



Contents lists available at ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid

Female copulatory orgasm and male partner's attractiveness to his partner and other women



Yael Sela*, Viviana A. Weekes-Shackelford, Todd K. Shackelford, Michael N. Pham

Department of Psychology, Oakland University, Rochester, MI, United States

ARTICLE INFO

Article history:

Received 14 November 2014

Received in revised form 2 February 2015

Accepted 4 February 2015

Keywords:

Evolutionary psychology

Female copulatory orgasm

Male attractiveness

Good-genes hypothesis

Sexy-Sons Hypothesis

ABSTRACT

Women's copulatory orgasm may function to retain sperm from men with "good genes", one indicator of which is attractiveness, and one benefit of which is pathogen resistance. Women who perceive their partner to be more (vs. less) attractive are more likely to report orgasm at last copulation. Another benefit of male attractiveness to women is that he may sire offspring that will gain the heritable share of this advantage (i.e., "sexy sons"). Research has not addressed the "Sexy Sons" Hypothesis (e.g., as indicated by women's perception of *other women's* assessments of their partner's attractiveness) in regards to female copulatory orgasm. We secured self-reports from 439 women in a committed, heterosexual relationship and investigated the relationships between women's orgasm at last copulation and (1) women's assessments of their partner's attractiveness and (2) women's perceptions of *other women's* assessments of their partner's attractiveness. The results indicate that women mated to more (vs. less) attractive men are more likely to report orgasm at last copulation, and this relationship is mediated by women's perceptions of other women's assessments of their partner's attractiveness. We discuss the mediated relationship, note limitations of the research, and suggest future research directions.

© 2015 Elsevier Ltd. All rights reserved.

1. Introduction

According to the Sperm Retention Hypothesis for women's copulatory orgasm, female copulatory orgasm functions as a sire-selection mechanism by preferentially retaining sperm provided by men with "good genes" and, in turn, increasing the probability of producing offspring that carry their sire's high quality genes (Baker & Bellis, 1993, reviewed in 1995; Thornhill, Gangestad, & Comer, 1995). Previously, the Good Genes Hypothesis of sexual selection has been framed in the context of pathogen theory (e.g., Thornhill et al., 1995), whereby sexual selection favors preferences for mates who exhibit honest indicators of pathogen resistance (Hamilton & Zuk, 1982). Potential benefits of preferentially retaining the sperm of males with good genes include development of healthy offspring (e.g., via pathogen resistance) and mateship to a healthier male (and, therefore, increased likelihood of the male's investment in the female and their offspring).

One indicator of good genes is physical attractiveness (Gangestad & Buss, 1993; Grammer, Fink, Møller, & Thornhill, 2003; Thornhill et al., 1995). Women mated to more (vs. less)

attractive men are more likely to report copulatory orgasm with their partner. Previous studies measured male attractiveness by constructing composite scores from independent raters (Puts, Welling, Burriss, & Dawood, 2012; Thornhill et al., 1995). Other researchers have measured male attractiveness by asking women to rate their partner on facets of attractiveness (Gallup, Ampel, Wedberg, & Pogosjan, 2014; Shackelford et al., 2000; Thornhill et al., 1995). Following previous research, we hypothesize that women who perceive their partner to be more (vs. less) attractive will be more likely to report orgasm with their partner at last copulation (Hypothesis 1).

Men who are found to be more attractive by women and, therefore, have greater sexual access to women (Bogaert & Fisher, 1995; Rhodes, Simmons, & Peters, 2005; Weeden & Sabini, 2007; cf. Hill et al., 2013), will transmit the heritable share of their attractiveness and, consequently, attractiveness-related success to their offspring. Therefore, another potential benefit of genetic quality is a man's heritable component of his attractiveness to women. A woman obtaining genes that built such a desirable man would pass on this advantage to her offspring (i.e., she will increase her likelihood of having "sexy sons"; Fisher, 1958). The Sexy Sons Hypothesis has been offered in the context of short-term mating and extra-pair mating (e.g., Cashdan, 1996; Kruger, Fisher, & Jobling, 2003). Here we test a variation of the Sexy Sons

* Corresponding author at: 130 Pryale Hall, Oakland University, Department of Psychology, Rochester, MI 48309-4401, United States. Fax: +1 248 370 4612.

E-mail address: ysela@oakland.edu (Y. Sela).

Hypothesis in a long-term mating context. One valid assessment of women's perception of their partner's attractiveness to *other women* (i.e., information relevant to the Sexy Sons Hypothesis) can be secured by directly asking women how attractive *other women* find their partner. We hypothesize that women mated to men that they perceive *other women* assess as more (vs. less) attractive will be more likely to report orgasm at last copulation (Hypothesis 2).

Because women mated to more (vs. less) attractive men are more likely to report copulatory orgasm, and because women mated to men that they perceive *other women* assess as more (vs. less) attractive may be more likely to report copulatory orgasm, their perception of *other women's* attraction to their partner may affect the relationship between their copulatory orgasm and their assessments of their partner's attractiveness. We tested the hypothesis that women's perception of *other women's* assessments of their partner's attractiveness mediates the relationship between women's assessments of their partner's attractiveness and orgasm at last copulation (Hypothesis 3). Because women's relationship satisfaction is correlated with their likelihood of experiencing copulatory orgasm (Ellsworth & Bailey, 2013; Shackelford et al., 2000; Singh, Meyer, Zambarano, & Hurlbert, 1998; Trudel, Boulos, & Matte, 1993), we control statistically for this and other potential confounding variables, including age of participant and partner and relationship duration.

2. Materials and methods

2.1. Participants

We recruited 439 women, each in a committed, sexual, heterosexual relationship from universities and surrounding communities. The mean participant age was 21.1 years ($SD = 5.5$), the mean of their partner's age was 23.2 years ($SD = 6.7$), and the mean relationship length was 26.6 months ($SD = 38.8$).

2.2. Materials

Participants completed a survey that included several sections. All sections of the survey followed Shackelford et al. (2000). First, participants reported demographic information, including the participant's age, her partner's age, and the duration of the current relationship. Second, four questions assessed women's perceptions of their partner's attractiveness: How (1) physically attractive and (2) sexually attractive do you think your partner is? How (3) physically attractive and (4) sexually attractive do *other women* think your partner is? Participants recorded responses on a Likert-type scale ranging from 0 (*Not at all*) to 9 (*Extremely*).

Participants answered questions about their most recent sexual intercourse with their partner, including whether the participant experienced copulatory orgasm (*Yes, I definitely DID have an orgasm / No, I definitely did NOT have an orgasm / I'm not sure or I can't remember if I had an orgasm*). Finally, participants answered two questions about their relationship satisfaction on a Likert-type scale ranging from 0 (*Not at all*) to 9 (*Extremely*): How (1) emotionally satisfied and (2) overall satisfied are you with your partner?

2.3. Procedure

Potential participants were asked if they were at least 18 years of age and in a committed, sexual, heterosexual relationship. Those who qualified were asked to sign a consent form and to complete a questionnaire. The consent form was placed in a separate envelope to retain anonymity.

3. Results

Following Shackelford et al. (2000), we excluded 32 women who were unsure or could not remember whether they had an orgasm the last time they had sexual intercourse with their partner, leaving data from 407 women for analyses (see Table 1). Following Shackelford et al., we constructed a *partner's attractiveness* variable from the mean of participant's ratings of (1) physical attractiveness of partner and (2) sexual attractiveness of partner ($\alpha = .82$). We constructed a *relationship satisfaction* variable from the mean of participant's reports of their (1) overall relationship satisfaction and (2) emotional satisfaction ($\alpha = .83$). *Women's age and partner's age* is the mean of participant's age and her partner's age ($\alpha = .91$). Finally, we constructed a *perception of other women's assessments of partner's attractiveness* variable from the mean of participant's ratings of their partner's (1) physical attractiveness and (2) sexual attractiveness to other women ($\alpha = .86$).

Tests of Hypothesis 1 followed Shackelford et al. (2000) and indicated that women who rated their partners as more attractive are more likely to report an orgasm at last copulation (*female copulatory orgasm*) than woman who rated their partners as less attractive (Table 2). Hypothesis 1 was supported. Tables 2 and 3 present the results of logistic regressions of the target variables (partner's attractiveness, relationship satisfaction and duration, and the couple's average age) on female copulatory orgasm. The models presented in Tables 2 and 3 were each significant when compared to a constant-only model ($\chi^2(1, n = 407) = 5.93, p = .015$; $\chi^2(4, n = 407) = 18.94, p = .001$; respectively). Table 3 shows that the relationship between partner's attractiveness and female copulatory orgasm remains after controlling for other variables, with participant's relationship satisfaction also predicting copulatory orgasm.

Tests of Hypothesis 2 indicated that women who perceive that other women find their partner to be more (vs. less) attractive are more likely to report orgasm at last copulation (Table 4). Tables 4 and 5 present the results of logistic regressions of the target variables on the presence (vs. absence) of female copulatory orgasm. The models presented in Tables 4 and 5 were each significant when compared to a constant-only model ($\chi^2(1, n = 407) = 8.30, p = .004$; $\chi^2(4, n = 407) = 21.57, p < .001$; respectively). Table 5 shows that this relationship remains even after controlling for other variables. Relationship satisfaction also predicts female copulatory orgasm. Hypothesis 2 was supported.

We tested Hypothesis 3 following the procedures outlined by Baron and Kenny (1986) (also see MacKinnon & Dwyer, 1993). First, tests of Hypothesis 1 indicated that women's ratings of their partner's attractiveness predicted their orgasm at last copulation (Fig. 1, path c). Second, linear regression indicated that *partner's attractiveness* and *perception of other women's assessments of partner's attractiveness* are positively related [$\beta = .46, F(1,405) = 108.49, p < .001$]. That is, women's ratings of their partner's attractiveness are related to their perception of *other women's* assessments of their partner's attractiveness (Fig. 1, path a). Third, we entered *partner's attractiveness* and *perception of other women's assessments of partner's attractiveness* into a logistic regression analysis predicting *female copulatory orgasm*. The model was significant [$\chi^2(2, n = 407) = 9.89, p = .007$]. *Perception of other women's assessments of partner's attractiveness* uniquely predicted *female copulatory orgasm* (Fig. 1, path b; $B = .160, Wald = 4.082, p = .043$). *Partner's attractiveness* no longer predicted *female copulatory orgasm* after controlling for *perception of other women's assessments of partner's attractiveness* (Fig. 1, path c'; $B = .11, Wald = 1.60, p = .206$). A Sobel test (Preacher & Leonardelli, 2001) confirmed that *perception of other women's assessments of partner's attractiveness* fully mediated the relationship between *partner's attractiveness* and *female copulatory orgasm* (Sobel test statistic = 1.99, *s.e.* = .04, $p = .047$).

Table 1
Descriptive statistics for target variables, by orgasm and last copulation.

| Variable | Last copulation | | | |
|--|---------------------|-------|------------------------|-------|
| | Orgasm (n = 288) | | No orgasm (n = 119) | |
| | Mean | SD | Mean | SD |
| Woman's age (years) | 21.41 | 5.68 | 20.37 | 4.95 |
| Partner's age (years) | 23.73 | 7.12 | 22.37 | 5.84 |
| Woman's rating of partner's attractiveness ^a | 7.50 | 1.32 | 7.13 | 1.42 |
| Woman's rating of other women's assessments of partner's attractiveness ^a | 6.74 | 1.51 | 6.26 | 1.56 |
| Woman's relationship satisfaction ^a | 7.80 | 1.49 | 7.21 | 1.89 |
| Relationship duration (months) | 29.32 | 44.42 | 21.96 | 25.63 |
| Woman's age and partner's age ^b (years) | 22.57 | 6.13 | 21.37 | 5.26 |

^a Composite variable with scale anchored by 0 (*not at all*) and 9 (*extremely*).

^b Composite variable, mean age of woman and her partner.

Table 2
Female copulatory orgasm predicted by woman's rating of partner's attractiveness.

| Predictor | B | s.e. | Odds ratio | Wald χ^2 |
|---------------------------------------|-------|------|------------|---------------|
| Partner's attractiveness ^a | 0.19* | 0.08 | 1.21 | 5.97 |
| (Constant) | −0.51 | 0.58 | 0.60 | 0.77 |

Female orgasm coded as 1 = orgasm, 2 = no orgasm.

B = unstandardized regression coefficient.

s.e. = standard error of unstandardized regression coefficient.

Wald chi-square = (unstandardized regression coefficient/standard error of estimate)², df = 1.

* $p < .05$ (two-tailed).

^a Composite variable with scale anchored by 0 (*not at all*) and 9 (*extremely*).

Table 3
Female copulatory orgasm predicted by woman's rating of partner's attractiveness, woman's relationship satisfaction, relationship duration, and woman's age and partner's age.

| Predictor | B | s.e. | Odds ratio | Wald χ^2 |
|--|---------|------|------------|---------------|
| Partner's attractiveness ^a | 0.14* | 0.09 | 1.15 | 2.74 |
| Woman's relationship satisfaction ^a | 0.18** | 0.07 | 1.20 | 6.80 |
| Relationship duration (months) | 0.01 | 0.01 | 1.01 | 0.99 |
| Woman's age and partner's age (years) ^b | 0.03 | 0.03 | 1.04 | 1.71 |
| (Constant) | −2.41** | 0.91 | 0.09 | 6.99 |

^a Composite variable with scale anchored by 0 (*not at all*) and 9 (*extremely*).

^b Composite variable, mean age of woman and her partner.

* $p < .1$ (two-tailed).

** $p < .05$ (two-tailed).

Table 4
Female copulatory orgasm predicted by woman's rating of other women's assessments of partner's attractiveness.

| Predictor | B | s.e. | Odds ratio | Wald χ^2 |
|--|-------|------|------------|---------------|
| Perception of other women's assessments of partner's attractiveness ^a | 0.20* | 0.07 | 1.23 | 8.21 |
| (Constant) | −0.43 | 0.47 | 0.65 | 0.86 |

^a Composite variable with scale anchored by 0 (*not at all*) and 9 (*extremely*).

* $p < .01$ (two-tailed).

4. Discussion

The results of the current research are consistent with the Good Genes Hypothesis of female orgasm: women mated to more (vs. less) attractive men are more likely to report orgasm at last copulation. These results are consistent with Hypothesis 1 and

Table 5
Female copulatory orgasm predicted by woman's rating of other women's assessments of partner's attractiveness, woman's relationship satisfaction, relationship duration, and woman's age and partner's age.

| Predictor | B | s.e. | Odds ratio | Wald χ^2 |
|--|---------|------|------------|---------------|
| Perception of other women's assessments of partner's attractiveness ^a | 0.17* | 0.07 | 1.18 | 5.35 |
| Woman's relationship satisfaction ^a | 0.20** | 0.07 | 1.22 | 8.43 |
| Relationship duration (months) | 0.01 | 0.01 | 1.0 | 0.86 |
| Woman's age and partner's age ^b (years) | 0.03 | 0.03 | 1.03 | 1.51 |
| (Constant) | −2.49** | 0.85 | 0.08 | 8.49 |

^a Composite variable (see text), with scale anchored by 0 (*not at all*) and 9 (*extremely*).

^b Composite variable (see text), mean age of woman and her partner.

* $p < .05$ (two-tailed).

** $p < .01$ (two-tailed).

with previous research (Shackelford et al., 2000; Thornhill et al., 1995), indicating that male partner's attractiveness (as indicated by women's responses to direct questions of their assessments of their partner's attractiveness) predicts female copulatory orgasm, even after controlling for age and relationship duration. Women's relationship satisfaction also predicts female copulatory orgasm, consistent with previous research (Ellsworth & Bailey, 2013; Shackelford et al., 2000; Singh et al., 1998; Trudel et al., 1993).

We extended the findings of Thornhill et al. (1995) and Shackelford et al. (2000), testing the Sexy Sons Hypothesis in a context in which women may selectively retain the sperm of men with good genes, by using women's perception of how *other women* assess their partner's attractiveness. The results are consistent with Hypotheses 1 and 2, and indicate that perception of *other women's* assessments of their partner's attractiveness predicts female copulatory orgasm, even after controlling for age and relationship duration and satisfaction (although relationship satisfaction also predicts female copulatory orgasm). However, when partner's attractiveness and perception of *other women's* assessments of partner's attractiveness are both included in the predictive model, the relationship between partner's attractiveness and female copulatory orgasm is eliminated.

Taking into account social information about a male partner's genetic quality, such as *other women's* assessments of his attractiveness, may offer additional information relevant to female sire-selection mechanisms, including female copulatory orgasm. This suggests that "good genes"-related traits may be preferred not only for their stabilizing effects on development (as indicated by symmetry, attractiveness, etc.), but also for their contribution to attracting potential partners (as indicated by perceptions of how attractive *other women* find the male partner).

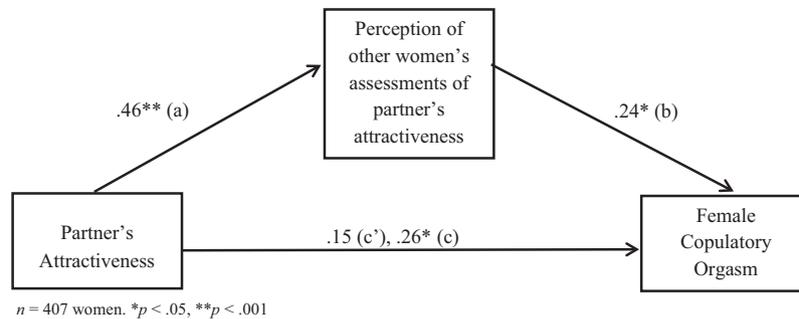


Fig. 1. Mediation analysis with β weights (standardized coefficients). The relationship between *Partner's attractiveness* and *female copulatory orgasm* reduced when controlling statistically for *perception of other women's assessments of partner's attractiveness*.

There is some evidence of mate choice-copying in humans (e.g., Eva & Wood, 2006; Hill & Buss, 2008; Jones, DeBruine, Little, Burriss, & Feinberg, 2007; Little, Burriss, Jones, DeBruine, & Caldwell, 2008; Place, Todd, Penke, & Asendorpf, 2010; Waynforth, 2007), but the function is generally thought to be a reduction in the costs of evaluating mates rather than producing attractive male offspring. Women may attend to which men other women find attractive and, as a consequence, find these men attractive, have sex with them, and have orgasms with them – all to reduce the costs of mate choice. However, studies of mate choice-copying in humans (e.g., Eva & Wood, 2006; Hill & Buss, 2008; Jones et al., 2007; Little et al., 2008; Place et al., 2010; Uller & Johansson, 2003; Waynforth, 2007) have focused on rating men, and on being influenced by women, all of whom were strangers to the female participants. In other words, it is unclear what role, if any, mate choice-copying has in the context of an established, long-term relationship. Future research could test mate choice-copying in an established relationship by experimentally manipulating other women's assessments of a female participant's long-term partner. It may also be worthwhile to investigate whether the relationship the female participant has with other women changes the influence of these other women on the female participant's assessment (e.g., whether they are kin, friends, competitors, strangers, etc.).

Female orgasm may be designed to increase relationship satisfaction (the "Pair-Bond" Hypothesis) and/or to retain preferentially the sperm of men with higher genetic quality ("Sire Choice" Hypothesis), or female orgasm may be a non-functional byproduct of male orgasm (reviewed in Puts, Dawood, & Welling, 2012). The results of the current research provide support for both the Pair-Bond Hypothesis and the Sire Choice Hypothesis, which are not mutually exclusive. Thus, one hypothesis alone may not best explain the function of female orgasm. Given the ongoing debate regarding the function of female orgasm (reviewed in Puts, Welling, Burriss, & Dawood, 2012), future research should continue to investigate the proposed functions of female orgasm.

One limitation of the current research is that we cannot determine the causal relationship between female copulatory orgasm and partner's attractiveness. Under the Good Genes Hypothesis, male attractiveness increases the likelihood of female copulatory orgasm. However, copulatory orgasm may cause increased ratings of male attractiveness, or these two variables may affect each other. Neither can the current research specify the causal direction of the relationship between copulatory orgasm and perceptions of other women's assessments of partner's attractiveness. Experimental or time series designs would be better suited to investigate the causal direction of these relationships.

Relationship satisfaction predicts female copulatory orgasm, according to the current study and previous studies (e.g., Ellsworth & Bailey, 2013; Gallup et al., 2014; Shackelford et al., 2000). Perhaps women who are more satisfied in their relationship

are, consequently, more likely to experience copulatory orgasm. Or perhaps women are more satisfied in their relationship *because* they more frequently or more reliably experience copulatory orgasm. Future research might investigate the causal direction of the links between relationship satisfaction and female copulatory orgasm. A time-series design could assess women's relationship satisfaction and copulatory orgasm over time with the same partner.

Given the high prevalence of sexual arousal, desire, and orgasmic difficulties reported by women (Brotto, Bitzer, Laan, Leiblum, & Luria, 2010; Laumann, Paik, & Rosen, 1999; West et al., 2008), understanding the psychological stimulus features associated with orgasmic response is important for developing interventions aimed at improving sexual functioning. Women's sexual functioning, and particularly their copulatory orgasm, is positively associated with their sexual (Haavio-Mannila & Kontula, 1997; Hisasue et al., 2005; Tao & Brody, 2011), relationship (Costa & Brody, 2007; Ellsworth & Bailey, 2013; Mah & Binik, 2005; Shackelford et al., 2000; Singh et al., 1998; Trudel et al., 1993), and general life satisfaction (Brody, 2007). Future research could examine other psychological stimulus features associated with copulatory orgasm, such as other male partner's features and traits as well as relationship characteristics as potential mediators, given the association between women's perceptions of partner attractiveness and copulatory orgasm.

The current research replicates and extends previous results addressing the relationship between male partner's attractiveness and female copulatory orgasm (Shackelford et al., 2000; Thornhill et al., 1995). Furthermore, the current research documents a link between perception of *other women's* assessments of partner's attractiveness and female copulatory orgasm and provides evidence that perception of *other women's* assessments of partner's attractiveness mediates the relationship between male partner's attractiveness and female copulatory orgasm. Women who perceive that *other women* assess their partner as more attractive are more likely to report copulatory orgasm.

References

- Baker, R., & Bellis, M. A. (1993). Human sperm competition: Ejaculate manipulation by females and a function for the female orgasm. *Animal Behaviour*, 46, 887–909.
- Baker, R., & Bellis, M. A. (1995). *Human sperm competition: Copulation, masturbation, and infidelity*. London, UK: Chapman & Hall.
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173–1182.
- Bogaert, A. F., & Fisher, W. A. (1995). Predictors of university men's number of sexual partners. *Journal of Sex Research*, 32, 119–130.
- Brody, S. (2007). Vaginal orgasm is associated with better psychological function. *Sexual and Relationship Therapy*, 22, 173–191.
- Brotto, L. A., Bitzer, J., Laan, E., Leiblum, S., & Luria, M. (2010). Women's sexual desire and arousal disorders. *The Journal of Sexual Medicine*, 7(1pt2), 586–614.

- Cashdan, E. (1996). Women's mating strategies. *Evolutionary Anthropology*, 5, 134–143.
- Costa, R. M., & Brody, S. (2007). Women's relationship quality is associated with specifically penile-vaginal intercourse orgasm and frequency. *Journal of Sex & Marital Therapy*, 33, 319–327.
- Ellsworth, R. M., & Bailey, D. H. (2013). Human female orgasm as evolved signal: A test of two hypotheses. *Archives of Sexual Behavior*. <http://dx.doi.org/10.1007/s10508-013-0152-7>.
- Eva, K. W., & Wood, T. J. (2006). Are all the taken men good? An indirect examination of mate-choice copying in humans. *Canadian Medical Association Journal*, 175, 1573–1574.
- Fisher, R. A. (1958). *The genetical theory of natural selection* (2nd ed.). New York, NY: Dover.
- Gallup, G. G., Jr, Ampel, B. C., Wedberg, N., & Pogosjan, A. (2014). Do orgasms give women feedback about mate choice? *Evolutionary Psychology*, 12, 958–978.
- Gangestad, S. W., & Buss, D. M. (1993). Pathogen prevalence and human mate preferences. *Ethology and Sociobiology*, 14, 89–96.
- Grammer, K., Fink, B., Møller, A. P., & Thornhill, R. (2003). Darwinian aesthetics: Sexual selection and the biology of beauty. *Biological Reviews of the Cambridge Philosophical Society*, 78, 385–407.
- Haavio-Mannila, E., & Kontula, O. (1997). Correlates of increased sexual satisfaction. *Archives of Sexual Behavior*, 26, 399–419.
- Hamilton, W. D., & Zuk, M. (1982). Heritable true fitness and bright birds: A role for parasites? *Science*, 218, 384–387.
- Hill, A. K., Hunt, J., Welling, L. L. M., Cárdenas, R. A., Rotella, M. A., Wheatley, J. R., et al. (2013). Quantifying the strength and form of sexual selection on men's traits. *Evolution and Human Behavior*, 34, 334–341.
- Hill, S. E., & Buss, D. M. (2008). The mere presence of opposite-sex others on judgments of sexual and romantic desirability: Opposite effects for men and women. *Personality and Social Psychology Bulletin*. <http://dx.doi.org/10.1177/0146167207313728>.
- Hisasue, S. I., Kumamoto, Y., Sato, Y., Masumori, N., Horita, H., Kato, R., et al. (2005). Prevalence of female sexual dysfunction symptoms and its relationship to quality of life: A Japanese female cohort study. *Urology*, 65, 143–148.
- Jones, B. C., DeBruine, L. M., Little, A. C., Burriss, R. P., & Feinberg, D. R. (2007). Social transmission of face preferences among humans. *Proceedings of the Royal Society B: Biological Sciences*, 274, 899–903.
- Kruger, D. J., Fisher, M., & Jobling, I. (2003). Proper and dark heroes as dads and cads: Alternative mating strategies in British Romantic literature. *Human Nature*, 14, 305–317.
- Laumann, E. O., Paik, A., & Rosen, R. C. (1999). Sexual dysfunction in the United States: Prevalence and predictors. *JAMA*, 281, 537–544.
- Little, A. C., Burriss, R. P., Jones, B. C., DeBruine, L. M., & Caldwell, C. A. (2008). Social influence in human face preference: Men and women are influenced more for long-term than short-term attractiveness decisions. *Evolution and Human Behavior*, 29, 140–146.
- Mackinnon, D. P., & Dwyer, J. H. (1993). Estimating mediated effects in prevention studies. *Evaluation Review*, 17, 144–158.
- Mah, K., & BINIK, Y. M. (2005). Are orgasms in the mind or the body? Psychosocial versus physiological correlates of orgasmic pleasure and satisfaction. *Journal of Sex & Marital Therapy*, 31, 187–200.
- Place, S. S., Todd, P. M., Penke, L., & Asendorpf, J. B. (2010). Humans show mate copying after observing real mate choices. *Evolution and Human Behavior*, 315, 320–325.
- Preacher, K. J., & Leonardelli, G. J. (2001). Calculation for the Sobel Test. <<http://quantpsy.org/sobel/sobel.htm>> Retrieved June, 12, 2013.
- Puts, D. A., Welling, L. L. M., Burriss, R. P., & Dawood, K. (2012a). Men's masculinity and attractiveness predict their partners' reported orgasm frequency and timing. *Evolution & Human Behavior*, 33, 1–9.
- Puts, D. A., Dawood, K., & Welling, L. L. M. (2012b). Why women have orgasms: An evolutionary analysis. *Archives of Sexual Behavior*, 41, 1127–1143.
- Rhodes, G., Simmons, L. W., & Peters, M. (2005). Attractiveness and sexual behavior: Does attractiveness enhance mating success? *Evolution and Human Behavior*, 26, 186–201.
- Shackelford, T. K., Weekes-Shackelford, V. A., LeBlanc, G. J., Bleske, A. L., Euler, H. A., & Hoier, S. (2000). Female coital orgasm and male attractiveness. *Human Nature*, 11, 299–306.
- Singh, D., Meyer, W., Zambarano, R. J., & Hurlbert, D. F. (1998). Frequency and timing of coital orgasm in women desirous of becoming pregnant. *Archives of Sexual Behavior*, 27, 15–29.
- Tao, P., & Brody, S. (2011). Sexual behavior predictors of satisfaction in a Chinese sample. *The Journal of Sexual Medicine*, 8, 455–460.
- Thornhill, R., Gangestad, S. W., & Comer, R. (1995). Human female orgasm and mate fluctuating asymmetry. *Animal Behaviour*, 50, 1601–1615.
- Trudel, G., Boulos, L., & Matte, B. (1993). Dyadic adjustment in couples with hypoactive sexual desire. *Journal of Sex Education & Therapy*, 19, 31–36.
- Uller, T., & Johansson, L. C. (2003). Human mate choice and the wedding ring effect: Are married men more attractive? *Human Nature*, 14, 267–276.
- Waynforth, D. (2007). Mate choice copying in humans. *Human Nature*, 18, 264–271.
- Weeden, J., & Sabini, J. (2007). Subjective and objective measures of attractiveness and their relation to sexual behavior and sexual attitudes in university students. *Archives of Sexual Behavior*, 36, 79–88.
- West, S. L., D'Aloisio, A. A., Agans, R. P., Kalsbeek, W. D., Borisov, N. N., & Thorp, J. M. (2008). Prevalence of low sexual desire and hypoactive sexual desire disorder in a nationally representative sample of US women. *Archives of Internal Medicine*, 168, 1441–1449.