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To cite this article: Raluca Petrican , Christopher T. Burris & Morris Moscovitch (2015) Shame, Sexual Compulsivity, and Eroticizing Flirtatious Others: An Experimental Study, The Journal of Sex Research, 52:1, 98-109, DOI: [10.1080/00224499.2013.829796](https://doi.org/10.1080/00224499.2013.829796)

To link to this article: <https://doi.org/10.1080/00224499.2013.829796>



Published online: 03 Dec 2013.



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## Shame, Sexual Compulsivity, and Eroticizing Flirtatious Others: An Experimental Study

**Raluca Petrican**

*Rotman Research Institute*

**Christopher T. Burris**

*Department of Psychology, St. Jerome's University*

**Morris Moscovitch**

*Department of Psychology, University of Toronto, Rotman Research Institute*

*Clinical observation and correlational studies with nonclinical samples suggest that a linkage between negative affective states (especially shame) and engagement in erotic pursuits typifies sexual compulsivity. The present study tested whether experimental induction of shame leads to increased interest in erotically suggestive targets among more sexually compulsive individuals. A total of 74 age-traditional heterosexual university students first recalled either an emotionally neutral or a shame-inducing personal experience, then completed a nonpredictive gaze-cueing task featuring flirtatious or emotionally neutral faces of the same or opposite sex. They also rated the faces' attractiveness and completed a validated sexual compulsivity scale and two control measures (executive control, sociosexuality). Higher (versus lower) sexual compulsivity predicted weaker gaze-triggered attentional orienting in response to the flirtatious opposite-sex face in the shame (versus neutral) condition, and this was accounted for by (higher) attractiveness ratings of the flirtatious opposite-sex face. Shame thus appears to increase sexualization (i.e., reduces salience of agentic features and increases appeal of physical attributes) of erotically suggestive targets among more sexually compulsive individuals.*

The intense preoccupation with erotic pursuits and inability to control sexual impulses that typify sexually compulsive individuals (Hook, Hook, Davis, Worthington, & Penberthy, 2010; Opitz, Tsytsarev, & Froh, 2009) reportedly fuel risky sexual behaviors. For example, sexual compulsivity predicts greater likelihood of multiple sex partners, more single-occurrence partners, more extrarelational sexual encounters, and more frequent unprotected sex (Dodge, Reece, Cole, & Sandfort, 2004; Grov, Parsons, & Bimbi, 2010; Kalichman & Rompa, 1995, 2001; Stupiansky, Reece, Middlestadt, Finn, & Sherwood-Laughlin, 2009).

Sexual compulsivity is assumed to reflect a phobia of long-term affective proximity (Katehakis, 2009), theorized to have arisen from poor early caregiving experiences that failed to provide the individual with adaptive relational models and self-regulatory tools. Indeed, clinical observations suggest that a reduced capacity to become emotionally intimate with others and a

poor repertoire of self-regulatory tools render some individuals vulnerable to using sexual gratification to alleviate distress (Adams & Robinson, 2001; Schwartz, 1996). Consequently, sexual behaviors function primarily to offer relief from negative emotional states (Klontz, Garos, & Klontz, 2005), with sexual partners becoming merely “things to be used” (Garcia & Thibaut, 2010) to foster mood repair. Supporting this characterization, clinical observations of predisposed individuals suggest that contextual self-regulatory challenges—such as relationship turmoil/dissolution (both romantic and nonromantic), family deaths, or catastrophes (personal or global)—can trigger the often extreme and maladaptive sexual behaviors that typify sexual compulsivity (e.g., excessive masturbation, prolonged promiscuity, anonymous sexual encounters, excessive use of pornography, romantic obsessions; see Parsons, Kelly, Bimbi, Muench, & Morgenstern, 2007).

Research with nonclinical samples corroborates clinical perspectives concerning the affective profile of sexual compulsivity (Adams & Robinson, 2001; Hall, 2011): Higher sexual compulsivity adults exhibit affect regulation deficits, manifest as chronic vulnerability to negative

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Correspondence should be addressed to Raluca Petrican, Rotman Research Institute, 3560 Bathurst Street, Toronto, ON M6A 2E1, Canada. E-mail: raluca.petrican@gmail.com

mood states (i.e., depression, anxiety) and affective instability (Skegg, Nada-Raja, Dickson, & Paul, 2010). Moreover, consistent with the putative affect regulation function of sexual behaviors, high negative and/or low positive affective states tend to increase (or fail to decrease) sexual excitability and interest in erotic activities among higher sexual compulsivity individuals, whereas the opposite effect is observed among less compulsive individuals (Bancroft & Vukadinovic, 2004; Grov, Golub, Mustanski, & Parsons, 2010).

Of all hedonically adverse states that fuel sexually compulsive behaviors, clinical observations highlight the role of shame (Adams & Robinson, 2001; Hall, 2011). Core to the experience of shame is a global, negative self-evaluation, manifest in the perception that a specific objectionable behavior signifies a defective, objectionable self (Lewis, 1971). Shame episodes are thus said to evoke feelings of worthlessness and powerlessness (Tangney, Miller, Flicker, & Barlow, 1996) that underscore the futility of self-improvement efforts while also rendering salient the need for engaging in mood repair (see also Reid, Harper, & Anderson, 2009)—which is particularly likely to involve engagement in erotic acts among sexually compulsive individuals. The link between shame episodes and engagement in erotic behaviors among sexually compulsive individuals is further strengthened by one experiential aspect of shame episodes: the desire to escape or to hide from others, rooted in the sense of being exposed and, thus, negatively evaluated by a real or imagined audience (Tangney, 1993; Tangney et al., 1996). Indeed, because sexually compulsive individuals tend to regard their sexual partners more as instruments to obtain sexual gratification than as persons (Adams & Robinson, 2001; Garcia & Thibaut, 2010), it seems likely that they frame their engagement in erotic behaviors as fulfilling both the desire to escape the scrutiny of evaluative others and to alleviate unpleasant affective states. Consistent with this line of reasoning, shame-proneness predicts greater sexual compulsivity among individuals seeking treatment for compulsive use of pornography (Gilliland, South, Carpenter, & Hardy, 2011).

To our knowledge, documentation of the postulated relationship between hedonically adverse states and sexually compulsive behaviors has been perhaps exclusively restricted to correlational studies (Gilliland et al., 2011; Grov, Golub, et al., 2010). Consequently, demonstrating experimentally that induction of a negative mood state such as shame spontaneously increases interest in erotically suggestive targets among more sexually compulsive individuals from a nonclinical sample would be a valuable extension of the literature.

### Current Research

The present study used an experimental approach and a heterosexual, nonclinical sample to test the

viability of the clinical proposition that shame increases (or fails to diminish) erotic interest—manifest as an increased tendency to sexualize erotically suggestive targets—among higher (versus lower) sexual compulsivity individuals. Perceiving others in a sexualized manner decreases the salience of their agentic attributes (i.e., their capacity to think, plan, and exert self-control; see Gray, Knobe, Sheskin, Bloom, & Barrett, 2011; Fredrickson & Roberts, 1997). Thus, we capitalized on previous findings that people reliably follow the gaze of both human and schematic faces, even if irrelevant to an assigned task, for the purpose of “reading” a face’s thoughts and intentions. Gaze following is therefore an indirect means of acknowledging a target as an intentional agent (i.e., an individual who has thoughts and intentions that guide his or her behaviors; see Frischen, Bayliss, & Tipper, 2007), whereas failure to follow gaze implies the opposite. Importantly, such reflexive gaze-following mechanisms tend to be disrupted by conditions that interfere with holistic face processing (Campbell, Heywood, Cowey, Regard, & Landis, 1990; Kingstone, Friesen, & Gazzaniga, 2000), and it has been demonstrated experimentally that the experience of raw sexual desire or lust hinders holistic processing of physical stimuli, including faces (see Förster, 2010; Förster, Özelsel, & Epstude, 2010). Thus, holistic face processing and reflexive gaze-cueing mechanisms may be partly disrupted for faces that evoke sexual desire.

The nonpredictive gaze-cueing task that we employed featured flirtatious or emotionally neutral faces of the same or opposite sex. We hypothesized that greater sexual compulsivity would predict reduced salience of the agentic features—manifest as reduced gaze following—associated with erotically suggestive targets compatible with our sample’s self-reported sexual orientation (i.e., flirtatious, opposite-sex faces) following recall of a shameful (versus emotionally neutral) personal event. Moreover, we expected this effect to be linked to the perceived attractiveness of the erotically suggestive targets, which would be congruent with the suggestion that these targets are being viewed as instruments for obtaining sexual gratification among individuals who are more (versus less) sexually compulsive.

Because such evaluations depend on holistic face processing, which is most likely to occur when the face is upright (see Todorov, Loehr, & Oosterhof, 2010), we expected that the predicted variations in gaze behavior as a function of sexual compulsivity and experimental condition would emerge when the target faces were upright, not inverted, so we included both. In light of prior evidence linking one aspect of sexual compulsivity (i.e., hypersexuality) to greater withdrawal in response to shame (Reid et al., 2009), it seemed plausible that shame could render sexually compulsive individuals more likely to objectify any social targets

(irrespective of their erotic relevance), thereby self-protectively reducing the salience of others' evaluations of the self following the "exposure" of the past shameful event. To test this possibility, the gaze task featured faces of both sexes (i.e., same-sex as well as opposite-sex targets). To test the possibility that shame leads higher (versus lower) sexual compulsivity individuals to objectify erotic targets, irrespective of the latter's implied receptivity, the gaze task included both emotionally neutral and flirtatious (i.e., erotically suggestive) targets.

To test the unique effect of sexual compulsivity on responses to erotically suggestive targets, participants also completed a measure of sociosexual orientation, which has been found to predict normal variations in sexual behavior such as receptivity to casual sex encounters (Penke & Asendorpf, 2008), number of lifetime sex partners (Stupiansky et al., 2009), and (over) perceptions of sexual intent from interaction partners (Howell, Etohells, & Penton-Voak, 2012). Finally, because ability to allocate attention flexibly—and thus to inhibit gaze following—varies as a function of executive control resources (Kane & Engle, 2002), participants also completed a complex spatial working memory task (Unsworth, Heitz, Schrock, & Engle, 2005).

The study was conducted with a university student sample—a decision that seemed justifiable for a number of reasons. First, relative to other nonclinical samples, university students report a higher number of sexual partners and greater incidence of riskier sexual behaviors such as unprotected sex (Baldwin & Baldwin, 2000; Civic, 2000; Ehde, Holm, & Robbins, 1995; Gurman & Borzekowski, 2004; Hein, Dell, Futterman, Rotheram-Borus, & Shaffer, 1995; Pinkerton, Cecil, Bogart, & Abramson, 2003; Reinisch, Sanders, Hill, & Ziemba-Davis, 1992; Wilson, 1990). Second, sexual compulsivity is a core predictor of risky sexual behaviors (e.g., unprotected sexual activities, greater number of sexual partners outside the context of a relationship) and adverse cognitive-behavioral outcomes following engagement in sexual activities in university student samples—even when the sample is predominantly (Dodge et al., 2004; McBride, Reece, & Sanders, 2008) or exclusively (Stupiansky et al., 2009) female and/or averages below the cutoff for clinical significance (Hook et al., 2010). Third, recent reviews of clinical observations point to the importance of investigating early markers of sexually compulsive behaviors in young adult samples, for symptoms of sexual compulsivity are hypothesized to emerge as early as adolescence (Sussman, 2007). Indeed, identifying the developmental trajectory of sexually compulsive behaviors may prove useful in designing more efficient interventions for individuals who seek help managing their sexual behaviors (for further discussion, see Sussman, 2007).

## Method

### Participants

A total of 74 self-identified heterosexual young adults (26 males;  $M = 21.72$  years,  $SD = 3.57$  years) participated for financial compensation (\$10/hr). Participants were recruited from a volunteer participant pool associated with the University of Toronto and by posting flyers on the University of Toronto campus. Because performance on the executive control and gaze-cueing task can be impaired by psychotropic medication or neurological insult, all participants were screened for cognitive or neurological problems as part of the consent process. Specifically, they were asked (a) whether they had ever had a stroke, tumor, neurological disease, concussion, depression, seizure, head injury, aneurysm, learning disability, psychiatric illness, or epilepsy; (b) whether they had ever been in a serious car accident and/or hit their head badly and/or been unconscious; and (c) what medication (if any) they took on a regular basis. Potential participants who responded "yes" to any of the questions at points (a) and (b) or reported that they were taking psychotropic medication on a regular basis were excluded from participating.

In the study sample, 93% of the participants self-identified as "single, never married"; the remaining 7% reported that they were in a cohabiting (nonmarital) relationship ( $M = 2.66$  years,  $SD = 4.44$  years). The majority of participants (77%) declared that their family of origin included two biological parents; the remainder came from a two-parent stepfamily (7.1%), a two-parent adoptive family (1.4%), a one-parent family (11.4%), or failed to report their family of origin's structure (3%). All were native English speakers or had lived in Canada and used English as the primary language for at least 15 years. Consistent with the composition of the student body at the University of Toronto, the sample's ethnicity was diverse: 33% East Asian, 32% Western European, 10% South Asian, 7% Eastern European, 3% African, 3% Caribbean, 3% Latin American, 1.5% Middle Eastern, 1.5% Mixed (African, Eastern European, Middle Eastern); 6% "Other." With respect to religious affiliation, 25% self-identified as agnostic, 23% as atheist, 17% as Catholic, 13% as Protestant, 6% as Hindu, 6% as Muslim, 3% as having a personal religion, 1% as Buddhist, 1% as Jewish, and 5% as "Other."

### Tasks

*Shame manipulation.* In the experimental condition, participants were asked to write a one-page description of a personal event from the previous year that caused them to experience a great amount of shame. They were asked to choose events that took no longer than a day to unfold and to describe in detail where, when, and how

the event developed, what other people were involved in the event, and the thoughts and emotions evoked by their reexperiencing of that event. Responding to similar instructions, control condition participants described a personal event that did not evoke a significant amount of emotion. Six participants in the shame (but none in the control) condition described events involving sexual encounters. The first author inspected all event descriptions (ranging from one-half page to one page in length) and verified that participants complied with the instructions to describe a specific past episode and make mention of their thoughts and feelings during the episode.

Neutral event accounts described regular school days, special school events (e.g., first day of school), accidental meetings with friends, or leisure activities. Although the shameful event accounts included the same type of settings, they described occurrences that made the participants feel “humiliated,” “worthless” (or having “little self-worth”), “disgusted,” and “disappointed” with the self, or like they were “an animal” for not being able to control a behavior or emotion (e.g., drinking, poor performance at school or work, sexual desire, envy, anger), which subsequently led to their being negatively evaluated by others (e.g., parents, former romantic partners, friends, schoolmates). Importantly, most of these accounts made mention of participants’ desire to hide from others (e.g., “wanting to die,” “running out of a romantic partner’s room in tears”) after the respective event occurred.

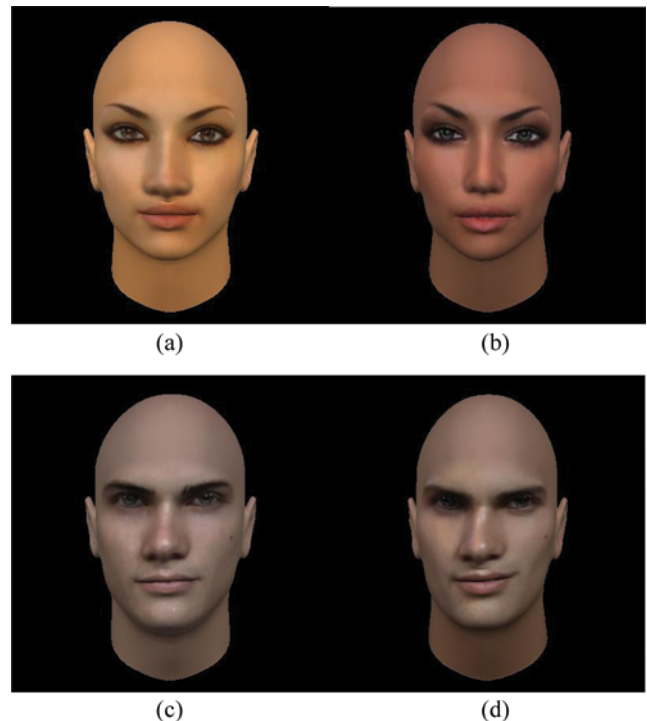
*Attentional orienting to erotic and nonerotic stimuli.* Participants completed two blocks of a gaze-cueing task, following Friesen and Kingstone’s (1998) guidelines and intended to assess participants’ tendency to orient in the direction of another’s gaze. A trial began with the central presentation of a four-inch-by-four-inch face (see the Facial Stimuli section that follows) that looked left, right, or straight ahead. The face appeared either upright (half of the trials) or inverted (the remaining trials). At 500 milliseconds (msec.) following the appearance of the face (in order to allow participants enough time to attend to the face), a target letter (F or T) appeared to the face’s left or right side. Participants were directed to press the left or the right arrow whenever a letter appeared on the left or right side of the screen (relative to the face), respectively. The face and target display remained on the screen until a response was made or until 2,700 msec. had passed (whichever occurred first). The intertrial interval was 680 msec.

Each of the two gaze-cueing blocks contained 288 trials (576 total). Within each block, 96 (48 per emotional expression: neutral versus flirtatious) were no-cue trials, with the eyes looking straight ahead and the target letter equally likely to appear on either side of the face; 96 (48 per emotional expression) were validly cued, with the eyes looking left or right and the target letter appearing where the eyes were looking; and 96 (48 per emotional expression) were invalidly cued, with the eyes looking left

or right and the target letter appearing opposite the eyes’ gaze direction. Direct gaze (i.e., no-cue) trials were introduced to establish the direction of the gaze-cueing effects obtained (i.e., whether participants would be slower in the invalidly cued and faster in the validly cued trials). Within each gaze-cueing block, presentation of the different trial types was randomized across participants.

At the beginning of the task, participants were informed of the task structure and told that the gaze direction was not predictive of subsequent target location. The dependent variable was reaction time, in milliseconds, to the target letter (i.e., localizing it). Because participants were told that the gaze cues were not predictive of subsequent target location, faster reaction times for validly cued trials (relative to invalidly cued and no-cue trials) and slower reaction times for invalidly cued trials (relative to the validly cued and no-cue trials) were interpreted as reflecting greater reflexive responsiveness to the gaze direction of others.

*Facial stimuli.* To assess the impact of erotically suggestive facial cues on gaze following, we incorporated two structural variations (emotionally neutral or flirtatious) of both a realistic male and a realistic female face in two separate gaze-cueing blocks, as shown in Figures 1(a) through 1(d). Pictures of the male and female models in both stances were selected from online sources. The criteria for selecting the flirtatious versions matched prior research on flirtatious displays (i.e., weak smile and sidelong glance; Simpson, Gangestad, & Biek, 1993).



**Figure 1.** Emotionally neutral female (a) and male (c) faces, and flirtatious female (b) and male (d) faces (color figure available online).

*Flirtatiousness manipulation check.* After completing the two gaze-cueing tasks, participants judged the flirtatiousness of all four faces (“neutral” and “flirtatious” male and female, randomized across participants) using a 7-point (1 = *Not at all flirtatious*; 7 = *Very flirtatious*) Likert-type response format. Separate paired samples *t*-tests for the male and female faces revealed that the “flirtatious” face was rated as more flirtatious across all participants (both  $ps < .001$ ). Greater sexual compulsivity scores did not predict greater flirtatiousness ratings (all  $ps > .15$ ), but a more unrestricted sociosexual orientation (see below) did, in response to opposite-sex faces only across both experimental conditions,  $b = .375$ ,  $SE = .122$ ,  $t(207) = 3.073$ ,  $p < .01$  (compare Howell et al., 2012).

*Explicit attractiveness judgments.* Participants also rated the attractiveness of the four (upright) faces (randomized across participants) using a 7-point (1 = *Not at all*; 7 = *Very*) Likert-type response format. These ratings were performed prior to the flirtatiousness judgments described previously to ensure that attractiveness judgments were not influenced by drawing participants’ attention to the erotic qualities of the faces.

## Measures

*Sexual compulsivity.* To assess participants’ obsessive preoccupation with sexual acts, their inability to control their sexual thoughts and/or behavior, and the consequent effects on daily functioning, we asked them to complete Kalichman and Rompa’s (2001) 10-item Sexual Compulsivity Scale (SCS). This scale uses a 4-point (1 = *Not at all like me*; 4 = *Very much like me*) response format to assess participants’ endorsement of statements such as “My sexual thoughts and behaviors are causing problems in my life” (Cronbach’s  $\alpha = .88$ ). Please refer to Table 1 for more detailed demographic information as a function of sexual compulsivity.

*Executive control.* Participants also completed a complex spatial working memory (WM) task as a measure of executive control—specifically, the automated e-prime version of the Symmetry Span task (see Unsworth et al., 2005) downloaded from Randall Engle’s Web site, <http://psychology.gatech.edu/renglelab/tasks.html> [TASKS]. As in all complex WM span tasks, presentation of the to-be-remembered stimuli (i.e., colored squares) in the symmetry span task is embedded within a processing task (i.e., judging the symmetry of abstract designs). The number of memory items ranged from two to five, and there were three trials at each memory level (12 total; Unsworth et al., 2005).

*Sociosexual orientation.* To assess participants’ overall orientation toward uncommitted sex, they completed Penke and Asendorpf’s (2008) revised Sociosexual

Orientation Inventory. This scale uses a 9-point response format to measure three distinct components of sociosexuality: past behavioral experiences (e.g., “With how many different partners have you had sex within the past 12 months?”), attitude toward uncommitted sex (e.g., “Sex without love is okay”), and sociosexual desire (e.g., “In everyday life, how often do you have spontaneous fantasies about having sex with someone you have just met?”). Cronbach’s alphas were .79, .93, and .91 for the behavioral, attitudinal, and desire components of sociosexuality, respectively. A one-way ANOVA with gender as the fixed factor revealed that male participants ( $M = 5.71$ ,  $SD = 3.06$ ) scored significantly higher than female participants ( $M = 3.65$ ,  $SD = 2.75$ ) on the attitudinal subscale,  $F(1, 68) = 8.03$ ,  $p < .01$ . Males ( $M = 6.02$ ,  $SD = 2.50$ ) also scored higher than females ( $M = 2.75$ ,  $SD = 1.70$ ) on the desire subscale,  $F(1, 68) = 41.30$ ,  $p < .01$ . Males ( $M = 2.36$ ,  $SD = 1.48$ ) and females ( $M = 1.77$ ,  $SD = 1.12$ ) did not differ significantly on the behavioral subscale,  $F(1, 68) = 3.54$ ,  $p > .06$ . Nevertheless, because subscale correlations were moderate to strong— $rs = .25$  ( $p = .039$ ),  $.56$  ( $p < .01$ ), and  $.61$  ( $p < .01$ ) for behavior/desire, behavior/attitude, and desire/attitude, respectively—we averaged scores across the three subscales to create a global sociosexuality index (Cronbach’s  $\alpha = .89$ ).

## Procedure

During a single 90-minute session conducted in a psychology laboratory at the University of Toronto, participants completed the following tasks in fixed order: experimental manipulation task; gaze-cueing block with opposite-sex (1) and same-sex (2) faces;<sup>1</sup> explicit attractiveness and flirtatiousness judgments; WM task; and a questionnaire package that included the SCS and Sociosexual Orientation Inventory.

## Data Reduction

In line with established practices regarding treatment of gaze-cueing data (e.g., Friesen & Kingstone, 1998; Tipples, 2006; Wilkowski, Robinson, & Friesen, 2009), all incorrect responses (5%)—pressing the left arrow when the target letter appeared on the right side of the face or vice versa—were eliminated. Four participants performed at chance levels—that is, a 50% (or lower) accuracy rate—on either gaze-cueing task and were thus excluded from all the reported analyses. Given the extremely low level of task difficulty,

<sup>1</sup>Although the tasks were administered in this fixed order across all participants, it is unlikely that order affected the reported results for two reasons. First, the comparison of interest, which drove the significant effects we report, involved the gaze-cueing effects elicited by opposite-sex flirtatious faces in participants in the neutral versus the shame condition: Participants in both conditions saw these target faces in the first gaze-cueing block. Second, the complementary interactive effect of condition and sexual compulsivity emerged in the explicit attractiveness rating task in which the presentation of the four faces was randomized across participants.

incorrect responses most likely reflected participants' disengagement from the task (e.g., not looking at the computer screen and pressing a response key randomly). Hence, excluding trials with an incorrect response and participants who performed at chance levels seemed justified.

For the remaining data, we managed reaction time outliers as follows (see also Tipples, 2006; Wilkowski et al., 2009): (1) We eliminated reaction times  $\pm 3$  SDs from that participant's mean (in total, 2% of all the correct responses); (2) we computed mean reaction times for each participant for each experimental condition (i.e., face orientation  $\times$  cue validity  $\times$  target flirtatiousness  $\times$  target gender) and log-transformed the scores. The resulting distributions of the aggregated reaction time scores showed no evidence of outliers and exhibited skewness within generally acceptable levels ( $< 1.00$ ).

### Data Analytic Strategy and Effect Sizes

We used hierarchical linear modeling techniques (HLM 7.0, Raudenbush, Bryk, & Congdon, 2011) to examine the within-person effects of cue validity, target flirtatiousness, and target gender on reaction times, as well as the moderating effect of between-individual differences in experimental condition and sexual compulsivity (see Nezlek, 2008, for a discussion concerning HLM as the most appropriate statistical tool for estimating cross-level interaction effects for reaction time data). The model contained two levels, wherein reaction times on each gaze following trial type (level 1) were nested within individuals (level 2). All level 2 variables were standardized.

Because the individual differences data violated normality and heterogeneity of variance assumptions and no transformation could address these concerns satisfactorily, we used raw scores and reported the robust standard error estimates for all analyses that follow (Hox, 2002). Model estimates were computed based on the log-transformed reaction time data. To estimate effect sizes, we computed predicted values of the reaction time outcome variable based on our fitted model (Nezlek, 2008) but using untransformed average reaction times.

## Results

### Preliminary Analyses

A one-way ANOVA with gender as the fixed factor revealed that males ( $M = 1.77$ ,  $SD = .64$ ) scored significantly higher than females ( $M = 1.29$ ,  $SD = .38$ ) on sexual compulsivity,  $F(1, 68) = 15.87$ ,  $p < .01$ , and global sociosexuality ( $M = 4.70$ ,  $SD = 1.84$ , for males and  $M = 2.72$ ,  $SD = 1.54$ , for females),  $F(1, 68) = 22.17$ ,  $p < .01$ . In contrast, no gender differences were observed

on WM ( $M = 21.87$ ,  $SD = 9.30$ , for males and  $M = 20.21$ ,  $SD = 8.70$ , for females),  $F(1, 68) = .54$ ,  $p > .47$ . In light of the sexual compulsivity gender difference, we controlled for gender and its interaction with experimental condition in all reported analyses to eliminate the possibility that any expected effects of sexual compulsivity could be attributed to gender.

### Hypothesis Testing

*Explicit attractiveness judgments.* First, we tested whether situationally induced shame would increase the attractiveness of relevant, erotically suggestive targets—that is, flirtatious opposite-sex faces (but not neutral opposite-sex or flirtatious/neutral same-sex faces) among higher (versus lower) sexual compulsivity scorers. A regression analysis controlling for gender and its interaction with experimental condition revealed the expected interaction of sexual compulsivity and shame condition on attractiveness ratings in response to flirtatious opposite-sex faces,  $b = .570$ ,  $SD = .267$ ,  $t(64) = 2.133$ ,  $p = .037$  (see Table 1). No similar effects were observed for attractiveness ratings in response to neutral opposite-sex or flirtatious/neutral same-sex faces (all  $ps > .14$ ). Follow-up analyses revealed that higher (versus lower) sexual compulsivity scores predicted greater attractiveness ratings in response to the flirtatious opposite-sex face in the shame condition,  $b = .281$ ,  $SD = .132$ ,  $t(32) = 2.131$ ,  $p = .041$ , whereas there was a nonsignificant reversal in the neutral condition,  $b = -.288$ ,  $SD = .238$ ,  $t(32) = -1.211$ ,  $p = .235$  (please see Table 2 and Figure 2).

*Attentional orienting to erotic stimuli.* To examine the effect of cue validity, target gender, and target flirtatiousness (neutral versus flirtatious) on gaze cueing in each face orientation condition, the following level 1 model was specified:

$$\begin{aligned}
 Y = & \beta_0 + \beta_1 \times (\text{CUE}) + \beta_2 \times (\text{TARGET GENDER}) \\
 & + \beta_3 \times (\text{CUE} \times \text{TARGET GENDER}) + \beta_4 \\
 & \times (\text{FLIRTATIOUSNESS}) + \beta_5 \\
 & \times (\text{CUE} \times \text{FLIRTATIOUSNESS}) + \beta_6 \\
 & \times (\text{TARGET GENDER} \times \text{FLIRTATIOUSNESS}) \\
 & + \beta_7 \times (\text{CUE} \times \text{TARGET GENDER} \\
 & \times \text{FLIRTATIOUSNESS}) + R
 \end{aligned} \tag{1}$$

where  $Y$  is the log-transformed average reaction time for each participant for each of the 12 experimental conditions (cue validity  $\times$  target gender  $\times$  flirtatiousness), cue is the ordinal variable (coded  $-1$  for invalid,  $0$  for no-cue, and  $1$  for valid), target gender is a dummy variable (coded  $0$  for same sex as the participant and  $1$  for opposite sex), and flirtatiousness is a dummy variable (coded  $0$  for neutral faces and  $1$  for flirtatious faces).

**Table 1.** Demographic Information, Executive Control and Sociosexuality Scores for High ( $M + 1 SD$ ) and Low ( $M - 1 SD$ ) Sexual Compulsivity Participants

Factor	Higher SCS ( $N = 11$ )	Lower SCS ( $N = 14$ )
Demographic information		
1. Gender	5 females/6 males	13 females/1 males
2. Age	21.77 years (3.31 years)	21.64 years (4.60 years)
3. Ethnicity	46% Western European; 27% East Asian; 9% African; 9% Eastern European; 9% "Other"	35% Western European; 29% East Asian; 29% South Asian; 7% Mixed (African, Eastern European, Middle Eastern)
4. Relationship status	73% Single, never married; 27% Cohabiting with a romantic partner	100% Single, never married
5. Religious background	37% Atheist; 18% Catholic; 18% Protestant; 18% Muslim; 9% Personal Religion	36% Agnostic; 21% Atheist; 21% Hindu; 7% Catholic; 15% Other
Control variables		
1. Executive control	17.27 (11.35)	19.14 (5.89)
2. Sociosexual behavior	1.91 (1.32)	1.50 (.98)
3. Sociosexual attitude	5.36 (3.39)	2.26 (1.70)
4. Sociosexual desire	6.49 (2.56)	1.88 (.94)

Note. SCS = Sexual Compulsivity Scale.

To examine the interactive effect of situationally induced shame and individual differences in sexual compulsivity on attentional orienting to erotically suggestive targets, the following level 2 model was specified for the level 1 intercept ( $\beta_0$ ) and slopes ( $\beta_i$ ), respectively:

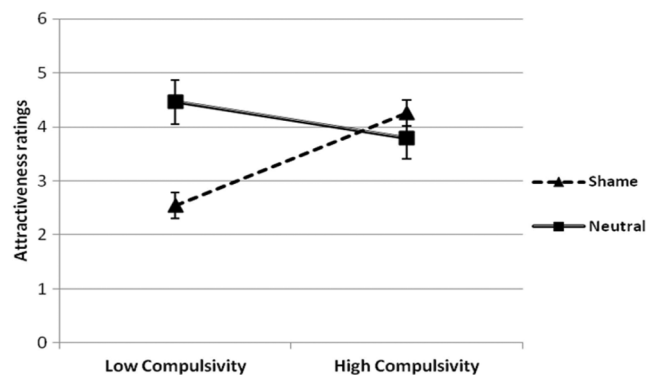
$$\beta_0 = \chi_{00} + \chi_{01} \times (\text{GENDER}) + \chi_{02} \times (\text{CONDITION}) + \chi_{03} \times (\text{GENDER} \times \text{CONDITION}) + \chi_{04} \times (\text{SEXUAL COMPULSIVITY}) + \chi_{05} \times (\text{CONDITION} \times \text{SEXUAL COMPULSIVITY}) + E \quad (2)$$

**Table 2.** Regression Coefficients for the Analyses Predicting Attractiveness Ratings of the Opposite Sex Flirtatious Face

Conditions	<i>b</i>	<i>SE</i>	<i>t</i> -value	<i>p</i> -value
Across both conditions				
1. Intercept	.470	.278	1.692	.096
2. Gender	-.424	.349	-1.216	.229
3. Condition	-.053	.392	-.136	.892
4. Sexual compulsivity	-.288	.229	-1.260	.212
5. Gender $\times$ condition	-.517	.495	-1.044	.300
6. Condition $\times$ Sexual compulsivity	.570	.267	2.133	.037
Shame condition				
1. Intercept	.417	.265	1.576	.125
2. Gender	-.941	.337	-2.794	.009
3. Sexual compulsivity	.281	.132	2.131	.041
Control condition				
1. Intercept	.470	.289	1.626	.114
2. Gender	-.424	.363	-1.168	.251
3. Sexual compulsivity	-.288	.238	-1.211	.235

$$\beta_i = \chi_{i0} + \chi_{i1} \times (\text{GENDER}) + \chi_{i2} \times (\text{CONDITION}) + \chi_{i3} \times (\text{GENDER} \times \text{CONDITION}) + \chi_{i4} \times (\text{SEXUAL COMPULSIVITY}) + \chi_{i5} \times (\text{CONDITION} \times \text{SEXUAL COMPULSIVITY}) \quad (3)$$

Two independent analyses revealed an interactive effect of condition and sexual compulsivity on attentional orienting in the upright face condition,  $\beta_{75} = .02$ ,  $SE = .008$ ,  $t(722) = 2.75$ ,  $p < .01$ , but not in the inverted face condition,  $\beta_{75} = .008$ ,  $SE = .008$ ,  $t(722) = 1.06$ ,  $p > .29$ .

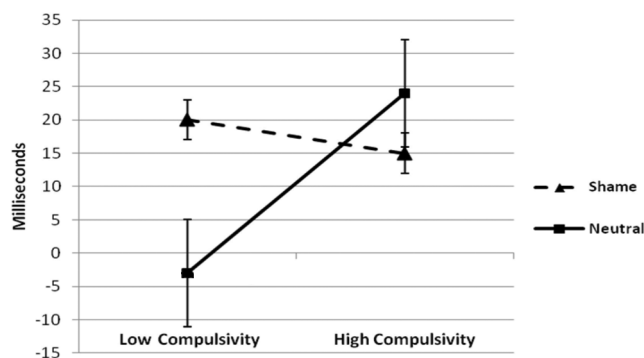


**Figure 2.** Estimates of the attractiveness ratings of the opposite sex flirtatious face as a function of experimental condition, where the extreme points represent high ( $M + 1 SD$ ) and low ( $M - 1 SD$ ) sexual compulsivity participants.



Separate analyses, focused on reaction times in response to flirtatious versus neutral upright faces, revealed that the interactive effect of cue validity, experimental condition, and sexual compulsivity emerged in response to flirtatious,  $\beta_{35} = .02$ ,  $SE = .008$ ,  $t(329) = 2.93$ ,  $p < .01$ , but not emotionally neutral,  $\beta_{35} = .001$ ,  $SE = .006$ ,  $t(329) = .230$ ,  $p > .82$ , faces. More specifically, it was in response to opposite-sex,  $\beta_{15} = .01$ ,  $SE = .004$ ,  $t(132) = 2.55$ ,  $p = .012$ , rather than same-sex,  $\beta_{15} = -.01$ ,  $SE = .005$ ,  $t(132) = -1.86$ ,  $p > .06$ , flirtatious faces that sexual compulsivity moderated gaze-cued attentional orienting patterns as a function of experimental condition. That is, greater sexual compulsivity tended to predict weaker gaze following tendencies in the shame condition as expected,  $\beta_{15} = .004$ ,  $SE = .002$ ,  $t(67) = 1.862$ ,  $p = .067$ , whereas the opposite effect tended to emerge in the control condition,  $\beta_{15} = -.006$ ,  $SE = .003$ ,  $t(65) = -1.944$ ,  $p = .056$  (see Figure 3). Although not predicted, the latter finding—suggestive of a link between lower sexual compulsivity and sexualization of erotically suggestive targets under emotionally neutral conditions—is consistent with recent daily diary report research showing that greater sexual compulsivity is linked to lower levels of sexual arousal under default conditions (Groß, Golub, et al., 2010).

*The role of explicit attractiveness ratings.* Finally, we investigated whether the reduced gaze following observed among higher sexual compulsivity individuals in the shame (relative to the control) condition in response to opposite-sex flirtatious faces could be accounted for by the latter's increased appeal among more sexually compulsive individuals. To this end, we regressed sexual compulsivity scores on attractiveness ratings of opposite-sex flirtatious faces— $r(68) = .29$ ,  $p < .05$ , overall;  $r(33) = .53$ ,  $p < .01$ , shame condition;  $r(33) = -.14$ ,  $p = .43$ , neutral condition—and saved the standardized residual. Subsequently, we used gender, experimental



**Figure 3.** Estimates of gaze cueing effects (untransformed mean reaction times on counter-cued trials – untransformed mean reaction times on cued trials) in response to the opposite sex flirtatious face as a function of experimental condition, with the extremes representing high ( $M + 1 SD$ ) and low ( $M - 1 SD$ ) sexual compulsivity participants.

condition, their interaction, the aforementioned residual sexual compulsivity score, and its interaction with experimental condition to predict gaze-triggered attentional orienting in response to flirtatious opposite-sex faces. As expected, sexual compulsivity was no longer a significant predictor of differential attentional orienting to opposite-sex flirtatious faces as a function of experimental condition once its shared variance with perceived attractiveness was removed,  $b = .007$ ,  $SE = .004$ ,  $t(132) = 1.750$ ,  $p = .083$ .

### Control Analyses

*Sociosexuality.* Consistent with prior reports of shared variance between sociosexual orientation and sexual compulsivity (Winters, Christoff, & Gorzalka, 2010), the two were rather strongly correlated in our sample,  $r(68) = .56$ ,  $p < .01$ . Nevertheless, controlling for sociosexual orientation did not eliminate the key effects of sexual compulsivity as a function of experimental condition on gaze-cued attentional orienting,  $\beta_{75} = .02$ ,  $SE = .008$ ,  $t(715) = 2.71$ ,  $p < .01$ , or attractiveness evaluations of the opposite-sex flirtatious face,  $b = .548$ ,  $SE = .268$ ,  $t(63) = 2.043$ ,  $p = .045$ .

*Executive control.* Likewise, when controlling for individual differences in executive control abilities, the effects of sexual compulsivity as a function of experimental condition on gaze-cued attentional orienting,  $\beta_{75} = .02$ ,  $SE = .008$ ,  $t(715) = 2.77$ ,  $p < .01$ , and attractiveness evaluations of the opposite-sex flirtatious face,  $b = .581$ ,  $SE = .270$ ,  $t(63) = 2.150$ ,  $p = .035$ , remained.

*Gender differences in the effect of sexual compulsivity as a function of experimental condition.* We also examined whether gender moderated the effect of sexual compulsivity as a function of experimental condition on gaze-cued attentional orienting to, or attractiveness evaluations of, the opposite-sex flirtatious face. Thus, using the level 1 model outlined previously (1) and the adapted level 2 models (2, 3) that also included the gender  $\times$  sexual compulsivity interaction term and the three-way gender  $\times$  experimental condition  $\times$  sexual compulsivity interaction term, we found no evidence that sexual compulsivity exerted a differential effect on gaze-triggered attentional orienting as a function of experimental condition in males versus females,  $\beta_{77} = .018$ ,  $SE = .023$ ,  $t(708) = .776$ ,  $p = .438$ . Likewise, a regression analysis with gender, experimental condition, sexual compulsivity, as well as their two-way and three-way interaction terms as predictors, provided no evidence that the effect of sexual compulsivity and shame condition on attractiveness ratings in response to flirtatious opposite-sex faces significantly differed in males versus females,  $b = .349$ ,  $SD = .531$ ,  $t(62) = .657$ ,  $p = .514$ .

*The effect of sexual versus nonsexual shameful memories.* Finally, because six participants (one male, five females) in the shame condition described events involving sexual encounters, we investigated whether their responses on the gaze-cueing task or their attractiveness evaluations of the opposite-sex flirtatious face differed from those of participants who wrote about nonsexual events. Results of two separate analyses provided no evidence that sexual compulsivity interacted with the type of memory (sexual versus nonsexual) recalled in the shame condition to predict differential gaze-triggered attentional orienting patterns,  $\beta_{15} = .005$ ,  $SE = .004$ ,  $t(65) = 1.314$ ,  $p = .193$ , or attractiveness evaluations,  $b = .539$ ,  $SD = .320$ ,  $t(30) = 1.681$ ,  $p = .103$ , in response to the opposite-sex flirtatious face. Controlling for the interaction of gender and the type of memory recalled (sexual versus nonsexual) likewise yielded no evidence that sexual compulsivity interacted with memory type to predict differential gaze-triggered attentional orienting patterns,  $\beta_{15} = .005$ ,  $SE = .006$ ,  $t(64) = .949$ ,  $p = .346$ , or attractiveness evaluations,  $b = .525$ ,  $SD = .330$ ,  $t(29) = 1.594$ ,  $p = .122$ , in response to the opposite-sex flirtatious face in the shame condition.

### Discussion

To our knowledge, the present study is the first to provide experimental evidence in a nonclinical sample that induction of a specific negative emotional state—that is, shame—can evoke a differential attentional style that is congruent with the motivational dynamics deemed typical of higher sexual compulsivity individuals (e.g., Katerhakis, 2009). Specifically, we found that higher sexual compulsivity predicted significantly higher attractiveness ratings in response to relevant, erotically suggestive targets (i.e., opposite-sex flirtatious faces) after recalling a shame-evoking personal event but not a neutral event. A similar sexual compulsivity by condition interaction emerged for gaze following as well: Although the link between higher sexual compulsivity and decreased gaze following—suggesting reduced salience of, or interest in, the target’s agentic features (compare Frischen et al., 2007; see also Förster, 2010, for a discussion of the inhibitory effects of sexual desire on holistic face processing)—was only marginally significant in the shame condition, this same relationship was reversed in the neutral condition. Importantly, the capacity of shame to trigger increased sexualization of erotically suggestive targets (compare Gray et al., 2011) appeared specific to sexual compulsivity, for the interactions remained significant when controlling for individual differences in sociosexual orientation and executive control/working memory.

Although a finer-grained understanding of the specific mechanism(s) responsible for the effects reported here is definitely warranted, they are suggestively

consistent with Bancroft and Vukadinovic’s (2004) dual control model of sexual behavior, which posits that the occurrence of sexual arousal is determined by the balance between sexual excitation and sexual inhibition. According to this model, emotionally challenging (e.g., high negative affect) situations normally tend to increase sexual inhibition, thereby decreasing the likelihood of investing cognitive resources in pursuit of sexual gratification that otherwise might be channeled into successful coping efforts. Sexually compulsive individuals may be deficient in these adaptive inhibitory mechanisms, however, such that they tend to exhibit a paradoxical increase in sexual interest under adverse affective circumstances. These authors suggest that the increased sexual interest manifest among sexually compulsive individuals experiencing adverse emotional events may result from transfer of excitation from the resulting negative affective state to sexual activities, which is amplified further by below-normal levels of threat-triggered inhibition of sexual excitability that typifies sexually compulsive individuals. Given shame’s capacity to generate high levels of generic arousal (e.g., Tangney, 1990; Tangney et al., 1996; Tangney, Wagner, Fletcher, & Gramzow, 1992), the dual control model certainly seems applicable here. Further investigations that probe both the mechanisms underlying the postulated affective transfer and the neurobehavioral factors leading to the apparently decreased contextual modulation of sexual excitability among sexually compulsive individuals are definitely warranted.

Although the present research offers experimental evidence that shame tends to evoke increased sexualization of erotically suggestive targets among higher sexual compulsivity individuals, the ensuing hedonic consequences and relationship to overt sexually compulsive behaviors remain open questions. Clinical observations suggest that sexually compulsive individuals’ engagement in erotic pursuits may yield some positive hedonic consequences: Might even fleeting glances cast toward erotically suggestive targets (as observed in the present study) be reinforcing among more sexually compulsive individuals? Even if so, the enactment of riskier, congruent sexual behaviors often results in more intense episodes of negative emotion, especially shame, thereby fueling the sexually compulsive cycle (Hall, 2011). Our findings thus raise the question of whether minimalist forms of erotic gratification might actually function as adaptive means of mood repair if disconnected from more extreme acts, or whether the attentional patterns documented here are actually the first phase of a more automatized—and thus perhaps inevitably maladaptive—emotion regulation process. Future research, employing both clinical and nonclinical samples, should investigate the short- and long-term hedonic consequences of engaging in sexually compulsive behaviors, as well as the viability and efficacy of training alternate, more adaptive emotion regulation strategies

to override engagement in a sexually compulsive cycle as a mood repair strategy.

Prior research attests to the importance of social support in fostering relationship satisfaction and overall well-being (Brunstein, 1993; Ruehlman & Wolchik, 1988). Nevertheless, clinical observations (Hall, 2011), correlational studies with nonclinical samples (Grov, Golub, et al., 2010), and the present research suggest that higher sexual compulsivity predicts greater sexual excitability under adverse affective circumstances—which apparently renders one more receptive to casual and/or risky erotic encounters (Grov, Golub, et al., 2010). It is indeed worth noting that sexual compulsivity predicted differential responding only to erotically suggestive targets, but not to nonerotized potential romantic partners or social targets of either gender, following a shame trigger. Thus, future research investigating the interpersonal consequences of sexual compulsivity, potentially as a function of the types of erotic targets selected, is definitely warranted.

Longitudinal investigations on the trajectory of sexually compulsive tendencies from early adulthood to middle age and later are likewise needed. Prior research with university student samples has shown that greater sexual compulsivity, even at subclinical levels, predicts a host of risky sexual behaviors similar to those documented in clinical samples (Dodge et al., 2004; McBride et al., 2008; Stupiansky et al., 2009). In our subclinical university student sample, we found evidence of the paradoxical relationship between negative affective states and sexual interest, previously documented in clinical samples of sexually compulsive individuals (Adams & Robinson, 2001; Katakakis, 2009). Given clinical observations that symptoms of sexual compulsivity may emerge as early as adolescence (Sussman, 2007), our findings underscore the utility of conducting longitudinal investigations designed to identify behavioral markers indicative of the progression of sexually compulsive tendencies into the clinically significant range, which may help facilitate development of more effective interventions for individuals seeking treatment regarding their sexual behavior.

Research is also recommended concerning the potential role of normal variations in sexual excitability and environmental norms regarding sexual expression and behavior in the (clinical) labeling of sexually compulsive patterns. For example, Levine and Troiden (1988) argued that erotic normalcy reflects prevailing cultural standards of desirable erotic conduct, whereas constructs of erotic deviance are merely value-laden labels that are instrumental in ensuring conformity to the prevailing erotic norms. It follows then that an important responsibility for clinicians assisting individuals who seek help managing their sexual lives is to disentangle sexual behaviors that merely contradict prevailing standards of erotic conduct but cause no functional impairment—and may be thus regarded as instances of normal

variations in sexuality—from those sexual behaviors that do (at least from the target's perspective) affect adversely his or her daily functioning. It seems plausible that such assessments would vary as a function of the gender and the sociocultural environment of the target individual. For example, in our present sample, although there were no significant gender differences in the effect of sexual compulsivity on responding to eroticized targets, there were significant mean gender differences in both sexual compulsivity and sociosexuality, with males outscoring females on both measures. Thus, at least within a North American context, it is possible that the range of sexual behaviors and experiences that incur significant functional impairments may also differ between genders. That is, the same reported frequency of “uncontrollable” sexual thoughts that may place a woman at the upper end of her gender continuum on sexual compulsivity, and therefore vulnerable to experiencing significant difficulties with adjustment, may leave a man among the midscorers of his gender and thus conceivably free of any deficits in daily functioning. Further investigations concerning potential gender-based differences in the “real life” manifestation and consequences of sexually compulsive behaviors are therefore definitely warranted.

In short, we have offered experimental evidence that hedonically adverse affective states can evoke attentional patterns suggestive of increased erotic receptivity that are congruent with subsequent engagement in sexual behaviors among higher sexual compulsivity individuals. In so doing, our research complements extant clinical observations and theory concerning the motivational dynamics of sexual compulsivity and may offer a paradigm for further investigation of the problematic intrapersonal, behavioral, and interpersonal consequences of this syndrome, perhaps outside as well as inside its clinically significant range.

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