Is women's sociosexual orientation related to their physical attractiveness?

Claire I Fisher, Amanda C Hahn, Lisa M DeBruine & Benedict C Jones

Institute of Neuroscience & Psychology, University of Glasgow, Scotland, UK.

Corresponding author: Claire Fisher (claire.fisher@glasgow.ac.uk), Institute of Neuroscience & Psychology, University of Glasgow, Scotland, UK.

Word count: 3534 words

Is women's sociosexual orientation related to their physical attractiveness?

Abstract

Although many researchers have suggested that more physically attractive women report less restricted sociosexual orientations (i.e., report being more willing to engage in short-term, uncommitted sexual relationships), evidence for this association is equivocal. Consequently, we tested for possible relationships between women's scores on the revised version of the Sociosexual Orientation Inventory (SOI-R) and women's body mass index (N=212), waist-hip ratio (N=213), ratings of their facial attractiveness (N=226), and a composite attractiveness measure derived from these three intercorrelated measures. Our analyses suggest that more attractive women report less restricted sociosexual orientations. Moreover, we show that this link between attractiveness and sociosexual orientation is not simply a consequence of women's scores on the behavior subscale of the SOI-R. Importantly, however, the correlations between measures of women's physical attractiveness and their reported sociosexual orientation were very weak, suggesting that perceptions of these potential cues of women's sociosexual orientation are unlikely to provide accurate, socially relevant information about others during social interactions.

Key words: attractiveness; sociosexuality; sociosexual orientation; mating; mate preferences; body shape; body mass index

1. Introduction

Individual differences in sociosexuality (i.e., the extent to which people are willing to engage in short-term, uncommitted sexual relationships, Simpson & Gangestad, 1991) have been the focus of a considerable amount of empirical research (see Penke & Asendorpf, 2008 and Schmitt, 2005 for reviews). Sociosexuality is most commonly assessed using versions of the Sociosexual Orientation Inventory (SOI), which was first developed by Simpson and Gangestad (1991) and revised (SOI-R) by Penke and Asendorpf (2008). Higher scores on these scales indicate a more unrestricted sexual strategy (i.e., greater openness to short-term, uncommitted sexual relationships).

Many researchers have tested for possible correlations between women's attractiveness and their sociosexual orientation. On one hand, more attractive women might be expected to be more open to short-term relationships because they have more opportunities to mate with high quality mates and, consequently, are better positioned to benefit from a short-term mating strategy (e.g., Gangestad & Simpson, 1990). On the other hand, more attractive women might be expected to have more restricted sociosexual orientations because they can be "choosier" (Penton-Voak et al., 2003).

Evidence for correlations between women's physical attractiveness and sociosexual orientation is mixed, however. Some studies have found that women with more attractive faces scored higher on the Sociosexual Orientation Inventory (Boothroyd et al., 2008, 2011). Women with more attractive body shapes or voices also report having been an extra-pair sexual

partner more frequently and having had more extra-pair sexual relationships than do women with relatively unattractive body shapes or voices (Hughes & Gallup Jr, 2003; Hughes et al., 2004). By contrast, other studies have not observed significant correlations between women's facial or body attractiveness and their reported sociosexual orientation (Perilloux et al., 2013; Penke & Asendorpf, 2008; Clark, 2004), their reported number of short-term or extra-pair sexual relationships (Rhodes et al., 2005; Wiederman & Hurst, 1998), or their reported need for emotional closeness in sexual relationships (Weeden & Sabini, 2007). Note, however, that frequency of extra-pair mating will only indicate unrestricted sociosexual orientation for individuals in long-term exclusive relationships. Attractiveness ratings of video clips showing women interacting with a male confederate are also not significantly correlated with their scores on the Sociosexual Orientation Inventory (Stillman & Maner, 2009).

There are several possible reasons for the mixed results outlined above. First, studies of facial attractiveness have not controlled for the effects of makeup on attractiveness ratings (see, e.g., Etcoff et al., 2011), which may obscure or create correlations between sociosexual orientation and facial attractiveness. Second, only two studies of the possible relationship between women's facial attractiveness and sociosexual orientation assessed sociosexual orientation using the SOI-R (Perilloux et al., 2013; Penke & Asendorpf, 2008). Neither of these studies reported significant positive correlations between women's attractiveness and sociosexual orientation. Furthermore, Penke and Asendorpf (2008) reported a weak *negative* correlation between facial

attractiveness and scores on the SOI, but not on the SOI-R, suggesting that the scale used to assess sociosexual orientation could be important. Third, studies reporting significant positive correlations between facial attractiveness and SOI (Boothroyd et al., 2008, 2011) used a method in which participants indicated whether a composite face with the average facial shape, color, and texture information of women who scored high on the SOI was more attractive than a composite face with the average facial shape, color, and texture information of women who scored low on the SOI. As Boothroyd et al. (2008) acknowledged, results of such comparisons would not necessarily generalize to ratings of individual faces.

In light of the above, we investigated the relationship between women's facial attractiveness and their scores on Penke and Asendorpf's (2008) revised version of the Sociosexual Orientation Inventory (SOI-R). To control for the effects of makeup on facial attractiveness, facial attractiveness was assessed from third-party ratings of face images of the women taken after they had removed their makeup. We also tested for possible relationships between women's scores on the SOI-R and two body measures known to be negatively correlated with women's attractiveness (reviewed in Weeden & Sabini, 2005): their body mass index (BMI) and waist-hip ratio (WHR). We investigated these issues in the largest sample of women tested to date (Ns= 212 to 226, depending on analysis).

2. Methods

First, digital face photographs of 226 young adult white women (mean age=20.73 years, SD=2.03 years) were taken. All of these women were students or staff at the University of Glasgow. Each woman first cleaned her face with hypoallergenic face wipes to remove any makeup and was photographed a minimum of 10 minutes later. Photographs were taken in a small windowless room against a constant background and under standardized diffuse lighting conditions. Participants were instructed to pose with a neutral expression. Camera-to-head distance and camera settings were held constant. Participants wore a white smock covering their clothing when photographed. Photographs were taken using a Nikon D300S digital camera and a GretagMacbeth 24-square ColorChecker chart was included in each image for use in color calibration. Following previous research (e.g., Jones et al., 2015), face images were color calibrated using a least-squares transform from an 11-expression polynomial expansion developed to ensure that color values in each image reflected the true color information (Hong et al., 2001). All images were aligned on pupil position and hairstyle and clothing were masked.

Height and weight were measured from 212 of the women (14 women chose not to have their height and/or weight measured) and were used to calculate their BMI (M=23.32 kg/m^2, SD=3.69 kg/m^2). According to the World Health Organization's (WHO) classifications (World Health Organization, 2000), 3% of these women were in the underweight BMI category (<18.5 kg/m²), 74% were in the normal category (18.5-24.99 kg/m²), 16% were in the overweight category (e25 kg/m²), and 7% were in the obese category (e30 kg/m²). None

of these women were extremely underweight (i.e., none had BMI < 15 kg/m², Bray, 1978) and none had a BMI lower than 17 kg/m². Waist and hip circumferences were measured from 213 of the women (13 women chose not to have their waist and/or hip circumference measured) and were used to calculate their WHR (M=0.76, SD=0.06). Age was weakly correlated with WHR (rho=.13, N=213, p=.054) and unrelated to BMI (rho=.10, N=212, p=.15).

All 226 women photographed completed the 5-point response scale version of the revised Sociosexual Orientation Inventory (SOI-R), which has previously been shown to have very good internal, external, and test-retest reliability (Penke & Asendorpf, 2008). The questionnaire consists of 9 items, each of which is answered using a 1 to 5 scale. The SOI-R has three components (behavior, attitudes, and desires). The SOI-R behavior component consists of 3 items (e.g., “With how many different partners have you had sex within the past 12 months?”), for which 1 on the response scale corresponds to “0 sexual partners” and 5 corresponds to “8 or more sexual partners” (M=2.13, SD=0.90). The SOI-R attitudes component consists of 3 items (e.g., “Sex without love is OK”), for which 1 on the response scale corresponds to “totally disagree” and 5 corresponds to “totally agree” (M=3.27, SD=1.15). The SOI-R desires component consists of 3 items (e.g., “In everyday life, how often do you have spontaneous fantasies about having sex with someone you have just met?”), for which 1 on the response scale corresponds to “never” and 5 corresponds to “nearly every day” (M=2.67, SD=0.99). Scores for each component are calculated by summing the individual scores for the 3 relevant

items. Our mean scores are similar to those reported for female university students by Penke and Asendorpf (2008). A total score (global SOI-R) can also be calculated by summing the three component scores. Higher scores indicate more unrestricted sociosexuality (i.e., greater openness to short-term mating). Following recent work investigating the correlation between women's physical attractiveness and sociosexual orientation that used the SOI-R (Perilloux et al., 2013), our main analyses used these global SOI-R scores. Age was related to scores on the behavior subscale (rho=.18, N=226, p=.006), but not the attitude subscale (rho=.07, N=226, p=.32), desire subscale (rho=.01, N=226, p=.92), or global SOI-R scores (rho=.11, N=226, p=.12).

The face images were rated for attractiveness by 626 heterosexual men (mean age=25.95 years, SD=6.65 years) using a 1 (much less attractive than average) to 7 (much more attractive than average) scale. Each man was randomly allocated 25 of the women's faces to rate. Men's attractiveness ratings of women can differ according to the temporal context of the relationship for which they are being judged (see, e.g., Little et al., 2014). Consequently, 328 of the men were instructed to rate the women's attractiveness for a short-term relationship ("You are looking for the type of person who would be attractive in a short-term relationship. This implies that the relationship may not last a long time. Examples of this type of relationship would include a single date accepted on the spur of the moment, an affair within a long-term relationship, and possibility of a one-night stand."). The other 298 men were instructed to rate the women's attractiveness for a long-

term relationship (“You are looking for the type of person who would be attractive in a long-term relationship. Examples of this type of relationship would include someone you may want to move in with, someone you may consider leaving a current partner to be with, and someone you may, at some point, wish to marry or enter into a relationship on similar grounds as marriage”). These definitions of short- and long-term relationships have been used in previous research (e.g., Penton-Voak et al., 2003).

Following Han et al. (2016) and Fruhen et al. (2015), inter-rater reliability for attractiveness ratings was estimated using bootstrapping. This technique computed the average correlation between ratings for each face (derived from randomly selected subsamples of participants over ten thousand iterations) separately for short-term and long-term attractiveness. The average correlation was high for both types of attractiveness rating (both $r>.75$, both $SD<.03$). This bootstrapping procedure was used because each participant had rated only a random subset of the full image set. We then calculated the average attractiveness rating for each face separately for the short-term ($M=2.31$, $SD=0.63$) and long-term ($M=2.37$, $SD=0.60$) contexts. These average ratings were used in our analyses. Younger women tended to be rated as more attractive for both short-term (rho=-.13, N=226, p=.05) and long-term (rho=-.12, N=226, p=.06) contexts.

3. Results

Not all variables were normally distributed (p-values for Kolmogorov-Smirnov tests ranged from <.001 to .26). Consequently, we report results of non-

parametric tests. Global SOI-R scores were positively correlated with rated facial attractiveness in both the long-term (rho=.16, N=226, p=.018) and short-term (rho=.15, N=226, p=.029) contexts. Although women with lower BMI or lower WHR tended to have higher global SOI-R scores, these correlations were not significant (BMI: rho=-.12, N=212, p=.083; WHR: rho=-.11, N=213, p=.105).

Facial attractiveness ratings for both the long-term and short-term contexts were negatively correlated with women's BMI (long-term: rho=-.34, N=212, p<.001; short-term: rho=-.32, N=212, p<.001) and WHR (long-term: rho=-.29, N=213, p<.001; short-term: rho=-.27, N=213, p<.001). Consequently, we subjected women's facial attractiveness in the long-term context, facial attractiveness in the short-term context, BMI, and WHR to principal component analysis with no rotation. This analysis produced a single "attractiveness" component that explained ~60% of the variance in scores (Kaiser-Meyer-Olkin measure of sampling adequacy=0.62; Bartlett's test of sphericity: p<.001). Scores on this attractiveness component were strongly positively correlated with both types of facial attractiveness rating (both rho>.89, N=212, p<.001) and strongly negatively correlated with both BMI (rho=-.55, N=212, p<.001) and WHR (rho=-.54, N=212, p<.001). Scores on this attractiveness component were positively correlated with global SOI-R scores (rho=.16, N=212, p=.020).

Additional analyses showed qualitatively similar patterns of results when scores on the behavior, attitudes, and desires subscales were substituted for global SOI-R. These results are shown in Table 1.

Table 1. Correlations between aspects of sociosexual orientation (assessed using Penke and Asendorpf's SOI-R) and aspects of women's physical attractiveness. Spearman's rho (and p values) are reported.

	Global SOI-R	Behavior SOI-R	Attitudes SOI-R	Desires SOI-R
Facial attractiveness (long-term)	.16 (.02)	.11 (.09)	.12 (.07)	.13 (.05)
Facial attractiveness (short-term)	.15 (.03)	.10 (.15)	.11 (.09)	.13 (.05)
BMI	-.12 (.08)	-.17 (.01)	-.14 (.04)	.03 (.64)
WHR	-.11 (.11)	-.04 (.60)	-.13 (.07)	-.08 (.23)
Attractiveness component	.16 (.02)	.11 (.10)	.14 (.04)	.10 (.14)

4. Discussion

We found that more facially attractive women scored higher on the SOI-R (i.e., reported greater willingness to engage in short-term, uncommitted sexual relationships). This pattern of results was observed when women's faces were rated for attractiveness as either a short-term or long-term partner. We also observed a significant, positive relationship between women's scores on the SOI-R and a composite attractiveness measure derived from principal component analysis of their facial attractiveness ratings, BMI, and WHR. Women with lower BMI or lower WHR also tended to score higher on the SOI-

R, although these relationships were not significant (p=.08 and p=.11, respectively). Nonetheless, collectively, our findings are consistent with previous research reporting positive relationships between measures of women's attractiveness and measures of their openness to short-term, uncommitted sexual relationships (Boothroyd et al., 2008, 2011; Hughes & Gallup Jr, 2003; Hughes et al., 2004). We speculate that more attractive women may be more open to short-term sexual relationships because they are better placed to offset the potential costs of engaging in short-term relationships, such as low investment and/or reputational costs.

The relationships between our measures of women's physical attractiveness and their scores on the behavior, desires, and attitudes subscales of the SOI-R were generally very similar to those observed for global SOI-R (see Table 1). This suggests that the tendency for more attractive women to score higher on global SOI-R is unlikely to be driven solely by their actual sexual behavior (i.e., is unlikely to be simply a direct consequence of their responses on the behavior subscale only). Additionally, women were not wearing makeup in the face photographs and images were masked so that hairstyle and clothing were not visible. Consequently, the correlations between women's facial attractiveness and SOI-R observed in the current study cannot be due to makeup, hairstyle, or clothing revealing women's sociosexual orientation. Given previous research has not controlled for the possible effects of makeup on attractiveness, our results are the first to suggest that women's faces contain correlates of their sociosexual orientation that are not due to makeup alone.

Consistent with previous research (e.g., Fisher et al., 2014; Han et al., in press; Penton-Voak et al., 2003), we found that women with lower BMI and lower (i.e., more feminine) WHR had more attractive faces. Given BMI and WHR are both negatively correlated with women's body attractiveness (reviewed in Weeden & Sabini, 2005), our results are also consistent with previous research suggesting that women with more attractive bodies tend to have more attractive faces (e.g., Thornhill & Grammer, 1999). The strength of the relationships between women's body measurements and their facial attractiveness did not differ when women's faces were rated for short-term and long-term relationships (BMI: rho=-.32 versus rho=-.34; WHR: rho=-.27 versus rho=-.29). This pattern of results suggests that men's preferences for femininity or adiposity cues in women's faces do not differ according to the temporal context of the relationship sought (but see Little et al., 2014). Further research would be needed to clarify the possible relationships between sociosexual orientation and other measures of adiposity (e.g., percentage body fat), body shape, and facial appearance (e.g., morphological facial femininity).

Our results demonstrate that more physically attractive women score higher on the SOI-R, suggesting that attractiveness is linked to greater openness to short-term, uncommitted sexual relationships. Moreover, our results suggest that this link between sociosexual orientation and physical attractiveness is unlikely to be simply a direct consequence of more attractive women having more mating opportunities. Importantly, however, the correlations between the

measures of physical attractiveness considered in our study and women's SOI-R were uniformly weak (absolute rho values ranging from .11 to .16 for global SOI-R). This suggests that perceptions of these potential cues of women's sociosexual orientation are unlikely to provide accurate, socially relevant information about others during social interactions.

5. Funding

This research was funded by a European Research Council Starting Grant awarded to BCJ.

6. References

Boothroyd, L. G., Jones, B. C., Burt, D. M., DeBruine, L. M., & Perrett, D. I. (2008). Facial correlates of sociosexuality. *Evolution and Human Behavior*, *29*, 211-218.

Boothroyd, L. G., Cross, C. P., Gray, A. W., Coombes, C., & Gregson-Curtis, K. (2011). Perceiving the facial correlates of sociosexuality: Further evidence. *Personality and Individual Differences*, *50*, 422-425.

Clark, A. P. (2004). Self-perceived attractiveness and masculinization predict women's sociosexuality. *Evolution and Human Behavior*, *25*, 113-124.

Etcoff, N. L., Stock, S., Haley, L. E., Vickery, S. A., & House, D. M. (2011). Cosmetics as a feature of the extended human phenotype: Modulation of the perception of biologically important facial signals. *PLoS ONE, 6,* e25656.

Fisher, C. I., Hahn, A. C., DeBruine, L. M., & Jones, B. C. (2014). Integrating shape cues of adiposity and color information when judging facial health and attractiveness. *Perception*, *43*, 499-508.

Fruhen, L. S., Watkins, C. D., & Jones, B. C. (2015). Perceptions of facial dominance, trustworthiness and attractiveness predict managerial pay awards in experimental tasks. *The Leadership Quarterly*, *26*, 1005-1016.

Han, C., Hahn, A. C., Fisher, C. I., DeBruine, L. M., & Jones, B. C. (2016). Women's facial attractiveness is related to their body mass index but not their salivary cortisol. *American Journal of Human Biology*, *28*, 352-355.

Hong, G., Luo, M. R., & Rhodes, P. A. (2001). A study of digital camera colorimetric characterisation based on polynomial modelling. *Color Research and Application, 26,* 76-84.

Hughes, S. M., & Gallup, G. G. (2003). Sex differences in morphological predictors of sexual behavior: Shoulder to hip and waist to hip ratios. *Evolution and Human Behavior*, *24*, 173-178.

Hughes, S. M., Dispenza, F., & Gallup, G. G. (2004). Ratings of voice attractiveness predict sexual behavior and body configuration. *Evolution and Human Behavior*, *25*, 295-304.

Jones, B. C., Hahn, A. C., Fisher, C. I., Wincenciak, J., Kandrik, M., Roberts, S. C., Little, A.C., & DeBruine, L. M. (2015). Facial coloration tracks changes in women's estradiol. *Psychoneuroendocrinology*, *56*, 29-39.

Little, A. C., Jones, B. C., Feinberg, D. R., & Perrett, D. I. (2014). Men's strategic preferences for femininity in female faces. *British Journal of Psychology*, *105*, 364-381.

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., Little, A. C., Jones, B. C., Burt, D. M., Tiddeman, B. P., & Perrett, D. I. (2003). Female condition influences preferences for sexual dimorphism in faces of male humans (Homo sapiens). *Journal of Comparative Psychology*, *117*, 264-271.

Perilloux, C., Cloud, J. M., & Buss, D. M. (2013). Women's physical attractiveness and short-term mating strategies. *Personality and Individual Differences*, *54*, 490-495.

Rhodes, G., Simmons, L. W., & Peters, M. (2005). Attractiveness and sexual behavior: Does attractiveness enhance mating success? *Evolution and human behavior*, *26*, 186-201.

Schmitt, D. P. (2005). Sociosexuality from Argentina to Zimbabwe: A 48-nation study of sex, culture, and strategies of human mating. *Behavioral and Brain Sciences*, *28*, 247-275.

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.

372 Stillman, T. F., & Maner, J. K. (2009). A sharp eye for her SOI: Perception and
373 misperception of female sociosexuality at zero acquaintance. *Evolution*
374 *and Human Behavior*, *30*, 124-130.
375 Thornhill, R., & Grammer, K. (1999). The body and face of woman: One
376 ornament that signals quality? *Evolution and Human Behavior*, *20*, 105-
377 120.
378 Weeden, J., & Sabini, J. (2005). Physical attractiveness and health in Western
379 societies: a review. *Psychological bulletin*, *131*, 635-653.
380 Weeden, J., & Sabini, J. (2007). Subjective and objective measures of
381 attractiveness and their relation to sexual behavior and sexual attitudes
382 in university students. *Archives of sexual behavior*, *36*, 79-88.
383 Wiederman, M. W., & Hurst, S. R. (1998). Body size, physical attractiveness,
384 and body image among young adult women: Relationships to sexual
385 experience and sexual esteem. *Journal of Sex Research*, *35*, 272-281.
386 World Health Organization (2000). *Obesity: Preventing and managing the*
387 *global epidemic*. Geneva, Switzerland: World Health Organization.