby those with higher scores (i.e., have a propensity for casual sex) were more likely to have a dispersed selection among mating options.

Age and Relationship Status

Pearson correlations showed that men's age was positively correlated with their dispersion scores in the mating scenarios for the following conditions: where all 10 pictures were of attractive, younger women, $r(264) = .13, p = .038$, where all 10 pictures were of average-looking younger women, $r(264) = .27, p < .001$, where all 10 pictures were of unattractive younger women, $r(262) = .20, p = .001$, and in the mating scenarios where there was a mix of attractiveness levels amongst the 10 pictures $r(262) = .20, p = .001$. This was not the case for the condition with the 10 older pictures, $r(261) = -0.11, p = .071$.

A similar pattern was not observed for women, and female age was not significantly correlated with their dispersion scores in any of the different mating opportunity scenarios having to do with younger males. However, female age was positively correlated with their dispersion score for the older male group that varied in level of attractiveness, $r(333) = .14, p = .010$.

A 3(Picture Age) X 2(Sex of Respondent) mixed model ANOVA was used to examine dispersion scores between the conditions that included a mix of attractiveness levels between the older face and the younger face groups. There was a main effect for picture age group, $F(1, 601) = 167.34, p < .001, \eta^2 = .218$, whereby respondents dispersed their mating opportunities more for the younger pictures ($M = 2.10, SE = 0.03$) than the older pictures ($M = 2.42, SE = 0.03$). There was also main effect for sex of the respondents, $F(1, 601) = 82.48, p < .001$, whereby men ($M = 2.04, SE = 0.04$) distributed a higher number of mating opportunities across individuals than women ($M = 2.47, SE = 0.03$). Lastly, there was a significant interaction between the attractiveness level of pictures and sex of the participants, $F(2, 1202) = 14.46, p < .001, \eta^2 = .023$. Post hoc independent t-tests showed that men ($M = 1.80, SE = 0.63$) dispersed their choices significantly more than women ($M = 2.40, SE = 0.60$) for the younger faces, $t(604) = 12.02, p < .001$. Men ($M = 2.29, SE = 0.77$) also dispersed their choices significantly more than women ($M = 2.55, SE = 0.60$) for the older faces, $t(604) = 4.62, p < .001$. The current relationship status of the respondents had no impact on their dispersion scores across any of the conditions.

Appearance Modification

Table 3 lists sex differences in the frequency of appearance modification. For most measures, women were more likely to engage in activities that changed their appearance than men. As such, men ($M = 4.80, SD = 2.24$) found it more appealing if their committed romantic partner changed their overall appearance frequently than had women ($M = 3.97, SD = 2.27$) preferred of their partners, $t(572) = 4.36, p < .001$. In addition, men's SOI scores positively correlated with their preferences for their partners' to change their appearance (SOI Global: $r(249) = .22, p = .001$; SOI Behavior: $r(253) = .11, p = .084$; SOI Attitude: $r(254) = .15, p = .015$; SOI Desire: $r(254) = .18, p = .004$). SOI did not significantly correlate with women's

preferences for their male partners to change their appearance frequently. Male and female mate values had positively correlated with their appearance modification activities; those who have higher mate values tend to engage with changing their appearances more frequently (see Table 4).

A 2(Rater Sex) X 2(Relationship Status) independent ANOVA was conducted on ratings of how appealing it would be if one's committed romantic partners changed their overall frequently. There was a significant interaction between rater sex and relationship status, $F(1, 568) = 4.01, p = .046, \eta^2 = .007$. Post hoc t-test showed that there was no difference in men's preferences for partner appearance modification between those in a relationship ($M = 4.73, SD = 2.42$) and those not in a relationship ($M = 4.88, SD = 2.04$), $t(254) = 0.53, p = .596$. However, women who were in a relationship ($M = 4.21, SD = 2.41$) found it far more appealing if their partners changed their appearance frequently than women not in a relationship ($M = 3.60, SD = 1.97$), $t(314) = 2.38, p = .018$.

Discussion

Across all experimental conditions men were more likely to disperse their mating opportunities across different female pictures than were women regardless of the target pictures' age or attractiveness. The only exception was in the condition with the choices of three older women. The dispersion scores for each sex were greatest amongst attractive arrays of opposite-sex pictures than the average and unattractive target arrays, suggesting that attractiveness level impacts men's mating decisions in addition to novelty. Our finding is consistent with cross-cultural findings that men value physical attractiveness in women (Buss, 1989), and physical attractiveness functions as a cue to mate quality and reproductive value (Buss, 1989; Thornhill & Gangestad, 1999), whereby female physical attractiveness has been linked to higher reproductive

success in both hunter-gather (Hill & Hurtado, 1996) and industrialized populations (Jokela, 2009).

The age and mate value of the respondents also, influenced their dispersion of mating selections in this task. The older age a male respondent was, the more likely he dispersed his selection among the mating opportunities for the younger female targets, regardless of the attractiveness levels of the target. His age was not correlated with his mating selection for older female pictures. These findings are suggested that older men preferred youth and sexual variety even more so than younger men. Cross-culturally, and especially in most small-scale societies, older age in men is associated with higher status because they have had more time to accrue wealth, knowledge and skills (Rueden, Gurven, & Kaplan, 2008; Simmons, 1945). Older men with resources would be more attractive, especially to younger women (Buss, 1989), so perhaps older men have higher mate value and be in a better position to gain higher mate value women.

On the other hand, we found that the older a woman was, the more likely she dispersed her selection only among the older male pictures, but not for the younger male pictures. Perhaps older women realize that their mate value has decreased with age and they have mating fewer options, so she will be more willing to mate with several older men, and she is not dispersing among younger men because perhaps she knows they may not be interested in older women. Women's reproductive value and fertility declined with age, and men prefer younger mates across cultures (Buss, 1989). In our study, men with higher self-perceived mate value were also less likely to widely disperse their mating selections among unattractive and older women, whereas a woman's mate value did not relate to her choices on this mating selection task.

Several SOI measures correlated with dispersion scores on the mating opportunity task for both men and women whereby those who have a propensity for casual sex were more likely

to have dispersed their selection across possible mates. Interestingly, the association between the desire sub-score of the SOI correlated with higher dispersion across potential mates in this task for only men and not women. While men may desire to have opportunistic sex with many individuals, it does not actually translate into the actual opportunity for it to happen. Our findings are consistent with those from other studies that indicate men tend to have stronger interest in sex, are more easily stimulated and aroused, and are more open to casual sex than women (Ellis et al., 2008; Meltzer, McNulty & Maner, 2017).

Women may play into male desires for variety by engaging in appearance modification. Our second hypothesis was supported; men, more than women, preferred if their romantic partners changed their physical appearance frequently, while women modified their physical appearance more frequently to appeal to male desires for novelty. Further, men with higher SOI scores (higher propensity toward casual sex) especially preferred that their committed partners to change their overall appearance more frequently. Such association was not observed among women with higher SOI scores.

Our hypothesis women in relationships would engage in changing their overall appearance more than singles was not supported. Perhaps, appearance modifications are important for both single women and women in committed relationships since physical appearance is more valued in women than men (Buss, 1989). Compared to singles, women in a relationship found it more appealing for their partners to change their appearance frequently than single women. It is possible that changes in appearance of men in relationships serve as a commitment signal to the women that their mate still cares enough to look physically attractive for their women.

Overall, it appears that men, more than women, prefer their committed partners to change their overall appearance more frequently. If appearance modifications of familiar partners are valued by men, more than women, then women could perhaps facilitate relationship satisfaction by changing their appearance and by also engaging in novel sexual behaviors in novel environments.

Study 2

Aims and Hypotheses

In this study, we examined visual interest toward facial stimuli that was novel versus repeatedly exposed. We considered the gender of viewer, the gender of target stimuli, and the level of attractiveness of the target facial picture being repeated as well as the attractiveness of the array of surrounding pictures. Examining eye-gaze and fixation patterns has been shown to be very useful in providing underlying complex visual information that is a reflection of a person's interest and intentions (Qvarfordt, & Zhai, 2005; Zhai, Morimoto, & Ihde, 1999). In particular, studies have shown that both sexes tend to visually attend to stimuli that elicit their sexual interest and display longer and a greater number of fixations toward erotic stimuli than non-erotic stimuli (Lykins, Meana, & Strauss, 2008).

Previous studies have also shown that changes in the eye movement occur as a function of previously repeated exposure, which is known as an eye movement-based memory effect (Althoff & Cohen, 1999) and is characterized by a reprocessing effect – repeated stimuli have fewer number of fixations, shorter viewing durations, and fewer sampling regions than novel ones (Bate, Haslam, Tree & Hodgson, 2008). This reprocessing effect has been documented in the viewing of novel versus repeated faces (Althoff & Cohen, 1999). Although Althoff and Cohen (1999) found that novel faces elicited more fixations than repeated faces. They used

famous faces to represent familiar stimuli, and non-famous faces to represent novel stimuli. Therefore, participants may or may not have viewed famous people before the experiment.

A previous study has shown that preferences for novelty versus familiarity depend on the experimental task (Liao, Yeh, & Shimojo, 2011); familiar faces were preferred in both passive viewing task (i.e. preference ratings based on mere exposure) and objective judgement task (i.e. preference ratings based on certain tasks such as stimuli roundness or color), but preferences for novel natural scenes happened during the objective judgement task, but not during passive viewing task. Therefore, Liao et al. (2011) showed that preferences for familiarity or novelty depend on the task-context during the exposure. In light of Liao et al.'s (2011) findings, for our study, we provided participants with context of thinking in terms of mate selection. Participants in this study were told that they would be viewing photos of people's faces taken to be posted on a dating website, and these individuals were seeking partners to causally date or engage in a short-term relationship.

Our participants first viewed a series of slides that consisted of a row of either all male or all female facial images while their gaze was being tracked by eye-tracking technology. Some faces were repeated in the next presentation and the level of attractiveness of the repeated target pictures and surrounding pictures in the array was manipulated. Because it has been shown that preferences for novel faces and partners are stronger in men than in women (Little et al., 2014; Morton & Gorzalka, 2015), we hypothesized that men would visually fixate on novel female faces rather than familiar ones, even preferring a novel female face over a more attractive face to which they had been repeatedly exposed. In comparison, we hypothesized that women would prefer familiarity and would not show this novelty effect when viewing male faces. We also

predicted that novelty effect would not be observed among men and women viewing faces of the same sex.

Method

Participants

A total of 92 participants (39 men and 53 women) were used in the analyses. The mean age of the participants was 19.71 ($SD = 1.40$, range = 17-25). We originally obtained 100 participants, but seven women were eliminated from analyses because of their reported non-heterosexual orientation, and one man was eliminated due to eye-tracking malfunction. For the male stimuli, we had to eliminate four more viewers due to eye-tracking malfunction (yielding $n = 88$, 52 women), and for the female data, we had to eliminate two male viewers for the same reason (yielding $n = 90$, 53 women). All participants reported that they had proper vision needed to complete the task either through natural vision or use of corrective lenses.

The majority of the participants reported being Caucasian/White (57.7%), followed by African American/Black (22.8%), Hispanic/Latino (10.9%), Asian/Pacific Islander (4.3%), and other (4.3%). There were 43.5% of the participants who indicated currently involved in committed romantic relationship while 56.5% were not. All participants completed a 17-item Mate Value Inventory known as MVI-7 (Kirsner, Figueredo, & Jacobs, 2003) to assess their self-perceived mate value and their mean mate value score was 5.50 ($SD = 0.63$, range = 3.82-6.82) on 7-point scale.

Materials and Procedures

After giving written informed consent and completing a brief demographic questionnaire asking the information reported above, participants were instructed to sit in front of an eye-tracking machine (Tobii -T60) and have their pupils calibrated to the equipment. This eye-

tracking system contains a light source and camera permanently attached to a monitor that allows participants to sit in a natural posture without having to use a chin rest. To measure the sex differences in visual attention to novel versus familiar faces, we examined the total fixation duration (i.e., the total amount of viewing time) participants spent looking at the face. An area of interest was created for each of faces shown in an array on one screen to examine which faces participants had visually examined.

In order to provide context of mate selection when viewing the photos, participants were informed that the individuals they would be viewing individuals who had their photos taken to be posted on a dating website and were seeking partners to causally date or engage in a short-term relationship. We also made clear to the participants that this eye-tracking task was *not* a memory task where they would be asked to recall or rate any of the pictures. We informed them that we were simply going to track their eye gaze.

Participants were shown 27 presentation slides within a block. Each slide consisted of a row of five facial pictures of different, same-sex individuals. The presentation slides were grouped in sets of three and one of the pictures within the array repeated in the set of three slides. The first slide in a set consisted of five novel faces; the second slide repeated only one person from the first slide with four novel faces; and the third slide in the set repeated the same picture once again along with four novel faces. Therefore, of the 27 slides shown, there were nine sets shown. Each slide was displayed for 10 seconds followed by a black screen with a cross fixation point displayed for three seconds. The placement of the cross on the screen varied, and this was done so to reduce bias of having the same starting point of a participant's focus before viewing the next slide.

We also manipulated the attractiveness level of the repeated picture in a set and the four juxtaposed pictures on each slide. Of the nine sets shown, the conditions included: 1) all five attractive individuals with one attractive individual repeated for three slides, 2) all attractive individuals with one average individual repeated for three slides 3) all attractive individuals with one unattractive individual repeated for three slides, 4) all average individuals with one attractive individual repeated for three slides, 5) all average individuals with one average individual repeated for three slides, 6) all average individuals with one unattractive individual repeated for three slides, 7) all unattractive individuals with one attractive individual repeated for three slides, 8) all unattractive individuals with one average individual repeated for three slides, and 9) all unattractive individuals with one unattractive individual repeated for three slides (see Appendix B for a schematic representation of the first experimental condition). The position of the repeated image in the row was counterbalanced for each slide. In addition, we created three versions where altogether different photos were used and paired together and repeated within the nine sets. Each slide was presented for 10 seconds, and the task took under five minutes to complete.

After taking a break in time to partake in another experimental task, participants were then asked to repeat this task by viewing another set of 27 presentation slides, but this time, the slides were of individuals who were the other gender than what they had previously viewed. We counterbalanced whether participants viewed the block of male faces or the female faces first.

Results

Analysis of Repeated Pictures

We conducted several 3(repeated picture order) X 3(attractiveness level of the repeated picture) x 3(attractiveness level of the surrounding picture) analyses of variance for the

dependent measure of total fixation duration for the male picture stimuli and female picture stimuli (Table 5).

Table 5 lists the main effects and interactions for total fixation duration. Significant interaction effects were further examined via simple effects (see Tables 6; 7; 8). Men viewed repeated average female faces for the third time significantly longer than both the second and the first time. Women viewed repeated unattractive male faces seen for the third time significantly longer than when seen the second time. When the repeated male faces were attractive, women viewed the repeated picture for the second time significantly longer than the first and the third time, and for the first time as significantly longer than the third time. A similar pattern was found among men viewing repeated attractive male faces, except that there were no differences in viewing duration between the first and the third time. When women viewed repeated unattractive female faces, the first time viewing was significantly longer than the second and the third time (see Table 6).

The attractiveness of the repeated person could be influenced by the attractiveness levels of the pictures that surround them. As shown in Table 7, analysis of the interaction between the attractiveness level of the surrounding picture and repeated picture order revealed that women viewed repeated attractive male faces seen for the third time as significantly longer than the first time when the surrounding pictures of the face were attractive. When the surrounding pictures of the face were average, women viewed the repeated male face for the first time as significantly longer than both the second and the third time. When surrounding pictures of the face are unattractive, women viewed the repeated male face for the second time as significantly longer than both the first and the third time. For the repeated average female faces, women viewed the first time as significantly longer than the second time; for the repeated unattractive female faces,

women viewed second time longer than the third time. On the other hand, there was no picture order effect for men when the surrounding pictures of the repeated male faces are attractive.

When the surrounding pictures are average and unattractive, men viewed the repeated male face for the second time as significantly longer than the first time, except that the second time was also significantly longer than the third time when the surrounding faces were unattractive.

Third, we further explored the interaction between the attractiveness level of the surrounding picture and attractiveness level of the repeated picture (see Table 8). Because there was no significant interaction effect for male target pictures, we only analyzed simple main effects for the female target pictures. For both men and women, when the surrounding faces were unattractive, the attractive faces were viewed longer than both average and unattractive faces, and the average faces were viewed longer than unattractive faces. A similar pattern was found when the surrounding faces were average, but the average faces were not viewed longer than unattractive faces. When the surrounding faces were attractive, men viewed attractive faces longer than the unattractive faces, and women viewed attractive faces longer than both average and unattractive faces.

Discussion

Our general hypothesis that men prefer novel opposite faces while women prefer familiar opposite faces was supported to some extent. Regardless of the attractive level of the repeated or surrounding pictures, men did not fixate longer with repeated exposure to the female faces, except when viewing the repeated pictures of average-looking female faces. Previously, Koukounas and Over (2000)'s reported repeated display of the same erotic film segment resulted in men's progressive decline not only in sexual arousal, but attention. By replacing the film with

a novel segment, men's attention increased in their study. Therefore, it is also possible that men could have fixated more toward novel surrounding pictures compared to the repeated target face.

On the other hand, we found that women's total fixation duration patterns were influenced more by the attractiveness levels of both the repeated and surrounding male pictures. For instance, when the repeated picture was unattractive, women viewed the repeated face seen for the third time significantly longer than the second time, implying that unattractive male faces solicited more visual interest from women with repeated exposure. Women may become more interested in unattractive men with repeated exposure because seeing a man many times could indicate that he is willing to commit. To compensate for a lack of physical attractiveness, less attractive men can offer commitment to women. Research has also found that women who are married to less attractive men are happier and more satisfied (Ma-Kellams, Wang, Cardiel, 2017; McNulty, Lisa, & Benjamin, 2008).

When the presented with surrounding male pictures that were all attractive, women also viewed the repeated picture seen for the third time significantly longer than when seen the first time. Overall women viewed the second presentation of a male face longer than the first time, and viewed the male face seen for the third time shorter than both the first and second time. Additionally, we found that when the surrounding male pictures are unattractive, women viewed the repeated picture for the second time as significantly longer than the first and third time. When male faces were surrounded by average male faces, women viewed the second and third time significantly shorter than the first time. Therefore, women's visual interests appear to be more dependent on both the attractiveness of the repeated and surrounding picture than based upon repeated exposure alone.

Our hypothesis that there would be no differences in eye gaze patterns when men and women viewed faces of the same sex was not supported; the general patterns among same sex faces revealed that men and women viewed the repeated face for the second time as significantly longer than the first or third time, which occurred mainly when the surrounding pictures were average and unattractive. When the surrounding pictures were attractive, there was a familiarity effect, which we interpret as a possible sign of potential intra-sexual competition. In support of this argument, we also found that when the repeated female faces were unattractive, subsequent viewing time of that unattractive face by female viewers was lower. Unattractive female faces would be less likely to be viewed as potential threats to other women.

The duration of time viewing the repeated target face seemed to be dependent upon the level of attractiveness of the faces surrounding the target. This influence is observed for both men and women. When the surrounding faces were unattractive, the attractive target faces were viewed longer than both average and unattractive target faces, and the average target faces were viewed longer than unattractive target faces. When the surrounding faces were average, the attractive target faces were viewed longer than both average and unattractive target faces, but average target faces were not viewed longer than unattractive faces. When the surrounding faces were attractive, men viewed attractive target faces longer than the unattractive target faces, and women viewed attractive target faces longer than both average and unattractive target faces. These findings are consistent with a study that reported that the target face became more attractive when surrounded by unattractive faces, which is known as the “Ugly Friend Effect” (Furl, 2016). Although Furl (2016) found that the effect was more pronounced in male target pictures for both male and female viewers, our study found that “Ugly Friend Effect” was only found within female target pictures. Our facial stimuli used in the study were young fertile

individuals, and physical attractiveness signaling youth has been reported to be more central to male mate preferences than female mate preferences (Buss, 1989). For women, young attractive females can be potential competitors; therefore, relatively longer viewing times toward attractive females in comparison to unattractive female faces can be seen as a form of intra-sexual competition among women. Future studies should clarify whether female faces are more commonly associated with “Ugly Friend Effect” than male faces.

Previous studies have shown that attractive faces tend to be visually examined for a longer period of time than unattractive faces (Valuch, Pflüger, Wallner, Laeng, & Ansorge, 2015). Likewise, familiar faces were considered more attractive, and studies have reported that humans also preferred familiar faces over novel ones (Park, Shimojo, & Shimojo, 2010; Liao et al., 2011). While we found some evidence to support sex differences in preference for novelty as measured by visual attention, the patterns were not as straightforward as we originally expected. Our findings demonstrate how sex differences in preferences for novelty versus repeatedly exposed stimuli were further dependent upon levels of attractiveness of the target and surrounding pictures, and this influence of attractiveness on novel opposite sex was more pronounced for women viewing same-sex target pictures. Although we explicitly told the participants that the task was not a memory task, we could not overrule a “reprocessing memory effect,” which occurs implicitly at the brain level (Bate et al., 2008). The “reprocessing memory effect” explains why repeated stimuli had fewer number of fixations, shorter viewing durations, and fewer sampling regions than novel ones, but this effect alone could not explain why sex differences in eye-gaze patterns were observed in our study. Our findings on sex differences in gaze pattern toward novelty and familiarity further support the idea that men and women respond differently to visual stimuli and contribute to the existing literature that there are sex differences

in visual fixation patterns of opposite-sex targets (Rupp & Wallen, 2008; Tsujimura, et al., 2009).

Study 3

Aims and Hypotheses

In our third experimental task, we asked participants to play a hypothetical dating game. Participants were presented with two facial images on a screen and were asked to select the person that they would prefer to date for a short-term relationship. The presentation software was response-adaptive and depending upon their responses, the next pairing included a presentation of their selected photo paired with a novel photo. We compared their selection of the repeated photos versus the novel face choices. We hypothesized that men would be more likely to select dating opportunities with novel female faces, while women would be more likely to select persons in which they were previously exposed.

Method

Participants

A total of 96 participants (40 males and 56 females) were used in the analyses. The mean age of the participants was 19.7 ($SD = 1.4$, range = 17-25). We originally obtained 100 participants, but four women were eliminated from analyses because they reported not being attracted to the opposite sex. The majority of the participants reported being Caucasian/White (56.3%), followed by African American/Black (25.0%), Hispanic/Latino (10.4%), Asian/Pacific Islander (4.2%), and other (4.1%). There were 42.7% of the participants who indicated currently involved in committed romantic relationship while 57.3% were not.

Materials and Procedures

For this study, we used facial images of individuals obtained from *Facity.com* that were rated to be in an average-looking category and were not placed into an attractive or unattractive category. Using SuperLab 5.0 presentation software, two facial images were presented next to each other on the screen. The participants were asked to select which of the two persons they would prefer to date for a short-term relationship (i.e., casual dating/as a “hook-up”) by pressing either “1” or “2” on the keyboard to indicate the left or right picture. The presentation software was response-adaptive and the subsequent presentation was a pairing of the picture selected plus a novel picture. Depending on the participant’s responses, participants viewed between 10 or 12 pairs of images. Altogether, there were three blocks of stimuli presented (see Appendix C for a schematic representation of the presentation blocks). Regardless of their previous choice, all participants saw three presentations of two paired novel faces; this was done so as to reduce the chances that participants would select one individual throughout the entire task, and realize that the same picture would potentially repeat throughout.

So that participants could acclimate to the task, the first pairing of pictures served as the trial set and was the same paired pictures seen by all participants. Therefore, this trial set was not included in the analyses for selection or reaction time measures. The order of the pictures was randomized as were the placement of whether a picture was positioned on either the right or left side of the screen. We also had presented two versions of the task that included different sets of pictures and pairings of images for each participant. We recorded the number of selections for repeated versus novel faces, as well as the reaction time for decisions made.

The entire task took approximately less than three minutes to complete, however participants were not told that there was any time constraint in making their decisions. Even though we did not tell participants this was a reaction time task, nor reveal that we would record

the time it took to make their responses, the presentation software recorded reaction time for each selection.

Analyses

Due to the fact that presentations were response-dependent, participants could see anywhere from 9 -12 pairings of pictures, therefore, we calculated the ratio of the number of times a participant chose a novel and a repeated picture within the task relative to the total number of repeated-novel picture pairings seen by a participant. In other words, we calculated the number of times that participants chose a repeated picture and a novel picture within the task and divided that number by the total number of pairings seen for each.

Results

A 2(repeated/novel) X 2(sex of rater) mixed model ANOVA was conducted to examine the number of times participants selected a repeated or novel picture as their choice to date. There was a main effect for stimulus type whereby participants overall selected the repeated pictures ($M = 0.74$, $SD = 0.02$) more often than the novel pictures ($M = 0.26$, $SD = 0.02$), $F(1, 94) = 208.59$, $p < .001$. There was a significant interaction between stimulus type and sex of rater, $F(1, 94) = 8.02$, $p = .006$. Post hoc t-tests showed that men ($M = 0.31$, $SD = 0.15$) selected a higher number of novel pictures than had women ($M = 0.21$, $SD = 0.16$), $t(94) = 2.83$, $p = .006$, whereas women ($M = 0.79$, $SD = 0.16$) had selected a higher number of repeated pictures than had men ($M = 0.69$, $SD = 0.15$), $t(94) = 2.93$, $p = .006$.

We examined the mean reaction time when a novel picture was selected and when a repeated picture was selected for all choices in the task that paired a novel with repeated photo (i.e., excluding the three instances where participants were presented with a pairing of two novel faces only). There was no difference in reaction time between men ($M = 10160.89\text{ms}$, $SD =$

8606.62), and women ($M = 7767.97\text{ms}$, $SD = 4551.28$) when raters selected novel picture within a paired set, $t(94) = 1.63$, $p = .107$. However, men ($M = 7740.24\text{ms}$, $SD = 5174.64$) took significantly longer to make their decision when they selected the repeated picture than had women ($M = 5855.13\text{ms}$, $SD = 3202.64$), $t(94) = 2.20$, $p = .030$.

Discussion

These findings provide further evidence that men prefer novelty in the context of short-term dating than women. Men were more likely to want to date novel females rather than those in which they were previously exposed in a hypothetical, short-term dating task, while women preferred to date men they had to which they became familiar because they were repeatedly seen. Further, when participants selected a repeated picture over a novel picture, men took a longer time to make this decision than did women. This finding suggests that women demonstrated greater cognitive ease than men when selecting a familiar individual to date, while men took more time to deliberate in choosing familiarity over novelty. This study's findings corroborate with Little et al. (2014) who also demonstrated men's preference for novel female faces and women's preferences for familiar male faces.

Study 4

Aims and Hypotheses

This study examined sex differences in the perception of attractiveness of faces during the initial exposure to the novel face compared to attractiveness ratings when the face becomes familiar by subsequent exposure. This task was a replication and extension of Little et al. (2014). In order to reduce the explicit memory of the repeated photos shown, we presented the facial images of different individuals for only extremely brief periods of time (i.e., 300 milliseconds) for participants to evaluate their attractiveness. Despite this minimal amount of time exposure to

the stimuli, we suspect to find similar results as Little and colleagues (2014) who allowed participants an unlimited time to evaluate the attractiveness of the repeated photos shown. We predicted that the greater the repeated exposure is to a face, the less attractive men would rate the repeated female face, whereas the more attractive women would rate the repeated male face.

Method

Participants

There were a total of 91 undergraduate students (38 males and 53 females) in this study. The mean age of the participants was 19.7 ($SD = 1.4$, range = 17-25). We originally obtained 100 participants, but seven women were eliminated from analyses because of their reported non-heterosexual orientation, and two men were excluded due to their incomplete data when recording. The majority of the participants reported being Caucasian/White (56.0%), followed by African American/Black (24.2%), Hispanic/Latino (11.0%), Asian/Pacific Islander (4.4%), and other (4.4%). There were 42.9% of the participants who indicated being currently involved in a committed romantic relationship while 57.1% were not. All participants completed a 17-item Mate Value Inventory known as MVI-7 (Kirsner et al., 2003) to assess their self-perceived mate value and their mean mate value score was 5.5 ($SD = 0.64$, range = 3.8-6.8) on a 7-point scale.

Materials and Procedures

For this study, we used facial images of individuals obtained from *Facity.com* that were judged by all independent raters ($n = 10$) to be categorically average-looking, and were different from those used in the other tasks. Participants were informed that they would be viewing a total of 27 faces and the pictures would be flashed on the screen for only a few milliseconds and could not be viewed again. After each presentation, they were to rate the attractiveness of the photo. The first two pictures shown served as a trial run in order for the participants to get a feel for the

task and were not counterbalanced or taken into account in the data analyses. The following 25 pictures presented were considered for analysis.

Using SuperLab 5.0, we first presented 10 novel facial pictures of the same gender. The next five pictures shown were repeated images selected from the first 10. Then five more novel photos were shown as distractors, followed by the five repeated pictures shown for a third time. In other words, there were 25 pictures presented (with the exception of the first two trial pictures), but only 15 different individuals were shown since five of those pictures repeated three times (see Appendix D for a schematic representation of the first experimental condition). Picture order was counterbalanced within each set of five picture sets. We counterbalanced which set of five pictures were the ones that repeated. We also created another version of this task with an entirely different set of 15 pictures, and counterbalanced that version similarly.

Each image was displayed for only 300 milliseconds. In between displays of each picture, we presented a screen where participants were instructed to make their rating of the picture they had just seen. Using a keyboard, participants rated the attractiveness of each photo on a 10-point rating scale (1= highly unattractive, 5 = average-looking, 10 = highly attractive, whereby participants used the 0 key to indicate a rating of 10). Once the participant indicated their rating, they were shown a screen with a fixation cross point which displayed for 3 seconds followed by the next presentation of the picture. This was done so to reduce the chances that the participant missed the brief presentation of the next stimuli after making their rating.

The entire block trial of viewing the 27 pictures was done twice, one for all male pictures, and one for all female pictures. Participants had breaks in between these two block trials where they participated in other tasks. We counterbalanced whether the male or female picture trials were seen first by each participant. When participants rated the attractiveness of same-sex

individuals, they were instructed to rate how attractive they thought the person appears to the opposite sex. The inter-rater reliability of the attractiveness ratings was high for male pictures (Cronbach's $\alpha = .93$) and female pictures (Cronbach's $\alpha = .91$).

Results

Attractiveness Ratings

A 2(picture sex) X 3(picture order) X 2(rater sex) mixed model ANOVA was conducted on mean attractiveness ratings for the repeated pictures. There was a significant three-way interaction effect between picture sex, picture order, and rater sex, $F(2, 178) = 3.33, p = .038, \eta^2 = .036$. To examine this interaction further, we split the data by sex of rater and examined picture order for male and female pictures separately. A One-Way ANOVA showed an effect for picture order on attractiveness ratings when male raters judged pictures of other men, $F(2, 74) = 4.91, p = .010, \eta^2 = .117$, where there was no difference between the men's rating of the first ($M = 4.85, SD = 0.24$) and second viewing ($M = 4.63, SD = 0.24$), but men rated the third viewing ($M = 4.46, SD = 0.22$) as significantly less attractive than the first ($p = .005$; see Figure 1). Likewise, men rated women's pictures viewed for the third time ($M = 4.51, SD = 0.22$) as significantly less attractive than when viewing the photo for the first time ($M = 4.85, SD = 0.16$) and second time ($M = 4.60, SD = 0.20$), with no significant difference between the first and second viewing, $F(2, 74) = 3.50, p = .035, \eta^2 = .086$ (see Figure 2).

Women rated male pictures viewed for the first time ($M = 4.99, SD = 0.21$) as being significantly more attractive than the second repeated time ($M = 4.62, SD = 0.19$) and the third repeated time ($M = 4.65, SD = 0.19$) with no significant difference between the second and third viewing, $F(2, 104) = 7.51, p = .001, \eta^2 = .126$ (see Figure 1). There was no difference in picture order of women's ratings of female images when seen for the first time ($M = 4.77, SD = 0.16$),

second time ($M = 4.86$, $SD = 0.19$), or third time ($M = 4.87$, $SD = 0.19$), $F(2, 104) = 0.71$, $p = .495$, $\eta^2 = .013$ (Figure 2).

Overall, there was also a main effect for picture order (i.e., whether the picture was seen for the first time, second time, or third time), $F(2, 178) = 8.06$, $p < .001$, $\eta^2 = .083$ and a two-way interaction between picture sex and picture order was also significant, $F(2, 178) = 3.29$, $p = .040$, $\eta^2 = .036$. These analyses were superseded by the three-way interaction discussed above. No other main effects or interactions were found.

Mate Value

We found that men's mate value scores (MVI-7) were negatively correlated with their ratings of attractiveness for other males when exposed to male pictures for the first time, $r(38) = -.41$, $p = .012$ and second time, $r(38) = -.40$, $p = .014$. This relationship was not the case for men's rating of female pictures or women's attractiveness ratings of either sex.

Reaction Time

Although we did not tell participants that this was a reaction time task, we had also recorded how long it took participants to make each of their attractiveness ratings. We ran a 2(picture sex) X 3(picture order) X 2(rater sex) mixed model ANOVA to examine reaction time. There was a main effect for picture sex, $F(1, 89) = 3.93$, $p = .050$, $\eta^2 = .042$, whereby male pictures ($M = 1675.75$ ms, $SE = 81.15$) were rated at a faster rate than female pictures ($M = 1818.37$ ms, $SE = 84.36$). There was also a main effect for picture order, $F(2, 178) = 30.92$, $p < .001$, $\eta^2 = .258$. The third time ($M = 1571.28$ ms, $SE = 77.52$) the images were seen was rated significantly faster than the first time ($M = 1816.82$ ms, $SE = 69.80$) and second time ($M = 1853.08$ ms, $SE = 85.52$) the same images were seen. No other main effects or interactions were significant.

To examine whether reaction time decreased due to fatigue effects, we examined the mean of the 5 sets of pictures presented in order including the non-repeated, distractor pictures: 1) Group A, 2) Group B, 3) Group A first repeat, 4) Group C, 5) Group A second repeat. Although there were some significant differences found between each set (p -values range .001-.079), there was no indication that reaction time progressively decreased as the task persisted (see Table 9).

Discussion

The findings from this study show evidence of the Coolidge Effect for both sexes. We found that both men and women rated the facial attractiveness of opposite-sex individuals seen for only milliseconds as being less attractive with repeated exposure, especially after the pictures were viewed for the third time. Our findings for male ratings are consistent with the findings from Little et al. (2014) indicating men's preferences for novelty. We also found that women rated the male pictures seen for the second and third times as being less attractive. This finding was inconsistent with Little and colleagues' findings, as they found that women rated men as being more attractive with increased exposure. Further, we could not replicate the findings of Little et al. with regards to same-sex ratings. Little and their colleagues found that attractiveness ratings increased with repeated exposure to a face for same-sex ratings made by both sexes. Our study showed that men rated other men as being less attractive when a picture was seen for the third time, while there were no picture order effects found for women rating other women's faces. Men might have found faces of other men who have been continually repeated as threatening since they could be potential competitors. The overall differences in findings between our study and those of Little et al. (2014) might also be attributed to methodological differences between our experiments; our participants were exposed to the facial stimuli for only

milliseconds whereas participants in Little et al. (2014) could take as much time as needed to evaluate the facial stimuli. Further, Little et al. (2014) repeated the presentation of the pictures only once, while we repeated the pictures twice. Therefore, with additional exposure, different patterns may have been revealed.

We also found that the higher a man's self-perceived mate value, the lower they rated the attractiveness ratings of other men's faces. A woman's self-perceived mate value did not impact her attractiveness ratings of other women's faces. Perhaps, men with higher mate value are more likely to see other men as a competitor. Studies have shown that men's higher mate-value and social status are linked with higher intrasexual competition among men; self-perceived mate value in Indian men is positively associated with their use of aggression (see review in Archer & Thanzami, 2009).

Our analysis on mean reaction time across the task indicated that there was no progressive decline in time to respond as the task endured; therefore, the decrease in attractiveness ratings with repeated exposure in men and women cannot be attributed to fatigue effects since the reaction time did not progressively decrease as the task persisted.

General Discussion

Our findings across four experiments provided converging data that further supports the existence of the Coolidge Effect in humans, and demonstrated there are sex differences in preferences for novelty in mates. Study 1 examined how men would distribute opportunities to mate with different women if given the opportunity in a hypothetical situation. We found that men had a more varied preference for mates than women regardless of the attractiveness and age of their selection of choices. We also found that these preferences for sexual novelty are influenced by a person's propensity toward casual sex (as measured by their SOI score) and by

mate value. As expected, men and women who had more unrestricted sociosexual orientations also showed stronger preferences for sexual variety. We also showed that the older age a male respondent was, the more likely he dispersed his selection among the mating opportunities for the younger female targets, regardless of the attractiveness levels of the target. For older women, she was more likely to desire mating with a variety of older men, but not younger men. These findings can be explained by the fact that a woman's mate value and reproductive capacity decline with age (Buss, 1989; Williams, 1975) and women therefore have less opportunity to mate as they age, whereas men's mate value and reproductive value does not decline in the same way (Delton, Robertson, & Kenrick, 2006), and men have more opportunity to mate as they age. We also found that regardless of respondents' current relationship status, men showed heightened preferences for partners who change their appearance more frequently whereas only women in relationship reported such preferences. This finding suggests that men may seek novelty from a long-term partner through her appearance modification.

Study 2 found that preferences for novelty are dependent upon the sex of the viewer, the attractiveness level of the target face, and the attractiveness level of the surrounding pictures. For unattractive repeated male faces, women fixated longer on the third presentation, showing some familiarity effect for unattractive male faces. Women visually fixated on the repeated picture during the second time for attractive and average faces, but less for the third presentation. It appears that female preference for novelty only came into effect after several presentations. Although men viewed the repeated female face longer with repeated exposure, the general gaze patterns revealed that men were not influenced by the attractiveness level of the target face or the attractiveness level of the surrounding face of opposite sex individuals.

Study 3 found that men, more than women, were more likely to select a novel person when given a choice between the novel and the familiar person to date in a short-term relation. In situations where men chose the familiar woman rather than the novel choice, men took longer to deliberate that decision suggesting that men had to think longer to decipher the tradeoff between their preference for novelty versus a preference for a familiar mate in which they previously had a preference. This deliberate decision to select novelty over familiarity might reflect underlying differential cost-benefit consideration in male preferences for sexual variety (Gangestad and Simpson, 2000); men could lose their opportunity to have sex with a single woman multiple times if they engage in promiscuous behaviors by mating one time with multiple partners.

Finally, Study 4 showed that when raters were exposed to faces for only very brief moments and asked to rate their attractiveness, both men and women rated opposite-sex faces as being less attractive when repeatedly presented than when initially exposed. For same-sex ratings, men also rated other men seen for a third time as being less attractive than the first two times seen, and for women, repeated exposure of a same-sex face had no impact on their attractiveness ratings of another woman. Unlike the findings of Little et al. (2014), our results revealed evidence for the Coolidge Effect for both men and women.

Although study 1 and study 3 showed clear evidence that men preferred more sexual variety than women, the results from study 2 and study 4 were not as straightforward; women also showed slight preferences for sexual novelty in both studies. In study 2, women gazed at photos of the repeated attractive and average men less during the third exposure compared to the second time. Study 4 showed that women's ratings of repeated opposite-sex faces were similar to those of men; their attractiveness ratings declined with repeated exposure. Furthermore, we

found that men's ratings of repeated same-sex face also declined over time, while there was no effect for women's ratings of repeated same-sex faces.

To expand upon the findings of study 4, future studies could replicate our study by repeating faces more than just twice for brief moments of time. We utilized the method of brief exposure in an attempt to tap into gut reactions of the participants, rather than giving them time to make deliberate ratings over familiar faces. Previous studies showed that familiar faces are considered more attractive and generally preferred over novel ones (Park et al., 2010), but viewers in our study might not have the time to truly realize familiarity. At least in our study, the repeated exposure to the same face for three times did not induce fatigue effects, as examined by reaction time over exposure (Table 9).

While we argue that men show stronger preferences for the novelty of mates than women, we also acknowledge that women would benefit from also having some preferences for novel sexual partners. For instance, women could increase the probability of the fertilization by competing sperm from multiple novel partners within a short period of time ("good sperm hypothesis; Kekäläinen, et al., 2010.) However, females engaging in short-term, multiple mating may face significant increase in predation risk, time and energy costs, physical harm, and diseases (Wright, Fuller, Godley, McGowan, Tregenza, & Broderick, 2013). Therefore, preferences for novelty in women might reflect preferences for novel partners over a lifetime whereas preferences for novelty in men might reflect renewed sexual interests with novel females within a short-amount of time. Future research could investigate how male and female preferences for novel mates differ across short and long-term mating scenarios across a lifespan.

There were several limitations with our studies. Our research questions do not answer how male preferences for novelty translate into reproductive fitness. Unlike animal studies, our

studies did not have the actual mating to test the Coolidge Effect. Future research should look into whether changes in partners' sexual behaviors or environment are associated with increased libido among men and women. If so, the Coolidge Effect findings could have practical applications especially for men and women who are interested in long-term, exclusive sexual relationships. For instance, couples might want to engage in novel sexual behaviors, frequently change their appearance, or engage in sexual behaviors in novel environments.

Conclusion

Although previous studies have shown that men tend to have more of a preference for sexual variety than women (Buss & Schmitt, 1993; Schmitt et al., 2003), our investigation is among the first to experimentally test this preference and demonstrate how the Coolidge Effect relates to human behavior. Across four experimental studies that employed different methodologies, we found that men demonstrated a preference for novelty for potential mates. In the first study, we found that men were more likely than women to select a variety of mates when given the opportunity to distribute chances to mate with different individuals. In the second study, men did not view novel females longer than familiar ones, but women preferred familiar male faces dependent upon the attractiveness level of the target, the attractiveness level of the surrounding, and the number of repeated exposure. In the third study, when participants were given a hypothetical dating task, men were more likely to select a novel woman to date in a short-term context while women were more likely to select men that were repeated exposed. Finally, in our last study, we showed that both sexes rated the faces of opposite-sex individuals as less attractive with repeated exposure. Each of these studies lends support to the idea that novelty as related to The Coolidge Effect is a part of the repertoire of human mating strategies.

References

- Ahlers, C. J., Schaefer, G. A., Mundt, I. A., Roll, S., Englert, H., Willich, S. N., & Beier, K. M. (2011). How unusual are the contents of paraphilias? Paraphilia-associated sexual arousal patterns in a community-based sample of men. *Journal of Sexual Medicine, 8*(5), 1362-1370
- Allen, M. (1981). Individual copulatory preference and the “strange female effect” in a captive group-living male chimpanzee (*Pan troglodytes*). *Primates, 22*, 221–236.
- Althoff, R. R., & Cohen, N. J. (1999). Eye-movement-based memory effect: A reprocessing effect in face perception. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 25*(4), 997-1010.
- Archer, J., & Thanzami, V. (2009). The relation between mate value, entitlement, physical aggression, size and strength among a sample of young Indian men. *Evolution and Human Behavior, 30*(5), 315-321.
- Archer, M. S., & Elgar, M. A. (1999). Female preference for multiple partners: Sperm competition in the hide beetle, *Dermestes maculatus* (DeGeer). *Animal Behaviour, 58*(3), 669-675.
- Atkins, D. C., Baucom, D. H., & Jacobson, N. S. (2001). Understanding infidelity: Correlates in a national random sample. *Journal of Family Psychology, 15*(4), 735-749.
- Bate, S., Haslam, C., Tree, J. J., & Hodgson, T. I. (2008). Evidence of an eye movement-based memory effect in congenital prosopagnosia. *Cortex: A Journal Devoted to the Study of the Nervous System and Behavior, 44*(7), 806-819.
- Beamer, W., Bermant, G., & Clegg, M. T. (1969). Copulatory behavior of the ram, *Ovis aries*: II. Factors affecting copulatory satiation. *Animal Behaviour, 17*, 706-711.

- Bermant, G. (1976). Sexual behavior: Hard times with the Coolidge effect. In M. H. Siegel, H. P. Zeigler (Eds.), *Psychological research: The inside story* (pp. 76-103). New York, N.Y.: Harper and Row.
- Boies, S. C. (2002). University students' uses of and reactions to online sexual information and entertainment: Links to online and offline sexual behavior. *The Canadian Journal of Human Sexuality, 11*(2), 77-89.
- Bruce, H. M., & Parrott, D. V. (1960). Role of olfactory sense in pregnancy block by strange males. *Science, 131*.
- Bunnell, B. N., Boland, B. D., & Dewsbury, D. A. (1977). Copulatory behavior of golden hamsters (*Mesocricetus auratus*). *Behavior, 61*(3/4), 180-206.
- Buss, D. M. (1989). Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures. *Behavioral and Brain Sciences, 12*(1), 1-49.
- Buss, D. M. (2016). *The evolution of desire: Strategies of human mating*. New York: Basic Books.
- Buss, D. M., & Schmitt, D. P. (1993). Sexual strategies theory: An evolutionary perspective on human mating. *Psychological Review, 100*, 204–232.
- Call, V., Sprecher, S., & Schwartz, P. (1995). The incidence and frequency of marital sex in a national sample. *Journal of Marriage and the Family, 57*, 639–652.
- Carroll, J. S., Padilla-Walker, L. M., Nelson, L. J., Olson, C. D., Barry, C. M., & Madsen, S. D. (2008). Generation XXX: Pornography acceptance and use among emerging adults. *Journal of Adolescent Research, 23*(1), 6-30.
- Caspar, H. (2010). FACITY. Retrieved April 10, 2017, from <http://www.facity.com/>

- Cheetham, S.A., Thom, M.D., Beynon R.J., & Hurst J.L. (2008) The effect of familiarity on mate choice. In J. L. Hurst, R. J. Beynon, S. C. Roberts, T. D. Wyatt (Eds) *Chemical Signals in Vertebrates 11* (pp. 271-280). Springer, New York, NY
- Cherney, E. F., & Bermant, G. (1970). The role of stimulus female novelty in the rearousal of copulation in male laboratory rats (*Rattus norvegicus*). *Animal Behaviour*, *18*(3), 567-574. doi:10.1016/0003-3472(70)90054-0
- Clark, R. D., & Hatfield, E. (1989). Gender differences in receptivity to sexual offers. *Journal of Psychology & Human Sexuality*, *2*(1), 39-55. doi:10.1300/J056v02n01_04
- Delton, A., Robertson, T. E., Kenrick, D. T. (2006). The mating game isn't over: A reply to Buller's critique of the evolutionary psychology of mating. *Evolutionary Psychology*, *4*, 262-273.
- Dewsbury, D. A. (1981). Effects of novelty on copulatory behavior: The Coolidge effect and related phenomena, *Psychological Bulletin*, *89*, 464-482.
- Dewsbury, Donald A. (2000). Frank A. Beach, master teacher. In G. A. Kimble & M. Wertheimer (Eds.), *Portraits of Pioneers in Psychology, Volume IV* (pp. 269-281). Washington, DC: American Psychological Association; Hillsdale, N.J.: Lawrence Erlbaum Associates.
- Dines, G., Jensen, R., & Russo, A. (1998). *Pornography, the production and consumption of inequality*. New York and London: Routledge.
- Durr, E. (2009). Lack of responsive sexual desire in women: Implications for clinical practice. *Sexual and Relationship Therapy*, *24*, 292–306.

- Ellis, B. J., & Symons, D. (1990). Sex differences in sexual fantasy: An evolutionary psychological approach. *Journal of Sex Research, 27*(4), 527-555.
doi:10.1080/00224499009551579
- Ellis, L., Karadi, K., Hershberger, S., Field, E., Wersinger, S., Pellis, S., & ... Hetsroni, A. (2008). *Sex differences: Summarizing more than a century of scientific research*. New York, NY, US: Psychology Press.
- Fisher, A. E. (1962). Effects of stimulus variation on sexual satiation in the male rat. *Journal of Comparative and Physiological Psychology, 55*(4), 614-620.
- Fox C. W., & Rauter, C. M. (2003). Bet-hedging and the evolution of multiple mating. *Evolutionary Ecology Research, 5*. 273–286.
- Furl, N. (2016). Facial-attractiveness choices are predicted by divisive normalization. *Psychological Science, 27*(10), 1379-1387.
- Gangestad, S. W., & Simpson, J. A. (2000). The evolution of human mating: Trade-offs and strategic pluralism. *Behavioral and Brain Sciences, 23*(4), 573-644.
- González-Ortega, E., & Orgaz-Baz, B. (2013). Minors' exposure to online pornography: Prevalence, motivations, contents and effects. *Anales De Psicología, 29*(2), 319-327.
- Gray, G. D., & Dewsbury, D. A. (1975). A quantitative description of the copulatory behavior of meadow voles (*Microtus pennsylvanicus*). *Animal Behaviour, 23*, 261-267.
- Grunt, J. A., & Young, W. C. (1952). Psychological modification of fatigue following orgasm (ejaculation) in the male guinea pig. *Journal of Comparative and Physiological Psychology, 45*, 508-510.

- Hald, G. M. (2006). Gender differences in pornography consumption among young heterosexual Danish adults. *Archives of Sexual Behavior*, 35(5), 577-585. doi:10.1007/s10508-006-9064-0
- Hale, E. B. (1996). Visual stimuli and reproductive behavior in bulls. *Journal of Animal Science*, 25, 36-48.
- Hatfield, E., & Walster, G. W. (1978). A new look at love. Lanham, MD: University Press of America.
- Hill, K., and A. M. Hurtado. (1996). *Ache life history: The ecology and demography of a foraging people*. New York: Aldine de Gruyter.
- Hosken, D. J. & Blanckenhorn, W. U. 1999 Female multiple mating, inbreeding avoidance and fitness: it's not only the magnitude of costs and benefits that count. *Behavioral Ecology*, 10, 462-464.
- Hughes, K. A., Houde, A. E., Price, A. C., & Rodd, F. H. (2013). Mating advantage for rare males in wild guppy populations. *Nature*, 503. 108-110.
- Hughes, S. M., Harrison, M. A., & Gallup, G. J. (2004). Sex differences in mating strategies: Mate guarding, infidelity and multiple concurrent sex partners. *Sexualities, Evolution & Gender*, 6(1), 3-13.
- Janicke, T., Häderer, I. K., Lajeunesse, M. J., & Anthes, N. (2016). Darwinian sex roles confirmed across the animal kingdom. *Evolutionary Biology*, 2(2). e1500983.
- Jokela, M. (2009). Physical attractiveness and reproductive success in humans: Evidence from the late 20th century United States. *Evolution and Human Behavior*, 30(5), 342-350.

- Jokela, M., Rotkirch, A., Rickard, I. J., Pettay, J., & Lummaa, V. (2010). Serial monogamy increases reproductive success in men but not in women. *Behavioral Ecology*, *21*(5), 906-912.
- Joseph, P.N., Sharma, R. K., Agarwal, A., & Sirot, L. K. (2015). Men ejaculate larger volumes of semen, more motile sperm, and more quickly when exposed to images of novel women. *Evolutionary Psychological Science*, *1*. 195-200.
- Karraker, A., & DeLamater, J. (2013). Past-year sexual inactivity among older married persons and their partners. *Journal of Marriage And Family*, *75*(1), 142-163.
- Kekäläinen, J., Rudolfson, G., Janhunen, M., Figenschou, L., Peuhkuri, N., Tamper, N., & Kortet, R. (2010). Genetic and potential non-genetic benefits increase offspring fitness of polyandrous females in non-resource based mating system. *BMC Evolutionary Biology*, *10*(20).
- Kelley, K., & Musialowski, D. (1986). Repeated exposure to sexually explicit stimuli: Novelty, sex, and sexual attitudes. *Archives of Sexual Behavior*, *15*, 487-498.
- Kirsner, B. R., Figueredo, A. J., & Jacobs, W. J. (2003). Self, friends, and lovers: Structural relations among Beck Depression Inventory scores and perceived mate values. *Journal of Affective Disorders*, *75*(2), 131-148.
- Kirsner, B. R., Figueredo, A. J., and Jacobs, W. J. (2003). Self, friends, and lovers: Structural relations among Beck Depression Inventory scores and perceived mate values. *Journal of Affective Disorders*, *75*, 131-148.
- Klusmann, D. (2002). Sexual motivation and the duration of partnership. *Archives of Sexual Behavior*, *31*(3), 275-287.

- Koukounas, E., & Over, R. (2000). Changes in the magnitude of the eyeblink startle response during habituation of sexual arousal. *Behavior Research and Therapy*, 38, 573-584.
- Liao, H. -I., Yeh, S. -L., & Shimojo, S. (2011). Novelty vs. familiarity principles in preference decisions: Task-context of past experience matters. *Frontiers in Psychology*, 2, 43.
- Lisk, R. D., & Baron, G. (1982). Female regulation of mating location and acceptance of new mating partners following mating to sexual satiety: The Coolidge effect demonstrated in the female golden hamster. *Behavioral and Neural Biology*, 36(4), 416-421.
- Little, A. C., DeBruine, L. M., & Jones, B. C. (2014). Sex differences in attraction to familiar and unfamiliar opposite-sex faces: Men prefer novelty and women prefer familiarity. *Archives of Sexual Behavior*, 43(5), 973-981.
- Lykins, A. D., Meana, M., & Strauss, G. P. (2008). Sex differences in visual attention to erotic and non-erotic stimuli. *Archives of Sexual Behavior*, 37(2), 219-228. doi:10.1007/s10508-007-9208-x
- Ma, D. S., Correll, J., & Wittenbrink, B. (2015). The Chicago Face Database: A free stimulus set of faces and norming data. *Behavior Research Methods*, 47(4), 1122-1135.
- Ma-Kellams, C., Wang, M. C., & Cardiel, H. (2017). Attractiveness and relationship longevity: Beauty is not what it is cracked up to be. *Personal Relationships*, 24(1), 146-161.
- Malamuth, N. M., Addison, T., & Koss, M. (2000). Pornography and sexual aggression: Are there reliable effects and can we understand them? *Annual Review of Sex Research*, 11, 26-91.
- Mark, K. P., Janssen, E., & Milhausen, R. R. (2011). Infidelity in heterosexual couples: Demographic, interpersonal, and personality-related predictors of extradyadic sex. *Archives of Sexual Behavior*, 40(5), 971-982.

- McNulty, J. K., Neff, L. A., & Karney, B. R. (2008). Beyond initial attraction: Physical attractiveness in newlywed marriage. *Journal of Family Psychology, 22*(1), 135-143.
- Meltzer, A. L., McNulty, J. K., & Maner, J. K. (2017). Women like being valued for sex, as long as it is by a committed partner. *Archives of Sexual Behavior, 46*(2), 475-488.
- Michael, R. P., & Zumpe, D. (1978). Potency in Male Rhesus Monkeys: Effects of continuously receptive females. *Science, 200*(28).
- Morton, H., & Gorzalka, B. B. (2015). Role of partner novelty in sexual functioning: A review. *Journal of Sex & Marital Therapy, 41*(6), 593-609. doi:10.1080/0092623X.2014.958788
- Ochiogu, I. S., Ogoejiolor, C. F., & Okafor, C. C. (2012). *Veterinarski Arhiv, 82*(1). 103-114. *of Sex Research, 41*(3), 288-300.
- Park, J., Shimojo, E., & Shimojo, S. (2010). Roles of familiarity and novelty in visual preference judgments are segregated across object categories. *PNAS Proceedings of the National Academy of Sciences of the United States of America, 107*(33), 14552-14555.
- Penke, L., & Asendorpf, J. B. (2008). Beyond global sociosexual orientations: A more differentiated look at sociosexuality and its effects on courtship and romantic relationships. *Journal of Personality and Social Psychology, 95*, 1113-1135.
- Plaud, J. J., Gaither, G. A., Amato-Henderson, S., & Devitt, M. (1997). The long-term habituation of sexual arousal in human males: A crossover design. *Psychological Record, 47*, 385-398.
- Qvarfordt, P., & Zhai, S. (2005). Conversing with the user based on eye-gaze patterns. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 221-230). Portland, Oregon, USA.

- Richters, J., de Visser, R. O., Rissel, C. E., Grulich, A. E., & Smith, A. A. (2008). Demographic and psychosocial features of participants in bondage and discipline, 'sadoomasochism' or dominance and submission (BDSM): Data from a national survey. *Journal of Sexual Medicine, 5*(7), 1660-1668.
- Rupp, H. A., & Wallen, K. (2008). Sex differences in response to visual sexual stimuli: A review. *Archives of Sexual Behavior, 37*(2), 206-218.
- Schmitt, D. P., Alcalay L., Allik, J., Austers, I., Bennett, K. L., Bianchi, G., . . . Zupanèiè, A. (2003). Universal sex differences in the desire for sexual variety: Tests from 52 nations, 6 continents, and 13 islands. *Journal of Personality and Social Psychology, 85*(1), 85-104.
- Schmitt, D. P., Shackelford, T. K., Duntley, J., Tooke, W., & Buss, D. M. (2001). The desire for sexual variety as a key to understanding basic human mating strategies. *Personal Relationships, 8*(4), 425-455. doi:10.1111/j.1475-6811.2001.tb00049.x
- Simmons, L. W. (1945). *The role of the aged in primitive society*. New Haven, CT, US: Yale University Press.
- Sims, K. E., & Meana, M. (2010). Why did passion wane? A qualitative study of married women's attributions for declines in sexual desire. *Journal of Sex & Marital Therapy, 36*(4), 360-380.
- Steiger, S., Franz, R., Eggert, A., & Mueller, J. K. (2008). The Coolidge effect, individual recognition and selection for distinctive circular signatures in a burying beetle. *Proceedings of the Royal Society Biological Sciences Series B, 275*(1645), 1831-1838.
- Thornhill, R., & Gangestad, S. W. (1999). Facial attractiveness. *Trends in Cognitive Sciences, 3*(12), 452-460.

- Tlachi-López, J. L., Eguibar, J. R., Fernández-Guasti, A., & Lucio, R. A. (2012). Copulation and ejaculation in male rats under sexual satiety and the Coolidge effect. *Physiology & Behavior, 106*(5), 626-630.
- Trivers, R. L. (1972). Parental investment and sexual selection. In B. Campbell (Ed.), *Sexual Selection and the Descent of Man, 1871-1971*. Chicago: Aldine.
- Tsujimura, A., Miyagawa, Y., Takada, S., Matsuoka, Y., Takao, T., Hirai, T., & ... Okuyama, A. (2009). Sex differences in visual attention to sexually explicit videos: A preliminary study. *Journal of Sexual Medicine, 6*(4), 1011-1017.
- Valuch, C., Pflüger, L. S., Wallner, B., Laeng, B., & Ansorge, U. (2015). Using eye tracking to test for individual differences in attention to attractive faces. *Frontiers in Psychology, 6*.
- Ventura-Aquino, E., Baños-Araujo, J., Fernández-Guasti, A., & Paredes, R. G. (2016). An unknown male increases sexual incentive motivation and partner preference: Further evidence for the Coolidge effect in female rats. *Physiology & Behavior, 158*. 54-59.
doi:10.1016/j.physbeh.2016.02.026
- von Rueden, C., Gurven, M., and Kaplan, H. (2008). Multiple dimensions of male social status in an Amazonian society. *Evolution and Human Behavior 29*(6):402-415.
- Whalen, R. E. (1963). Sexual behavior of cats. *Behaviour, 20*, 321-342.
- Williams, K. M., Cooper, B. S., Howell, T. M., Yuille, J. C., & Paulhus, D. L. (2009). Inferring sexually deviant behavior from corresponding fantasies: The role of personality and pornography consumption. *Criminal Justice and Behavior, 36*(2), 198-222.
- Williams. (1975). *Sex and evolution*. Princeton, N. J.: Princeton University Press.

- Wilson J.R, Kuehn R.E, & Beach F.A. (1963). Modification in sexual behavior of male rats produced by changing stimulus female. *Journal of Comparative Physiology*, 56. 636–644.
- Wilson, G. D. (1981). Cross-generational stability of gender differences in sexuality. *Personality and Individual Differences*, 2(3), 254-257.
- Wilson, G. D. (1987). Male-female differences and sexual activity, enjoyment, and fantasies. *Personality and Individual Differences*, 8, 125-127.
- Wright, L. I., Fuller, W. J., Godley, B. J., McGowan, A., Tregenza, T., & Broderick, A. C. (2013). No benefits of polyandry to female green turtles. *Behavioral Ecology*, 24(4), 1022-1029.
- Zhai, S., Morimoto, C., & Ihde, S. (1999). Manual and gaze input cascaded (MAGIC) pointing. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, USA*, 246-253. doi: 10.1145/302979.303053
- Zumpe, D., Bonsall, R. W., & Michael, R. P. (1983). Behavior of rhesus monkeys during 28-day cycles of estrogen treatment. *Behavioral Neuroscience*, 97(4), 615-623.
- Zurbriggen, E. L., & Yost, M. R. (2004). Power, desire, and pleasure in sexual fantasies. *The Journal of Sex Research*, 41(3), 288-300.

Table 1

Independent t-tests Comparing Sex Differences in Dispersion Scores across Each of the Hypothetical Conditions

Experimental Conditions	<i>M</i>	<i>SD</i>	<i>df</i>	<i>t</i>	<i>p</i>	Cohen's d
Younger, All Attractive (10 pictures)			606	-9.54	<.001***	-0.772
Male	1.30	0.80				
Female	1.87	0.67				
Younger, All Average (10 pictures)			611	-6.71	<.001***	-0.526
Male	1.81	0.78				
Female	2.19	0.66				
Younger, All Unattractive (10 pictures)			604	-4.87	<.001***	-0.392
Male	2.37	0.79				
Female	2.65	0.63				
Younger, Mixed Attractiveness (10 pictures)			604	-12.02	<.001***	-0.975
Male	1.80	0.63				
Female	2.40	0.60				
Older, Mixed Attractiveness (10 pictures)			604	-4.62	<.001***	-0.377
Male	2.29	0.77				
Female	2.55	0.60				
Younger, Mixed Attractiveness (3 pictures)			598	-7.63	<.001***	-0.613
Male	4.54	1.53				
Female	5.34	1.03				
Older, Mixed Attractiveness (3 pictures)			597	-0.09	.928	-0.008
Male	5.15	1.24				
Female	5.16	1.18				
Mean All Younger (10 pictures)			598	-9.54	<.001***	-0.760
Male	1.82	0.64				
Female	2.27	0.54				

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. Lower means indicated the greater the dispersion scores.

Table 2

Correlations between Dispersion Scores across Each of The Hypothetical Conditions, Sociosexual Orientation (SOI), and Mate Value of Male and Female Participants

Array of Pictures	Male Respondents					Females Respondents				
	MVI	SOI- Total	SOI- Behavior	SOI- Attitude	SOI- Desire	MVI	SOI- Total	SOI- Behavior	SOI- Attitude	SOI- Desire
MVI-7 Score	—	.06	.19**	.02	-.04	—	.05	.13*	-.02	.04
10 Younger, All Attractive	-.04	-.21***	-.10	-.22**	-.15*	.07	-.12*	-.003	-.17**	-.09
10 Younger, All Average	.11	-.14*	-.05	-.12	-.15*	.10	-.07	.05	-.13*	-.04
10 Younger, All Unattractive	.18**	-.09	.01	-.05	-.16*	.03	-.01	.06	-.04	-.03
10 Younger, Mixed Attractiveness	.13*	-.15*	-.06	-.15*	-.13*	.08	-.09	.01	-.11*	-.09
10 Older, Mixed Attractiveness	.15*	-.04	.05	-.07	-.06	.08	-.16**	-.05	-.20***	-.09
3 Younger, Mixed Attractiveness	.18**	-.17	-.07	-.15*	-.15*	.13*	.02	.06	.01	-.02
3 Older, Mixed Attractiveness	.13*	-.06	.08	-.04	-.14*	-.02	.05	.06	.04	.02
Mean Younger Overall Attractive	.11	-.18**	-.06	-.16*	-.17**	.09	-.09	.04	-.14*	-.07

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. Lower means indicated the greater the dispersion scores.

Table 3

Independent t-tests Showing Sex Differences in Appearance Alterations

Appearance Alterations	Sex of Respondent	<i>M</i>	<i>SD</i>	<i>df</i>	<i>t</i>	<i>p</i>	Cohen's <i>d</i>																																																																								
Change your overall appearance (e.g., fashion style, hair style, facial hair, make-up, overall "look")	Male	2.88	1.98	575	-3.77	<.001***	-0.316																																																																								
	Female	3.53	2.13					Change your hair color	Male	1.32	1.13	574	-10.94	<.001***	-0.949	Female	3.13	2.45	Get hair highlights/low-lights	Male	1.28	1.16	575	-9.46	<.001***	-0.813	Female	2.87	2.51	Change your hair style	Male	2.29	1.82	574	-7.16	<.001***	-0.604	Female	3.54	2.29	Buy new clothes	Male	4.17	2.16	575	-5.57	<.001***	-0.468	Female	5.24	2.41	Change your fashion style	Male	2.57	1.91	575	-4.00	<.001***	-0.334	Female	3.24	2.10	Lose noticeable weight	Male	2.58	2.08	575	-1.83	.069	-0.156	Female	2.91	2.16	Gain noticeable weight	Male	2.27	1.80	574	-2.28
Change your hair color	Male	1.32	1.13	574	-10.94	<.001***	-0.949																																																																								
	Female	3.13	2.45					Get hair highlights/low-lights	Male	1.28	1.16	575	-9.46	<.001***	-0.813	Female	2.87	2.51	Change your hair style	Male	2.29	1.82	574	-7.16	<.001***	-0.604	Female	3.54	2.29	Buy new clothes	Male	4.17	2.16	575	-5.57	<.001***	-0.468	Female	5.24	2.41	Change your fashion style	Male	2.57	1.91	575	-4.00	<.001***	-0.334	Female	3.24	2.10	Lose noticeable weight	Male	2.58	2.08	575	-1.83	.069	-0.156	Female	2.91	2.16	Gain noticeable weight	Male	2.27	1.80	574	-2.28	.023*	-0.193	Female	2.63	1.93						
Get hair highlights/low-lights	Male	1.28	1.16	575	-9.46	<.001***	-0.813																																																																								
	Female	2.87	2.51					Change your hair style	Male	2.29	1.82	574	-7.16	<.001***	-0.604	Female	3.54	2.29	Buy new clothes	Male	4.17	2.16	575	-5.57	<.001***	-0.468	Female	5.24	2.41	Change your fashion style	Male	2.57	1.91	575	-4.00	<.001***	-0.334	Female	3.24	2.10	Lose noticeable weight	Male	2.58	2.08	575	-1.83	.069	-0.156	Female	2.91	2.16	Gain noticeable weight	Male	2.27	1.80	574	-2.28	.023*	-0.193	Female	2.63	1.93																	
Change your hair style	Male	2.29	1.82	574	-7.16	<.001***	-0.604																																																																								
	Female	3.54	2.29					Buy new clothes	Male	4.17	2.16	575	-5.57	<.001***	-0.468	Female	5.24	2.41	Change your fashion style	Male	2.57	1.91	575	-4.00	<.001***	-0.334	Female	3.24	2.10	Lose noticeable weight	Male	2.58	2.08	575	-1.83	.069	-0.156	Female	2.91	2.16	Gain noticeable weight	Male	2.27	1.80	574	-2.28	.023*	-0.193	Female	2.63	1.93																												
Buy new clothes	Male	4.17	2.16	575	-5.57	<.001***	-0.468																																																																								
	Female	5.24	2.41					Change your fashion style	Male	2.57	1.91	575	-4.00	<.001***	-0.334	Female	3.24	2.10	Lose noticeable weight	Male	2.58	2.08	575	-1.83	.069	-0.156	Female	2.91	2.16	Gain noticeable weight	Male	2.27	1.80	574	-2.28	.023*	-0.193	Female	2.63	1.93																																							
Change your fashion style	Male	2.57	1.91	575	-4.00	<.001***	-0.334																																																																								
	Female	3.24	2.10					Lose noticeable weight	Male	2.58	2.08	575	-1.83	.069	-0.156	Female	2.91	2.16	Gain noticeable weight	Male	2.27	1.80	574	-2.28	.023*	-0.193	Female	2.63	1.93																																																		
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Gain noticeable weight	Male	2.27	1.80	574	-2.28	.023*	-0.193																																																																								
	Female	2.63	1.93																																																																												

How attractive/appealing if your committed romantic partner changed their overall appearance frequently		572	4.36	<.001***	0.368
Male	4.80	2.24			
Female	3.97	2.27			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 4

Correlations between Dispersion Scores across Each of the Hypothetical Conditions and Mate Value of Male and Female Participants

Appearance Modification	Female MVI-7 (IV)	Male MVI-7 (IV)
1. Change your overall appearance (e.g., fashion)	.13*	.20**
2. Change your hair color	-.001	.01
3. Get hair highlights/low-lights	.18**	.02
4. Change your hair style	.15**	.14*
5. Buy new clothes	.18**	.39***
6. Change your fashion style	.17**	.19**
7. Lose noticeable weight	.02	.11
8. Gain noticeable weight	-.08	-.04
9. How attractive/ appealing if your committed romantic partner changed their overall appearance frequently	.09	.04

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. Lower means indicated the greater the dispersion scores.

Table 5

ANOVA Table on Total Fixation Duration of Men and Women toward Male and Female Pictures

Male Target Pictures	<i>df</i>	<i>F</i>	<i>p</i>	Partial eta
<u>Male Viewers</u>				
Trial	2, 70	0.43	.654	.012
Rep Pic	2, 70	0.51	.600	.014
Pic Order	2, 70	8.32	.001**	.192
Rep Pic x Pic Order	4, 140	5.54	.000***	.137
Trial x Pic Order	4, 140	4.17	.003**	.106
Trial x Rep Pic	4, 140	0.15	.962	.004
Trial x Rep Pic x Pic Order	8, 280	0.97	.461	.027
<u>Female Viewers</u>				
Trial	2, 102	0.21	.809	.004
Rep Pic	2, 102	1.10	.337	.021
Pic Order	2, 102	5.76	.004**	.101
Rep Pic x Pic Order	4, 204	12.07	.000***	.191
Trial x Pic Order	4, 204	9.09	.000***	.151
Trial x Rep Pic	4, 204	2.03	.092	.038
Trial x Rep Pic x Pic Order	8, 408	6.63	.000***	.115
<u>Female Target Pictures</u>				
<u>Male Viewers</u>				
Trial	2, 72	42.86	.000***	.544
Rep Pic	2, 72	44.62	.000***	.553
Pic Order	2, 72	1.38	.259	.037
Rep Pic x Pic Order	4, 144	3.64	.007***	.092
Trial x Pic Order	4, 144	0.92	.453	.025
Trial x Rep Pic	4, 144	21.19	.000***	.371
Trial x Rep Pic x Pic Order	8, 288	1.51	.154	.040
<u>Female Viewers</u>				
Trial	2, 104	62.59	.000***	.546
Rep Pic	2, 104	163.54	.000***	.554
Pic Order	2, 104	4.34	.015*	.077
Rep Pic x Pic Order	4, 208	2.74	.030*	.050
Trial x Pic Order	4, 208	2.75	.029*	.050
Trial x Rep Pic	4, 208	13.04	.000***	.200
Trial x Rep Pic x Pic Order	8, 416	1.60	.124	.030

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. Trial = attractiveness level of surrounding pictures, Rep Pic = attractiveness level of target picture, Pic Order = order of the target picture being presented.

Table 6

Simple Effect Analysis for Attractiveness Level of Target Picture and Picture Order on Total Fixation Duration of Men and Women toward Male and Female Target Pictures

Male Target Pictures	1 st time viewing (1)	2 nd time viewing (2)	3 rd time viewing (3)				
Male Viewers	<i>M (SE)</i>	<i>M (SE)</i>	<i>M (SE)</i>	<i>df</i>	<i>F</i>	<i>p</i>	<i>Partial eta</i>
Attractive Target ^{a, b}	1.20 (0.11)	1.79 (0.15)	1.10 (0.10)	2, 70	12.94	.000	.270
Average Target	1.32 (0.11)	1.40 (0.10)	1.36 (0.12)	2, 70	0.29	.753	.008
Unattractive Target	1.14 (0.11)	1.38 (0.13)	1.34 (0.11)	2, 70	2.46	.093	.066
Female Viewers							
Attractive Target ^{a, b, c}	1.30 (0.10)	1.92 (0.12)	1.01 (0.08)	2, 102	20.71	.000	.289
Average Target	1.29 (0.08)	1.52 (0.09)	1.27 (0.09)	2, 102	2.84	.063	.053
Unattractive Target ^b	1.50 (0.12)	1.19 (0.10)	1.67 (0.10)	2, 102	5.32	.006	.094
Female Target Pictures	1 st time viewing (1)	2 nd time viewing (2)	3 rd time viewing (3)				
Male Viewers	<i>M (SE)</i>	<i>M (SE)</i>	<i>M (SE)</i>	<i>df</i>	<i>F</i>	<i>p</i>	<i>Partial eta</i>
Attractive Target	2.31 (0.17)	2.47 (0.18)	2.39 (0.20)	2, 72	0.53	.592	.014
Average Target ^{b, c}	1.48 (0.10)	1.51 (0.12)	1.87 (0.12)	2, 72	6.17	.003	.146
Unattractive Target	1.05 (0.08)	0.94 (0.08)	0.95 (0.06)	2, 72	1.41	.252	.038
Female Viewers							
Attractive Target	2.23 (0.13)	2.30 (0.15)	2.08 (0.12)	2, 104	1.96	.147	.036
Average Target	1.49 (0.08)	1.38 (0.08)	1.47 (0.08)	2, 104	.967	.384	.018
Unattractive Target ^{a, c}	1.24 (0.09)	0.94 (0.06)	0.97 (0.70)	2, 104	7.79	.001	.130

Note. ^a = significant difference between 1 and 2, ^b = significant difference between 2 and 3, ^c = significant difference between 1 and 3

Table 7

Simple Main Effect for Attractiveness Level of Surrounding Pictures and Picture Order of Target Face on Total Fixation Duration of Men and Women toward Male and Female Pictures

Male Target Pictures	1 st time viewing (1)	2 nd time viewing (2)	3 rd time viewing (3)				
Male Viewers	<i>M (SE)</i>	<i>M (SE)</i>	<i>M (SE)</i>	<i>df</i>	<i>F</i>	<i>p</i>	<i>Partial eta</i>
Attractive Surround	1.21 (0.12)	1.33 (0.14)	1.43 (0.11)	2, 70	1.09	.342	.030
Average Surround ^b	1.36 (0.13)	1.43 (0.11)	1.16 (0.11)	2, 70	2.00	.142	.054
Unattractive Surround ^{a,b}	1.09 (0.10)	1.81 (0.16)	1.21 (0.12)	2, 70	12.02	.000	.256
Female Viewers							
Attractive Surround ^c	1.16 (0.10)	1.43 (0.11)	1.54 (0.11)	2, 102	4.89	.009	.088
Average Surround ^{a, c}	1.69 (0.12)	1.38 (0.11)	1.23 (0.08)	2, 102	5.14	.007	.092
Unattractive Surround ^{a,b}	1.23 (0.07)	1.81 (0.14)	1.17 (0.09)	2, 102	15.60	.000	.234
Female Target Pictures	1 st time viewing (1)	2 nd time viewing (2)	3 rd time viewing (3)				
Male Viewers							
Attractive Surround	0.86 (0.09)	0.96 (0.09)	1.00 (0.10)	2, 72	0.83	.439	.023
Average Surround	1.68 (0.10)	1.59 (0.10)	1.64 (0.12)	2, 72	0.28	.756	.008
Unattractive Surround	2.30 (0.19)	2.37 (0.17)	2.57 (0.21)	2, 72	1.82	.169	.048
Female Viewers	<i>M(SE)</i>	<i>M (SE)</i>	<i>M (SE)</i>	<i>df</i>	<i>F</i>	<i>p</i>	<i>Partial eta</i>
Attractive Surround	1.03 (0.08)	0.93 (0.06)	1.04 (0.06)	2, 104	1.11	.333	.021
Average Surround ^a	1.76 (0.11)	1.44 (0.09)	1.51 (0.10)	2, 104	3.92	.023	.070
Unattractive Surround ^b	2.17 (0.12)	2.24 (0.14)	1.97 (0.13)	2, 104	3.45	.035	.062

Note. ^a = significant difference between 1 and 2, ^b = significant difference between 2 and 3, ^c = significant difference between 1 and 3

Initial analysis, as shown in Table 5, revealed no significant interactions between attractiveness level of surrounding pictures and picture order for men viewing female target pictures.

Table 8

Simple Main Effects for Attractiveness Level of Surrounding Pictures and Attractiveness Level of Target Picture on Total Fixation

Duration of Men and Women toward Male and Female Pictures

Male Target Pictures	Attractive Target (1)	Average Target (2)	Unattractive Target (3)				
Male Viewers	<i>M (SE)</i>	<i>M (SE)</i>	<i>M (SE)</i>	<i>df</i>	<i>F</i>	<i>p</i>	<i>Partial eta</i>
Attractive Surround	1.35 (0.12)	1.39 (0.10)	1.23 (0.13)	2, 70	0.68	.509	.019
Average Surround	1.34 (0.12)	1.33 (0.11)	1.28 (0.10)	2, 70	0.13	.877	.004
Unattractive Surround	1.39 (0.12)	1.37 (0.12)	1.35 (0.13)	2, 70	0.03	.974	.001
Female Viewers							
Attractive Surround ^c	1.20 (0.12)	1.35 (0.10)	1.58 (0.12)	2, 102	3.15	.047	.058
Average Surround	1.51 (0.13)	1.42 (0.09)	1.38 (0.08)	2, 102	0.43	.652	.008
Unattractive Surround	1.51 (0.10)	1.31 (0.11)	1.39 (0.09)	2, 102	1.59	.209	.030
Female Target Pictures	Attractive Target (1)	Average Target (2)	Unattractive Target (3)				
Male Viewers	<i>M (SE)</i>	<i>M (SE)</i>	<i>M (SE)</i>	<i>df</i>	<i>F</i>	<i>p</i>	<i>Partial eta</i>
Attractive Surround ^c	1.09 (0.10)	0.89 (0.08)	0.84 (0.09)	2, 72	3.12	.050	.080
Average Surround ^{a, c}	2.55 (0.22)	1.29 (0.11)	1.07 (0.09)	2, 72	25.28	.000	.413
Unattractive Surround ^{a, b, c}	3.54 (0.30)	2.67 (0.27)	1.02 (0.08)	2, 72	40.78	.000	.531
Female Viewers	Att Rep (1)	Avg Rep (2)	Unatt Rep (3)				
Attractive Surround ^{a, c}	1.21 (0.09)	0.96 (0.06)	0.84 (0.06)	2, 104	7.71	.001	.129
Average Surround ^{a, c}	2.34 (0.18)	1.26 (0.09)	1.11 (0.08)	2, 104	29.92	.000	.365
Unattractive Surround ^{a, b, c}	3.05 (0.21)	2.12 (0.17)	1.20 (0.09)	2, 104	42.21	.000	.448

Note. ^a = significant difference between 1 and 2, ^b = significant difference between 2 and 3, ^c = significant difference between 1 and 3

Initial analysis, as shown in Table 5, revealed no significant interactions between attractiveness level of surrounding pictures and attractiveness level of target picture for both men and women viewing male target pictures.

Table 9

Mean reaction times (in ms) made by male and female raters for each set of 5 pictures shown in order.

Stimuli	Male Ratings		Female Ratings	
	Male Pictures	Female Pictures	Male Pictures	Female Pictures
1. Group A	1755	1891	1735	1886
2. Group B	1854	1755	1715	1828
3. Group A (first repeat)	1751	2009	1784	1869
4. Group C	1793	1752	1689	1829
5. Group A (second repeat)	1439	1613	1590	1642

Note. Pairwise comparisons showed men rating male pictures, 5 < all groups ($p = .001$); men rating female pictures ($p = .001$): 5 < 3 & 1; 3 > 2 & 4; women rating male pictures: 5 < 3 ($p = .079$); women rating female pictures: 5 < all groups ($p = .009$).

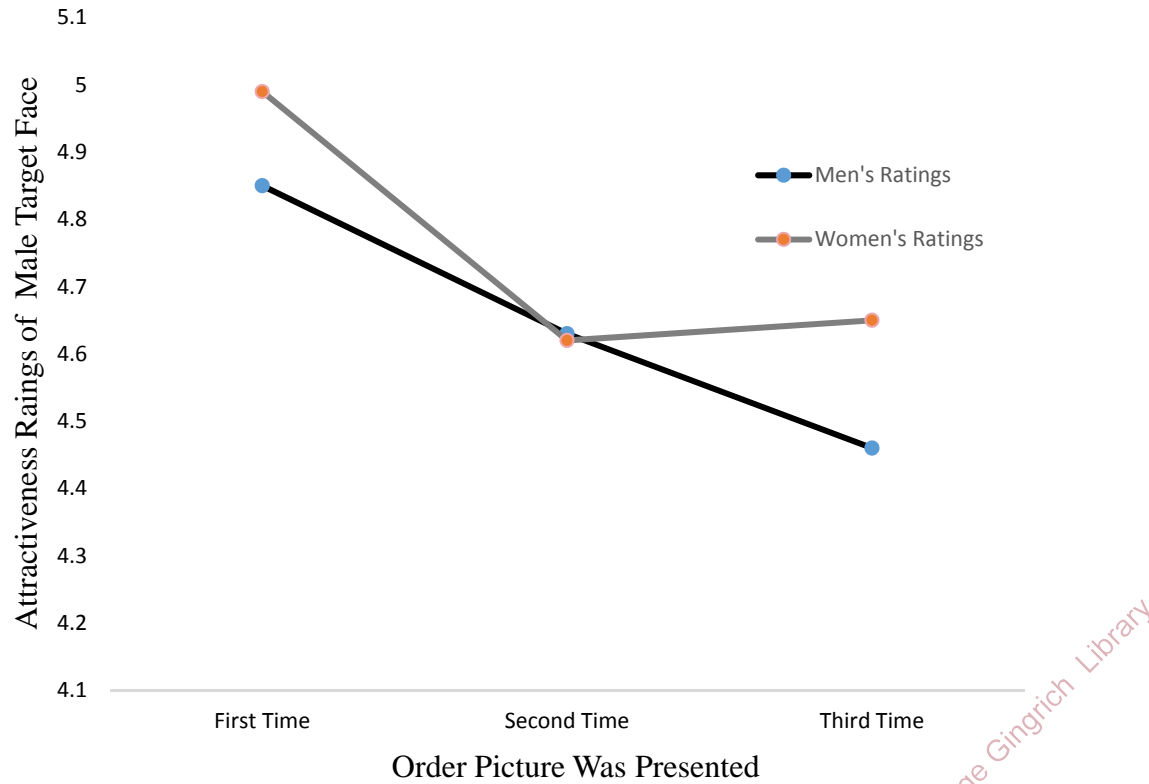


Figure 1. Changes in attractiveness ratings of male faces being presented for three times.

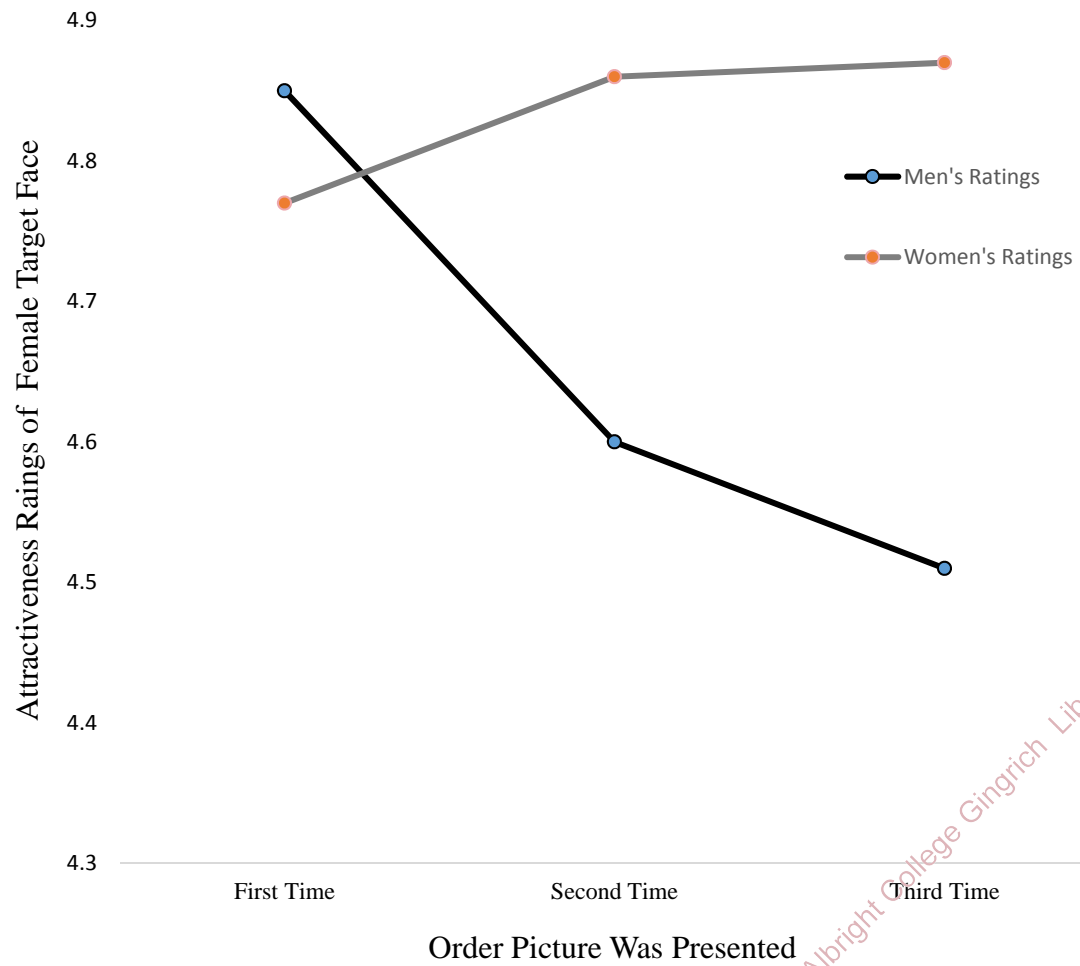


Figure 2. Changes in attractiveness ratings of female faces being presented for three times.

Appendix A

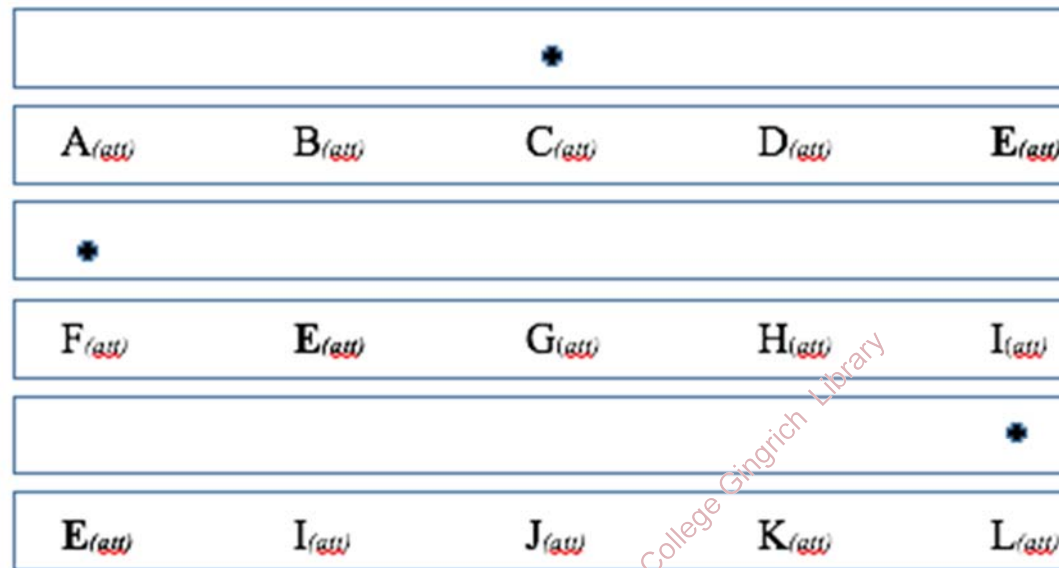
The following figure represents a schematic example of an experimental condition where participants viewed 10 pictures of all attractive, younger individuals distributed 10 mating opportunities across individuals. In two of the conditions, only three pictures with the same instruction were presented. The attractiveness level (attractive, average-looking, and unattractive groups) and age was manipulated in the experiment. *Note.* A, B, C, D, F, G, H, I, J, K, L = Facial images; y-att = young attractive individual.

Hypothetical. You only have 10 opportunities to have sex. Please distribute those 10 times across the following 10 individuals by placing a number next to each picture for how many times you would have sex with that person out of the 10. For example, you can have sex with each of them once, you can have sex with one of them 10 times, you can have sex three times with one person and seven times with another person, etc., but your total number must sum to 10. Each box should have a number, and a zero indicates you would not have sex with that person.

A _(y-att)	B _(y-att)	C _(y-att)	D _(y-att)	E _(y-att)
F _(y-att)	G _(y-att)	H _(y-att)	I _(y-att)	J _(y-att)

Appendix B

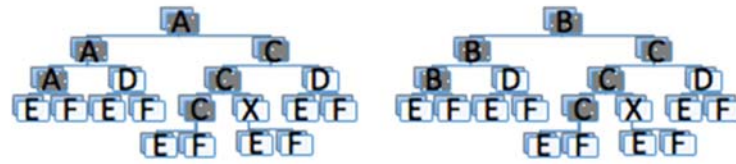
Below is a schematic example of three sets of individuals, participants viewed in study 2. Between each set of pictures, participants first saw a fixation point. Then, participants viewed a collage of 5 attractive individuals. In this example, person E is repeated for two more sets at varying locations and paired with other attractive individuals in the subsequent collages. For each gender, there were a total of 27 sets of experimental stimuli participants viewed. *Note.* A, B, C, D, F, G, H, I, J, K, L = Facial images; **E** = Repeated facial image; att = attractive individual.



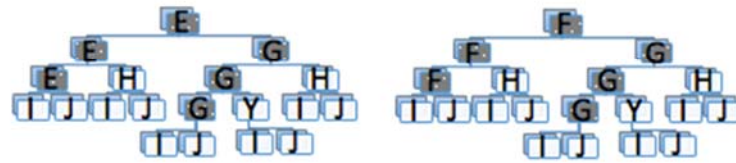
Appendix C

A schematic representation of the picture stimuli participants viewed in study 3. Participants viewed three different blocks, beginning with the pictures A and B stimuli of the block 1. For example, if stimulus “A” is chosen as a preferred short-term dating partner, stimulus “A” is repeated and paired with a novel stimulus “C”. If “C” is chosen, “C” is repeated and paired with a novel stimulus “D”. If “C” is chosen again, “C” is paired with a novel stimulus “X”. After participants chose either “C” or “X,” the block 2 will begin presenting pictures “E” and “F”. *Note.* B, C, E, F, G, I, J, K = Facial images that could be repeated, dependent on participant’s input (■); D, H, L, X, Y, Z = Facial images that could be presented only once (□); End of the experiment (■); the line between the pictures represent the flow of the pictures presentation.

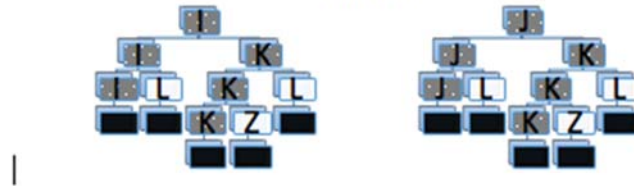
Block 1



Block 2



Block 3



Appendix D

A schematic presentation flow of the 15 male (female) faces participants viewed in in study 4. Participants saw a fixation point in the center of the screen for 3 seconds, followed by the first male (female) image, which was displayed for 300 milliseconds. Participants then saw a screen which asked them to rate the attractiveness of the person from 1-10. The same procedure followed for each subsequent image presented. The first 10 images participants saw were novel (i.e. each image was presented only once). Five of the 10 images were repeated for the first time (i.e. the participants saw same five faces from previous 10). Then, participants saw five more novel images. Then, five of the 10 images were repeated for the second time. Repeated images were counterbalanced and differed across participants.

