

Sociosexuality and sexual arousal

Amanda D. Timmers¹ and Meredith L. Chivers¹

¹ Department of Psychology, Queen's University, Kingston, ON

Abstract: This study investigated the relationship between sociosexuality—one's willingness to engage in uncommitted sexual activity—and heterosexual women and men's patterns of sexual arousal to stimuli varying by gender and relationship context. Assessments were made of 23 women's and 20 men's self-reported sexual arousal and genital arousal to conditions where the sexual targets were unfamiliar (i.e., strangers) versus familiar (i.e., friends and long-term relationship partners) to the participant and to relationship contexts that were uncommitted (i.e., strangers and friends) versus committed (i.e., long-term relationship partners). Sociosexuality was found to significantly predict genital arousal to partner familiarity for male and female sexual targets, and predicted genital arousal to relationship commitment where the sexual actor was male, but for women only. This may indicate that, under certain circumstances, gender cues are a salient factor in women's sexual responding; the relationship between gender cues and specificity of sexual arousal may be conditional upon individual differences such as sociosexuality and relationship context cues. Sociosexuality did not significantly predict women's and men's self-reported sexual arousal patterns. This is the first study to demonstrate that sociosexual orientation is related to patterns of genital sexual response.

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Introduction

Category specificity of sexual arousal

Research suggests that the stimulus properties associated with sexual arousal differ for men and for heterosexual women. Men's sexual arousal is category-specific for gender; their genital and self-reported sexual responses are significantly greater to stimuli depicting their preferred versus non-preferred gender (Chivers, Rieger, Latty, & Bailey, 2004). Heterosexual women, by contrast, have a nonspecific pattern of arousal, demonstrating little discrimination in genital response to sexual stimuli depicting their preferred and non-preferred genders (Chivers, Seto, & Blanchard, 2007). Women's self-reported arousal, however, is somewhat category-specific, though women do report sexual arousal to both preferred

and non-preferred sexual stimuli (Chivers & Bailey, 2005; Chivers et al., 2007).

The physical features of the sexual actors do not appear to be the most relevant characteristics driving heterosexual women's sexual response: women have been found to demonstrate significant genital arousal to sexual content, even when the sexual targets were non-human (i.e., bonobos), whereas men have not (Chivers & Bailey, 2005). Taken together, these findings suggest that men's sexual arousal is strongly dependent upon gender features of the actors (i.e., primary and secondary sex characteristics), whereas heterosexual women's arousal is more dependent, at least genitally, upon other cues, such as the sexual activity depicted in sexual stimuli (Chivers et al., 2007; Chivers, Seto, Lalumière, Laan, & Grimbos, 2010).

Correspondence concerning this article should be addressed to Dr. Meredith Chivers, Department of Psychology, Queen's University, Kingston, Ontario K7L 3N6. E-mail: chiversm@queensu.ca

The importance of relationship context for sexual response

While gender cues do not appear to significantly affect heterosexual women's genital sexual arousal, relationship context cues do (Chivers & Timmers, 2012). Genital and self-reported sexual arousal were recorded while heterosexual women listened to stories describing sexual interactions with women and men that varied by relationship context; the stories described interactions with a stranger, close friend, or long-term relationship partner. Replicating past results, women's genital responses were nonspecific for gender; genital arousal to female and male stimuli was not found to be significantly different. Genital arousal did vary, however, with relationship context: Women demonstrated significantly less genital response to interactions with close friends than to interactions with strangers or long-term partners; the latter two conditions were not significantly different from each other. Women's self-reported arousal was category-specific; they reported greater arousal to the male than female stimuli, but, surprisingly, showed no variation by relationship condition. These findings provide preliminary support for previous speculation that women's sexual arousal is dependent upon relationship cues (Rupp & Wallen, 2008).

The importance of relationship context cues in sexual response, however, does not appear to be unique to women. In one focus group study, men frequently reported that relationship context is an important aspect of arousal, particularly distinguishing between a new or casual partner and a long-term partner (Janssen et al., 2008). Likewise, men have been found to report more sexual arousal when presented with a novel stimulus depicting different actors performing the same sexual activity than the same actors performing a different sexual activity (Kelley & Musialowski, 1986), indicating that men may demonstrate greater sexual arousal to a novel partner than a long-term relationship partner. Research has also found that habituation of men's genital sexual response occurs over long-term, as well as short-term periods of time (Plaud & Gaither, 1997), which suggests the possibility that men could habituate to a sexual partner with whom they have become familiar. A recent follow-up study to Chivers and Timmers (2012), with a larger sample of men, found that men had a similar sexual response

pattern to the relationship context cues as women (less genital arousal to the friend condition than to stranger and long-term relationship conditions; Brandon & Chivers, 2012). Men, however, unlike women, also reported less sexual arousal to the friend than stranger and long-term relationship partner conditions, reflecting the greater concordance between self-reported and genital arousal in men than in women (Chivers et al., 2010).

Sociosexuality and its measurement

Given that women's and men's genital sexual arousal is sensitive to relationship cues, we proposed that variation in response to these cues may relate to individual differences in the propensity to engage in sexual relations as a function of relationship commitment, termed sociosexual orientation, or sociosexuality. Sociosexuality is a distinct, trait-like construct showing temporal stability, e.g., test-retest reliability over a two-month period (Simpson & Gangestad, 1991); moderate heritability estimates (Bailey, Kirk, Zhu, Dunne, & Martin, 2000); and the evidence of genetic effects (Westerlund et al., 2010). Simpson and Gangestad demonstrated that sociosexual orientation is a unique psychological dimension distinct from a general interest in sex (or "sex drive"), sexual satisfaction, guilt, and anxiety. Though correlated with sex drive and number of lifetime sexual partners, sociosexual orientation has been found to be an independent predictor of lifetime number of sexual partners, while sex drive has not (Ostovich & Sabini, 2004).

The Sociosexual Orientation Inventory (SOI) developed by Simpson and Gangestad (1991) has become the leading measure of sociosexuality, and assesses the construct along a bipolar continuum ranging from a "restricted" orientation (preference for sexual activities/relationships characterized by commitment and closeness) to an "unrestricted" orientation (a preference for uncommitted sexual activities and relationships). Individuals with an "unrestricted" sociosexual orientation tend to require less relationship investment before engaging in sexual activity, are more likely to engage in sexual activity with more than one partner at a time, and to be involved in sexual relationships characterized by less commitment, dependency, and expressed love compared to their more restricted counterparts (Simpson & Gangestad).

Gender differences have been found in sociosexuality such that men tend to demonstrate a more “unrestricted” sociosexual orientation, i.e., greater interest in uncommitted sexual relationships, than women (Simpson & Gangestad, 1991). Indeed, several studies have shown that men tend to adopt a more short-term mating strategy than women do, which could be due, in part, to the relatively low parental investment required by men (see Buss & Schmitt, 1993). Interestingly, more “unrestricted” women have been shown to have more masculine gender identities than “restricted” women, both in childhood and also as adults (Ostovich & Sabini, 2004).

Recently, researchers have proposed other multidimensional models of sociosexuality (Jackson & Kirkpatrick, 2007; Penke & Asendorpf, 2008; Webster & Bryan, 2007). Penke and Asendorpf outlined one such model assessing sociosexuality along three different dimensions: sociosexual attitudes (moral or “evaluative disposition toward uncommitted sex”); behaviours (prior experience/engagement in uncommitted sex); and desires (motivational drive to engage in uncommitted sexual activity). The Sociosexual Orientation Inventory – Revised, or SOI-R (Penke & Asendorpf, 2008), wherein responses are rated on a Likert-type scale, has the advantage of avoiding scoring problems inherent in Simpson & Gangestad’s SOI; with the SOI, responses are not given on a common metric, and, due to the open-ended format of several of the items, skewed data from estimates, exaggerations, and other self-reported biases have been observed (see Penke & Asendorpf for a review).

The current study

To date, no one has examined whether sociosexual orientation, a preference for sexual activity within an uncommitted sexual context, is related to genital and self-reported sexual arousal to scenarios that depict committed versus uncommitted sexual situations. Furthermore, although sociosexual orientation has been found to correlate negatively with engaging in sexual relationships for a sense of emotional closeness (Jones, 1998), and those with an unrestricted sociosexual orientation have been found to engage in sexual activity with a partner earlier in the relationship than their more restricted counterparts (Simpson & Gangestad, 1991), it is not

known whether sociosexual orientation is predictive of sexual arousal to stimuli featuring unfamiliar versus familiar sexual partners. Therefore, the objectives of the current study were to determine: (1) whether sociosexual orientation meaningfully relates to patterns of genital and self-reported arousal to stimuli varying in level of commitment and partner familiarity; and (2) whether the relationship between sociosexuality and sexual arousal to partner familiarity and level of commitment varies as a function of the participants’ gender.

The Revised Sociosexual Orientation Inventory (SOI-R; Penke & Asendorpf, 2008) was administered to a subsample of heterosexual women and men from the Chivers and Timmers’ (2012) study, and also to a new sample of heterosexual women and men added to ensure that we had an appropriate number of participants to complete our analysis. We examined the relationship of SOI-R scores to partner familiarity and relationship commitment indices of genital and self-reported arousal. The indices were created from participants’ responses to audio stimuli that described sexual activities with an individual who varied by gender (male and female) and relationship context (stranger, friend, and long-term relationship partner).

We conducted a series of moderated regressions to examine the effect of participants’ gender and sociosexual orientation, and their interaction, on arousal to the partner familiarity and relationship commitment indices for the female and male stimuli, separately. We hypothesized that an interaction would emerge such that the participants’ gender would be a significant moderator of the relationship of sociosexuality and genital arousal and self-reported sexual arousal. Due to men’s well-reported category-specific pattern of sexual response, we expected that the association between sociosexuality and arousal would be stronger for women than for men to the male sexual targets, because heterosexual men do not typically show a significant sexual response to male sexual targets (e.g., Chivers et al., 2007). As a result, men may exhibit a floor effect in that they may not have enough variation in their sexual responding to male targets to detect a relationship with sociosexuality. For all other scenarios (self-reported and genital arousal to female targets), we hypothesized that sociosexuality would predict

genital and self-reported arousal to relationship commitment and partner familiarity, controlling for participants' gender.

Methods

Participants

Data from twenty-five women and twenty men recruited through advertisements posted on a university campus were analyzed. All eligible participants identified as heterosexual, were between 18 and 37 years old ($M = 20.22$, $SD = 2.98$), were able to read and write English fluently, had no active sexually transmitted infections, no history of sexual response difficulties, and were not using medications that are known or suspected to influence sexual functioning. The women who participated had a regular menstrual cycle (between 23 and 33 days) and were not pregnant or menstruating at the time of testing (for participant demographics see Table 1).

Materials

Sociosexual orientation

Sociosexual orientation was assessed using the

Revised Sociosexual Orientation Inventory (SOI-R; Penke & Asendorpf, 2008). Average scores for the SOI-R total and attitudinal and desire dimensions (Table 2) were comparable to those in past research (all $ps > .05$). Interestingly, the SOI-R behavioural dimension scores for women in the current study ($M = 2.05$, $SD = 1.18$) were significantly lower than those in previous research ($M = 2.65$, $SD = 1.73$), $t(24) = -2.53$, $p < .05$, indicating that our female sample was more restricted in their sexual behaviours than Penke and Asendorpf's sample. The average SOI-R behavioural dimension scores for men were not significantly different from those found in previous research ($p > .05$). Internal consistencies for total score, and the behavioural, attitudinal, and desire dimensions were very good.

Self-reported arousal

Participants completed pre-stimulus ("How sexually aroused do you feel?") and post-stimulus ("How high was your sexual arousal during the story?") items, rated on a 10-point scale ranging from 0 ("no sexual arousal") to 9 ("most arousal ever experienced"). Self-reported arousal was calculated as the difference between post- and pre-stimulus arousal ratings.

Experimental stimuli

The experimental stimuli consisted of 18 audio narratives (approximately 90 s each), read by a female actor, presented using headphones, written in the second person, describing sexual and nonsexual interactions between the participant and male and female strangers, friends, or long-term relationship (LTR) partners; twelve of the narratives described sexual interactions initiated and performed by the participant (e.g., manual stimulation of the sexual partner's genitals without orgasm), and six described nonsexual interactions (e.g., doing yoga, cooking, etc.). Two exemplars of each stimulus combination were presented. For further information on development of the stimuli, see Chivers and Timmers (2012).

Apparatus

Genital response

Psychophysiological responses were sampled and recorded with a Limestone Technologies DataPac USB system (Limestone Technologies, Odessa, Ontario, Canada) and recorded with a Dell Precision T5400 computer. Genital sexual response in women was assessed using vaginal photoplethysmography. Vaginal

Table 1 Participant demographic information, separated by gender

	Men ($n = 20$)	Women ($n = 25$)
Age (yrs.)	20.45 (4.24)	20.04 (1.43)
Relationship status (in %)		
Single	55	40
Dating	40	60
Divorced	5	--
Length of dating relationship (mos.)	25.56 (25.36)	21.93(17.42)
Number of sexual partners	5.45 (6.40)	4.60 (4.69)
Age at first intercourse	16.42 (1.87)	16.48 (1.65)
Ethnicity (in %)		
African-Canadian	5	4
Asian-Canadian	10	28
European-Canadian	85	56
Other	--	12
Highest level of education (in %)		
Community college	5	8
University	85	84
Graduate/professional school	10	8

Note. Table presents means of the items presented unless otherwise specified as percentages. Standard deviations are presented in parentheses where applicable.

Table 2 Mean scores, standard deviations, and internal consistencies of the Sociosexual Orientation Inventory (Revised), separated by gender

Measure	Men			Women			Gender difference	
	M	SD	α	M	SD	α	<i>t</i>	Cohen's <i>d</i>
SOI-R Total	5.19	1.64	.86	3.69	1.52	.89	3.18**	.97
SOI-R Attitude	6.78	2.45	.87	5.24	2.40	.89	2.12*	.65
SOI-R Behaviour	2.77	2.04	.91	2.05	1.18	.86	1.39	.42
SOI-R Desire	6.03	1.68	.70	3.79	1.79	.86	4.29***	1.31

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

Note. *Df* for the *t*-tests was 43. SOI-R scores are based on Penke and Asendorpf's (2008) Revised Sociosexual Orientation Inventory

pulse amplitude (VPA), which measures the changes in blood engorgement in vaginal tissue as a function of heart rate (Laan, Everaerd, & Evers, 1995) was used for the current study. Higher amplitudes indicate greater vaginal vasocongestion, which has been shown to be an indicator of sexual response (Laan, Everaerd, & Evers, 1995). The photoplethysmograph signal was sampled at a rate of 10 samples per second, band-pass filtered (0.5 Hz to 10 Hz) and digitized (40 Hz). VPA was measured as peak-to-trough amplitude for each vaginal pulse. Movement artifacts in the VPA were found by visual inspection of the waveforms and deleted prior to data analysis.

Genital response in men was measured with a mercury-in-rubber strain gauge (manufactured by DM Davis) calibrated over six 5mm steps, sampled at a rate of 10Hz, low-pass filtered to .5Hz, digitized (40Hz), and transformed into millimeters change in circumference. Movement artifacts were detected by visual inspection and deleted prior to analysis.

Procedures

All participants were asked to refrain from all sexual activity for 24 hours and exercising for three hours prior to their appointment time. Before testing, the experimenter instructed the participant on how to use the genital gauge, asked the participant to pay attention to the audio clips, to not touch their genitals or manipulate their genital responding in any way, and to sit as still as possible, to reduce movement artifacts in the genital response data (Hatch, 1979). The participants, seated in a comfortable recliner in a dimly lit room, inserted or attached the genital gauge themselves, in private, and listened to a short adaptation stimulus. Participants were

then exposed to the 18 experimental stimuli in a predetermined, random order. Before and after every stimulus, participants reported their self-reported sexual arousal. During an inter-stimulus period of approximately one minute, participants were asked to relax, so as to allow their genital arousal to return to its pre-trial level. If the genital responses did not return to pre-trial levels, the participant was asked to engage in a distraction task (e.g., reading aloud from a neutral magazine, counting backwards in groups of sevens from 300) for up to three minutes, or until genital responding returned to baseline. After the sexual arousal assessment was concluded, participants completed the questionnaires and measures described above, and were asked to watch a short neutral film to ensure that they did not leave the lab sexually aroused. Genital gauges were subject to high-level disinfection between uses.

Data reduction and analysis

Genital response was calculated by subtracting pre-trial baseline genital responses (during the 5-10s prior to stimulus onset) from mean genital arousal to each experimental stimulus. These change scores were then standardized within subjects to control for individual differences in responding (Harris, Rice, Quinsey, Chaplin, & Earls, 1991). Genital and self-reported sexual responding to each relationship condition (stranger, friend, and long-term relationship) was determined by averaging across the two trials of each relationship condition, separately for female and male stimuli. Self-reported and genital arousal to the sexual stimuli were significantly greater than to the neutral scenarios ($ps < .05$), suggesting sexual arousal was evoked by the sexual stimuli themselves and not to other extraneous factors. A few exceptions

to this rule were found: women's genital arousal to one of the female friend stimuli, men's genital and self-reported arousal to the male friend sexual stimuli, and men's genital arousal to one male long-term relationship stimulus were not significantly different than arousal to their respective neutral conditions ($ps > .05$). Overall, mean genital and self-reported arousal to sexual stimuli was significantly greater than average genital and self-reported arousal to the neutral stimuli for both men, $ts > 8.72$, $ps < .001$, and women, $ts > 11.40$, $ps < .001$.

To express sexual response as a function of decreasing relationship commitment and partner familiarity, two separate contrast scores were calculated for both genital and self-reported sexual arousal, one representing relationship commitment and the other representing partner familiarity, separately for male and female sexual stimuli. The *Relationship Commitment Index* was calculated by subtracting arousal to committed partners (long-term relationship conditions) from arousal to uncommitted partners (stranger and friend conditions). The *Partner Familiarity Index* was calculated by subtracting arousal to familiar sexual partners (average of friend and long-term relationship conditions) from arousal to unfamiliar sexual partners (stranger condition). Positive contrast scores indicate greater genital/self-reported arousal to the uncommitted/unfamiliar relationship scenarios and negative scores indicate greater arousal to committed/familiar relationship scenarios.

Manipulation check and data exclusion

After listening to each stimulus, participants were asked to identify the relationship context in the narrative (i.e., stranger, friend, long-term relationship, don't recall). Trials where the relationship context was incorrectly identified or where participants could not recall were excluded from analysis and mean genital and self-reported sexual responses were based on the remaining trial for the stimulus category. Twenty-seven men were initially recruited: four were not included in analyses as they did not identify as heterosexual; an additional participant was excluded because he did not show at least 2.5mm change in penile circumference (Kuban, Barbaree, & Blanchard, 1999) in response to any of the sexual stimuli; one misidentified both exemplars of the

male long-term relationship stimulus type and was excluded from analyses; one other misidentified both exemplars of the male stranger relationship stimulus type and was excluded from analyses, leaving a total of twenty men.

Thirty-five women were initially recruited: five reported a nonheterosexual orientation and were excluded from analyses; one made errors identifying both exemplars of the male stranger stimulus type and was excluded from analyses; three produced uninterpretable genital responses—two of these women were included in analyses of self-reported arousal only, the third had not properly identified both exemplars of the male stranger and female long-term relationship conditions and was excluded from analyses; one participant made errors identifying both exemplars of the female long-term relationship stimulus type and was excluded from analyses; visual inspection of a scatterplot of the data identified one outlier whose data was excluded from analyses; and one participant had a technical error with her testing session and was excluded from analyses, leaving a total of twenty-five women for analyses of self-reported arousal, and twenty-three women for analyses of genital arousal.

Results

Paired samples *t*-tests showed that women had higher genital arousal to the scenarios in which the male and female sexual targets were unfamiliar ($M_s = .62, .77$ and $SD_s = .64, .76$, respectively; see Table 3) versus familiar ($M_s = .22, .29$ and $SD_s = .46, .55$, respectively) to the participant, $t(22) = 3.13$ for male targets, $t(22) = 2.61$ for female targets, all $ps < .01$. Men also had significantly higher genital arousal to unfamiliar versus familiar sexual targets, though only when the target was male ($M = -.22$ and $SD = .42$ vs. $M = -.48$ and $SD = .23$, respectively), $t(19) = 3.01$, $p < .01$. No significant differences were found for self-reported arousal to the familiar and unfamiliar male or female targets (Table 4). Likewise, no significant differences were found between the genital or self-reported arousal to the committed and uncommitted scenarios (male or female).

To examine the effect of sociosexuality and participants' gender on genital and self-reported

Table 3 Means and standard deviations of genital arousal to familiar, unfamiliar, committed, and uncommitted sexual contexts

	Men (<i>n</i> = 20)		Women (<i>n</i> = 23)	
	M	SD	M	SD
Male Target				
Familiar	-.48	.23	.22	.46
Unfamiliar	-.22	.42	.62	.64
Committed	-.38	.36	.28	.75
Uncommitted	-.39	.25	.38	.56
Female Target				
Familiar	.75	.39	.29	.55
Unfamiliar	1.07	.87	.77	.76
Committed	1.00	.77	.43	.76
Uncommitted	.78	.63	.46	.50

Table 4 Means and standard deviations of self-reported arousal to familiar, unfamiliar, committed, and uncommitted sexual contexts

	Men (<i>n</i> = 20)		Women (<i>n</i> = 25)	
	M	SD	M	SD
Male Target				
Familiar	.04	1.5	3.24	1.29
Unfamiliar	.25	1.66	3.02	1.16
Committed	.13	1.67	3.36	1.55
Uncommitted	.10	1.41	3.07	1.11
Female Target				
Familiar	4.08	1.56	2.14	1.46
Unfamiliar	4.75	2.01	2.18	1.84
Committed	4.40	1.78	2.06	1.84
Uncommitted	4.25	1.65	2.2	1.56

arousal on the familiarity and commitment index scores, a series of simultaneous, moderated regressions were run. Familiarity and commitment index scores were regressed onto sociosexuality (SOI-R Total score), participants' gender (effects coded, male = 1, female = -1), and a sociosexuality by participants' gender interaction term, resulting in 8 total regressions (4 genital and 4 self-reported arousal; 2 with the *Partner Familiarity Index* – one with male sexual targets, one with female sexual targets – and 2 with the *Relationship Commitment Index* – one with male sexual targets, one with female sexual targets).

Table 5 presents Pearson's correlations between participants' genital and self-reported arousal on the familiarity and commitment contrasts and sociosexual orientation, by gender. Generally, there tended to be strong, positive correlations between dimensions of sociosexual orientation and genital

arousal to cues of relationship commitment and partner familiarity when the sexual target was of the participant's preferred gender. Correlations between dimensions of sociosexual orientation and genital arousal contrast scores to stimuli featuring the participant's non-preferred gender, and self-reported arousal to contrast scores to both partner genders tended to be weaker and largely non-significant. Interestingly, however, more unrestricted SOIR-Total scores tended to be associated with genital arousal to unfamiliar male targets (the non-preferred gender) for our male sample, at a trend level.

Partner familiarity index

Sociosexuality uniquely accounted for a significant proportion of the variance of genital arousal scores on the familiarity index for male sexual targets, $B = .12$, $p < .05$ and for female sexual targets, $B = .22$, $p < .05$, indicating that higher levels of sociosexuality (i.e., more "unrestricted" sociosexual orientations, or

Table 5 Correlations among unfamiliar-familiar and uncommitted-committed genital and self-reported arousal contrast scores to male and female stimuli and measures of sociosexual orientation

Measure	Correlations with unfamiliar-familiar contrast scores				Correlations with uncommitted-committed contrast scores			
	Genital arousal		Self-reported arousal		Genital arousal		Self-reported arousal	
	PG	NPG	PG	NPG	PG	NPG	PG	NPG
SOI-R Total								
Men	.49**	.40*	.26	.01	.28	-.03	.24	-.09
Women	.37*	.19	.31	.05	.43**	.00	.07	.29
SOI-R Attitude								
Men	.47**	.33	.31	.00	.27	.17	.24	-.02
Women	.23	.22	.39*	-.04	.31	-.03	.08	.17
SOI-R Behaviour								
Men	.45**	.37	.14	-.10	.23	-.04	.10	-.11
Women	.50**	.11	.18	.06	.44**	.13	.02	.28
SOI-R Desire								
Men	.21	.24	.15	.17	.13	-.28	.24	-.11
Women	.32	.12	.14	.13	.40*	-.06	.07	.32

* $p < .10$, ** $p < .05$

Note. PG = Preferred gender (i.e., male stimuli for women, female stimuli for men), NPG = Non-preferred gender (i.e., female stimuli for women, male stimuli for men), SOI-R scores are based on Penke and Asendorpf's (2008) Revised Sociosexual Orientation Inventory.

preference for uncommitted sexual activity) predicted greater genital arousal to sexual targets (both male and female) that are unfamiliar versus familiar to the participant. Because we have employed a moderated regression, the unique effect of sociosexuality on arousal is calculated when gender equals zero: We effects coded our categorical variable (participants' gender; male = 1, female = -1), so zero in this context equals the average of our female and male groups. As such, the slope of the conditional effect of sociosexuality can be interpreted similarly to a main effect in an ANOVA; the unique effect of sociosexual orientation (averaging/collapsing across participants' gender) on arousal. When we collapse across male and female participants, sociosexual orientation significantly predicts genital arousal to partner familiarity to male and female targets, such that more unrestricted sociosexual orientations predict greater arousal to unfamiliar male and female targets. The regression equations examining self-reported arousal to the familiarity index for male and female targets were not found to be significant (all $ps > .05$). Likewise, no interactions were found to be significant (all $ps > .05$)

Relationship commitment index

Sociosexuality uniquely predicted genital arousal

scores on the commitment index for male sexual targets at a trend level, $B = .13$, $p = .06$, indicating that more "unrestricted" sociosexual orientations showed higher levels of genital arousal to uncommitted versus committed male sexual targets at a level approaching statistical significance. An interaction between participants' gender and sociosexuality was also found, $B = -.14$, $p = .05$. Simple regressions separated by gender indicated that sociosexual orientation significantly predicted genital arousal for the male uncommitted-committed contrast score for women, $B = .26$, $t(21) = 2.19$, $p < .05$, but not for men, $p > .05$. The regression equations to the commitment index for female sexual targets were not found to be significant ($p > .05$). Likewise, neither of the regression equations examining self-reported arousal to the commitment index was found to be significant (all $ps > .05$).

Discussion

This is the first study to demonstrate that sociosexual orientation is related to patterns of genital arousal, as measured by vaginal photoplethysmography in women and penile photoplethysmography in men. Sociosexual orientation was significantly related to genital arousal to partner familiarity for both

male and female sexual targets, and, for women, relationship commitment, but only when the sexual targets were male. In other words, more unrestricted sociosexual orientations tended to predict increased genital responding to unfamiliar relative to familiar male and female sexual partners (i.e., strangers vs. friends and long-term relationship partners); high sociosexuality women showed greater genital response to uncommitted relative to committed relationship contexts with male partners (i.e., strangers and friends vs. long-term relationships).

Partner familiarity

Both women and men demonstrated greater genital sexual arousal to unfamiliar versus familiar male sexual partners, suggesting an overall effect of risk on genital responding. Long-term partners and friends may be perceived as less risky than unfamiliar individuals (i.e., strangers) since, with unknown individuals, a greater degree of uncertainty about the sexual partner exists, such as the propensity to commit violence, or possible exposure to sexually transmitted infections. Genital vasocongestion to sexual cues may be an automatic and protective response among women (Chivers et al., 2007); greater genital response to sexual stimuli with cues of relationship risk may reflect this protective mechanism, as per the preparation hypothesis (Suschinsky & Lalumière, 2011). Increased genital arousal and vaginal lubrication may decrease the risk of vaginal tearing and subsequent infection in situations where some form of risk is present, such as when a sexual partner is unknown and may pose risk to the woman, or where rape may be possible. There is some empirical support for the preparation hypothesis, with women showing similar levels of genital arousal to rape scenarios and conventional sexual scenes (Suschinsky & Lalumière). Men's increased genital arousal to unfamiliar partners is less clear, though it may be associated with men's preference for novel sexual actors (Kelley & Musialowski, 1986).

Previous research suggests that individuals with a more "unrestricted" sociosexual orientation tend to have more sex partners (Simpson & Gangestad, 1991), greater risk-taking tendencies, greater impulsivity in overall decision-making, and a higher likelihood to engage in unprotected sexual

intercourse, despite being more knowledgeable about safe sex practices than their more restricted counterparts (Seal & Agostinelli, 1994). Items from the Sociosexual Orientation Inventory (typically some selection or combination of the first three items; see Simpson & Gangestad, and Seal & Agostinelli) have been used as a proxy for sexual risk-taking in studies of risky sexual behaviour. In one of these studies, sexual risk taking (defined by item three of the SOI; see Simpson & Gangestad) was found to be associated with stronger genital and smaller eye-blink responses to threatening and nonthreatening sexual stimuli in heterosexual and homosexual men (Janssen, Goodrich, Petrocelli, & Bancroft, 2009). Women and men higher in sociosexuality may be less sensitive to risk cues, or possibly more aroused by them, resulting in greater motivation for sexual relationships with unfamiliar sexual targets.

Sociosexual orientation significantly predicted genital arousal to the partner familiarity index for male and female sexual targets, above and beyond the effect of gender. A significant interaction was not found between participants' gender and genital or self-reported arousal to the male sexual targets, contrary to our hypothesis that men would demonstrate a floor effect in responding to male stimuli, allowing for a gender difference to emerge. Though in some cases, men's genital and self-reported arousal to the sexual stimuli was not found to be significantly greater than to the neutral scenarios, overall response to the sexual stimuli was greater than overall arousal to the neutral stimuli, and there was enough variance for a significant association between sociosexuality and arousal to emerge. Likewise, our hypothesized significant relationship between sociosexuality and self-reported arousal to the partner familiarity index was not found. It appears that either the effect of self-reported arousal was too small to be detected with our low power, or that sociosexual orientation simply has no predictive power on self-reported arousal to our indices.

Relationship commitment

It is remarkable that sociosexual orientation demonstrated meaningful relationships with patterns of genital sexual response for heterosexual women, unlike sexual orientation, or gender preferences. While an association between sociosexuality and

arousal to uncommitted-committed scenarios may seem intuitive, this study provides the first empirical support for a facet of a heterosexual woman's self-reported sexual preferences corresponding to her genital responding (see Chivers, 2005 and 2010 for a full review of women's nonspecific genital responding with respect to gender cues). For heterosexual women, cues indicating relationship context (Chivers & Timmers, 2012) and level of sexual activity (Chivers et al., 2007) have been posited to be more salient to genital sexual response than gender cues.

The association between self-stated sexual preferences and patterns of genital response observed in the current study is somewhat more complex, however, as the relationship between sociosexual orientation and genital arousal patterns to committed versus uncommitted sexual scenarios in women was only found in response to the male stimuli. If gender of the sexual targets truly had no bearing on women's sexual response patterns, then we would have found an effect of sociosexual orientation on genital arousal to the relationship commitment index for female sexual targets as well, but this was not the case. None of the predictors (even the unique effect of sociosexuality above and beyond the effect of gender) were significantly related to genital arousal to the relationship commitment index for female sexual targets. Likewise, genital arousal to the relationship commitment index for female sexual targets was uncorrelated with sociosexual orientation in our female participants. This may indicate that, under certain circumstances (such as in the current study, where the relationship between sociosexuality and genital arousal to commitment cues emerged in response to male sexual targets), gender cues may be a salient factor in women's sexual responding. What remains unclear is why sociosexuality did not significantly predict self-reported arousal to the relationship commitment index for male and female targets.

The significant interaction between participants' gender and sociosexual orientation to the relationship commitment index for male sexual targets was consistent with our hypothesis that participants' gender would moderate the relationship between sociosexuality and genital arousal to the commitment

index for male sexual targets only. Our rationale -- that men's tendency not to show a significant sexual response to sexual targets of their non-preferred gender (e.g., Chivers et al., 2007) would produce a floor effect of sexual responding for men, making it more difficult to find an association between sociosexual orientation and arousal in men than women -- was not supported; the same pattern (a moderating effect of participants' gender) was not found for sociosexuality and self-reported arousal to the uncommitted-committed index (indeed, sociosexual orientation did not appear to significantly relate to any indices of self-reported arousal) or for sociosexuality and the partner familiarity index.

The lack of consistent significant relationships between sociosexual orientation and self-reported arousal to the partner familiarity and relationship commitment indices is surprising, particularly in light of the significant relationship between sociosexuality and genital response; one might expect two self-report measures (self-reported arousal and the SOI-R) to be more strongly associated than a measure of self-report (SOI-R) and a physiological measure (genital arousal), but this was not the case. Unfortunately, previous literature does little to shed light on this result. Heterosexual women's self-reported arousal patterns toward sexual targets' gender (which are somewhat category-specific) have been shown to be somewhat discordant with their genital arousal patterns (which are nonspecific), whereas men's genital and self-reported arousal to male and female sexual targets has been found to converge quite well (see Chivers et al., 2007).

A related facet of heterosexual women's self-reported sexual preferences (sexual orientation) aligned with their self-reported arousal (to male or female sexual targets), while genital arousal did not (Chivers et al.). In the current study, women's self-reported sexual preference (sociosexual orientation) was not significantly related to self-reported arousal indices of relationship commitment and partner familiarity, while genital arousal was. It remains unclear why the conditional effect of sociosexual orientation and self-reported arousal (irrespective of participants' gender) was not found to be significant.

Limitations and future directions

Several limitations of the current study must be considered. First, individuals who volunteer for studies of sexual psychophysiology have been found to differ from non-volunteers (e.g., less sex guilt, higher levels of masturbation, and greater number of sexual partners) (Wolchik, Braver, & Jensen, 1985). Second, the constructs we used for “relationship commitment” and “partner familiarity” have not been previously validated. Although we found that these constructs were related to sociosexual orientation (which is a theoretically related construct), further research is certainly needed. Third, the current study had a small sample size ($n_s = 25$ and 20 for women and men, respectively for measures of self-reported arousal and $n_s = 23$ and 20 for women and men, respectively, for measures of genital arousal). Although small sample sizes are common in sexual psychophysiology research, concerns regarding the representativeness of the sample and the external validity of the results suggest that our findings should be interpreted cautiously.

The current study suggests that, for women, the association between sociosexuality and patterns of response to stimuli varying in relationship commitment is contingent upon the gender of the actor described in the sexual stimulus. This pattern of response is different from the gender-nonspecific sexual responses reported for women in many other sexual psychophysiology studies. This finding suggests that the relationship between gender and specificity of sexual arousal may be conditional upon individual differences such as sociosexuality and specific stimulus conditions. Future research might examine whether other individual differences in sexual psychology are related to specificity of sexual responding in women and men.

Future research could also attempt to isolate and understand the stimulus features, e.g., relationship risk and partner novelty, that may be more directly driving the association between sociosexual orientation and genital response. For example, one might wish to examine the relationship between sociosexual orientation and sexual response to relationship risk through the use of threatening and non-threatening sexual and nonsexual stimuli. Similarly, one may wish to examine the association

between sociosexual orientation and partner novelty by employing a habituation paradigm with familiar or novel sexual actors and examining participants' genital and self-reported arousal patterns.

References

- Bailey, J.M., Kirk, K.M., Zhu, G., Dunne, M.P., & Martin, N.G. (2000). Do individual differences in sexuality represent genetic or environmentally contingent strategies? Evidence from the Austrian twin registry. *Journal of Personality and Social Psychology, 78*, 537-545.
- Brandon, J., & Chivers, M.L. (2012). The effects of sociosexual orientation, gender cues and relationship context cues in audio narratives on patterns of sexual arousal in heterosexual men. Unpublished honour's thesis.
- Buss, D.M., & Schmitt, D.P. (1993). Sexual strategies theory: An evolutionary perspective on human mating. *Psychological Review, 100*, 204-232.
- Chivers, M.L. (2005). Leading comment: A brief review and discussion of sex differences in the specificity of sexual arousal. *Sexual and Relationship Therapy, 20*, 377-390.
- Chivers, M.L., & Bailey, J.M. (2005). A sex difference in features that elicit genital response. *Biological Psychology, 70*, 115-120.
- Chivers, M.L., Rieger, G., Latty, E., & Bailey, J.M. (2004). A sex difference in the specificity of sexual arousal. *Psychological Science, 15*, 736-744.
- Chivers, M.L., Seto, M.C., & Blanchard, R. (2007). Gender and sexual orientation differences in sexual response to sexual activities versus gender of actors in sexual films. *Journal of Personality and Social Psychology, 93*, 1108-1121.
- Chivers, M.L., Seto, M.C., Lalumière, M.L., Laan, E., & Grimbos, T. (2010). Agreement of self-reported and genital measures of sexual arousal in men and women: A meta-analysis. *Archives of Sexual Behavior, 39*, 5-56.
- Chivers, M.L., & Timmers, A.D. (2012). The effects of gender and relationship context cues in audio narratives on heterosexual women's and men's genital and subjective sexual response. *Archives of Sexual Behavior, 41*, 185-197.

- Harris, G.T., Rice, M.E., Quinsey, V.L., Chaplin, T.C., & Earls, C. (1992). Maximizing the discriminant validity of phallometric assessment data. *Psychological Assessment, 4*, 502-511.
- Hatch, J.P. (1979). Vaginal photoplethysmography: Methodological considerations. *Archives of Sexual Behavior, 8*, 357-374.
- Jackson, J.J., & Kirkpatrick, L.A. (2007). The structure and measurement of human mating strategies: Toward a multidimensional model of sociosexuality. *Evolution and Human Behaviour, 28*, 382-391.
- Janssen, E., Goodrich, D., Petrocelli, J.V., & Bancroft, J. (2009). Psychophysiological response patterns and risky sexual behavior in heterosexual and homosexual men. *Archives of Sexual Behavior, 38*, 518-550.
- Janssen, E., McBride, K.R., Yarber, W., Hill, B. J., Butler, S. M. (2008). Factors that influence sexual arousal in men: A focus group study. *Archives of Sexual Behavior, 37*, 252-265.
- Jones, M. (1998). Sociosexuality and motivations for romantic involvement. *Journal of Research in Personality, 32*, 173-182.
- Kelley, K., & Musialowski, D. (1986). Repeated exposure to sexually explicit stimuli: Novelty, sex, and sexual attitudes. *Archives of Sexual Behavior, 15*, 487-498.
- Kuban, M., Barbaree, H.E., & Blanchard, R. (1999). A comparison of volume and circumference phallometry: Response magnitude and method agreement. *Archives of Sexual Behavior, 28*, 345-359.
- Laan, E., Everaerd, W., & Evers, A. (1995). Assessment of female sexual arousal: Response specificity and construct validity. *Psychophysiology, 32*, 476-485.
- Ostivich, J.M. & Sabini, J. (2004). How are sociosexuality, sex drive, and lifetime number of sexual partners related? *Personality and Social Psychology Bulletin, 30*, 1255-1266.
- 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. (1997). The long-term habituation of sexual arousal in human males: A crossover design. *Psychological Record, 47*, 385-398.
- Rupp, H.A., & Wallen, K. (2008). Sex differences in response to visual sexual stimuli: A review. *Archives of Sexual Behavior, 37*, 206-218.
- Seal, D.W., & Agostinelli, G. (1994). Individual differences associated with high-risk sexual behaviour: Implications for intervention programmes. *AIDS Care, 6*, 393-398.
- 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.
- Suschinsky, K.D., & Lalumière, M.L. (2011). Prepared for anything? An investigation of female genital arousal in response to rape cues. *Psychological Science, 22*, 159-165.
- Webster, G.D., & Bryan, A. (2006). Sociosexual attitudes and behaviors: Why two factors are better than one. *Journal of Research in Personality, 41*, 917-922.
- Westerlund, M., Santtila, P., Johansson, A., Varjonen, M., Witting, K., Jern, P., Alanko, K., & Sandnabba, N.K. (2010). Does unrestricted sociosexual behaviour have a shared genetic basis with sexual coercion? *Psychology, Crime & Law, 16*, 5-23.
- Wolchik, S.A., Braver, S.L., & Jensen, K. (1985). Volunteer bias in erotica research: Effects of intrusiveness of measure and sexual background. *Archives of Sexual Behavior, 14*, 93-107.

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