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Women's responses to stereotypical media portrayals: An fMRI study of sexualized and domestic images of women

I. STEPHANIE VEZICH*, BENJAMIN C. GUNTER and MATTHEW D. LIEBERMAN
University of California, Los Angeles (UCLA), 1285 Franz Hall, Los Angeles, CA 90095, USA

ABSTRACT

Women tend to be portrayed in a sexualized or domestic manner in mainstream advertising; importantly this trend holds not only for ads targeting men but also for those targeting women themselves. Such a focus on sexualized portrayals in particular may not seem strategic given a wealth of evidence suggesting that women evaluate these portrayals quite negatively. Consumer attitudes toward domestic portrayals are more mixed but, unsurprisingly, vary according to how much a woman identifies as traditional. If female consumers do not evaluate these common portrayals positively, why might they persist? Past work suggests a disconnect between reported attitudes toward general visual sexual stimuli and physiological and neural responses; therefore, it is plausible that neural responses to stereotypical female portrayals in advertising may be at odds with reported attitudes and may have a bigger impact on consumer behavior. The current study exposed women to sexualized, domestic, and control images in a functional magnetic resonance imaging scanner as an initial test of this idea. We found that participants reported liking both domestic and control images more than sexualized images. In contrast, they showed more activity in regions associated with reward and arousal (ventral striatum and amygdala, respectively) while viewing sexualized images relative to both control and domestic images. Surprisingly, ventral striatum response to sexualized ads was *stronger* for women who endorsed traditional attitudes than those who reported less traditional attitudes. These results suggest that despite reporting negative attitudes toward sexualized portrayals, women may in fact have a favorable response to these images. Copyright © 2017 John Wiley & Sons, Ltd.

Advertisers have long operated according to the mantra "sex sells." Despite repeated efforts from groups such as family values organizations and religious leaders to impose restrictions on sexual media content, it appears to persist; for example, the share of magazine ads featuring sexualized women has increased from less than one-third in 1964 to roughly half in 2003 (Soley & Reid, 1988; Reichert *et al.,* 1999; Reichert & Carpenter, 2004; Nelson & Paek, 2005). When racy campaigns from Victoria's Secret, Calvin Klein, and Abercrombie & Fitch are wildly successful, other companies are strongly incentivized to act in kind (Bryant, 1999; Rice, 2000; cf. Reichert, 2002). In a particularly surprising example of sexualized marketing, the Dallas Opera turned around season ticket sales by highlighting more suggestive scenes in their marketing materials (Chism, 1999).

Marketing success stories like this beg the question: Is the appeal of sexualized advertising universal, or are these effects driven by particular customer segments? Reactions to sexualized advertising have been shown to vary widely by audience (Alexander & Judd, 1978). In particular, because the bulk of sexualized images focus on women (women are three times more likely than men to appear in provocative clothing in ads), one might imagine that there would be sharp gender differences in response to these ads as they may likely serve as a ploy to sell to men primarily (Reichert *et al.,* 1999). However, these sexualized female ads do not appear solely for men's products; while few mainstream ads targeting men feature sexualized male images, far more mainstream ads targeting women feature sexualized female images (Reichert, 2002). In addition, women demonstrate greater awareness of female media stereotypes than do men (Whipple & Courtney, 1985). Therefore, it is important to know how women are responding to these portrayals of other women. Within gender, attitudes about gender roles may also play an important part in one's evaluation of these images; past work has shown wide variation in women's attitudes toward female depictions in advertising (Lundstrom & Sciglimpaglia, 1977; Mittal & Lassar, 2000; Reichert & Fosu, 2005; Sengupta & Dahl, 2008). The current study addresses these questions by focusing specifically on women's self-reported and neural responses using functional magnetic resonance imaging (fMRI) to the two most common female media portrayals—sexualized and domestic (Dominick & Rauch, 1972; Duker & Tucker, 1977).

*Correspondence to: I. Stephanie Vezich, University of California, Los Angeles (UCLA), 1285 Franz Hall, Los Angeles, CA 90095, USA.
E-mail: isvezich@ucla.edu

Women report negative evaluations of sexualized ads

The bulk of prior work investigating how women evaluate sexualized portrayals suggests a markedly negative response. For example, women report negative reactions to sexual ads, particularly those in which the sexual imagery is irrelevant to the product (Peterson & Kerin, 1977; Jones *et al.,* 1998; Pope *et al.,* 2004). Probing what specifically is negative about women's reactions, some work has shown that women find sexualized ads more offensive and less effective than neutral ads (Alexander & Judd, 1978; Sciglimpaglia *et al.,* 1979; Fetto, 2001; Jones, 2005), while other work suggests that they consider the use of sexually explicit content to be unethical, which in turn drives negative evaluations (Mittal & Lassar, 2000; LaTour & Henthorne, 2003).

While these explanations provide a few possibilities for women's negative reactions to sexual imagery, they depend on fairly deliberative, conscious cognition about the message, which other work suggests is not an accurate depiction of how people tend to process ads during real-world exposure (Burnett & Moriarty, 1998; Sengupta & Gorn,

2002; Peracchio & Luna, 2006). To address this limitation, some studies have attempted to gauge reactions to sexual content via "thin slice" processing but find similar results nonetheless (Ambady *et al.,* 2000; Ambady *et al.,* 2006). That is, these findings also suggest that women harbor negative feelings toward sexualized female depictions (Dahl *et al.,* 2009). For example, under cognitive load, women's attitudes toward sex appeals are more negative than toward neutral appeals, while men show the opposite pattern (Sengupta & Dahl, 2008). Other results demonstrate that erotic images serve as positive reinforcers for men but as negative reinforcers for women; men made choices in a shape discrimination task that would gain them more exposure to the erotic images, while women made choices to avoid seeing the images (Griffitt & Kaiser, 1978).

Women's reported attitudes toward sexual media are negative in general but appear to be particularly negative toward portrayals of other women in these roles. For example, women's affective and attitudinal responses are more negative for sexualized commercials of other women than for commercials featuring heterosexual couples or men (Reichert *et al.,* 2007). In addition, women give positive evaluations of nude male ads but negative evaluations of nude female ads (Sciglimpaglia *et al.,* 1979; Belch *et al.,* 1981). Other work has found that as the amount of female sexual content in an ad increases, men's evaluations become more positive while women's evaluations become more negative (Patzer, 1980; LaTour, 1990; Latour *et al.,* 1990). Interestingly, however, women's evaluations of sexualized female depictions are less negative than men's evaluations of sexualized male depictions (Dudley, 1999; Rupp & Wallen, 2008).

Importantly, the valence and amount of reported arousal appear to drive these effects; men score higher on positively valenced arousal as the female nudity increases, whereas women score higher on negatively valenced arousal as nudity increases, which in turn predicts "attitudes toward the ad" (AAd) (LaTour, 1990; Latour *et al.,* 1990; LaTour & Henthorne, 1993). Huang (2004) also found that arousal drives AAd and in fact becomes a stronger influence as sexual explicitness increases. Consistent with the idea that women feel "negative arousal" to sexualized female depictions, a study employing galvanic skin response to proxy arousal (positive or negative) found that women show more arousal to sexualized female images than do men but rate these ads as less interesting, less appealing, and more offensive than do men (Belch *et al.,* 1981).

Thus, across several studies, we see that arousal to sexual images can be accompanied by a positive or negative affective response. And importantly, it is not arousal alone that is important for the success of a sexualized ad but positive arousal specifically. The combination of arousal and valence has been theorized to be important in the advertising context, the idea being that positive arousal promotes approach motivations toward the stimulus (in this case, the product), increasing persuasiveness of the ad (Reichert, 2002). The current study parallels these ideas by focusing on activation in the amygdala (commonly associated with emotional arousal; Lane *et al.,* 1999; Taylor *et al.,* 2000; Phan *et al.,* 2003; Gläscher & Adolphs, 2003; Brooks *et al.,* 2012) and the ventral striatum (commonly associated with positive rewarding stimuli; Knutson *et al.,* 2001; Knutson *et al.,* 2005; Knutson *et al.,* 2007; Cooper & Knutson, 2008) in response to gender stereotypical images of women. As discussed later, these regions are also associated with processing of visual sexual stimuli (VSS) specifically.

Traditional women report especially negative evaluations of sexualized ads

While women report more negative responses to sexualized ads than do men, gender does not tell the whole story. Socialization accounts of gender differences in evaluations of sexual content contend that women have negative reactions to erotic images because of repeated conditioning that has led them to have less positive attitudes toward sex than men in general (Griffitt & Kaiser, 1978; Rupp & Wallen, 2008). Therefore, the way one has been taught to think about sex may contribute to their evaluations of sexual images independently of gender *per se*. Results from the development of individual differences scales such as sociosexual attitudes, erotophobia–erotophilia, sexual liberalism, and sexual self-schema—which predict an array of attitudes and behaviors—demonstrate high variation in these measures among women (Mercer & Kohn, 1979; Fisher *et al.,* 1988; Simpson & Gangestad, 1991). And indeed, women with more conservative attitudes toward sex have a more negative reaction to sexualized ads than women with more liberal attitudes (Sciglimpaglia *et al.,* 1979; Mittal & Lassar, 2000; Reichert & Fosu, 2005; Sengupta & Dahl, 2008).

Age may also play a role. Unlike other research with adults, both male and female undergraduates respond more positively to sexual relative to nonsexual ads (Severn *et al.,* 1990; Reichert *et al.,* 2001). In addition, work comparing age differences specifically found that young adults have more positive attitudes about sexualized advertising than do older adults (Wise *et al.,* 1974; Johnson & Satow, 1978). However, the college student sample used in these studies is likely to hold more liberal attitudes about sex than an older population, which may still be the underlying mechanism for these results.

Women's responses to domestic female portrayals

Although our focus is on sexualized media portrayals of women, we wanted to compare responses to these images with another type of stereotypical female image commonly used in advertising. Content analysis reveals that women are most often portrayed in sexual or domestic roles in television commercials (Dominick & Rauch, 1972; Duker & Tucker, 1977); therefore, we chose to compare these two roles directly.

There has been much less work carried out on women's responses to domestic ads; the extant research has typically compared how women with traditional versus progressive attitudes evaluate these messages. Perhaps unsurprising, these studies found that women with traditional attitudes have significantly more favorable evaluations of ads with domestic female portrayals than do women with progressive attitudes (Whipple & Courtney, 1980; Barry *et al.,* 1985; Leigh *et al.,* 1987; Morrison & Shaffer, 2003). In addition,

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women with more feminine sex-role identities favor traditional role portrayals in ads, while women with more masculine sex-role identities favor modern role portrayals (Jaffe & Berger, 1994).

The little work that has focused strictly on responses to domestic portrayals has had inconsistent findings. One study reported neutral or slightly negative evaluations from both men and women, while evaluations of professional/business female portrayals were significantly higher (Kilbourne, 1986). Others found positive evaluations of traditional portrayals (Wortzel & Frisbie, 1974; Duker & Tucker, 1977; Bettinger & Dawson, 1979; Courtney & Whipple, 1983). And yet others have found negative effects of traditional portrayals (Kelly *et al.,* 1977; Leavitt, 1978). Finally, some work suggests that the effectiveness of traditional portrayals depends on how well it matches the product being advertised (Buchanan & Reid, 1977). Notably, the majority of research on evaluations of domestic portrayals occurred decades ago when the feminist movement was more salient, creating a gap in recent literature (Morrison & Shaffer, 2003).

Examining neural response to stereotypical female images

The existing literature on women's responses to common stereotypical female media portrayals (i.e., sexualized and domestic) does not present a clear picture of how women privately evaluate these images. Such inconsistency is common with self-report measures, particularly when individuals are providing opinions about value-laden or controversial issues (Fazio & Olson, 2003; Hofmann *et al.,* 2005). In these cases, one may wish to report attitudes in line with particular social identities—for instance, a stay-at-home mother may rate a domestic portrayal positively because to do otherwise would be inconsistent with her self-image and cause cognitive dissonance. Conversely, she may rate a sexualized portrayal much less favorably because it seems inconsistent with what a mother would do. However, latent affective and cognitive responses may be present and predictive of future behavior. Rupp and Wallen (2008) expound this argument:

> *Because women may feel more self-conscious in their response to sexual stimuli due to social expectations, they may try to inhibit their responses to match socialized gender roles in which women do not display high levels of sexual response* (p. 112).

To investigate this potential disconnect, we used fMRI to compare more and less traditional women's brain activity while watching sexualized and domestic female images.

Neuroimaging techniques may help elucidate relationships between consumer self-report and behavior for several reasons. First, they eliminate the common issue of participants being unable or unwilling to report true attitudes (Wicker, 1969; Nisbett & Wilson, 1977; Nolan *et al.,* 2008). Second, past fMRI studies have shown that neural data can predict downstream behavior better than self-report (Falk *et al.,* 2010; Falk *et al.,* 2011; Berns & Moore, 2012; Falk *et al.,* 2015). Third, we are able to access the cognitive processing of a stimulus (e.g., an ad and an image) as it is occurring as opposed to asking participants about their attitudes after they have already processed the stimulus to some extent.

Indeed, the limited neuroimaging and physiological work on VSS has increased our understanding of how both men and women automatically process sexual imagery, and how these processes might differ from their reported responses. In particular, women show much lower correspondence between self-reported attitudes toward sexual stimuli and actual physiological response than do men (Rosen & Beck, 1988; Koukounas & McCabe, 1997; Karama *et al.,* 2002; Chivers *et al.,* 2010). Despite substantial differences in men's and women's self-reported responses to VSS, they show remarkable overlap in neural responses across a number of studies (Karama *et al.,* 2002; Hamann *et al.,* 2004; Gizewski *et al.,* 2006; Sabatinelli *et al.,* 2007; Rupp & Wallen, 2008; Gizewski *et al.,* 2009; Chung *et al.,* 2013). Namely, amygdala and striatum activation are common across this body of work. Studies that have looked at neural responses to VSS in women specifically also find amygdala and striatal activation (Zhu *et al.,* 2010; Kim *et al.,* 2013). However, this work has largely used erotic video and photo stimuli more akin to pornographic content than the type of suggestive but not explicit content one would see in an advertisement. Therefore, we combine prior behavioral work in the advertising domain with neuroimaging work in VSS to explore whether similar neural processes hold in both cases, despite predicted disjunction with self-reported responses.

Hypotheses

We predicted that participants would report liking domestic and control images more than sexualized images. However, we predicted that the fMRI data would suggest a disconnect between these self-reports and private responses. Specifically, we hypothesized that ventral striatum activity would be greater in response to sexualized images relative to both control and domestic images. Given the arousing nature of these images, we predicted that amygdala activity would be greater in response to sexualized images relative to control or domestic images as well. Finally, we hypothesized that the strength of these effects would vary to the extent that a participant endorsed traditional gender roles, namely, that they would be stronger for less traditional women. Our hypotheses focus on women's responses (and thus we recruited female participants exclusively rather than including a mix of male and female subjects) because the portrayals in these images are typically geared toward products for women (Reichert, 2002). In other words, the main agent in an advertisement is generally wearing or using the product to be sold; therefore, ads with female protagonists are targeting female consumers. Therefore, we were interested in understanding women's cognitions regarding female portrayals. In addition, we reasoned that excluding men would reduce heterogeneity in both self-reported and neural responses; in other words, men may feel more comfortable explicitly reporting positive attitudes toward sexualized female images than women do, and we wanted to avoid introducing this source of variance.

DOI: 10.1002/cb

METHOD

Participants

Twenty-eight right-handed neurologically normal women ($M_{age} = 31.57$, $SD_{age} = 5.04$) were recruited through a community database and completed the fMRI scan and the survey used in this study. Four participants were eliminated from analyses owing to bad coregistration, leaving 24 participants in final analyses. Potential participants were screened and excluded if they were claustrophobic, were pregnant or breastfeeding, had any metal in their bodies, or were currently taking psychoactive medication.

Materials

One hundred stock images of women were collected by Nuance Digital Marketing and Luminare Labs and categorized into five roles: aspirational, business, domestic, sexualized, and normal. Twenty additional stock images of cars were collected by the same agencies, which served as our control condition. Isolated stock images (rather than real-life advertisements) were chosen to remove potential biases from brand associations and allow for greater experimental control; however, the images were specifically chosen to be representative of the types of photos that one might see in a typical advertisement.[1]

Procedure

Prior to the day of the scan, participants completed a survey that gauged their attitudes toward various portrayals of women in advertising, along with more general attitudes about gender roles. Focal to our analyses, they answered the question "To what extent do you agree with the following statement? Maintaining traditional gender roles is important." This question was answered on a four-point scale from "disagree completely" to "agree completely."

During the scan, participants saw 120 images from five gender role types: aspirational, business, domestic, sexualized, normal, and a cars-only control.[2] Within these gender role types, there were four product types: cars, household items, technology, and control (women without a product). Twelve 10-trial blocks were presented in random order. Each trial consisted of three parts: 4 seconds of image presentation, up to 5 seconds during which participants responded to the question "How much do you like this image? 1 = *dislike*, 2 = *somewhat dislike*, 3 = *somewhat like*, 4 = *like*" and a jittered fixation between 0.5 and 1.5 seconds.

Data acquisition and analysis

Imaging data were acquired using a Siemens Trio 3-T head-only MRI scanner (Siemens Medical Solutions USA, Inc. 51 Valley Stream Parkway Malvern, PA 19355-1406). Head motion was minimized using foam padding and surgical tape; goggles were also fixed in place using surgical tape connecting to the head coil and scanner bed. A matched-bandwidth structural scan (spin-echo; repetition time (TR) = 5000 milliseconds; echo time (TE) = 34 milliseconds; matrix size = 128 × 128; 36 axial slices; field of view (FOV) = 20 cm; 3 mm thick; voxel size = 1.6 × 1.6 × 3.0 mm) and a magnetization-prepared rapid-acquisition gradient echo structural scan (TR = 2170 milliseconds; TE = 4.33 milliseconds; matrix size = 256 × 256; 192 sagittal slices; FOV = 25.6 cm; 1 mm thick; voxel size = 1.0 mm × 1.0 mm × 1.0 mm) were acquired. One functional run was recorded (echo-planar T2-weighted gradient echo, TR = 2000 milliseconds, TE = 25 milliseconds, flip angle = 90, matrix size = 64 × 64, 36 slices, FOV = 20 cm, 3 mm thick; voxel size = 3.1 × 3.1 × 3.0 mm).

The fMRI data were analyzed using Statistical Parametric Mapping (SPM8 Wellcome Trust Centre for Neuroimaging Institute of Neurology, UCL 12 Queen Square, London WC1N 3BG, UK). Images were realigned to correct for motion, normalized into stereotactic space, and smoothed with an 8-mm Gaussian kernel full width at half maximum. The task was modeled for participants at the single subject level, comparing activity while viewing a key gender role of interest (e.g., sexualized) to activity while viewing the car control images. A random effects model was constructed, averaging over these single subject results at the group level.

Regions of interest

We had two regions of interest (ROIs) that we were interested in *a priori*. We looked at ventral striatum specifically because it is generally associated with reward and positive valuation processes (Knutson *et al.,* 2001; Knutson *et al.,* 2005; Knutson *et al.,* 2007; Cooper & Knutson, 2008). Automated meta-analyses of hundreds of neuroimaging studies suggest that when ventral striatum activity is present in a study, it likely reflects positive reward-related cognition (Yarkoni *et al.,* 2011). This region has also been used to predict future behavior such as product sales success in past work (Knutson *et al.,* 2007; Berns & Moore, 2012). This ROI was constructed using Wake Forest University Pickatlas, starting with putamen and nucleus accumbens and then restricting to the ventral and medial halves of the mask to constrain our search to the most canonical portion of ventral striatum (Figure 1; Maldjian *et al.,* 2003). We were also interested in the amygdala, as it has been associated with emotional arousal in past work and also appears in automated meta-analyses of regions related to arousal (Lane *et al.,* 1999; Taylor *et al.,* 2000; Gläscher & Adolphs, 2003; Phan *et al.,* 2003; Ball *et al.,* 2009; Yarkoni *et al.,* 2011; Brooks *et al.,* 2012). In the context of advertising, prior work suggests that provoking emotional arousal may be key to the success of a message (Berger, 2011; Berger & Milkman, 2012). Because some gender role images (e.g., sexualized) lend themselves to be more arousing than others, this was a natural region to look at. This ROI was constructed using Wake Forest University Pickatlas, dilated to 3 mm (Figure 1).

[1]Images are available upon request from the authors.

[2]Results regarding aspirational, business, and normal images are not reported here. We believe the more interesting contrasts are between sexualized and domestic images, as they are most stereotypically associated with female gender roles in the media (see "Women's responses to domestic female portrayals" for more details). In contrast, a category such as "aspirational" may have been too subtle to evoke a distinct response in our participants.

DOI: 10.1002/cb

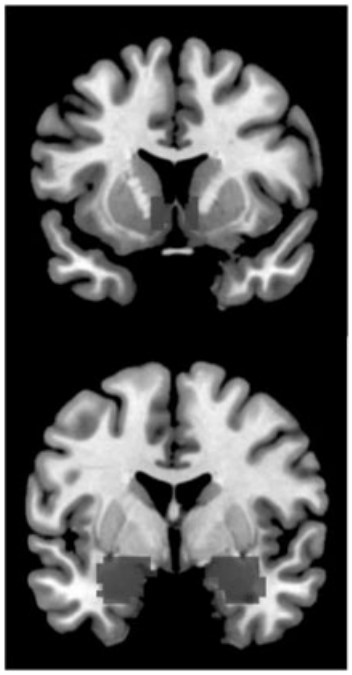

Figure 1. Ventral striatum and amygdala regions of interest.

RESULTS

Behavioral responses

A repeated-measures analysis of variance revealed a significant difference in liking among sexualized, domestic, and control images, Wilks's $\lambda = 0.548$, $F(2, 22) = 9.082$, $p = 0.001$. As predicted, participants reported liking sexualized images ($M = 2.28$, $SD = 0.55$) less than both control images ($M = 2.80$, $SD = 0.66$), $t(23) = 2.92$, $p = 0.0076$, and domestic images ($M = 3.10$, $SD = 0.66$), $t(23) = 4.36$, $p = 0.00023$ (Figure 2). Participants also liked domestic images marginally more than control images, $t(23) = 2.02$, $p = 0.055$.

Neural responses

Next, we wanted to examine whether ventral striatum and amygdala activity would be greater for sexualized images relative to domestic or car images, which would run counter to participants' self-report.

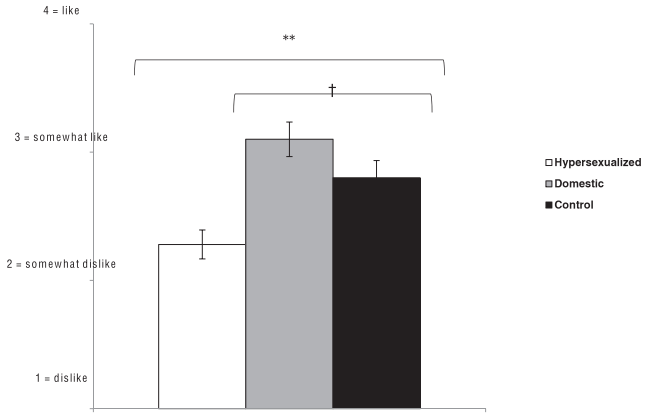

Figure 2. Women's self-reported liking by image type. *Note*: $\dagger p < 0.10$, $*p < 0.05$, $**p < 0.01$.

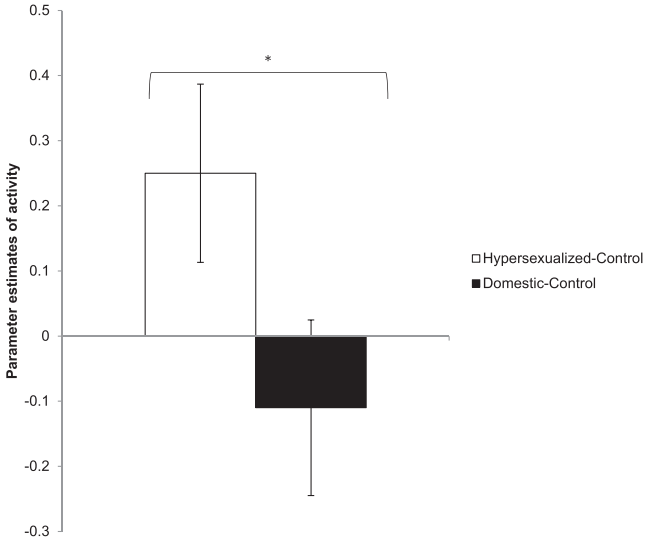

Figure 3. Ventral striatum activity by image type. *Note*: $\dagger p < 0.10$, $*p < 0.05$, $**p < 0.01$.

As we hypothesized, there was greater ventral striatum activity when participants viewed sexualized images relative to control images ($M = 0.25$, $SD = 0.67$), $t(23) = 1.87$, $p = 0.038$ (Figure 3). In addition, there was greater amygdala activity when participants viewed sexualized images relative to control images ($M = 0.45$, $SD = 0.57$), $t(23) = 3.85$, $p = 0.00041$ (Figure 4). In contrast, there was not greater activity in ventral striatum ($M = -0.11$, $SD = 0.66$), $t(23) = -0.83$, $p = 0.21$ (Figure 3), or amygdala ($M = -0.09$, $SD = 0.96$), $t(23) = -0.47$, $p = 0.33$ (Figure 4), during viewing of domestic images relative to control images. Importantly, the difference in activity between sexualized and domestic images was significant in both regions; participants showed greater ventral striatum ($M = 0.33$, $SD = 0.79$), $t(23) = 2.04$, $p = 0.027$, and amygdala ($M = 0.47$, $SD = 0.91$), $t(23) = 2.53$, $p = 0.0095$, activity during sexualized images relative to domestic images.

Relating neural responses to traditional gender attitudes

While the results described earlier suggest a more positive private response to sexualized ads than to control or domestic

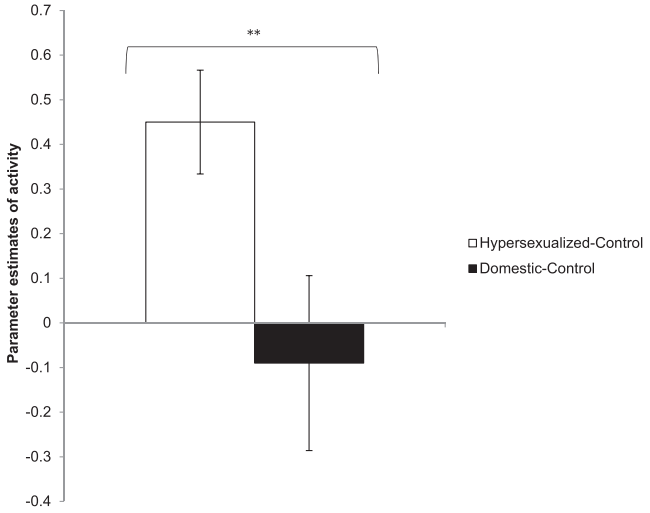

Figure 4. Amygdala activity by image type. *Note*: $\dagger p < 0.10$, $*p < 0.05$, $**p < 0.01$.

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ads overall, one might expect that these evaluations would be modulated by the extent to which an individual holds traditional attitudes about gender roles. Therefore, we looked at the correlation between activity in our ROIs (ventral striatum and amygdala) and the extent to which participants endorsed traditional gender roles (the survey question answered prior to the day of the scan).

Counter to our expectations, there was a significant positive correlation between traditional attitudes about gender roles and activity in the ventral striatum ROI when viewing sexualized relative to control images (Figure 5; $r = 0.56$, $p = 0.0048$). That is, to the extent someone endorsed traditional gender roles, they showed *more* ventral striatum activity to sexualized images. This was surprising in light of the fact that endorsing traditional gender roles is often associated with reported dislike of explicitly sexual content (Sciglimpaglia *et al.,* 1979; Mittal & Lassar, 2000; Reichert & Fosu, 2005; Sengupta & Dahl, 2008). Therefore, we wanted to see whether the correlation also existed for domestic images—which one might expect would resonate with more traditional women—or whether it was unique to sexualized images. Again, to our surprise, there was not a significant correlation between traditional attitudes and ventral striatum activity to domestic images relative to control (Figure 6; $r = 0.25$, $p = 0.25$).

We did not find significant correlations between traditional attitudes and amygdala activity during any of our three key contrasts (sexualized vs. control, domestic vs. control, and sexualized vs. domestic). This suggests that while women might find sexualized content more arousing than other kinds of content overall, the extent of arousal is not related to how traditional they consider themselves. In contrast, there is a relationship between traditional attitudes and ventral striatum response to sexualized images, suggesting that more traditional women (in contrast to their stated preference) may have more positive private reactions to this content than less traditional women.

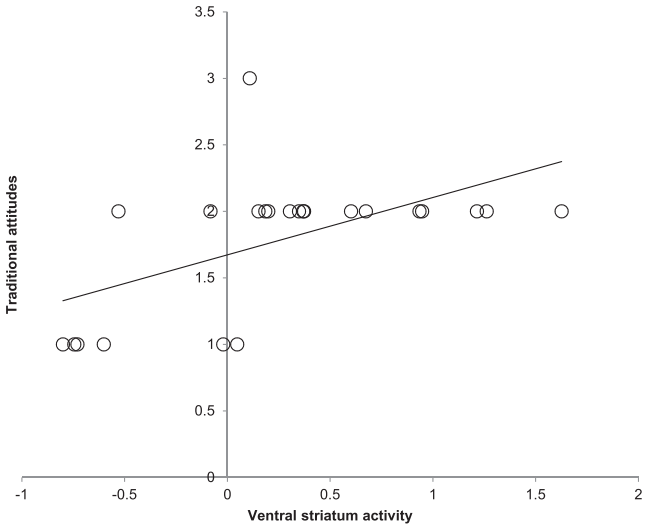

Figure 5. Correlation between traditional attitudes and ventral striatum activity to hypersexualized versus control images, $r = 0.56$, $p = 0.0048$.

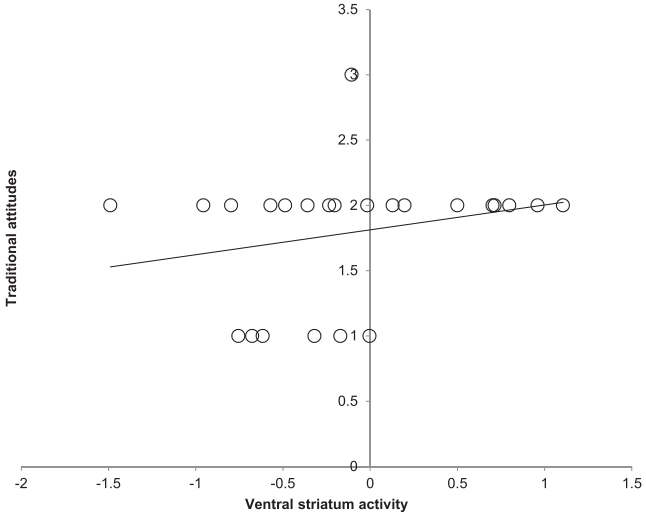

Figure 6. Non-significant correlation between traditional attitudes and ventral striatum activity to domestic versus control images, $r = 0.25$, $p = 0.25$.

DISCUSSION

Although women typically report a distaste for sexualized female depictions in the media, ad campaigns targeting both men and women have continued to use these depictions, suggesting that they may be effective in driving purchase behaviors. To investigate this seeming contradiction between self-report and potential underlying preferences, we exposed female participants to sexualized and domestic images while undergoing fMRI to compare their consciously stated attitudes regarding these image types to their neural responses. As predicted, we found that women reported greater liking for domestic images relative to both control and sexualized images. In contrast, they showed greater activity in the ventral striatum—a region associated with reward—in response to sexualized images relative to both control and domestic images. They also showed greater activity in the amygdala—a region associated with arousal—in response to sexualized images relative to both control and domestic images. Finally, this effect in ventral striatum was *heightened* by the endorsement of traditional attitudes; that is, more traditional participants showed *greater* ventral striatum activity to sexualized images (relative to control images) than less traditional participants. We are not strongly in favor of any particular explanation for the relationship between reported traditional attitudes and heightened ventral striatum response to sexualized ads, but several interesting possibilities exist. It could be that participants who reported high traditional values consider sexualized female portrayals to be traditional on some level. Indeed, it could be argued that evaluating women based on their physical attractiveness (vs. intellect) is a more old-fashioned trait; therefore, rating oneself as "traditional" may not be entirely inconsistent. It is also possible that women raised in more traditional environments who have less exposure to sexualized images may regard them as more novel and potentially interesting, leading to a heightened striatal response. Another possibility is that participants who consider themselves highly feminine are more likely to

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both self-report traditional values and have a positively valenced response to the sexualized images in which the main figures are in highly feminine attire. It will be informative for future research to explore these ideas further, as they are speculative at this point.

Our data suggest that while women may not consciously report liking sexualized female portrayals, they may be responding positively to these images on some level. Although amygdala activation is associated with emotional arousal in general (both positive and negative; Ball *et al.,* 2009), heightened ventral striatum activity is reliably associated with positively valenced reward processes (Cooper & Knutson, 2008); in conjunction, our results could suggest a positive emotional response, despite a lack of self-reported endorsement. There may be several reasons why women would not wish to endorse such images. For example, they may find the use of the female form to sell a product exploitative or offensive, there may be body image issues at play, or they may be responding out of a lifetime of social conditioning to report less positive attitudes about sex than men in general in order to maintain propriety. However, one possibility underlying the potential positive valence associated with these images (and why advertisers continue to use sexualized portrayals) is that such images suggest an idealized image of the self that the consumer may wish to strive toward. In other words, sexualized images of an attractive model may cause the viewer to consider whether the advertised product could enhance their own attractiveness, a positively valenced cognition.

The current study did not allow us to investigate these or other possibilities for women's self-reported negative attitudes toward the sexualized images, but it does suggest the need for an increased understanding of the reasons underlying this disconnect, which could have important implications for advertisers. In other words, it is not entirely surprising or counterintuitive that participants reported negative sentiment despite heightened ventral striatum activity. However, these results suggest that it may be worthwhile to explore strategies that would make an explicit positive attitude acceptable and thus remove this inconsistency. For example, if the reason underlying the disconnect seen in the current research is an explicit disapproval of subjugation typically associated with sexualized female images, studies could compare such images to alternative portrayals in which the female subject has more agency or ownership over a sexualized role. Such explorations would allow us to tease apart this dissociation and design better messages that may still evoke implicit positive responses and also allow respondents to feel licensed to express a positive explicit response.

Several limitations of the current study may lend themselves to future investigation. First, we chose to show participants isolated stock images of women in different roles rather than actual product ads, although the images were chosen to be in line with photos typically used in commercial advertisements. The reason for this was that we did not want existing associations with products to contaminate the responses. Thus, the current approach represents a purer test of women's responses to these different stereotypical role portrayals; however, it is a less naturalistic test of how they might process such images in the context of evaluating a product. Therefore, it would be useful to see whether our results replicate while exposing participants to either real-life or constructed ads portraying women in sexualized or domestic roles. It would also be valuable to use these images in the context of ads to evaluate whether both self-report and neural responses are moderated by product type. For example, there may be greater consistency between self-report and neural responses to sexualized images when the advertised product is seen as a natural match for a sexualized role (e.g., lingerie) and less consistency when the product is seen as a mismatch (e.g., soap).

Second, we recruited women from the greater Los Angeles area, arguably a region where women are especially likely to encounter sexualized portrayals of women in media (given their proximity to the entertainment industry) than in other regions. It would be useful to conduct this type of work in several regions where this potential issue would be avoided. On an even broader scope, because public attitudes and even laws about female media portrayals vary widely by culture, it would be interesting to study this issue cross-culturally (Reiss, 1986; Widmer *et al.,* 1998; Rupp & Wallen, 2008). It seems almost certain that one would find differences in self-reported attitudes across cultures, but it would be interesting to see whether differences in neural activity would be as pronounced.

Finally, as discussed in the Introduction, men report more negative responses to sexualized depictions of other men than do women of other women. However, it is possible that, like women, they may in fact show neural patterns suggestive of positive response to these depictions in spite of their stated attitudes. Paralleling our use of domestic images as a counterpoint to sexualized images in the current study, it would be helpful to compare men's responses to sexualized images with more traditional male role images, such as working in an office. If results were consistent with those observed in men, these findings would hold important marketing implications as sexualized portrayals of men in advertising are exceedingly less common than those of women.

The present study is the first to show that despite stated attitudes, women may have a neurocognitive pattern of activity consistent with a positive response to sexualized media portrayals of other women, and counter to intuition, this effect may be the strongest among those who report the most traditional attitudes. However, it would be a major oversimplification to suggest that these results support the use of sexual ad content in general. As discussed earlier, we have not yet explored moderators such as product type and cultural values that could greatly influence how these gender roles are interpreted and processed. Instead, we suggest that these reward responses are not well understood and are ripe for more nuanced exploration. Framed in an empowering way, these types of images may resonate with women even better than current media attempts, allowing us to capitalize on potential existing latent preferences.

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BIOGRAPHICAL NOTES

I. Stephanie Vezich is a doctoral candidate in social psychology at UCLA and a Jacob K. Javits trainee, working in Dr. Lieberman's lab along with the UCLA Anderson School of Management and the UCLA Institute of the Environment and Sustainability. She received her BA and MA at Stanford University in 2010. Her research focuses on the neural correlates of persuasion and behavior change. isvezich@ucla.edu

Benjamin Gunter is a doctoral student in social psychology at UCLA and National Science Foundation trainee, working in Dr. Lieberman's lab. He received his BA from York College of Pennsylvania in 2006 and MA from UCLA in 2012. His research interests include the neural bases of persuasion, political psychology, and developing neural measures of analytic forecast accuracy.

Dr. Matthew Lieberman is a professor of psychology, and psychiatry and biobehavioral sciences at UCLA, director of the Social Cognitive Neuroscience Lab, and founding editor of the journal *Social Cognitive and Affective Neuroscience*. He received his PhD in Psychology at Harvard University in 1999. He uses functional magnetic resonance imaging to examine the neural bases of social cognition and social experience. In particular, he examines the neural bases of social cognition, persuasion, emotion regulation, and social factors related to education.

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