CATEGORY-SPECIFICITY AND PREPOTENT SEXUAL CUES

by

Amanda D. Timmers

A thesis submitted to the Department of Psychology
in conformity with the requirements for
the degree of Master of Science

Queen’s University
Kingston, Ontario, Canada
August 2013

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ABSTRACT

Marked differences have been found in men’s and women’s sexual response patterns, contingent upon their sexual orientation; opposite- and same-gender attracted men demonstrate greatest genital and self-reported arousal to their preferred stimulus type, whereas other-gender attracted women do not, and findings of same-gender attracted women have been mixed (e.g., Chivers, Seto & Blanchard, 2007; Chivers, Bouchard, Timmers, & Haberl, 2012). Given the complex nature of sexual stimuli that are used in research paradigms involving category-specificity of sexual arousal, however, it is often unclear to what extent contextual cues (cues other than the sexual actor’s sex characteristics; body movement, level of sexual activity, etc.) influence participants’ sexual response patterns. As such, the current study attempted to parse contextual cues from sexual stimuli and examined genital, self-reported, and continuous self-reported responses of same- and other-gender attracted men and women to prepotent sexual features (stimuli believed to elicit automatic sexual arousal: erect penises and vasoengorged vulvas), nonprepotent sexual features (flaccid penises and pubic triangles) and neutral stimuli (clothed men and women). All samples were found to exhibit a category-specific pattern of genital, self-reported, and continuous self-reported sexual arousal. Similarly, genital, self-reported, and continuous self-reported arousal was generally found to be greatest to “prepotent” sexual conditions. Limitations and implications are discussed.
ACKNOWLEDGEMENTS

I would like to take this opportunity to express my profound gratitude to my supervisor, Dr. Meredith Chivers, for her substantial guidance and support. I would also like to thank my committee members, Dr. Ronald Holden and Dr. Caroline Pukall, for being available and helpful resources to me and for providing constructive feedback on my project. Warm thanks are also extended to Samuel Yoon, Lucas Hildebrand, and the members of the Sexuality and Gender Lab for their extensive contributions to the participant recruitment and participant running processes. Special thanks go to Jessica Spape, for her input, and Dr. Jorge Ponseti, for allowing us the use of his images.
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Chapter 1

Introduction

Category-specificity of sexual arousal

Sexual arousal has long been used as a proxy to determine sexual interest in a specified target or stimulus set (e.g., Freund, 1963; Laan, Everaerd, & Evers, 1995; Seto, Lalumière, & Blanchard, 2000), though research indicates that sexual arousal and self-identified sexual interest do not always align; particularly in the case of self-identified gender preferences (sexual orientation). More specifically, although sexual interest and physiological and self-reported sexual arousal appear to correspond for same- and other-gender attracted men and for same-gender attracted women, for other-gender attracted women, physiological arousal and sexual orientation do not always coincide (e.g., Chivers, Seto, & Blanchard, 2007).

Same- and other-gender attracted men demonstrate a “category-specific” pattern of sexual arousal, in that their sexual interests and patterns of sexual response correspond: Same- and other-gender attracted men demonstrate greatest physiological and self-reported arousal to stimuli depicting their preferred gender (e.g., Chivers et al., 2007; Freund, 1963; Freund, 1967; Freund, Watson, & Rienzo, 1989). For other-gender attracted men, the concept of category-specificity has even been found to apply to other preferred stimulus categories (beyond gender), with other-gender attracted men demonstrating “category-specific” responses to preferred age (e.g., Seto, Lalumière, & Blanchard, 2000), species of the sexual target (Chivers & Bailey, 2005), and sexual activities, such as violence and injury in the case of male sadists (Seto, Lalumière, Harris, & Chivers, 2012).
Similarly, same-gender attracted women report greater arousal to female than to male stimuli, and have been shown to demonstrate increased genital arousal to depictions of solitary women who are exercising or masturbating relative to depictions of solitary males engaged in these same activities, suggesting a category-specific pattern of genital and self-reported arousal (Chivers et al., 2007); this specificity of physiological arousal to gender cues disappeared, however, when women were shown more sexually intense films of couples engaging in penetrative intercourse. Chivers and colleagues (2007) posited that the sexual intensity of the coupled sexual intercourse stimuli may have overwhelmed category-specific patterns of response, creating a ceiling effect in women’s genital arousal. Indeed, women with some degree of same-gender attraction demonstrated an increase in genital arousal as the level of sexual activity depicted in the sexual stimuli became more intense (Chivers et al., 2007). In further support of this hypothesis, same-gender attracted women were found to have significantly longer viewing times for less sexually explicit, partially clothed pictures of women than of men (Rullo, Strassberg, & Israel, 2010).

In a more recent study, same-gender attracted women demonstrated greater genital and self-reported arousal to both less sexually intense audio scenarios depicting sexual interactions with a woman than with a man, and, surprisingly, to sexually-intense audiovisual stimuli depicting female relative to male sexual targets; a category-specific pattern of response (Chivers, Bouchard, Timmers, & Haberl, 2012). Of note, genital sexual arousal to female stimuli significantly increased with degree of same-gender attraction; self-reported sexual response showed the same pattern, though it plateaued in the two groups reporting the highest levels of attraction to women.
Other-gender attracted women tend to have an even more complex pattern of sexual response, in that they show a “nonspecific” pattern of arousal; other-gender attracted women demonstrate little discrimination in terms of physiological arousal to stimuli depicting their preferred and non-preferred gender (Chivers et al., 2004; Chivers & Bailey, 2005; Chivers, Seto & Blanchard, 2007; Chivers, 2010; Laan, Everaerd, & Evers, 1995). Other-gender attracted women’s self-reported arousal, however, is somewhat category-specific; other-gender attracted women report heightened arousal to their preferred gender relative to their non-preferred gender (e.g., Chivers, Rieger, Latty, & Bailey, 2004), though they report increased arousal to both male and female sexual targets (Chivers, 2005; Chivers et al., 2007). This nonspecific pattern of sexual response does not appear to be an artifact of stimulus modality (the same effects have been observed using audio and audiovisual stimuli; see Chivers & Timmers, 2012) or measurement type, as these results have been replicated when viewing time was used as an objective measure of sexual interest; other-gender attracted women were found to view same-gender pictures longer than men did (Israel & Strassberg, 2008).

Taken together, these findings suggest that the stimulus features associated with sexual arousal are different for men and for women. While men’s arousal is strongly dependent upon gender features of the actors (i.e., primary and secondary sex characteristics), other-gender attracted women’s arousal, by contrast, is more dependent (at least genitaly) upon other cues, such as the level of sexual activity (naked exercising vs. masturbation vs. oral or penetrative sex; Chivers et al., 2007) or the relationship context (stranger vs. friend vs. long-term relationship partner; Chivers & Timmers, 2012) depicted in the stimuli. These findings suggest a tendency for other-gender attracted women to respond to contextual cues;
cues other than the sexual actor’s sex characteristics. These contextual cues include cues that are abstract rather than concrete and visible, such as relationship context cues, or that exist outside of the sexual target itself, such as the level of sexual activity that is occurring. This tendency is so strong that (both opposite- and same-gender attracted) women have been found to demonstrate significant physiological arousal to sexual content, even when the sexual targets were non-human (i.e. bonobos), whereas men have not (Chivers & Bailey, 2005; Chivers et al., 2007).

**Prepotent sexual cues**

Given the marked difference in patterns of sexual response between men and women, researchers have begun to question what constitutes a sexually competent stimulus, and why it is that (particularly other-gender attracted) women demonstrate heightened physiological arousal to a broader range of sexual stimuli than men. Van Lunsen and Laan (2004) suggest that perhaps women demonstrate an automatic increase in vaginal vasocongestion in response to sexual cues, irrespective of their sexual interest, and, sometimes, without their own awareness. Van Lunsen and Laan (2004) noted that women tend to demonstrate physiological arousal to sexual stimuli within seconds of the onset of a sexual stimulus, indicative of an evolutionarily adaptive response mechanism; increased vaginal vasocongestion is a precursor to vaginal lubrication, which protects against vaginal injury, and subsequent infection in the event of vaginal penetration (see Suschinsky & Lalumière, 2011; discussed later in Chapter 1). Not all stimuli elicit a sexual response, however (e.g., males exercising naked – while their penises were flaccid - failed to elicit a sexual response from other-gender attracted women; Chivers et al., 2007). As such, some stimuli are more sexually salient than others: the question remains as to what cues elicit this automatic sexual response.
Although stimulus saliency and automaticity of physiological response is a relatively new phenomenon in sex research, the construct has long been studied in the fear literature and is referred to as stimulus prepotency. Though some discrepancies between definitions exist, a prepotent stimulus is generally described as a stimulus that we are biologically prepared to attend to intently, that activates nervous activity, and that requires some adjustive – and typically adaptive – response (e.g., sexual, aggressive, etc.) due to its emotional and adaptive salience (cf., Lang, Rice, & Sternbach, 1972; Marks & Nesse, 1994). From an evolutionary perspective, an individual who is able to recognize and respond to stimuli (or more specifically, threats) quickly and appropriately would be likely to live longer and subsequently produce more offspring than those without this predisposition. Thus, it is posited that our nervous system has been shaped by selection to evoke strong, unlearned responses to these salient, prepotent stimuli (Merckelbach, van den Hout, & Lavy, 1990).

For example, skin conductance responses to spiders and snakes tend to be greater than to neutral stimuli before any form of aversive conditioning has taken place in a laboratory (e.g., Cook, Lang, & Hodes, 1986). Conditioned responses to these “fear-relevant” stimuli (e.g., snakes and spiders) also tend to demonstrate greater resistance to extinction than conditioned responses to “fear-irrelevant” stimuli (e.g., flowers and mushrooms; Öhman, Eriksson, & Olofsson, 1975). Likewise, phylogenetic stimuli (evolutionarily-linked stimuli thought to provoke a fear response, like snakes and spiders) tend to show greater resistance to extinction in conditioning paradigms than ontogenetic stimuli (more recent, culturally-determined stimuli thought to provoke a fear response, like guns and electrical outlets; Hugdahl & Karker, 1981; Cook et al., 1986), providing support for an evolutionary model of nervous system development that is sensitive to prepotent cues.
In a recent study, Spape and Chivers (2011) proposed that vasoengorged genitals (i.e., sexually-aroused genitals; exposed vulvas and erect penises) serve as “prepotent sexual stimuli” that elicit an automatic physiological sexual response in women, greater than that experienced in response to “non-prepotent sexual stimuli” (i.e., non-aroused genitals; flaccid penises and pubic triangles). This hypothesis was derived from the work of Ponseti and colleagues (2006), who examined the brain activity of same- and other-gender attracted men and women while they viewed pictures of aroused genitals. Men and women were found to have stronger brain activity in the ventral premotor cortex and the ventral striatum and centromedial thalamus (brain areas thought to be associated with motor representations – presumably of manual or oral sex – and incentive value, respectively), suggesting that pictures of exposed genitals are sexually salient enough to stimulate an automatic sexual response. Further support that aroused genitals are sufficient to elicit an automatic sexual response was found in a later study examining the sexual response patterns of other-gender women; subliminally presented images of exposed vulvas and erect penises were found to elicit greater sexual arousal to a subsequent target stimulus than a subliminally presented neutral prime (Ponseti & Bosinski, 2009).

Spape and Chivers (2011) posited that sexual arousal experienced by women in response to these “prepotent” sexual cues may be responsible for the “nonspecific” pattern of sexual response typically observed among other-gender attracted female participants. Contrary to their hypothesis, however, other-gender attracted women demonstrated category-specific patterns of genital arousal, such that sexual response was significantly greater to prepotent male stimuli (i.e., erect penises) than all other stimulus types. A nonspecific pattern of genital arousal was found in response to the non-prepotent and neutral (i.e., images of men
and women fully clothed) sexual stimuli. Notably, this is the first study to report a category-specific pattern of genital responding to cues of gender in other-gender attracted women.

**Current Study**

*Category-specificity of sexual arousal and contextual cues*

Other-gender attracted women’s uncharacteristic display of category-specificity to pictures of vasoengorged genitals may speak to the role that contextual cues (e.g., relationship context, sexual activity) have played on women’s genital sexual arousal patterns in previous studies. That is, other-gender attracted women’s arousal to contextual cues may have been masking arousal to cues of gender; in all previous studies of category-specificity of sexual arousal, cues of gender were not the only sexually salient material presented to the participants; cues of relationship context, sexual body movements, facial expressions, attractiveness of the sexual target, music, sexual vocalizations, and a host of other sexual information was also present. It is only when these contextual cues were limited, and other-gender attracted women were exposed only to markers of gender (vasoengorged genitals), that category-specificity of arousal emerged (Spape & Chivers, 2011).

For same-gender attracted women, category-specificity of physiological arousal has not always been evident. It is possible that, as is the case with other-gender attracted women, contextual cues in the stimuli (e.g., level of sexual activity, which has been shown to be an important determinant of same-gender attracted women’s sexual arousal; see Chivers et al., 2007), have been confounding women’s physiological responses to cues of gender. Similarly, though contextual cues do not appear to be a more important determinant than gender cues on men’s sexual arousal patterns (as men demonstrate category-specific patterns of sexual response), it is important to note that contextual cues also have an impact on the way that men
respond to sexual stimuli (see Chivers et al., 2007) and may be influencing the way that men respond in sexual psychophysiology studies.

As a result, it is unclear whether depictions of genitals alone (one of the most salient markers of gender) in the absence of other contextual cues are enough to evoke: a) sexual arousal, and, b) a category-specific pattern of sexual response in same-gender attracted women and men and other-gender attracted men. As such, an investigation into the sexual arousal patterns of these populations to cues of gender - when contextual cues are limited - is warranted. The current study examined the sexual arousal patterns of same- and other-gender attracted men and same-gender attracted women in response to gender cues (i.e., the aroused and unaroused pictures of genitals featured in Spape & Chivers, 2011) when contextual cues were limited in the stimuli. Spape and Chivers’ (2011) other-gender attracted female sample was also included in the analyses, as a comparison. All men and women were hypothesized to demonstrate category-specific patterns of physiological and self-reported arousal.

**Prepotent sexual cues**

Another explanation for Spape and Chivers’ (2011) unexpected finding (of category-specificity in other-gender attracted women) could be that exposed vulvas do not serve as prepotent stimuli for women in the same way that erect penises do. Erect penises are both a) reproductively relevant for women, and b) indicative that vaginal penetration is potentially imminent. As such, arousal to these cues would be particularly evolutionarily advantageous as it may facilitate reproduction or serve as a protective mechanism. That is, genital arousal (and subsequent vaginal secretions) in response to these cues facilitates sexual intercourse, may reduce the likelihood of a vaginal tear (and subsequent infection), and may even serve to reduce the risk of contracting sexually transmitted infections; vaginal and cervical secretions
have been found to have a considerable antibacterial effect, particularly after sexual activity leading to the presence of spermatozoa (Eggert-Kruse, Botz, Pohl, Rohr, & Strowitzki, 2000; Pommerenke & Taylor, 1953; Zukerman, Kahana, & Carmel, 1975).

Exposed vulvas, by contrast, do not hold these same associations, as they do not always indicate that vaginal penetration is forthcoming; though they do indicate (as do all vasoengorged genitals) that sexual activity is either occurring or imminent. Engorged genitals are rarely seen outside of a sexual context, and arousal in response to these cues may also be advantageous, though not as directly so. Thus, we propose that all engorged genitals, being indicative of sexual activity, serve as “prepotent” sexual stimuli, with erect penises holding particular sexual salience for women (as described above).

The conceptualization of sexual arousal as an adaptive, protective response has been termed the “preparation hypothesis” by Suschinsky and Lalumière (2011), and has garnered some empirical support. Indeed, women tend to demonstrate heightened arousal in the presence of sexual cues, regardless of their sexual preferences, or the sexual actor’s appeal to the woman (e.g., same- and other-gender attracted women’s arousal to sexual scenes featuring bonobos; Chivers et al., 2007). Likewise, other-gender attracted women demonstrate similar levels of genital arousal to rape scenarios and conventional sexual scenes in laboratory settings (Suschinsky & Lalumière, 2011). Following this logic, then, one should also expect that same-gender attracted women will demonstrate increased arousal to erect penises as a protective response, despite their self-reported lack of sexual interest in men.

In the current study, the “prepotency” of the sexual cues used in Spape and Chivers’ (2011) study was tested in a sample of same- and other-gender attracted men and same-gender attracted women. Spape and Chivers’ (2011) other-gender attracted women were also
included as a comparison group. We hypothesized that prepotent stimuli would be significantly more physiologically arousing than non-prepotent and neutral stimuli for all of these populations. Additionally, we proposed that erect penises would be significantly more arousing to same-gender attracted women than flaccid penises; supporting our hypothesis of a selection-based nervous system that responds to cues with adaptive salience.

**Hypotheses**

The objectives of the current research project can be summarized as follows: a) To determine if same- and other-gender attracted men and women demonstrate category-specific patterns of physiological and self-reported arousal to gender cues when sexually relevant contextual cues (e.g., sexual activity, relationship context, etc.) are removed from the sexual stimuli; b) To determine if same- and other gender attracted men and women demonstrate greater sexual arousal to prepotent versus non-prepotent and neutral stimuli; and c) To determine if same-gender attracted women demonstrate greater physiological arousal to erect (male prepotent) than flaccid (male non-prepotent) penises (as per the preparation hypothesis; Suschinsky & Lalumière, 2011).

We hypothesized that: a) all participants would demonstrate a category-specific pattern of sexual response (demonstrating and reporting greatest arousal to their preferred gender), b) all participants would demonstrate greater physiological arousal to the prepotent than non-prepotent and neutral stimuli, and c) same-gender attracted women would demonstrate greater physiological arousal to erect (male prepotent) than flaccid (male non-prepotent) stimuli.
Chapter 2

Method

Participants

We recruited other-gender attracted men and same-gender attracted men and women through advertisements posted around Queen’s University and the surrounding Kingston community, contacting local queer groups, and posting messages on queer community listservs, Facebook, Twitter, Craigslist, and Kijiji. Data for 36 other-gender attracted women were acquired from an archival dataset collected by Spape and Chivers (2011). Individuals were eligible for the study if they: (1) were between 18 and 40 years of age; (2) were able to read, write, and understand English; (3) did not have a history of sexual dysfunction, mental illness, or substance abuse; (4) had normal or corrected-to-normal vision; (5) did not have an active sexually transmitted infection; and (6) were not taking any medications that are known to interfere with sexual responding. Additionally, women who had never experienced vaginal penetration, were pregnant, did not have a regular menstrual cycle, or experienced superficial or deep pain during more than 50% of sexual activities or insertions were ineligible to participate in the study. Recruitment measures were in place from July 2012 to April 2013. Thirty-five other-gender attracted men, 21 same-gender attracted men, and twenty same-gender attracted women contacted the laboratory for information about the study. After hearing a brief description of the study, 33 other-gender attracted men, 16 same-gender attracted men, and 16 same-gender attracted women were interested in participating. Of these potential participants, nine other-gender attracted men, three same-gender attracted men, and seven same-gender attracted women indicated that they did not meet the eligibility criteria.
described above. As a result, 24 other-gender attracted men, 13 same-gender attracted men, and nine same-gender attracted women participated in the study.

Measures

**Personal information.** Participants completed a questionnaire assessing age, relationship status, sexual identity, education level, and ethnicity. Participant demographic information can be found in Table 1.
Table 1

Participant demographic information, shown separately for other-gender attracted men (OGAM), other-gender attracted women (OGAW), same-gender attracted men (SGAM), and same-gender attracted women (SGAW).

<table>
<thead>
<tr>
<th></th>
<th>OGAM (n = 24)</th>
<th>OGAW (n = 36)</th>
<th>SGAM (n = 13)</th>
<th>SGAW (n = 9)</th>
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<td><strong>Age (yrs.)</strong></td>
<td>23.38 (5.78)</td>
<td>21.86 (4.38)</td>
<td>26.46 (8.77)</td>
<td>22 (3.08)</td>
</tr>
<tr>
<td><strong>Relationship status (in %)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>50 (12)</td>
<td>28 (10)</td>
<td>69 (9)</td>
<td>22 (2)</td>
</tr>
<tr>
<td>Dating</td>
<td>33 (8)</td>
<td>58 (21)</td>
<td>15 (2)</td>
<td>67 (6)</td>
</tr>
<tr>
<td>Engaged</td>
<td>--</td>
<td>3 (1)</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Common law</td>
<td>--</td>
<td>8 (3)</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Married</td>
<td>13 (3)</td>
<td>3 (1)</td>
<td>15 (2)</td>
<td>11 (1)</td>
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<tr>
<td>Divorced</td>
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<td><strong>Length of relationship (mos.)</strong></td>
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<td>20.22 (24.7)</td>
<td>35.5 (34.7)</td>
<td>14.29 (20.62)</td>
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<td><strong>Ethnicity (in %)</strong></td>
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<td>First nations</td>
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<td><strong>Highest level of education (in %)</strong></td>
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<td>High school</td>
<td>8 (2)</td>
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<td>8 (3)</td>
<td>23 (3)</td>
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<td>University</td>
<td>63 (15)</td>
<td>75 (27)</td>
<td>54 (7)</td>
<td>78 (7)</td>
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<td>17 (6)</td>
<td>8 (1)</td>
<td>22 (2)</td>
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<td><strong>Sexual identity (in %)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterosexual</td>
<td>83 (20)</td>
<td>83 (30)</td>
<td>8 (1)</td>
<td>11 (1)</td>
</tr>
<tr>
<td>Bisexual</td>
<td>--</td>
<td>6 (2)</td>
<td>--</td>
<td>33 (3)</td>
</tr>
<tr>
<td>Lesbian or gay</td>
<td>--</td>
<td>--</td>
<td>69 (9)</td>
<td>56 (5)</td>
</tr>
<tr>
<td>Queer</td>
<td>--</td>
<td>--</td>
<td>39 (5)</td>
<td>33 (3)</td>
</tr>
<tr>
<td>Do not use a label</td>
<td>13 (3)</td>
<td>6 (2)</td>
<td>15 (2)</td>
<td>22 (2)</td>
</tr>
<tr>
<td>Other</td>
<td>4 (1)</td>
<td>6 (2)</td>
<td>8 (1)</td>
<td>11 (1)</td>
</tr>
<tr>
<td>Oral contraceptive use (in %)</td>
<td>--</td>
<td>56 (20)</td>
<td>--</td>
<td>11 (1)</td>
</tr>
</tbody>
</table>

Note. Table presents means of all items unless otherwise specified as percentages. Standard deviations (when means are presented) or number of participants (when frequencies are provided) are presented in parentheses where applicable. Sexual identity frequencies may exceed 100%, as participants had the option to endorse more than one identity.
**Sexual attraction.** Only those women and men who had exclusively or predominantly same-sex or other-sex attractions on the Kinsey Sexual Attraction Scale (KSAS; Kinsey, Pomeroy, & Martin, 1948; Kinsey, Pomeroy, Martin, & Gebhard, 1953), were included in the data analysis. After excluding participants who did not meet this criterion, the sample comprised 24 other-gender attracted men, 32 other-gender attracted women, 11 same-gender attracted men, and four same-gender attracted women.

**Apparatus and Materials**

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

**Continuous self-reported sexual arousal.** Overall sexual arousal during stimulus presentation was continuously reported by the participant. A virtual gauge (i.e., an electronic representation of a vertical bar) appeared concurrently with the stimuli on a television screen. The participant continuously raised or lowered his/her subjective sexual arousal using a “+” or “-” key on a keypad attached to the armrest of a reclining chair. Responses were scored on a scale from 0% (no sexual arousal; represented by the absolute bottom of the scale) to 100% (most sexual arousal ever felt/sexual arousal associated with orgasm; represented by the absolute top of the scale).

**Data acquisition.** Psychophysiological sexual responses were continuously sampled and recorded using Limestone Technologies Data-Pac_USB system (Limestone Technologies, Kingston, Ontario, Canada). The Limestone software and hardware was
installed on a Pentium Dell desktop computer (Dell Canada Inc., North York, Ontario, Canada).

**Female genital response.** Genital sexual response was assessed in women using vaginal photoplethysmography. Vaginal 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. Higher amplitudes indicate greater vaginal vasocongestion, which has been shown to be a valid and reliable indicator of sexual response (Laan et al., 1995; Suschinsky et al., 2009). 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 offline visual inspection of the waveforms and deleted prior to data analysis.

**Male genital response.** 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.

**Experimental stimuli.** Stimuli consisted of 12 photographic slideshows presenting: a) male prepotent stimuli (erect penises); b) female prepotent stimuli (exposed vulvas); c) male non-prepotent stimuli (flaccid penises); d) female non-prepotent stimuli (pubic triangles); e) male neutral stimuli (clothed men engaging in nonsexual, everyday activities); and f) female neutral stimuli (clothed women engaging in nonsexual, everyday activities). Each slideshow was 90s in length and consisted of 15 photographs, presented for 6s each. Many of the images were provided by Jorge Ponseti from his 2006 and 2009 studies, and
were used in 2011 by Spape and Chivers. Two exemplars of each slideshow category were presented.

Procedure

All participants were asked to refrain from all sexual activity for 24 hours and exercising for three hours prior to their appointment time, as physical exercise leads to sympathetic nervous system arousal, which can potentiate genital responding (Meston & Gorzalka, 1996). Before testing, the experimenter taught the participant how to use the vaginal photoplethysmograph or penile strain gauge, asked the participant to pay attention to the photographic slideshow, 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 plethysmograph themselves, in private, and watched a short adaptation stimulus consisting of neutral images of landscapes. Participants were then exposed to the experimental stimuli, which were presented in random order. Before, during, and after every stimulus, participants indicated their self-reported arousal using the methods described above. During an inter-stimulus period of approximately one minute, participants were told 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 completed, 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 in a state of arousal. All participants signed a written informed
consent and received twenty-five dollars as compensation for their time. Genital gauges were reprocessed using a high-level disinfectant. Study procedures were approved by the Health Sciences Research Ethics Board at Queen’s University.

**Data Reduction and Analysis**

Change in genital response and continuous self-reported arousal was calculated by subtracting baseline responding from mean genital or self-reported arousal, respectively, to the stimulus. Baseline responding was established during the 5-10s interval before each stimulus slideshow onset, while the participant was still answering pretrial questions. Change in self-reported arousal was determined by creating contrast scores, whereby participants’ self-reported post-stimulus perceptions of sexual arousal was subtracted from pre-stimulus self-reported sexual arousal. Genital and self-reported responding to each context (male prepotent, male non-prepotent, etc.) was determined by averaging across the two trials of each. The final genital change scores were standardized within subjects using z-scores to control for individual differences in responding (Harris, Rice, Quinsey, Chaplin, & Earls, 1992).

From our original sample of 24 other-gender attracted men, 32 other-gender attracted women, 11 same-gender attracted men, and four same-gender attracted women (after excluding men and women who were not exclusively or predominantly same-gender attracted), several participants were excluded from data analyses for various reasons. For genital arousal analyses, technical difficulties occurred for three other-gender attracted men and two other-gender attracted women, leaving a final sample of 21 other-gender attracted men, 11 same-gender attracted men, 30 other-gender attracted women, and four same-gender attracted women. For the self-reported arousal analyses, technical difficulties were
experienced with three other-gender attracted men and one other-gender attracted woman, leaving a final sample of 21 other-gender attracted men, 11 same-gender attracted men, 31 other-gender attracted women, and four same-gender attracted women. For the continuous self-reported arousal analyses, technical difficulties occurred for three other-gender attracted men and one other-gender attracted woman. One same-gender attracted man and two other-gender attracted women forgot to rate their continuous self-reported arousal during the session, and as such, their data could not be included in the analyses. Similarly, three other-gender attracted women failed to rate their continuous self-reported arousal for both exemplars of one experimental condition; their data were excluded from the continuous self-reported arousal analyses, leaving a total of 21 other-gender attracted men, 10 same-gender attracted men, 26 other-gender attracted women, and four same-gender attracted women.

Final sample sizes are re-stated in the body of the results for clarity.

Chapter 3

Results

Genital response

Mean genital responses to the sexual stimuli were submitted to a 2 (Stimulus Gender) x 3 (Stimulus Potency) x 4 (Participant Group) mixed-model ANOVA: The two within subjects factors were Stimulus Gender (male, female) and Stimulus Potency (neutral, nonprepotent, and prepotent) and the between-subjects factor was Participant Group (same-gender attracted men, same-gender attracted women, other-gender attracted men, and other-gender attracted women). The ANOVA revealed a statistically significant three- and two-way interaction between Stimulus Gender, Stimulus Potency, and Participant Group, Wilks’ $\lambda = .573$, $F(6, 122) = 6.52$, $p < .001$, $\eta^2_p = .24$, and Stimulus Gender and Participant Group,
Wilks’ $\lambda = .325$, $F(3, 62) = 42.96$, $p < .001$, $\eta_p^2 = .68$. The two-way interaction between Stimulus Potency and Stimulus Gender was not statistically significant, Wilks’ $\lambda = .953$, $F(2, 61) = 1.50$, $p = .23$, $\eta_p^2 = .05$.

To further investigate this three-way interaction, I conducted four, 2 (Stimulus Gender) x 3 (Stimulus Potency) repeated measures ANOVAs, separated by Participant Group. Results from these analyses can be found in Table 2.
Table 2

Outcomes of $F$ tests for genital arousal are shown separately for other-gender attracted men (OGAM), other-gender attracted women (OGAW), same-gender attracted men (SGAM), same-gender attracted women (SGAW).

<table>
<thead>
<tr>
<th></th>
<th>Wilks’ $\lambda$</th>
<th>$df$</th>
<th>$F$</th>
<th>$p$</th>
<th>$\eta^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OGAM</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stimulus Gender</td>
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<td>71.43</td>
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<td>.78</td>
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<tr>
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<td>.67</td>
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<td>Gender x Potency</td>
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<td>2, 19</td>
<td>3.89</td>
<td>.04</td>
<td>.29</td>
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<td><strong>OGAW</strong></td>
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<td></td>
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<tr>
<td>Stimulus Gender</td>
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<td>.001</td>
<td>.34</td>
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<td>Stimulus Potency</td>
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<td>.69</td>
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<td>Gender x Potency</td>
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<td>2, 28</td>
<td>8.78</td>
<td>&lt; .001</td>
<td>.39</td>
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<td><strong>SGAM</strong></td>
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<td>Stimulus Gender</td>
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<td>.73</td>
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<td>.001</td>
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<td>Gender x Potency</td>
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<td>49.28</td>
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<td>.92</td>
</tr>
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<td><strong>SGAW</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>Stimulus Gender</td>
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<td>1, 3</td>
<td>44.85</td>
<td>.007</td>
<td>.94</td>
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<td>Stimulus Potency</td>
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<td>33.98</td>
<td>.03</td>
<td>.97</td>
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<tr>
<td>Gender x Potency</td>
<td>.015</td>
<td>2, 2</td>
<td>64.65</td>
<td>.02</td>
<td>.99</td>
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</tbody>
</table>
**Other-gender attracted men**

After excluding three men who had technical difficulties with their sessions, data for 21 other-gender attracted men were analyzed. A main effect of Stimulus Gender was found, such that men demonstrated significantly greater genital arousal to the female ($M = .50, SD = .27$) than to the male stimuli ($M = -.50, SD = .27$). A main effect of Stimulus Potency was also found, though these main effects were superseded by an interaction between Stimulus Potency and Stimulus Gender (refer to Table 2).

Simple main effects, separated by Stimulus Gender, showed a significant effect of Stimulus Potency for female stimuli, Wilks’ $\lambda = .37, F(2, 19) = 16.19, p < .001, \eta_p^2 = .63$, and male stimuli at a trend level, Wilks’ $\lambda = .732, F(2, 19) = 3.49, p = .05, \eta_p^2 = .27$. Pairwise comparisons found men’s arousal to the female prepotent stimuli ($M = 1.13, SD = .62$) was significantly greater than arousal to the female nonprepotent stimuli ($M = .43, SD = .62$), $t(20) = 3.69, p = .001$, Cohen’s $d = 1.24$. In turn, men’s arousal to the female nonprepotent stimuli was significantly greater than men’s arousal to the female neutral stimuli ($M = -.05, SD = .47$), $t(20) = 2.69, p = .01$, Cohen’s $d = 0.84$. No significant difference between arousal to the male neutral ($M = -.67, SD = .39$) and male nonprepotent ($M = -.59, SD = .49$) stimuli ($t(20) = .63, p > .05$, Cohen’s $d = 0.19$) was found, though arousal to the male prepotent stimuli ($M = -.25, SD = .55$) was significantly greater than arousal to the male nonprepotent, $t(20) = 2.31, p < .05$, Cohen’s $d = 0.72$, and male neutral, $t(20) = 2.56, p < .05$, Cohen’s $d = 0.79$, stimuli.
**Figure 1.** Other-gender attracted men’s standardized genital arousal for all stimulus categories. Error bars represent the standard error of the mean. Figure represents means for n = 21.

**Other-gender attracted women**

After excluding four women who were not exclusively or predominantly other-gender attracted and two women who had technical difficulties with their sessions, data for 30 other-gender attracted women were analyzed. A main effect of Stimulus Gender was found, such that women demonstrated significantly greater arousal to the male (M = .21, SD = .29) than to the female stimuli (M = -.22, SD = .31). A main effect of Stimulus Potency was also found. This main effect is not discussed further as an interaction between Stimulus Potency and Stimulus Gender was also found (see Table 2).

Simple main effects, separated by Stimulus Gender, showed a significant effect of Stimulus Potency for both male, Wilks’ λ = .331, $F(2, 28) = 28.32, p < .001, \eta^2_p = .67$, and female, Wilks’ λ = .753, $F(2, 28) = 4.59, p < .05, \eta^2_p = .25$, stimuli. Pairwise comparisons
found significant differences between arousal to the male neutral (\(M = -0.40, SD = 0.56\)) and male nonprepotent (\(M = -0.08, SD = 0.49\)) stimuli, \(t(29) = 2.21, p < .05\), Cohen’s \(d = 0.57\), and between arousal to the male prepotent stimuli (\(M = 1.06, SD = 0.75\)) and arousal to the male nonprepotent stimuli, \(t(29) = 7.12, p < .001\), Cohen’s \(d = 1.88\). Women’s arousal to the female prepotent stimuli (\(M = 0.08, SD = 0.55\)) was found to be greater than arousal to the female nonprepotent stimuli (\(M = -0.16, SD = 0.58\)), \(t(29) = 1.89, p = 0.07\), Cohen’s \(d = 0.49\), at a trend level. Similarly, women’s arousal to the female nonprepotent stimuli was greater than women’s arousal to the female neutral stimuli (\(M = -0.51, SD = 0.72\)), \(t(29) = 1.82, p = 0.08\), Cohen’s \(d = 0.47\), at a trend level. Women’s genital arousal to the female prepotent stimuli, however, was significantly greater than arousal to the female neutral stimuli, \(t(29) = 2.96, p < .01\), Cohen’s \(d = 0.77\).

![Figure 2](image-url)  
*Figure 2.* Other-gender attracted women’s standardized genital arousal for all stimulus categories. Error bars represent the standard error of the mean. Figure represents means for \(n = 30\).
Same-gender attracted men

After excluding two men who were not exclusively or predominantly same-gender attracted, data for 11 same-gender attracted men were analyzed. A main effect of Stimulus Gender was found, such that men demonstrated significantly greater arousal to the male ($M = .45$, $SD = .29$) than to the female stimuli ($M = -.45$, $SD = .29$). A main effect of Stimulus Potency was also found. This main effect is not discussed further as an interaction between Stimulus Potency and Stimulus Gender was also found (see Table 2).

Simple main effects, separated by Stimulus Gender, showed a significant effect of Stimulus Potency for male, Wilks’ $\lambda = .088$, $F(2, 9) = 46.40$, $p < .001$, $\eta^2_p = .91$, but not female, Wilks’ $\lambda = .729$, $F(2, 9) = 1.67$, $p > .05$, $\eta^2_p = .27$, stimuli. Pairwise comparisons found significant differences between arousal to the male neutral ($M = -.38$, $SD = .32$) and male nonprepotent ($M = .49$, $SD = .70$) stimuli, $t(10) = 3.41$, $p < .01$, Cohen’s $d = 1.51$. Arousal to the male prepotent stimuli ($M = 1.24$, $SD = .68$) was greater than arousal to the male neutral stimuli, $t(10) = 8.67$, $p < .001$, Cohen’s $d = 4.25$, and also greater than arousal to the male nonprepotent stimuli, $t(10) = 2.15$, $p = .06$, Cohen’s $d = 0.92$ at a level that approached statistical significance.
Figure 3. Same-gender attracted men’s standardized genital arousal for all stimulus categories. Error bars represent the standard error of the mean. Figure represents means for \( n = 11 \).

**Same-gender attracted women**

After excluding five women who were not exclusively or predominantly same-gender attracted, data for 4 same-gender attracted women were analyzed. A main effect of Stimulus Gender was found, such that women demonstrated significantly greater arousal to the female (\( M = .47, SD = .14 \)) than to the male (\( M = -.47, SD = .14 \)) stimuli. A main effect of Stimulus Potency was also found. This main effect is not discussed further as an interaction between Stimulus Potency and Stimulus Gender was also found (refer to Table 2).

Simple main effects, separated by Stimulus Gender, showed a significant effect of Stimulus Potency for female, Wilks’ \( \lambda = .023, F(2, 2) = 43.10, p < .05, \eta_p^2 = .98 \), but not male, Wilks’ \( \lambda = .181, F(2, 2) = 4.54, p > .05, \eta_p^2 = .82 \), stimuli. Pairwise comparisons found women’s arousal to the female prepotent stimuli (\( M = 1.31, SD = .23 \)) was significantly
greater than arousal to the female nonprepotent stimuli ($M = .80, SD = .18$), $t(3) = 4.48, p < .05$, Cohen’s $d = 3.23$. In turn, arousal to the female nonprepotent stimuli was found to be significantly greater than arousal to the female neutral stimuli ($M = -.68, SD = .26$), $t(3) = 9.15, p = .003$, Cohen’s $d = 6.55$. An a priori $t$-test found that arousal to the male prepotent stimuli ($M = .20, SD = .51$) was significantly greater than arousal to the male nonprepotent stimuli ($M = -.67, SD = .22$), $t(3) = 3.68, p < .05$, Cohen’s $d = 3.05$.

**Figure 4.** Same-gender attracted women’s standardized genital arousal for all stimulus categories. Error bars represent the standard error of the mean. Figure represents means for $n = 4$.

**Self-reported sexual arousal**

Self-reported responses to the sexual stimuli were submitted to a 2 (Stimulus Gender) x 3 (Stimulus Potency) x 4 (Participant Group) mixed-model ANOVA: The two within subjects factors were Stimulus Gender (male, female) and Stimulus Potency (neutral, nonprepotent, and prepotent) and the between-subjects factor was Participant Group (same-
gender attracted men, same-gender attracted women, other-gender attracted men, and other-gender attracted women). The ANOVA revealed a significant three- and two-way interaction between Stimulus Gender, Stimulus Potency, and Participant Group, Wilks’ $\lambda = .531, F(6, 124) = 7.70, p < .001, \eta^2_p = .27$, and Stimulus Gender and Participant Group, Wilks’ $\lambda = .213, F(3, 63) = 77.59, p < .001, \eta^2_p = .79$. A nonsignificant two-way interaction between Stimulus Potency and Stimulus Gender was also found, Wilks’ $\lambda = .926, F(2, 62) = 2.48, p > .05, \eta^2_p = .07$.

To further investigate this three-way interaction, I conducted four, 2 (Stimulus Gender) x 3 (Stimulus Potency) repeated measures ANOVAs, separated by Participant Group. Results from these analyses can be found in Table 3.
Table 3

Outcomes of F tests for self-reported arousal are shown separately for other-gender attracted men (OGAM), other-gender attracted women (OGAW), same-gender attracted men (SGAM), same-gender attracted women (SGAW).

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<thead>
<tr>
<th></th>
<th>Wilks’ λ</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>( \eta_p^2 )</th>
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<tbody>
<tr>
<td><strong>OGAM</strong></td>
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<tr>
<td>Stimulus Gender</td>
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<td>99.92</td>
<td>&lt; .001</td>
<td>.83</td>
</tr>
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<td>Stimulus Potency</td>
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<td>&lt; .001</td>
<td>.66</td>
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<tr>
<td>Gender x Potency</td>
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<td>2, 19</td>
<td>11.67</td>
<td>&lt; .001</td>
<td>.55</td>
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<td><strong>OGAW</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stimulus Gender</td>
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<td>50.51</td>
<td>&lt; .001</td>
<td>.63</td>
</tr>
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<td>Stimulus Potency</td>
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<td>36.40</td>
<td>&lt; .001</td>
<td>.72</td>
</tr>
<tr>
<td>Gender x Potency</td>
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<td>2, 29</td>
<td>11.66</td>
<td>&lt; .001</td>
<td>.45</td>
</tr>
<tr>
<td><strong>SGAM</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stimulus Gender</td>
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<td>1, 10</td>
<td>41.99</td>
<td>&lt; .001</td>
<td>.81</td>
</tr>
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<td>Stimulus Potency</td>
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<td>.03</td>
<td>.53</td>
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<tr>
<td>Gender x Potency</td>
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<td>2, 9</td>
<td>2.36</td>
<td>&gt; .05</td>
<td>.34</td>
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<td><strong>SGAW</strong></td>
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<tr>
<td>Stimulus Gender</td>
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<td>.90</td>
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<td>2, 2</td>
<td>6.96</td>
<td>&gt; .05</td>
<td>.87</td>
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</tbody>
</table>
**Other-gender attracted men**

After excluding three men who had technical difficulties with their sessions, data for 21 other-gender attracted men were analyzed. A main effect of Stimulus Gender was found, such that men reported significantly greater arousal to the female ($M = 2.72, SD = 1.22$) than to the male stimuli ($M = -.52, SD = .80$). A main effect of Stimulus Potency was also found, though these main effects were superseded by an interaction between Stimulus Potency and Stimulus Gender (refer to Table 3).

Simple main effects, separated by Stimulus Gender, showed a significant effect of Stimulus Potency for both male, Wilks’ $\lambda = .645, F(2, 19) = 5.23, p < .05, \eta_p^2 = .36$, and female, Wilks’ $\lambda = .392, F(2, 19) = 14.72, p < .001, \eta_p^2 = .61$, stimuli. Pairwise comparisons found no significant differences between self-reported arousal to the male neutral ($M = -.50, SD = .84$) and male nonprepotent ($M = -.88, SD = .133$) stimuli, $t(20) = 1.40, p > .05$, Cohen’s $d = -.020$. Self-reported arousal to the male prepotent stimuli ($M = -.14, SD = .67$) was found to be significantly greater than arousal to the male nonprepotent, $t(20) = 2.87, p = .01$, Cohen’s $d = 0.71$, and male neutral, $t(20) = 2.25, p < .05$, Cohen’s $d = 0.80$, stimuli.

Men’s arousal to the female prepotent stimuli ($M = 4.05, SD = 1.93$) was significantly greater than arousal to the female nonprepotent stimuli ($M = 2.93, SD = 1.94$), $t(20) = 3.04, p < .01$, Cohen’s $d = 1.14$. In turn, men’s arousal to the female nonprepotent stimuli was significantly greater than men’s arousal to the female neutral stimuli ($M = 1.19, SD = .131$), $t(20) = 3.33, p = .003$, Cohen’s $d = 0.84$. 
Figure 5. Other-gender attracted men’s self-reported sexual arousal (calculated as the difference between reported pre- and post-trial arousal) for all stimulus categories. Error bars represent the standard error of the mean. Figure presents means for $n = 21$.

**Other-gender attracted women**

After excluding four women who were not exclusively or predominantly other-gender attracted and one woman who had technical difficulties with her session, data for 31 other-gender attracted women were analyzed. A main effect of Stimulus Gender was found, such that women reported significantly greater arousal to the male ($M = 1.45, SD = .92$) than to the female stimuli ($M = .02, SD = .80$). A main effect of Stimulus Potency was also found. This main effect is not discussed further as an interaction between Stimulus Potency and Stimulus Gender was also found (refer to Table 3).

Simple main effects, separated by Stimulus Gender, showed a significant effect of Stimulus Potency for both male, Wilks’ $\lambda = .250, F(2, 29) = 43.43, p < .001, \eta_p^2 = .75$, and female, Wilks’ $\lambda = .755, F(2, 29) = 4.70, p < .05, \eta_p^2 = .25$, stimuli. Pairwise comparisons
found significant differences between arousal to the male neutral ($M = .13, SD = 1.06$) and male nonprepotent ($M = 1.15, SD = 1.29$) stimuli, $t(30) = 3.81, p = .001$, Cohen’s $d = 0.97$, and between arousal to the male prepotent stimuli ($M = 3.08, SD = 1.52$) and arousal to the male nonprepotent stimuli, $t(30) = 7.33, p < .001$, Cohen’s $d = 1.88$. Women’s arousal to the female prepotent stimuli ($M = .42, SD = 1.48$) was not found to be significantly greater than arousal to the female nonprepotent stimuli ($M = .19, SD = 1.17$), $t(30) = 0.80, p > .05$, Cohen’s $d = 0.20$. However, women’s arousal to the female prepotent stimuli and female nonprepotent stimuli was significantly greater than women’s arousal to the female neutral stimulus ($M = -.55, SD = 1.11$), $t(30)s > 2.36, ps < .05$, Cohen’s $ds > 0.60$.

![Graph](image)

**Figure 6.** Opposite-gender attracted women’s self-reported sexual arousal (calculated as the difference between reported pre- and post-trial arousal) for all stimulus categories. Error bars represent the standard error of the mean. Figure presents means for $n = 31$. 
**Same-gender attracted men**

After excluding two men who were not exclusively or predominantly same-gender attracted, data for 11 same-gender attracted men were analyzed. A main effect of Stimulus Gender was found, such that men reported significantly greater arousal to the male (\(M = 2.81, SD = 1.32\)) than to the female (\(M = -.13, SD = 1.21\)) stimuli. A main effect of Stimulus Potency was also found. Pairwise comparisons found significant differences between the neutral (\(M = .40, SD = 1.18\)) and nonprepotent (\(M = 1.52, SD = 1.29\)) stimuli, \(t(10) = 2.56, p < .05\), Cohen’s \(d = 1.09\), and the neutral and prepotent (\(M = 2.19, SD = 1.15\)) stimuli, \(t(10) = 4.08, p = .002\), Cohen’s \(d = 1.74\). Men’s self-reported arousal to the prepotent stimuli was found to be greater than arousal to the nonprepotent stimuli at a level that approached statistical significance, \(t(10) = 1.97, p = .08\), Cohen’s \(d = 0.84\). No significant interaction between Stimulus Potency and Stimulus Gender was found (see Table 3).

![Figure 7](image-url)

*Figure 7*. Same-gender attracted men’s self-reported sexual arousal (calculated as the difference between reported pre- and post-trial arousal) for all stimulus categories. Error bars represent the standard error of the mean. Figure presents means for \(n = 11\).
**Same-gender attracted women**

After excluding five women who were not exclusively or predominantly same-gender attracted, data for 4 same-gender attracted women were analyzed. A main effect of Stimulus Gender was found, such that women reported significantly greater arousal to the female ($M = 1.88$, $SD = .89$) than to the male ($M = -.21$, $SD = .60$) stimuli. No significant effect of Stimulus Potency or Stimulus Potency by Stimulus Gender interaction was found (see Table 3).

![Figure 8](image)

*Figure 8.* Same-gender attracted women’s self-reported sexual arousal (calculated as the difference between reported pre- and post-trial arousal) for all stimulus categories. Error bars represent the standard error of the mean. Figure presents means for $n = 4$.

**Continuous Self-reported Arousal**

Continuous self-reported responses to the sexual stimuli were submitted to a 2 (Stimulus Gender) x 3 (Stimulus Potency) x 4 (Participant Group) mixed-model ANOVA:
The two within-subjects factors were Stimulus Gender (male, female) and Stimulus Potency (neutral, nonprepotent, and prepotent) and the between-subjects factor was Participant Group (same-gender attracted men, same-gender attracted women, other-gender attracted men, and other-gender attracted women). The ANOVA revealed a significant three- and two-way interaction between Stimulus Gender, Stimulus Potency, and Participant Group, Wilks’ $\lambda = .568, F(6, 112) = 6.11, p < .001, \eta_p^2 = .25$, and Stimulus Gender and Participant Group, Wilks’ $\lambda = .537, F(3, 57) = 16.37, p < .001, \eta_p^2 = .46$. A nonsignificant two-way interaction between Stimulus Potency and Stimulus Gender was also found, Wilks’ $\lambda = .952, F(2, 56) = 1.42, p > .05, \eta_p^2 = .05$.

To further investigate this three-way interaction, I conducted four, 2 (Stimulus Gender) x 3 (Stimulus Potency) repeated measures ANOVAs, separated by Participant Group. Results from these analyses can be found in Table 4.
Table 4

Outcomes of $F$ tests for continuous self-reported arousal are shown separately for other-gender attracted men (OGAM), other-gender attracted women (OGAW), same-gender attracted men (SGAM), same-gender attracted women (SGAW).

<table>
<thead>
<tr>
<th></th>
<th>Wilks’ $\lambda$</th>
<th>$df$</th>
<th>$F$</th>
<th>$p$</th>
<th>$\eta_p^2$</th>
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<td><strong>OGAM</strong></td>
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<tr>
<td>Stimulus Gender</td>
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<td>14.50</td>
<td>&lt; .001</td>
<td>.42</td>
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<td>.45</td>
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<td>2, 19</td>
<td>6.70</td>
<td>&lt; .001</td>
<td>.41</td>
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<tr>
<td><strong>OGAW</strong></td>
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<td></td>
</tr>
<tr>
<td>Stimulus Gender</td>
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<td>.001</td>
<td>.36</td>
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<td>Stimulus Potency</td>
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<td>2, 24</td>
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<td>.001</td>
<td>.46</td>
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<td>Gender x Potency</td>
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<td>2, 24</td>
<td>13.11</td>
<td>&lt; .001</td>
<td>.52</td>
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<td><strong>SGAM</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Stimulus Gender</td>
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<td>1, 9</td>
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<td>.003</td>
<td>.64</td>
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<td>&gt; .05</td>
<td>.29</td>
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<td>.07</td>
<td>.48</td>
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<tr>
<td><strong>SGAW</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stimulus Gender</td>
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<td>1, 3</td>
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<td>.05</td>
<td>.76</td>
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<td>&gt; .05</td>
<td>.79</td>
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<td>Gender x Potency</td>
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<td>2, 2</td>
<td>2.07</td>
<td>&gt; .05</td>
<td>.67</td>
</tr>
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</table>
Other-gender attracted men

After excluding three men who had technical difficulties with their sessions, data for 21 other-gender attracted men were analyzed. A main effect of Stimulus Gender was found, such that men reported significantly greater arousal to the female \( (M = 7.82, SD = 9.72) \) than to the male stimuli \( (M = -.85, SD = 1.79) \). A main effect of Stimulus Potency was also found, though these main effects were superseded by an interaction between Stimulus Potency and Stimulus Gender (see Table 4).

Simple main effects, separated by Stimulus Gender, showed a significant effect of Stimulus Potency for female, Wilks’ \( \lambda = .556, F(2, 19) = 7.59, p = .004, \eta^2_p = .44 \), but not male, Wilks’ \( \lambda = .800, F(2, 19) = 2.37, p > .05, \eta^2_p = .20 \), stimuli. Pairwise comparisons found a significant difference between men’s continuous self-reported arousal to the female prepotent stimuli \( (M = 13.06, SD = 14.42) \) and continuous self-reported arousal to the female nonprepotent stimuli \( (M = 8.35, SD = 11.40) \), \( t(20) = 3.08, p < .01, \) Cohen’s \( d = 1.04 \). Men’s arousal to the female nonprepotent stimuli was found to be significantly greater than men’s arousal to the female neutral stimuli \( (M = 2.04, SD = 6.31) \), \( t(20) = 3.37, p = .003, \) Cohen’s \( d = 1.24 \).
Figure 9. Other-gender attracted men’s mean continuous self-reported sexual arousal ratings for all stimulus categories. Error bars represent standard error of the mean. Figure presents means for $n = 21$.

**Other-gender attracted women**

After excluding four women who were not exclusively or predominantly other-gender attracted, one woman who had technical difficulties with her session, and two women who forgot to report their continuous self-reported arousal, the sample comprised continuous self-reported arousal data for 29 women. Of these 29 women, three women failed to rate their continuous self-reported arousal for both exemplars of one stimulus type, and as such, data for only 26 other-gender attracted women were included in the analyses. A main effect of Stimulus Gender was found, such that women reported significantly greater arousal to the male ($M = 6.37, SD = 7.58$) than to the female stimuli ($M = -1.06, SD = 4.94$). A main effect of Stimulus Potency was also found. This main effect is not discussed further as an interaction between Stimulus Potency and Stimulus Gender was also found (refer to Table 4).
Simple main effects, separated by Stimulus Gender, showed a significant effect of Stimulus Potency for male, Wilks’ $\lambda = .421, F(2, 24) = 16.51, p < .001, \eta^2_p = .58$, but not female, Wilks’ $\lambda = .95, F(2, 24) = 0.67, p > .05, \eta^2_p = .05$, stimuli. Pairwise comparisons indicated that women’s continuous self-reported arousal to the male prepotent stimuli ($M = 16.23, SD = 15.61$) was significantly greater than arousal to the male nonprepotent stimuli ($M = 3.21, SD = 7.72$), $t(25) = 4.94, p < .001$, Cohen’s $d = 1.59$. In turn, women’s continuous self-reported arousal to the male nonprepotent stimuli was found to be significantly greater than arousal to the male neutral stimuli ($M = -.85, SD = 3.95$), $t(25) = 3.16, p = .004$, Cohen’s $d = 1.02$.

Figure 10. Other-gender attracted women’s mean continuous self-reported sexual arousal ratings for all stimulus categories. Error bars represent standard error of the mean. Figure presents means for $n = 26$. 
**Same-gender attracted men**

After excluding two men who were not exclusively or predominantly same-gender attracted and one man who forgot to rate his continuous self-reported arousal, data for 10 same-gender attracted men were analyzed. A main effect of Stimulus Gender was found, such that men reported significantly greater arousal to the male ($M = 10.94, SD = 10.06$) than to the female ($M = -1.67, SD = 3.89$) stimuli. A significant main effect of Stimulus Potency was not found. A trend-level interaction between Stimulus Potency and Stimulus Gender was found (refer to Table 4). Simple main effects, separated by gender, found no effect of Stimulus Potency for male, Wilks’ $\lambda = .669, F(2, 8) = 1.98, p > .05, \eta^2_p = .33$, or female, Wilks’ $\lambda = .714, F(2, 8) = 1.60, p > .05, \eta^2_p = .29$, stimuli.

![Figure 11](image.png)

**Figure 11.** Same-gender attracted men’s mean continuous self-reported sexual arousal ratings for all stimulus categories. Error bars represent standard error of the mean. Figure presents means for $n = 10$. 
Same-gender attracted women

After excluding five women who were not exclusively or predominately same-gender attracted, data for 4 same-gender attracted women were analyzed. A trend-level main effect of Stimulus Gender was found, such that women reported greater arousal to the female ($M = 10.37$, $SD = 7.62$) than to the male ($M = -.74$, $SD = 3.56$) stimuli. No significant effect of Stimulus Potency, or Stimulus Potency by Stimulus Gender interaction was found (see Table 4).

![Figure 12](image_url)

*Figure 12.* Same-gender attracted women’s mean continuous self-reported sexual arousal ratings for all stimulus categories. Error bars represent standard error of the mean. Figure presents means for $n = 4$. 

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Category-specificity of sexual arousal and contextual cues

Given men’s and women’s tendency to respond to contextual cues in sexual stimuli (e.g., Chivers et al., 2007; Chivers & Timmers, 2012), the first aim of the current study was to examine sexual arousal patterns of opposite- and same-gender attracted men and women to cues of gender (i.e., primary sex characteristics), when contextual cues (and their potentially confounding effects on arousal to cues of gender) were limited in the sexual stimuli. In line with our predictions, the findings of the present study indicate that gender cues alone (i.e., primary sex characteristics) are sufficient to elicit a category-specific pattern of genital, self-reported, and continuous self-reported arousal in all of the populations studied. One exception to this general pattern was same-gender attracted women’s continuous self-reported arousal responses: Though same-gender attracted women reported greater arousal to female (preferred gender) than to male (nonpreferred gender) stimuli, this difference was not found to be statistically significant. It is likely, however, that this failure to reach statistical significance was due to a lack of power ($n = 4$), rather than a truly nonspecific pattern of response.

Previous literature has found a category-specific pattern of sexual arousal to cues of gender in other- and same-gender attracted men (e.g., Chivers et al., 2004). Studies of women’s sexual arousal to gender cues, by contrast, have had mixed results (such as in the case of same-gender attracted women - e.g., Chivers et al., 2007; Chivers et al., 2012; Peterson, Janssen, & Laan, 2010; Rullo, Strassberg, & Israel, 2010) or have found a nonspecific pattern of sexual response (such as in the case of other-gender attracted women - e.g., Chivers et al., 2007). It should be noted that in the sexual stimuli presented in previous
psychophysiology studies examining category-specificity of sexual response, gender cues were presented in concert with a host of other potentially sexually relevant information (e.g., cues of relationship context, body movement, level of sexual activity, attractiveness, etc.). The findings from the current study suggest that when the majority of these contextual cues were removed, participants relied on cues of gender to inform their sexual responses, resulting in a category-specific pattern of sexual arousal for all of the samples that were studied. This finding is particularly remarkable for other-gender attracted women, in whom sexual responding has consistently been found to be gender-nonspecific (e.g., Chivers, 2010).

Though it is clear that contextual cues are an important determinant of sexual arousal in men and women (e.g., Chivers et al., 2007; Chivers & Timmers, 2012), what is more difficult to understand is why these cues seem to be differentially affecting men and women’s sexual response patterns to cues of gender. That is, it is unclear why arousal to contextual cues appear to be impacting women’s sexual responses to cues of gender in a more marked way than men’s. Perhaps the first barrier to understanding this phenomenon is that it is still unclear exactly what cues (e.g., attractiveness of sexual actors, body movements, vocalizations) are confounding women’s sexual responses to cues of gender: Future research in this area is warranted.

**Prepotent sexual cues**

*Vasoengorged genitals are sexually salient cues*

The second aim of the current study was to determine if exposed and sexually aroused (vasoengorged) genitals (i.e., exposed vulvas and erect penises) would elicit a greater physiological and subjective sexual response than genitals that were not vasoengorged (i.e., pubic triangles and flaccid penises) or neutral images (of men or women engaging in
nonsexual, everyday activities). That is, we proposed that vasoengorged genitals, which are rarely seen outside of a sexual context, are sexually prepotent cues and would elicit an automatic sexual response in same- and other-gender attracted men and women. Generally, our results were consistent with this hypothesis: Same- and other-gender attracted men and women generally demonstrated greatest arousal to prepotent stimuli. Interestingly, significant interactions between stimulus potency and gender were found to emerge for almost all analyses (exceptions were found among same-gender attracted men and women’s self-reported and continuous self-reported sexual arousal – presumably due to a lack of power due to small sample sizes); such that the effect of stimulus potency was generally strongest in response to one’s preferred gender. Given the strong effect of category-specific responding to cues of gender on men and women’s sexual responses, this interaction is not altogether surprising.

Increased sexual responses to vasoengorged genitals of one’s preferred gender were also reported in a functional magnetic resonance imaging (fMRI) study conducted by Ponseti and colleagues (2006): When same- and other-gender attracted men and women were exposed to images of aroused male and female genitals\(^1\), stronger neuronal responses were observed in the central striatum and centromedian thalamus (areas of the brain associated with motor representations - presumably of manual or oral sexual behaviours - and reward), in response to stimuli depicting genitals of their preferred gender. Comparative studies on non-human primates also reinforce the conceptualization of vasoengorged genitals as being a strong sexually salient cue. For example, female baboons with prominent genital swellings garner more mating attempts from male baboons, more aggressive fighting between potential

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\(^1\) Stimuli from Ponseti et al. (2006) were included in the current study’s “prepotent” stimulus conditions.
consorts, and longer grooming sessions from male baboons, than female baboons with more inconspicuous perineal swelling (Domb & Pagel, 2001).

Interestingly, one recent study reported that redness in female vulvas (a cue that the genitals are vasoengorged; inferring sexual arousal) is “strongly aversive” to other-gender attracted men (Johns, Hargrave, & Newton-Fisher, 2012, p.3). Johns and colleagues (2012) generated a series of 16 images of vulvas, digitally manipulating the colour of the labia minora to fall into one of four categories: pale pink, light pink, dark pink, and red. Other-gender attracted men were found to rate the red vulvas as significantly less attractive than all other vulvar shades (no differences in attractiveness ratings were observed among the pink shades). Johns and colleagues’ assertion that other-gender attracted men displayed a “strong aversion” to the red genitals, however, may have been overstated: On a scale of attractiveness ranging from 0 (“Unattractive”) to 100 (“Attractive”), the average attractiveness rating for red vulvas was found to be 35.37 (contrasted with an average attractiveness rating of 40.32 for vulvas with a pink shade), indicating that other-gender attracted men were, in fact, reporting that the red vulvas were at least somewhat sexually attractive. Similarly, though the experimenters manipulated the redness of the vulvas, other cues that indicate sexual arousal (e.g., swelling, lubrication) were not depicted. In the absence of these other cues of sexual arousal, the redness in the vulva may have been interpreted as vulvar/vaginal irritation, infection (e.g., trichomoniasis), or menstruation, possibly accounting for men’s lower attractiveness ratings to these images.

**Unaroused genitals are arousing?**

Unexpectedly, arousal to the non-prepotent stimuli was generally greater than arousal to the neutral stimuli; that is, flaccid penises and pubic triangles (which we had termed “non-
prepotent” under the hypothesis that these cues would not be sufficient to elicit a sexual response) generally garnered greater sexual arousal than “neutral” images of clothed men and women ² (though in most instances, greater sexual arousal than neutral was only found for nonprepotent stimuli of one’s preferred gender). This finding suggests that genitals (of one’s preferred gender) alone -- even genitals that are not vasoengorged -- are generally sufficient to elicit sexual responses. It should be noted, however, that arousal to our prepotent stimuli (vasoengorged genitals) was still generally greater than arousal to the nonprepotent stimuli.

Though we had not anticipated that non-prepotent stimuli would elicit heightened sexual responses in our samples, ours is not the first study to demonstrate the sexual potency of unaroused genitals. In 1972, Freund examined penile volume change (PVC) in a group of nonpedophilic, other-gender attracted men, in response to images of the following male and female body parts: 1) the face; 2) the chest/shoulders-to-waist; 3) the lower belly/pubic region to the middle of the thighs (analogous to our “non-prepotent” condition – pubic triangles and flaccid penises); 4) the legs from the thighs down; and 5) the “back end”/buttocks from the waist to thighs. The images presented also ranged by age of the sexual target (child, pubertal youth, and adult). Arousal to the female adult pubic region (pubic triangles) was found to be significantly greater than genital arousal to all other stimulus conditions. Interestingly, Freund’s sample demonstrated increased genital arousal to female pubic regions, even when the sexual targets were pubertal youths or children. This increased genital arousal to pubic triangles in men’s nonpreferred sexual targets (with respect to age), seems to speak to the power of genitals (particularly of one’s preferred gender) in eliciting (even unwanted) sexual responses.

² Note that, for the purposes of this paper, these stimuli will still be termed “non-prepotent”, despite their ability to elicit sexual responses in our samples.
The sexual potency of erect penises

The third aim of the current study was to determine if same-gender attracted women demonstrate greater physiological arousal to erect penises than flaccid penises, given that arousal to erect penises may be particularly evolutionarily advantageous to women as it may facilitate reproduction or serve as a protective mechanism -- e.g., lubrication may decrease the risk of vaginal tearing and subsequent infection. Indeed, as predicted, same-gender attracted women were found to demonstrate greater genital arousal to erect than to flaccid penises. This finding is particularly remarkable given our small sample size (n = 4): Despite our low power, effect sizes were found to be quite large. For this same reason, however, results must be interpreted cautiously: The findings of the current study suggest that it is possible that the female nervous system has been shaped by selection to evoke strong, unlearned responses to erect penises (irrespective of self-stated sexual interest), due to their adaptive salience, however, due to our small sample size, future research is warranted.

It is of note that, even though our sample identified as predominantly or exclusively sexually attracted to women, half of our same-gender attracted sample (n = 2) had engaged in prior sexual behaviour with men. As a result, women’s sexual responses to erect penises may not have been entirely unlearned. It is possible that previous (positive) sexual experiences with men, or even with phallic-shaped sex toys, may have facilitated genital responding to subsequent erect penises/phallic images, through conditioning. In support of this learning model, research has shown that women’s genital sexual responses are capable of conditioned learning (e.g., Both et al., 2008). Repeated pairings of pleasurable physiological responses (elicited by genital vibrotactile stimulation) and subliminally presented neutral stimuli has been shown to produce increased genital arousal in women to subsequent presentations of the
same neutral stimuli, even though the genitals were no longer being stimulated (Both et al., 2008). As such, repeated pairings of pleasurable physiological responses and erect penises could result in subsequent increased sexual arousal to depictions of erect penises, even when these pleasurable physiological responses associated with sexual activity are absent.

Erect penises were also found to be a powerful sexual cue for other-gender attracted men. Despite the established importance of gender cues for male sexual arousal, we found a simple main effect of stimulus potency on genital sexual arousal to both female and male stimuli. That is, other-gender attracted men demonstrated significantly more physiological arousal to male prepotent stimuli (erect penises) than male non-prepotent (flaccid penises) and male neutral (clothed men) stimuli. Though arousal to a non-preferred stimulus type seems to preclude a category-specific pattern of response, it is important to note that category-specificity refers to an overall pattern of responding, or relative difference between arousal to one’s preferred versus non-preferred gender, and not an absolute magnitude of responding. For example, though men did demonstrate heightened arousal to the male prepotent stimuli, this arousal was still significantly lower than responding to female prepotent or female non-prepotent stimuli.

Heightened physiological arousal to male stimuli in other-gender attracted men is not a novel finding and has been reported in many studies examining sexual psychophysiology to cues of gender (e.g., Chivers & Bailey, 2005; Chivers et al., 2007; Chivers & Timmers, 2012). The current finding, however, suggests that this heightened arousal to (non-preferred) male sexual targets may be specific to stimuli in which an erect penis is featured. In support of this argument, Chivers and colleagues (2007) did not find any significant increases in physiological arousal to sexual stimuli featuring a man exercising naked (while flaccid), but
did demonstrate increased arousal to male-male intercourse (in which erect penises were prominently featured). Other-gender attracted men’s arousal to cues of men masturbating, however, did not follow this same pattern: Other-gender attracted men were not found to demonstrate heightened physiological arousal in response to men masturbating (Chivers et al., 2007). It is possible that men did not demonstrate increased genital responding to these videos of men masturbating, however, as the penises featured in these videos were only partially erect.

Men’s heightened physiological arousal to erect penises could be due to a number of factors. Firstly, just as women’s sexual responses have been found to be susceptible to conditioning, so too have men’s: After pairing sexually explicit images with a neutral slide of a penny jar, Plaud and Martini (1999) found that other-gender attracted men demonstrated increased physiological arousal to the image of the penny jar alone. It is possible that through repeated pairings of erect penises (either watching one’s own penis, or viewing other erect penises, such as in pornography) and one’s preferred sexual target (i.e., images of naked women), or even pleasurable sexual activity (e.g., masturbation accompanying pornography use), men may become conditioned to view erect penises as sexual. It is also possible that men may also demonstrate increased genital arousal to erect penises because they identify with the stimulus. In a recent study, Bossio, Spape, Lykins, and Chivers (2013) found that imagining oneself as a participant in sexual stimuli where an erect penis was featured significantly predicted other-gender attracted men’s genital arousal, after controlling for sexual attraction. In this way, other-gender attracted men may not be viewing the erect penis as a sexual object itself, but instead, may be imagining themselves as the sexual actors (i.e.,
when viewing images of an erect penis, men may be thinking about what it feels like to be as aroused as is depicted in the image, instead of viewing the erect penis as a sexual target).

**The automatized sexual response mechanism**

It is interesting that our samples’ self-reported and physiological arousal patterns generally seemed to correspond (self-reported and continuous self-reported arousal patterns of our same-gender attracted men and women often failed to reach statistical significance, presumably due to a lack of statistical power, but overall patterns of responding remained remarkably consistent with genital responding). We had posited that vasoengorged genitals would comprise a class of sexual stimuli that automatically elicit sexual responding, and thus, it was unnecessary for self-reported sexual responses to mirror physiological arousal responses for our stimuli to be considered “prepotent”. Indeed, in studies of fear, subliminally presented evolutionarily relevant stimuli (phylogenetic stimuli, e.g., snakes, spiders) have been found to elicit fear responses (e.g., skin conductance responses) before participants were able to consciously process and evaluate the stimuli (e.g., Öhman & Soares, 1994).

Similarly, in studies of sexual psychophysiology, women have been found to demonstrate increases in genital vasocongestion within seconds of stimulus onset (see van Lunsen & Laan, 2004). In some studies of sexual dysfunction, women with female sexual arousal disorder (FSAD) have even been found to exhibit heightened genital arousal, comparable to women without FSAD, in response to explicit sexual stimuli (e.g., Laan, van Driel, & Lunsen, 2008), despite experiencing weaker subjective sexual arousal and perception of genital sensations (see van Lunsen & Laan, 2004), though findings in this area have been mixed (e.g., Brotto, Basson, & Gorzalka, 2004). In a study examining the sexual responses of healthy other-gender attracted women, subliminally presented images of exposed vulvas and
erect penises were found to elicit greater sexual arousal to a subsequent target stimulus than a subliminally presented neutral prime (Ponseti & Bosinski, 2009). Thus, studies of sexual psychophysiology provide preliminary support for a nervous system that automatically appraises and responds to sexually salient cues.

The information processing model of sexual arousal (Janssen, Everaerd, Spiering, & Janssen, 2000) suggests that both conscious and deliberate and automatic and unconscious cognitive processes are engaged during sexual arousal. In Janssen and colleagues’ (2000) model, sexual arousal is the product of an unconscious or automatic appraisal stage and a response-generation stage. In the appraisal stage a stimulus is given emotional meaning through a process of stimulus encoding and matching to stimuli from memory. The response generation stage is described as an integrative process in which the meaning of the stimulus is integrated with response generation or motor plans (e.g., a sexual stimulus elicits physiological arousal). The appraisal and response-generation stages are purported to operate on a largely preattentive and unconscious level. Attentional processes and other higher-order mechanisms may affect or be triggered by the appraisal and response-generation stages, but are not wholly necessary to elicit a sexual response.

Janssen and colleagues (2000) assert that generated responses (e.g., physiological sexual arousal) may also become the object of appraisals themselves. As such, our similar pattern of self-reported and physiological arousal may be indicative of: (1) a sexual interest in the sexual stimuli being presented (this is likely when sexual images of one’s preferred gender were presented), or (2) increased self-reported arousal due to an awareness and appraisal of one’s automatic and unconscious genital responding to prepotent sexual cues. The second scenario is more likely among the male samples of the current study, as male
sexual concordance (agreement between self-reported and genital arousal) has consistently been found to be greater than female sexual concordance; though substantial within-gender variability exists (see Chivers, Seto, Lalumière, Laan, & Grimbos, 2010).

Support for a “feedback model” of self-reported arousal may be found among research on asexual women (women with an absence of sexual attraction). Brotto and Yule (2011) found that, despite a lack of self-stated sexual interest, asexual women demonstrated genital and self-reported arousal comparable to other-gender attracted, bisexually attracted, and same-gender attracted women, in response to sexually explicit stimuli. This finding may be due to a prepared, automatic physiological sexual response to prepotent sexual cues (i.e., vasoengorged genitals displayed in the sexual videos), followed by an appraisal of these genital changes, resulting in increased self-reported ratings of sexual arousal. Indeed, asexual women were found to demonstrate significantly greater sexual concordance than all other women, suggesting a higher level of interoceptive awareness (awareness of one’s own internal bodily states; Brotto & Yule, 2011).

**Limitations and future directions**

Although we have purported that physiological arousal in reaction to prepotent sexual cues may be a largely preattentive and unconscious process, the stimulus length in the current study (90s) arguably provided enough time for substantial cognitive elaboration to occur. As such, conscious processes may have (as discussed earlier, in the case of self-reported arousal) been influenced by physiological responses, and, in turn, higher order processes may have influenced genital arousal. Perhaps a better paradigm to examine the “prepotency” of sexual stimuli would be an extinction paradigm similar to those used in the fear literature (e.g., Öhman, Eriksson, & Olofsson, 1975). That is, one might condition participants’ responses by
pairing “prepotent” sexual stimuli (e.g., erect penises, exposed/vasoengorged vulvas), “non-prepotent” sexual stimuli (e.g., nonerect penises, pubic triangles), and neutral images (e.g., landscapes, potted plants, etc.), with sexual pleasure (e.g., through genital vibrotactile stimulation). If the vasoengorged genitals are found to be more resistant to subsequent extinction than the other stimulus conditions, the contention that vasoengorged genitals are “prepotent” would be supported.

Though the present findings provide preliminary support for the role of contextual cues on men and (particularly) women’s sexual response patterns, future research identifying which contextual cues are sexually salient (e.g., body movements, attractiveness, music) and how they differentially influence men and women’s sexual responding, is warranted. It should be noted that although the current study attempted to limit the number of contextual cues present in our stimuli (i.e., focus solely on depictions of male and female primary sex characteristics), they were not eliminated completely from the stimuli or experimental paradigm. For instance, several exemplars of the male and female stimuli (particularly the male prepotent stimuli) featured a section of the lower torso/abdomen – a section of men’s bodies that may be highly sexualized (e.g., “six pack abs”) in a way that women’s lower torsos generally are not. It is also possible that participants read a sexual context into the images due to the nature of our laboratory and research program. All of our participants entered a laboratory dedicated to sexuality research for a study that they knew involved viewing sexual and nonsexual images while their mental and physiological responses were recorded. As such, our participants may have entered the study primed for sex – this may have led women and men to experience more or report more arousal due to sexual priming. It should be noted, however, that this sexual priming due to environment is likely to have
affected all of our experimental conditions. Because we examined overall patterns of response instead of absolute magnitudes of responding, any effect of sexual priming should not have influenced our pattern of results.

Another limitation of the current study is our small sample size. According to a power analysis, where power was set at .8, alpha was set at .05 and the predicted effect was set at $\eta_p^2$ of .34 (Spape & Chivers, 2011), 12 participants were found to be needed for each sample. Unfortunately, our same-gender attracted female ($n = 4$) and male ($n = 11$) samples did not reach our projected sample sizes. Results of the current study pertaining to these samples must be interpreted cautiously. However, it should be noted that despite these small sample sizes, we found large effect sizes for the majority of our analyses. As such, further investigation of the current hypotheses with a larger sample of same-gender attracted men and women is warranted.

Volunteers for studies of sexual psychophysiology have been found to differ from non-volunteers in various ways (e.g., Wolchik, Braver, & Jensen, 1985). For example, studies have shown that those who participate in studies of sexual psychophysiology tend to masturbate more than non-volunteers, have greater noncoital sexual experience (e.g., oral sex), less sex guilt and a greater number of sexual partners (Strassberg & Lowe, 1995; Morokoff, 1986). These differences, however, should not be taken as proof that volunteers in sexual psychophysiology research are not representative of the general population in terms of patterns of sexual arousal. On the contrary, Chivers, Rieger, Latty, and Bailey (2004) found that many factors that differentiate volunteers from non-volunteers (e.g., number of male sexual partners) were not significantly associated to specificity of genital or subjective arousal with respect to gender.
Future studies could examine the effect of previous sexual behaviour on subsequent sexual responses. There is some evidence to suggest that prior sexual experience with same- or other-gender individuals may influence women’s pattern of gender-specificity in the laboratory (see Peterson et al., 2010). It is possible that prior sexual experience may alter participants’ subsequent responses through learning, or may be indicative of a greater level of excitability/arousability or sexual inhibition, which might influence participants’ responses to various sexual stimuli. Although these questions were beyond the scope of the current study, future investigation in this area is warranted.

**Chapter 5**

**Conclusions**

Previous literature has found a category-specific pattern of sexual arousal to cues of gender in other- and same-gender attracted men (e.g., Chivers et al., 2004). Studies on women’s sexual arousal to cues of gender, by contrast, have found a nonspecific pattern of sexual response in other-gender attracted women, and have had mixed results in same-gender attracted women (e.g., Chivers et al., 2007; Chivers et al., 2012; Peterson, Janssen, & Laan, 2010; Rullo, Strassberg, & Israel, 2010). Given the complex nature of sexual stimuli that are used in research paradigms involving category-specificity of sexual arousal, it is often unclear to what extent contextual cues (cues other than the sexual actor’s sex characteristics; body movement, level of sexual activity, etc.) influence participants’ sexual response patterns. The current study suggests that when stimulus context cues are limited, and participants are exposed to male and female genitals (believed to be prepotent sexual features), a category-specific pattern of sexual response emerges for same- and opposite-gender attracted men and women.
Prepotent sexual features, that is, stimuli that elicit nervous system activity involuntarily (cf. Lang, Rice & Sternbach, 1972), may be associated with an automatic sexual response (Chivers, 2005; Ponseti et al., 2006; Ponseti & Bosinski, 2009; Van Lunsen & Laan, 2004), and have been found to elicit category-specific patterns of physiological and self-reported arousal among other-gender attracted women, to cues of gender (Spape & Chivers, 2011). The current study found that these same- and other-gender attracted men and women generally demonstrate heightened physiological and self-reported arousal in response to these “prepotent” cues, though future research is required to verify that arousal in response to these cues is automatic.
References


Appendix 1: Personal information questionnaire

Turmeric Questionnaire

This questionnaire asks about your personal information, sexual orientation, sexual experiences, sexual attitudes, typical sexual responses to sexual stimuli, and personality characteristics as an adult (since age 18). Each section has directions, in bold type, on how to answer the questions. Please read the directions and questions carefully, and either place a checkmark in the circle of the answer that most applies to you, write your answer in the space provided, or circle the number that most applies to you.

If a question does not apply to you, please write NA (not applicable) in the space provided. If you do not feel comfortable answering a question, please draw a slash through it and go to the next question.

When you have finished answering the questionnaire, please put it in the envelope provided. Remember, all of your answers are completely confidential and identified by a participant number only. Your name cannot be linked to your responses. Please answer as honestly as possible.

PLEASE DO NOT WRITE IN THIS AREA

Participant ID #: ________________________
Date Completed: _________________________
Initials of Experimenter: __________________
Date Data Entered: ______________________
The following questions ask about your personal information. Please read each question carefully and either place a checkmark in the circle of the answer that best describes you, or write your answer in the space provided. Remember, all of your answers are completely confidential.

1. Age: ___________________
2. Date of birth (DD/MM/YY): ______________________
3. Relationship status:
   1. Single
   2. Married
   3. Dating
   4. Common Law
   5. Engaged
   6. Divorced
   7. Widowed
4. If you are currently in a relationship please state the length of that relationship:
   _______ years OR _______ months
5. How many children do you have? _____________
   Other (please specify) _____________
7. Highest level of education completed:
   1. Completed Grade 8
   2. Some high school completed (grades 9-11)
   3. Graduated from high school, or equivalent
   4. Vocational, trade or business school completed
   5. Community college – currently attending or completed diploma
   6. University – currently attending or completed bachelor’s degree
   7. Graduate/professional school (MA, PhD, MBA, MD): attending or completed degree
8. Are you currently employed at a paid job?
   1. Yes, full-time
   2. Yes, part-time
      a. If yes, what is your current position/title? __________________________
   3. No, full-time homemaker
   4. No, retired
   5. No, full-time student
   6. No, currently unemployed
9. Did you use any of the following substances or beverages today? Please check all that apply.
   • Beverage containing caffeine (e.g., coffee, tea, Coke, Mountain Dew)
   • Alcohol
   • Marijuana
   • Tobacco
   • Other recreational drug
   • I used none of these substances
10. Do you engage in regular physical activity? Yes No
11. If Yes, how many times per week? ___________________
12. Did you engage in physical exercise today? Yes No
13. If Yes, how many hours did you exercise before coming into the laboratory today?

______
14. Did you take any medications today? Yes No
15. If Yes please list: ____________________________________________________
16. (If female) Do you currently use hormonal contraceptives? Yes No
17. If yes, please list the name here _______________________________________
18. (If female) How long (in days), on average, is your monthly cycle? (From the beginning of one period to the next?) ________ days
19. (If female) How many days do you typically menstruate/bleed for? ________ days
20. What was the date for the first day you started menstruating from your last menstrual period? (e.g., June 27). If you know the day of the week but are not sure about the correct date, please look at the calendar on the table). ________ (day) ________ (month)
21. (If female) Are you currently pregnant? Yes No

The following questions ask about your romantic and sexual attractions, sexual contacts, and sexual identity, in adulthood (since age 18). Please read each question carefully and read the options presented after each question. Please check the circle next to the response that best describes you. Remember, all of your answers are completely confidential.

1. Please think about the people you have typically been romantically attracted to. By “romantically” attracted we mean a deep emotional connection that is more than friendship. Would you say that your romantic attractions are toward:
   1. Women only
   2. Women mostly, but men occasionally too
   3. Women mostly, but men frequently (but not more than toward women)
   4. Women and men about equally
   5. Men mostly, but women frequently (but not more than toward men)
   6. Men mostly, but women occasionally too
   7. Men only

2. Please think about the people you have typically been sexually attracted to. By “sexually” attracted we mean you experience sexual desire or interest in someone. Would you say that your sexual attractions are toward:
   1. Women only
   2. Women mostly, but men occasionally too
   3. Women mostly, but men frequently (but not more than toward women)
   4. Women and men about equally
   5. Men mostly, but women frequently (but not more than toward men)
   6. Men mostly, but women occasionally too
   7. Men only

3. Please think about the people you typically have sexual fantasies about. By a “sexual fantasy” we mean sexual scenarios or daydreams you think about, and may use when masturbating and/or having sex with a partner. Would you say your sexual fantasies are about:


1. Women only
2. Women mostly, but men occasionally too
3. Women mostly, but men frequently (but not more than about women)
4. Women and men about equally
5. Men mostly, but women frequently (but not more than about men)
6. Men mostly, but women occasionally too
7. Men only

4. Now, please think about having sexual contact with a man. How sexually interested or excited do you feel by the thought of having sex with a man?
   1. Extremely
   2. Definitely
   3. Somewhat
   4. A little bit
   5. Not at all

5. Keep thinking about having sexual contact with a man. How “turned-off” or disgusted do you feel by the idea of having sex with a man?
   1. Extremely
   2. Definitely
   3. Somewhat
   4. A little bit
   5. Not at all

6. Now, please think about having sexual contact with a woman. How sexually interested or excited do you feel by the thought of having sex with a woman?
   1. Extremely
   2. Definitely
   3. Somewhat
   4. A little bit
   5. Not at all

7. Keep thinking about having sexual contact with a woman. How “turned off” or disgusted do you feel by the idea of having sex with a woman?
   1. Extremely
   2. Definitely
   3. Somewhat
   4. A little bit
   5. Not at all

8. Please check any of the following labels that you currently use to think about yourself.
   - Heterosexual
   - Lesbian or gay
   - Bisexual
   - Queer
   - Other __________
   - I do not use a label

The following questions ask about your sexual experiences and sexual responses in adulthood. Please read each question carefully and either check the circle that best describes you, or write your answer in the space
provided. By “sexual contact” we mean consensual contact with you or your partner’s genitals, such as manual, oral, or penetration sex. Remember, all of your answers are completely confidential.

1. Have you ever had sexual contact with a man? Yes No
2. If yes, with how many men have you had sexual contact? ________
3. How old were you when you first had sexual contact with a man? ________
4. Have you ever had sexual contact with a woman? Yes No
5. If yes, with how many women have you had sexual contact? ________
6. How old were you when you first had sexual contact with a woman? ________
7. Are you romantically or sexually involved with anyone right now? Yes No
8. If “yes,” check ALL of the following that apply to your situation
   • I am romantically involved with one person.
   • I am sexually involved with one person.
   • I am romantically involved with more than one person.
   • I am sexually involved with more than one person.
   • I am married.
   • I consider myself to be in a committed, lasting relationship.
9. If you are involved with one person right now, is this person…
   1. Male
   2. Female
   3. Transgender (born female)
   4. Transgender (born male)
10. If you are involved with more than one person right now, are these individuals…
    (check all that apply)
    1. Male
    2. Female
    3. Transgender (born female)
    4. Transgender (born male)
11. How often do you look at sexual pictures or films? (please select only one)
    1. I have never seen sexual pictures or films
    2. I have seen sexual pictures or films once or twice but do not use them regularly
    3. Less than once per month Several times a week
    4. Once per month
    5. Once per week
    6. Once a day
    7. Several times a day
12. How often do you read sexual stories? (please select only one)
    1. I have never read sexual stories
    2. I have read sexual stories once or twice but do not use them regularly
    3. Less than once per month Several times a week
    4. Once per month
    5. Once per week
    6. Once a day
    7. Several times a day
Thank you for completing this questionnaire. Please take a minute to make sure you answered all the questions. When you are finished, please put this questionnaire in the envelope provided and then tell the experimenter you have finished.

Before answering this question, please let the experimenter know that you are finished.

How sexually aroused do you feel right now? (0 = “No arousal”, 9 = “Most arousal I’ve ever felt”)

0 1 2 3 4 5 6 7 8 9
Appendix 2: Letter of information and consent form

Letter of Information and Consent

TITLE OF PROJECT:

Psychophysiological assessment of sexual responses to sexually explicit images.

BACKGROUND INFORMATION:

You are being invited to participate in a research study conducted in the Sexuality and Gender Laboratory, directed by Dr. Meredith Chivers, and sponsored by the Department of Psychology at Queen’s University. The principal investigator for this study is Dr. Chivers. The study involves measuring your physical and mental sexual arousal responses to nonsexual and sexual images. Participating in this study also involves completing a questionnaire about your sexuality.

Your participation will help scientists understand how features within sexual stimuli affect women’s and men’s sexual arousal.

A trained research assistant will read through this form with you, describe the study procedures in detail, show you the testing room and the genital gauges, and answer any questions you might have. This study has been reviewed for ethical compliance by the Queen’s University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board.

DETAILS OF THE STUDY:

The aims of this study are to examine the following among sexually healthy women and men: 1) genital and subjective sexual response to sexual and nonsexual images; 2) associations between sexual interests and patterns of sexual response to sexual images.

You will not be considered for this study if you: 1) are younger than 18 or older than 50; 2) do not read and write English fluently; 3) have current or past mental illness or substance abuse; 4) are using medications thought to influence sexual response; 5) have chronic genital or subjective sexual arousal problems; 6) have a sexually transmitted infection. If you are female, 7) you experience pain during sexual activity. Pain, in this context, is defined as superficial pain during more than 50% of sexual activities or insertions; 8) are pregnant, or
have been pregnant in the last six months; 11) have never experienced vaginal penetration during sexual activity, used menstrual tampons, or undergone a pelvic examination; 12) have an irregular menstrual period.

Your participation in this study involves undergoing 1) a sexual arousal assessment, and 2) the completion of questionnaires. The arousal assessment and completion of questionnaires will take place at the Sexuality and Gender Laboratory, Department of Psychology, Queen’s University.

Sexual Arousal Assessment: The first part of this study involves measuring your physical and mental sexual arousal to sexual and nonsexual images. These images will feature male and female genitalia as well as images of men and women engaged in activities. This part of the study will take about one hour.

The experimenter will explain how to use the equipment to measure your arousal responses. Once you understand how to do this, you will undress from the waist down in a private testing room, sit in a comfortable reclining chair, and insert or attach the genital gauge. You will insert the gauge into your vagina, or attach the gauge to your penis, yourself.

The experimenter will guide you through the first part of the study from a separate room, using messages sent over a computer monitor. You will first watch a 3-minute long slideshow featuring landscapes. Then you will see twelve slideshows that are all approximately 90 seconds long. These slideshows will feature images of male and female genitals as well as images of fully clothed men and women engaging in nonsexual activities. Immediately before and after viewing each slideshow, you will be asked to answer questions about your sexual and emotional responses to the images, and you will be asked to rate image characteristics. After you have watched all the slideshows, you will remove the genital gauge, place it in a plastic bag, and dress.

Questionnaires: After the sexual arousal assessment, you will be asked to complete a questionnaire asking about your personal information (age, marital status, education, household income, ethnicity, employment status, medication, substance use, and current sexual health), sexual experiences, sexual orientation, sexual responses to sexual stimuli, sexual functioning, sexual attitudes, and personality characteristics. You will complete these questionnaires in a private room. This part of the study will take about a half hour.

After you have completed the questionnaire, you will watch a 10-minute long film and complete a question asking about your sexual feelings.

COMPENSATION:

Upon completion of the study, you will receive $25 as compensation for your time and study-related expenses such as travel. If the study has to be terminated for any reason, compensation will be adjusted according to the fraction of the study completed at a rate of $12.50 per hour.
BENEFITS OF PARTICIPATION:

The information obtained from this study will potentially improve understanding of the processes involved in sexual arousal. While you may not benefit directly from this study, results from this study may benefit women and men by increasing our understanding of the sexual psychophysiology of sexual interests.

RISKS OF PARTICIPATION:

There are no known risks from participating in this study. You may, however, feel awkward using the genital gauge if you are not comfortable touching your genitals. You may feel awkward watching the images if you find sexually explicit materials objectionable.

The genital gauges are reused and undergo thorough, high-level disinfection (cold sterilization) between uses. High-level disinfection is a common and safe way of disinfecting instruments made of plastics and is the same procedure used in hospitals. There is minimal risk from using a genital gauge after it has been disinfected.

CONFIDENTIALITY AND PARTICIPANT RIGHTS:

All information obtained during the course of this study is strictly confidential and your anonymity will be protected at all times. Coded (ID) numbers will replace all names and you will be identified only by this number. There will be one password-protected file linking your name and contact information with your ID number; that password will be available only to the members of the research team working on this study. Data will be stored in locked files and will only be available to the investigators and research assistants involved in this project. You will not be identified in any publication or reports of the study; data will be combined in all reports of this study.

Your participation in this study is completely voluntary. You may withdraw from this study at any time without any consequence.
SUBJECT STATEMENT AND SIGNATURE SECTION:

I, ________________________________ (please print name), have read and understood the information/consent form for this study. I have had the purposes and procedures of this study explained to me by a trained research assistant and I understand what is required for participation in this study. I understand that my participation is voluntary and that I can withdraw my participation at this time. I have been given sufficient time to consider the above information and have had the opportunity to ask questions which have been answered to my satisfaction. I understand the potential benefits and risks associated with participating in this study and understand that my confidentiality will be protected throughout the study. I am voluntarily signing this form. I will retain a copy of this consent form for my information.

Should I have further questions, I understand that I can contact any of the following individuals:

- Dr. Meredith Chivers, Principal Investigator (613-533-2889; Meredith.Chivers@queensu.ca), Assistant Professor in the Department of Psychology at Queen’s University
- Dr. Richard Beninger (613-533-2486; psychead@post.queensu.ca), Head of the Department of Psychology at Queen’s University
- Dr. Albert Clark (613-533-6081), Chair of the Queen’s University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board

By signing this consent form, I am indicating that I agree to participate in this study

______________________          ______________________
Participant’s name          Participant’s signature                   Date

______________________
Person obtaining consent

Please check ONE of the following boxes:

☐  I would like any identifying information destroyed once the study is completed, and I would like to remain anonymous.

☐  I agree to let the researchers keep my identifying information on file in the secure lab, and to contact me for participation in future research projects.

STATEMENT OF INVESTIGATOR:
I, or one of my colleagues, have carefully explained to the participant the nature of the above research study. I certify that, to the best of my knowledge, the participant understands clearly the nature of the study and demands, benefits, and risks involved to participate in this study.

______________________           __________
Signature of Principal Investigator            Date
Limits of Confidentiality

All information disclosed during your participation in this research study is confidential and will not be disclosed to anyone with your written and informed consent except where reporting is required by law, that is –

1. where there is suspicion that a child or children (that is, an individual who is PRESENTLY under the age of 16) has been or is being abused,

2. where the research participant is likely to harm her- or himself unless protective measures are taken,

3. where the research participant presents a serious danger of violence to others, and

4. if the research participant reveals that she has been sexually abused by a healthcare provider (for example, a psychologist or physician) covered by the Regulated Health Professionals Act, it is necessary by law to report the name of the perpetrator to his/her governing body.

IF YOU HAVE ANY CONCERNS ABOUT THESE MATTERS, OR ABOUT THIS FORM, PLEASE DISCUSS THESE WITH THE RESEARCH ASSISTANT.

************************************************************************

PLEASE SIGN THE ACKNOWLEDGEMENTS BELOW TO INDICATE THAT YOU HAVE READ THIS INFORMATION ABOUT CONFIDENTIALITY

************************************************************************

I acknowledge the circumstances that limit confidentiality and I accept them.

______________________          ______________________           __________
Participant’s name          Participant’s signature                   Date

______________________
Person obtaining consent
Appendix 3: Debriefing letter

Debriefing Statement

Previous research suggests that women and men respond differently to sexual stimuli. Women respond to both preferred (relative to her sexual orientation) and non-preferred genders, whereas men respond much more to persons of their preferred gender.

Chivers et al. (2007) found that heterosexual women experienced genital and subjective sexual arousal when viewing films of nude women performing an aerobic routine. More surprising, these heterosexual women did not get sexually aroused by films of naked men exercising. We do not understand why women showed this counterintuitive pattern of sexual arousal. One possibility is that, in the female films, the female actors opened and closed their legs and exposed their vulvas while they exercised and women responded to this as a sexual cue; in the male films, men had exposed penises but these were flaccid. Ponseti et al. (2006) have proposed that an exposed vulva or erect penis may function as a prepotent sexual feature, that is, a visual sexual stimulus that evokes an automatic sexual response regardless of the sexual orientation of the viewer. Women may have responded to the films of women exercising and not to the films of men exercising because the films featured a prepotent sexual feature.

The presence of prepotent sexual features in sexual stimuli may help explain why women respond to a broader range of sexual stimuli than men. The current study will examine whether exposed vulvas and erect penises lead to an automatic genital sexual response in same- and other-sex attracted men and women.

A reminder: All information is kept completely confidential in locked research cabinets and password-protected computer files. Only members of the research team will have access to this information. At no time will you be identified as an individual because the data will be numerically coded to ensure confidentiality and anonymity. Only the group data will be reported in the research.

If participating in this study leads you to feel distressed, you are encouraged to contact your family physician or a mental health professional. Attached is a list of mental health resources in the Kingston and surrounding area, as well as a list of websites related to sexuality.

Thank you for participating in this study. Your time and effort is greatly appreciated.

If you have any further comments or questions about this research project, or would like to receive a summary of research findings, please contact Amanda Timmers by e-mail at 6at9@queensu.ca, or Dr. Meredith Chivers by e-mail at Meredith.Chivers@queensu.ca, or by telephone at (613) 533-2889.
Sexual and Mental Health Resources

Belleville General Hospital ........................................(613) 969-5511
Brockville General Hospital ........................................(613) 345-5645
Kingston General Hospital .........................................(613) 548-2333

Frontenac Community Mental Health Services:
  Information........................................................................544-1356
  24 Hour Crisis Line..........................................................544-4229

Leeds and Grenville Rehabilitation and Counseling Services:
  Toll Free.................................................................1 800 267-4406
  Delta..............................................................................(613) 928-3460
  Gananoque.................................................................(613) 382-4016 ext. 100
  Kemptville.................................................................(613) 258-7204
  Prescott.....................................................................(613) 925-5940

KFLA Health Unit (Sexually Transmitted Infection Clinic)
Confidential diagnosis and treatment
221 Portsmouth Ave.
Phone: 613-549-1232 or 1-800-267-7875
Website: http://www.healthunit.on.ca/programs/sexualhealth.html

Queen's University Student Health Services
LaSalle Building, 146 Stuart St.
Phone: 613-533-2506
Website: http://www.queens-hcds.org

Sexual Health Resource Centre (SHRC)
2nd Floor of the John Deutsch University Centre
Phone: 613-533-2959

Sexual Assault Crisis Centre Kingston (SACCK)
Phone: 613-544-6424

Lesbian/Gay/Bi Youth Phone Line
Phone: 1-800-268-YOUTH

Education Queer Issues Project (EQUIP)
Phone: 613-533-3154
Email: equip@ams.queensu.ca
Website: http://clubs.myams.org/equip/

http://www.sexualhealth.com/
http://www.sexualityandu.ca/
http://www.plannedparenthood.org/
http://www.hars.ca