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The association between men's ratings of women as desirable long-term mates and individual differences in women's sexual attitudes and behaviors

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ABSTRACT

This research examined whether individual differences in women's sexual attitudes and behaviors are associated with men's ratings of them as desirable long-term mates when men were exposed to only pictures of women's faces. Links between sexual attitudes and behaviors with the presence of more masculine facial features were also assessed. Women completed the Sociosexual Orientation Inventory (SOI; Simpson & Gangestad, 1991) and had their faces photographed (without make-up). Facial markers of masculinity were measured, and female raters then independently rated the perceived masculinity of each face. Following this, male raters independently evaluated each woman's face on two dimensions: desirability as a long-term mate and trustworthiness. More sexually unrestricted women, who pose a greater threat of future infidelity, had more masculine facial features, and were evaluated as being both less desirable long-term mates and less trustworthy in relationships. Exploratory analyses suggested that men rated women with higher SOI scores less positively partly because these women had a more masculine facial appearance.

1. Introduction

From an evolutionary perspective, adopting a long-term mating strategy should be beneficial for some and perhaps most men (Gangestad & Simpson, 2000). Adopting a long-term strategy can allow men to gain greater control over a mate's lifetime reproductive potential, to attract women of higher mate value, to increase the survival of a man's children, and to increase the probability of paternity (see Buss, 2004). One major problem that ancestral men had to solve to be reproductively successful, however, was to increase the probability of paternity. Because women give birth, maternity is never in question; paternity, in contrast, is less certain. Thus, increasing the likelihood of paternity should have been important, particularly considering that the costs of cuckoldry are severe when paternal investment is high and exclusive (Buss & Schmitt, 1993).

One way that cuckoldry can be reduced is to prefer long-term mates who are chaste, sexually faithful, and likely to remain faithful in the future. Most men value sexual loyalty highly in potential mates (Buss & Schmitt, 1993), and most become extremely distressed if their partners are unfaithful (Daly & Wilson, 1988). Moreover, men report being less attracted to women who have had more sexual partners (Kenrick, Sundie, Nicastle, & Stone, 2001). This effect could be partly attributable to the perceived increased risk of future infidelity. Consequently, most men should be sensitive to cues that signal a heightened risk of future infidelity in potential long-term mates.

One of the best predictors of extramarital sex and infidelity is premarital sexual permissiveness (Thompson, 1983). Individuals vary considerably in their willingness to engage in sexual intercourse with multiple partners. Part of this variation is captured by individual differences in *sociosexual orientation* (Gangestad & Simpson, 1990; Simpson, Wilson, & Winterheld, 2004). Individuals who have a more restricted sociosexual orientation require more time in relationships before having sex with partners, have fewer partners, and are less likely to enjoy casual, uncommitted sex. More unrestricted individuals, in contrast, require less time in relationships before having sex, and are more comfortable engaging in sex without love, closeness, or commitment. Unrestricted persons, in fact, report having more sex partners and are more likely to engage in "one-night stands" (Simpson & Gangestad, 1991). In addition, more unrestricted individuals who are currently involved in supposedly exclusive dating relationships reported being more inclined to actively pursue extra-pair involvements (Seal, Agostinelli, & Hannett, 1994), and individuals who have had more prior sexual relationships (i.e., more unrestricted persons) are more likely to engage in infidelity (Barta & Kiene, 2005; Feldman & Cauffman,

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1999). More unrestricted women, therefore, should pose a greater risk of future infidelity and, thus, should be perceived as both less desirable long-term mates and less trustworthy in relationships.

2. Are facial features associated with an unrestricted sociosexual orientation?

In humans, the development of masculine facial features is facilitated by the androgen testosterone, especially during puberty (Apperloo, Van Der Stege, Hoek, & Weijmer Schultz, 2003; Fink & Penton-Voak, 2002). For instance, greater levels of testosterone are associated with the lateral growth and lengthening of the lower face (e.g., jaw and chin), as well as the forward growth of the eyebrow ridges (Farkas, 1981; Rosa & Basir, 2002). Androgens such as testosterone influence the brain and behavior in two ways. First, they act prenatally and during early infancy to organize the brain. Second, circulating androgens in later adolescence and adulthood mediate behavior by altering the activity of target neural systems (van Anders & Hampson, 2003). Davis (2000), in fact, claims that there may be a biological link between testosterone and the modulation of sexual motivation. Indeed, differences in testosterone levels between men and women may be partly responsible for some of the observed gender differences in sexual behavior (Townsend, 1999).

Higher levels of testosterone in women are associated with increased sexual desire and having a more unrestricted sociosexual orientation (Cashdan, 1995; Udry, Talbert, & Morris, 1986). Moreover, Mikach and Bailey (1999) have found that more unrestricted women report being more masculine (both as young girls and as adult women), and they are rated by observers as appearing more physically and behaviorally masculine. Higher levels of testosterone in women also predict more frequent initiation of coitus and masturbation, more frequent intercourse during the middle of the reproductive cycle, greater vaginal blood flow after exposure to erotic stimuli (Meston & Frohlich, 2000), wearing more revealing clothing (Grammer, Renninger, & Fischer, 2004), as well as having more sexual partners (Cashdan, 1995; van Anders, Hamilton, & Watson, 2007).

On the basis of the above reasoning, masculine facial features in women – especially features shaped by higher testosterone levels such as more prominent brow ridges, chins, and jaw lines – should be reliably associated with their current sexual behaviors and attitudes. As a result, women who have a more masculine facial appearance should be more sexually unrestricted and, therefore, may pose a greater risk of future infidelity (i.e., they should be less trustworthy in relationship contexts).

To our knowledge, the current research is the first to test relations between women's sexual attitudes and behavior (i.e., their sociosexual orientation), the masculinity of their faces (rated by observers and assessed by measures of facial characteristics), and their perceived desirability as long-term mates (also rated by observers). We predicted that women who are more sexually unrestricted should have more masculine facial features than women who are less sexually unrestricted. Additionally, we predicted that men (male raters) should perceive more sexually unrestricted women, and those with more masculine facial features, as both less desirable as long-term mates and less trustworthy than less sexually unrestricted women and those with less masculine facial features.

3. Method

3.1. Participants and procedure

One hundred and forty women attending a university in the northeastern United States participated in this research. The average age of participants was 19.93 years (SD = 1.37). Sixty-nine women reported being single, 70 were in a dating relationship, and one did not provide information. Participants were recruited through student newspaper ads and were paid $15 for participating. They were told to not apply any makeup before the study (so their "normal" face could be photographed). Prior research has demonstrated that the topography and color of the skin of women's faces is related to men's ratings of their faces (e.g., Fink, Grammer, & Matts, 2006; Fink, Grammer, & Thornhill, 2001; Fink & Matts, 2008), and therefore this step was important so that women did not have the opportunity to alter the appearance of their skin (e.g., by covering blemishes or the natural color of their skin) prior to being photographed. Upon arrival, participants first answered a short questionnaire. They were then asked to tie back their hair so it did not cover their face and to look directly at a digital camera with a neutral facial expression. High resolution pictures (300 dpi) were taken of each woman's face using a Nikon digital camera (Model E950), at the size of 1600 pixels high by 1200 pixels wide. Participants were then thanked and debriefed.

4. Materials

Participants first provided information on their age and dating status. They then completed the Sociosexual Orientation Inventory (SOI), which assesses restricted versus unrestricted sociosexual orientations (Simpson & Gangestad, 1991). The SOI taps five components of sociosexuality: (a) number of different sex partners (where "sex" connotes sexual intercourse) in the past year; (b) number of "one-night" stands; (c) number of sex partners anticipated in the next 5 years; (d) frequency of sexual fantasies involving persons other than the current (or most recent) romantic partner; and (e) attitudes toward engaging in casual, uncommitted sex. The components are weighted and then summed to form a single score (see Simpson & Gangestad, 1991). Higher scores reflect a more unrestricted sociosexual orientation, and lower scores reflect a more restricted one (α = .83).[1]

Face Ratings. Once all photographs had been taken, the faces were rated. One set of ten raters (all women) first independently viewed and rated each photograph on a personal computer in a random order.[2] These raters were recruited from a large Canadian university and had no knowledge of participants' self-ratings or the study hypotheses. Each rater evaluated how well 4 items (see below) described each woman on a 7-point scale, anchored 1 = not at all and 7 = very much. Interrater agreement for each item was high (α ranged from .83 to .95), so scores were averaged across the raters on each item.

Given the links between the appearance of women's facial skin with ratings of their attractiveness (e.g., Fink & Matts, 2008), we had raters evaluate the appearance of each woman's skin on two dimensions: (a) how smooth each woman's skin appeared, and (b) how many facial blemishes each woman had. Because ratings on these items were highly correlated (r = .95), they were averaged to create an index of appearance of the skin.

The masculinity of women's facial features was assessed by 2 items: (a) how masculine each woman appeared to the rater, and (b) how feminine each woman appeared to the rater (reverse-scored). Raters were not instructed to focus on any particular facial features when making these ratings. Because these items were

[1] Some recent research suggests that the SOI may not be a unitary construct (e.g., Penke & Asendorpf, 2008; Webster & Bryan, 2007). The results of the present research, however, were similar for the attitudinal and behavioral components of the SOI.

[2] Female raters were used out of convenience, and each rater evaluated the face of each participant. The ratings were not conducted in one sitting, but instead were conducted over the course of six weeks. Female raters did not rate the faces of participants on items related to attractiveness as a mate or trustworthiness.

highly correlated (r = .91), they were averaged to create an index of masculine facial appearance.[3]

Measurements of certain facial characteristics were also made for each woman. Following procedures discussed by Gangestad and Thornhill (2003), these facial measurements were used to calculate indexes of chin length, jaw width, eye height, eye width, and lip width. These five indexes, along with the perceived masculinity ratings of each woman's face, were then entered into a principal components analysis (PCA) with varimax rotation. Two factors with eigenvalues greater than 1 emerged (eigenvalues = 2.19 and 1.48), explaining 61% of the variance. A scree plot also suggested a two factor solution. The first factor contained the perceived masculinity ratings, chin length, and eye height (negatively loaded). The second factor contained the measures of eye width, lip width, and jaw width. These results suggest that perceived masculinity is more strongly associated with variation in chin size and eye height, mirroring prior research showing that prominent brow ridges (and thus lower eye height) and larger chins are related to ratings of facial dominance in men (Berry & Brownlow, 1989). Variation in size of these facial markers is also more directly linked to variation in testosterone levels (Swaddle & Reierson, 2002). Accordingly, the perceived masculinity ratings and the measures of chin length and eye height (reverse-coded) were standardized and summed to create a facial masculinity index for each woman (α = .50). This index is the primary focus of our predictions.

One hundred forty-two men were then recruited from introductory psychology classes at a large Canadian university to independently view the faces of all the women and make ratings. These raters also had no knowledge of either participants' self-ratings or the hypotheses. The male raters were seated in a room containing a desk and a computer. On the computer screen, each rater was randomly shown the faces of 28 women, one at a time. Each face was rated on the same items by at least 28 male raters. When a face appeared on the screen, each rater evaluated how well 6 items described that woman on a 7-point scale, anchored 1 = not at all and 7 = very much. The ratings were made in a random order for each face within each male rater. The average interrater agreement for each rated item (α) for each group of men who rated the same set of faces was high (mean = .85, range = .67 to .96). Thus, scores were averaged across the raters for each item within the groups of raters who evaluated the same set of faces.[4]

Specifically, the male raters evaluated how desirable each woman appeared to be as a long-term mate on three items: How good as a long-term mate would this woman be?; How many men would want to be in a long-term relationship with this woman?; and How physically attractive is this woman? (anchored 1 = very few, 7 = very many). The male raters also evaluated how trustworthy each woman appeared to be on three items: How trustworthy does this woman appear to be?; How loyal/faithful would this woman be in a long-term romantic relationship?; and How kind and supportive is this woman?

These six items were entered into a principal components analysis (PCA) with varimax rotation. Two eigenvalues greater than 1 emerged (eigenvalues = 4.10 and 1.56), accounting for 95% of the variance. A scree plot also suggested a two factor solution. The first factor contained the three items assessing desirability as a long-term mate. Thus, scores on each item were averaged, with higher scores indicating greater desirability as a long-term mate (α = .94).The second factor contained the three items that assessed trustworthiness. Accordingly, scores on these items were averaged, with higher scores signifying greater perceived trustworthiness (α = .96). The correlation between these two factors was positive and statistically significant (see Table 1).

Table 1
Means, standard deviations, and correlations between the SOI, facial masculinity index, ratings of desirability as a long-term mate, ratings of trustworthiness, and ratings of appearance of the skin.

	Mean (SD)	1	2	3	4
1. SOI	49.34 (36.58)	–			
2. Facial masculinity index	0.00 (.68)	.29**	–		
3. Desirability as a long-term mate	3.30 (.73)	−.18*	−.57***	–	
4. Trustworthiness	4.25 (.46)	−.24**	−.28**	.43***	–
5. Appearance of the skin	2.82 (1.17)	.08	.21*	−.33**	−.12

Note. Standard deviations are reported in parentheses.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

5. Results

Correlations between the variables, as well as the means and standard deviations of each variable, are presented in Table 1. We predicted that more unrestricted women should have higher scores on the facial masculinity index. Consistent with this prediction, a significant positive correlation was found between women's self-reported SOI scores and the facial masculinity index.

We also predicted that more unrestricted women should be viewed by men as both less desirable long-term mates and less trustworthy. As predicted, significant negative correlations emerged between women's SOI scores and the male raters' ratings on these dimensions. Similarly, women who had higher scores on the facial masculinity index were also perceived by male raters as being less desirable long-term mates and less trustworthy.

Although women's SOI scores and their scores on the facial masculinity index were correlated with the ratings made by the male raters, the male raters had no knowledge of the women's past sexual history or sexual attitudes whereas they were privy to the facial characteristics of each woman. It is therefore possible that men perceived more sexually unrestricted women as less desirable long-term mates and less trustworthy by virtue of these women also scoring higher on the facial masculinity index. We therefore ran two multiple regression models where perceptions of long-term mate quality and trustworthiness served as outcome variables, and SOI scores and scores on the facial masculinity index served as predictor variables. In the model predicting perceptions of long-term mate quality, SOI was not a significant predictor in the model (semi-partial r = −.01, *ns*), but the facial masculinity index was a significant predictor (semi-partial r = −.56, $p < .001$). In the model predicting perceptions of trustworthiness, SOI was only a marginally significant predictor in the model (semi-partial r = −.17, $p < .10$), whereas the facial masculinity index was a significant predictor (semi-partial r = −.22, $p < .05$). This pattern of results, where SOI scores no longer significantly predicted the outcomes when scores on the facial masculinity index were statistically controlled, suggest that our male raters may have rated more sexually unrestricted women less positively partly because these women also had higher scores on the facial masculinity index.

Women who were rated as having less desirable skin (i.e., more facial blemishes, less smooth skin) also had more masculine facial

[3] Providing support for the validity of perceptual measures of facial masculinity, Penton-Voak and Chen (2004) have reported that the perceived masculinity of faces in humans is linked with circulating testosterone levels. Specifically, the faces of men who have higher levels of circulating testosterone are perceived as more masculine than are the faces of men who have lower circulating testosterone.

[4] When ratings were not aggregated across raters who evaluated the same faces but were instead subjected to Hierarchical Linear Modeling (HLM) in which raters were treated as a random variable, the results were virtually identical.

features ($r = .21$, $p < .05$). In addition, they were rated by men as less desirable mates ($r = -.33$, $p < .01$), but not as less trustworthy ($r = -.12$, *ns*). Skin appearance was not correlated with women's scores on the SOI ($r = .07$, *ns*), however. The analyses reported above were run again controlling for the appearance of the skin measure. None of the reported results became non-significant, suggesting that the results reported above were not confounded by the appearance of women's skin.

6. Discussion

Based on information gleaned only from facial photographs, men perceived women who reported having a more unrestricted sociosexual orientation as being less desirable long-term mates and less trustworthy in romantic relationships. Theoretically, these findings make sense given that more unrestricted women, who have had more prior sexual partners and are more comfortable engaging in sex without love or commitment, are less likely to be sexually faithful in committed relationships across time. The male raters in this research, however, had no knowledge of the women whose faces they appraised, suggesting that women's sexual unrestrictedness was partly conveyed via their facial features. Indeed, more sexually unrestricted women were rated as having more masculine faces as indexed by perceptions of their masculinity, facial measurements of their chin length, and facial measurements of their eye height (reverse-coded). It is possible, therefore, that the male raters' less positive perceptions of the women in our sample were in part influenced by the higher scores on the facial masculinity index of more sexually unrestricted women.

The development of more masculine facial features and more unrestricted sexual attitudes and behaviors in women are likely to be partially influenced by testosterone. More specifically, testosterone is known to facilitate the development of larger chins during pubertal development (Apperloo et al., 2003; Fink & Penton-Voak, 2002), and it is likely to be a precursor of more unrestricted sexual attitudes and behaviors in women (Cashdan, 1995; van Anders et al., 2007). Although it may be possible to conceal personal information such as one's sociosexual orientation, it is more difficult to conceal physical features such as facial characteristics that are partly governed by testosterone and reliably correlate with one's sexual history and attitudes. The present research suggests that information about women's sexual unrestrictedness, which is related to their risk of infidelity, can potentially be conveyed by the masculinity of women's faces.

Although the present research is the first to our knowledge to suggest that a more masculine facial appearance in women might convey their sexual unrestrictedness and perhaps their long-term mate quality, future research should investigate other possible information that may also be conveyed by a more masculine facial appearance. For instance, research has shown that women who have more feminine (less masculine) facial features tend to be more fertile (Law Smith et al., 2005), partly because they have more estrogen. Additionally, women who have more masculine facial features are more likely to have respiratory diseases, partly because of their higher levels of testosterone (Thornhill & Gangestad, 2006). Men tend to be more attracted to women who have waist-to-hip ratios (WHRs) near .70, and they are much less attracted to women who have higher WHRs (Singh, 1993). Higher levels of circulating testosterone are associated with higher WHRs (van Anders & Hampson, 2003), and higher WHRs in women are associated with both decreased fertility (Jasienska, Ziomkiewicz, Ellison, Lipson, & Thune, 2004; Singh, 2002) and more health problems (Bjorntorp, 1988). Women who have more masculine facial features, therefore, may have more health problems and decreased fertility, also rendering them less attractive as long-term mates.

6.1. Caveats and conclusions

This research has some limitations. For instance, testosterone levels of the female participants were not assessed, meaning that we could not test whether testosterone levels were associated with, and perhaps directly responsible for, women's sexual behavior and attitudes as assessed by the SOI and facial masculinity. Although such links have been reported in prior research, future research needs to directly assess the role of testosterone in explaining purported links between women's sexual behavior and attitudes, women's facial masculinity, and men's ratings of women's desirability as long-term mates. Also, this research is correlational in nature, meaning that the results do not support any causal conclusions. Future experimental research should manipulate the masculinity of women's faces while holding other factors constant to test whether facial masculinity causes men to alter their perceptions of women's desirability as long-term mates. Lastly, this research focused on long-term mating preferences. More sexually unrestricted women tend to adopt a short-term mating perspective. Thus, even though such women may not be desired as long-term mates, they are likely to be successful at securing short-term mating opportunities with desirable men. Whereas this research focused on the costs associated with women being more sexually unrestricted in terms of being less desired as long-term mates, future research should focus on the potential benefits that adopting a short-term mating perspective might accrue. These limitations notwithstanding, the present findings are important in demonstrating that perceptions of women as desirable, and trustworthy long-term mates can be reliably gleaned by men from viewing only the women's facial features.

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References

Apperloo, M. J. A., Van Der Stege, J. G., Hoek, A., & Weijmer Schultz, W. C. M. (2003). In the mood for sex: The value of androgens. *Journal of Sex and Marital Therapy, 29*, 87–102.

Barta, W. D., & Kiene, S. M. (2005). Motivations for infidelity in heterosexual dating couples: The roles of gender, personality differences, and sociosexual orientation. *Journal of Social and Personal Relations, 22*, 339–360.

Berry, D. S., & Brownlow, S. (1989). Were the physiognomists right? Personality correlates of facial babyishness. *Personality and Social Psychology Bulletin, 15*, 266–279.

Bjorntorp, P. (1988). The association between obesity, adipose tissue distribution and disease. *Acta Medica Scandinavica, 723*(Suppl.), 121–134.

Buss, D. M. (2004). *Evolutionary psychology: The new science of the mind*. Needham Heights, MA: Allyn & Bacon.

Buss, D. M., & Schmitt, D. P. (1993). Sexual strategies theory: An evolutionary perspective on human mating. *Psychological Review, 100*, 204–232.

Cashdan, E. (1995). Hormones, sex, and status in women. *Hormones and Behavior, 29*, 354–366.

Daly, M., & Wilson, M. (1988). *Homicide*. Hawthorne, NY: Aldine de Gruyter.

Davis, S. (2000). Testosterone and sexual desire in women. *Journal of Sex Education and Therapy, 25*, 25–32.

Farkas, L. G. (1981). *Anthropometric facial proportions in medicine*. Springfield: Charles C. Thomas.

Feldman, S., & Cauffman, E. (1999). Your cheatin' heart: Attitudes, behaviours, and correlates of sexual betrayal in late adolescents. *Journal of Research on Adolescents, 9*, 227–252.

Fink, B., Grammer, K., & Matts, P. J. (2006). Visible skin color distribution plays a role in the perception of age, attractiveness, and health in female faces. *Evolution and Human Behavior, 27*, 433–442.

Fink, B., Grammer, K., & Thornhill, R. (2001). Human (Homo sapiens) facial attractiveness in relation to skin texture and color. *Journal of Comparative Psychology, 115*, 92–99.

Fink, B., & Matts, P. J. (2008). The effects of skin color distribution and topography cues on the perception of female facial age and health. *Journal of the European Academy of Dermatology and Venerology, 22*, 493–498.

Fink, B., & Penton-Voak, I. (2002). Evolutionary psychology of facial attractiveness. *Current Directions in Psychological Science, 11*, 154–158.

Gangestad, S. W., & Simpson, J. A. (1990). Toward an evolutionary history of female sociosexual variation. *Journal of Personality Special Issue: Biological Foundations of Personality: Evolution, Behavioral Genetics, and Psychophysiology, 58*, 69–96.

Gangestad, S. W., & Simpson, J. A. (2000). The evolution of human mating: Trade-offs and strategic pluralism. *Behavioral and Brain Sciences, 23*, 573–644.

Gangestad, S. W., & Thornhill, R. (2003). Facial masculinity and fluctuating asymmetry. *Evolution and Human Behavior, 24*, 231–241.

Grammer, K., Renninger, L., & Fischer, B. (2004). Disco clothing, female sexual motivation, and relationship status: Is she dressed to impress? *Journal of Sex Research, 41*, 66–74.

Jasienska, G., Ziomkiewicz, A., Ellison, P. T., Lipson, S. F., & Thune, I. (2004). Large breasts and narrow waists indicate reproductive potential in women. *Proceedings of the Royal Society of London, B, 271*, 1213–1217.

Kenrick, D. T., Sundie, J. M., Nicastle, L. D., & Stone, G. O. (2001). Can one ever be too wealthy or too chaste? Searching for nonlinearities in mate judgment. *Journal of Personality and Social Psychology, 80*, 462–471.

Law Smith, M. J., Perrett, D. I., Jones, B. C., Cornwell, R. E., Moore, F. R., Feinberg, D. R., et al. (2005). Facial appearance is a cue to oestrogen levels in women. In *Proceedings of the Royal Society B*, FirstCite Early Online Publishing, ISSN 1471-2954.

Meston, C. M., & Frohlich, P. F. (2000). The neurobiology of sexual function. *Archives of General Psychiatry, 57*, 1012–1030.

Mikach, S. M., & Bailey, J. M. (1999). What distinguishes women with unusually high numbers of sex partners? *Evolution and Human Behavior, 20*, 141–150.

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.

Penton-Voak, I. S., & Chen, J. Y. (2004). High salivary testosterone is linked to masculine male facial appearance in humans. *Evolution and Human Behavior, 25*, 229–241.

Rosa, A., & Basir, M. (2002). Thin-plate spline analysis of allometry and sexual dimorphism in the human craniofacial complex. *American Journal of Physical Anthropology, 117*, 236–245.

Seal, D. W., Agostinelli, G., & Hannett, C. A. (1994). Extradyadic romantic involvement: Moderating effects of sociosexuality and gender. *Sex Roles, 31*, 1–21.

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

Simpson, J. A., Wilson, C. L., & Winterheld, H. A. (2004). Sociosexuality and romantic relationships. In J. H. Harvey, A. Wenzel, & S. Sprecher (Eds.), *Handbook of sexuality in close relationships* (pp. 87–112). Mahwah, NJ: Erlbaum.

Singh, D. (1993). Adaptive significance of female physical attractiveness: Role of waist-to-hip ratio. *Journal of Personality and Social Psychology, 65*, 293–307.

Singh, D. (2002). Female mate value at a glance: Review of relationship of waist-to-hip ratio to health, fecundity and attractiveness. *Human Ethology and Evolutionary Psychology, 23*, 81–91.

Swaddle, J. P., & Reierson, G. W. (2002). Testosterone increases perceived dominance but not attractiveness in human males. *Proceedings of the Royal Society of London, B, 269*, 2285–2289.

Thompson, A. P. (1983). Extramarital sex: A review of the research literature. *Journal of Sex Research, 19*, 1–22.

Thornhill, R., & Gangestad, S. W. (2006). Facial sexual dimorphism, developmental stability, and susceptibility to disease in men and women. *Evolution and Human Behavior, 27*, 131–144.

Townsend, J. M. (1999). Extraversion, sexual experience, and sexual emotions. *Behavioral and Brain Sciences, 22*, 537.

Udry, J. R., Talbert, L. M., & Morris, N. M. (1986). Biosocial foundations for adolescent female sexuality. *Demography, 23*, 217–230.

van Anders, S. M., & Hampson, E. (2003). *Waist-to-hip ratio is positively associated with bioavailable testosterone in healthy premenopausal women*. Unpublished manuscript, University of Western Ontario.

van Anders, S. M., Hamilton, L. D., & Watson, N. V. (2007). Multiple partners are associated with higher testosterone in North American men and women. *Hormones and Behavior, 51*, 454–459.

Webster, G. D., & Bryan, A. (2007). Sociosexual attitudes and behaviors: Why two factors are better than one. *Journal of Research in Personality, 41*, 917–922.