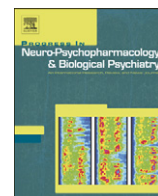




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A selective impairment in attentional disengagement from erotica in obsessive–compulsive disorder

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ABSTRACT

Although an attentional bias for threat has been implicated in obsessive–compulsive disorder (OCD), evidence supporting such a bias has been inconsistent. Furthermore, few studies have made distinctions between attentional capture vs. attentional disengagement and the extent to which different emotional content modulates attention in OCD also remains unclear. To address these issues, we examined patients with OCD ($n=30$) and controls ($n=30$) during an emotional attentional blink paradigm in which participants searched for a target embedded within a series of rapidly presented images. Critically, an erotic, fear, disgust, or neutral distracter image appeared 200 ms or 800 ms before the target. Impaired target detection was observed among OCD patients relative to controls following erotic distracters, but only when presented 800 ms, and not 200 ms, prior to the target, indicating difficulty with attentional disengagement. Difficulty disengaging from erotic images was significantly correlated with OCD symptoms in the full sample but not with symptoms of trait anxiety. These data delineate a specific information processing abnormality in OCD.

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A growing body of research has implicated an attentional bias favoring threatening information in the development of various anxiety disorders (Bar-Haim et al., 2007; Cisler and Koster, 2010). The modal finding in such research is increased allocation of attention to threatening stimuli, through biases in the orienting of attention (vigilance; Mogg and Bradley, 1998), or in the continued engagement of attention (maintenance; Weierich et al., 2008). Although obsessive–compulsive disorder (OCD) appears to also be associated with an attentional bias favoring threatening information, as well as reduced levels of cognitive inhibition (Muller and Roberts, 2005), the experimental demonstration of such biases has been less consistent relative to other anxiety disorders (Moritz and Mühlhens,

2008; Summerfeldt and Endler, 1998). Indeed, the specific components of the attentional bias that occur in OCD remain unclear, as it has yet to be determined if attentional biases in OCD are comprised of facilitated attention to threat and/or difficulty disengagement from threat.

Neurobehavioral research has begun to illuminate the neural substrates of attentional biases in the anxiety disorders (Bishop, 2008; Cisler and Koster, 2010). This literature has suggested that amygdala activity may mediate facilitated attention to threat. However, higher-order cortical structures centered around prefrontal cortex (PFC) activity may account for difficulty disengaging from threat via individual differences in the ability to down-regulate the influence of sub-cortical fear structures (i.e., attentional control) and maintain attention on task-relevant stimuli (Eldar and Bar-Haim, 2010). OCD is characterized by dysfunction of fronto-striatal-thalamic circuitry and this dysfunction may account for the difficulty with attentional disengagement that may be observed in the disorder (van den Heuvel et al., 2005).

Despite important advances in the neural bases of attention, a clear understanding of the inconsistency in demonstrating an attentional bias in OCD remains elusive. The inconsistency may be partially attributed to the heterogeneous and idiosyncratic nature of OCD (Summerfeldt and Endler, 1998). Inconsistencies in demonstrating an attentional bias may also be partially due to use of stimuli that inadequately access core beliefs in OCD. Most attentional bias studies have focused on the manipulation of the emotional valence of

Abbreviations: OCD, obsessive–compulsive disorder; PFC, prefrontal cortex; RSVP, rapid serial visual presentation; SCID-IV, Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; YBOCS, Yale-Brown Obsessive Compulsive Scale; DOCS, Dimensional Obsessive–Compulsive Scale; STAI-T, State-Trait Anxiety Inventory Trait; ACS, Attentional Control Scale; IAPS, International Affective Picture System; NCC, non-clinical controls; ANOVA, Analysis of Variance; DES, disengagement efficiency score.

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the stimuli. However, emerging research suggests that the arousal value of a stimulus, and not necessarily its valence (negative versus positive versus neutral) is more important for modulating attention (Anderson, 2005; Most et al., 2007). Erotic (i.e., sexually explicit) stimuli in particular, which are often associated with high arousal value but minimal valence, have been found to affect attention to a greater degree than stimuli with negative valence (Arnell et al., 2007). Thus, erotic stimuli may be excellent stimuli to employ in attentional bias research among anxious populations to control for arousal levels when examining the effects of valenced stimuli on attention. Although the attentional capture by erotica has been found to be robust in past research (Ciesielski et al., 2010), this attentional capture may be moderated by individual differences in attentional control (Derryberry and Reed, 2002). Attentional control consists of one's ability to maintain attentional engagement in the face of distraction and one's ability to execute attentional disengagement, in order to shift attention away from a distraction or towards a new task. These attentional processes may be limited among those high in OCD symptoms.

Cognitive behavioral models posit that OCD emerges as a function of inflated responsibility composed of the following beliefs: (1) the threat of a negative outcome, which may be either a *manifest* threat (e.g. a car accident) or a *moral* threat (e.g. "Having unacceptable thoughts means that I am a bad person"); (2) the prevention of a negative outcome as the primary goal; and (3) the belief in one's personal power to prevent the negative outcome (e.g., Rachman, 1998; Salkovskis, 1999). Theoretical and empirical extensions of this model contend that appraisals of responsibility, which are characteristic of OCD, are mediated by fear of behaving badly and associated feelings of guilt (Mancini and Gangemi, 2004; Niler and Beck, 1989). Employing stimuli that more directly evoke fear of behaving badly and associated guilt feelings may reveal more disorder-unique attentional biases in OCD. Erotica are of interest in this regard, as they can evoke feelings of guilt because of their taboo nature, and moral/religious concerns. Indeed, such stimuli may be perceived as either rewarding or punishing depending upon one's level of guilt (Griffitt and Kaiser, 1978). Prior research has also shown that erotica rated as unpleasant still evinced inhibited startle, which was interpreted as indicating pleasant affect to those same stimuli (Bradley et al., 2001). Such findings may highlight the potential utility of erotic content in accessing the overactive conflict monitoring system that may be central to OCD (Pitman, 1987). Although exposure to erotic content, relative to other emotional stimuli, may more directly stimulate underlying processes implicated in OCD, no study to date has employed such stimuli in the examination of attentional biases in OCD.

A better understanding of the components underlying attentional biases in OCD may be informed by a more comprehensive assessment of the specific affective content that may modulate attention as well as employment of tasks where components of attention can be clearly operationalized. The emotional attentional blink task (Most et al., 2005), provides a robust paradigm for examining different components of attention. On each trial participants view a rapid serial visual presentation (RSVP) of stimuli and attempt to detect a rotated target image, which occurs either 200 ms (Lag 2) or 800 ms (Lag 8) after an emotional distractor allowing for a measurement of attentional capture (Lag 2) and disengagement recovery (Lag 8). It was predicted in the present study that OCD patients would show deficits at Lag 8 following emotional distractors. Prior research with non-clinical participants found impaired target detection at early lags, but not late lags, for erotic stimuli (Most et al., 2007). Similar effects have been observed for sexual words on a lexical version of the task (Arnell et al., 2007). Consistent with deficits in attentional disengagement and inhibition in OCD (Chamberlain et al., 2005; Cisler and Olatunji, 2010), it was predicted that OCD patients would be especially less accurate than controls when erotic emotional distractors appeared at Lag 8, whereas all subjects were expected to perform poorly when these images appeared at Lag 2.

1. Method

1.1. Participants

Participants consisted of 30 adults who met diagnostic criteria for OCD and 30 non-clinical controls (NCC) with no current diagnoses. Administration of the Structured Clinical Interview for the DSM-IV (SCID-IV; First et al., 1997) was supervised by a trained clinical psychologist to confirm diagnosis for all participants, with exclusionary criteria for the OCD groups which included a diagnosis of substance abuse, attention deficit hyperactivity disorder, pervasive developmental disorders, mental retardation, or current or past neurological diseases. A Yale-Brown Obsessive Compulsive Scale (YBOCS; Goodman et al., 1989a, 1989b) was also administered to those meeting diagnostic criteria for OCD to ensure that presenting symptoms were at least moderate in severity (minimum score of 16). Many OCD patients had additional current Axis I diagnoses (46%), including 21% with major depressive disorder and 18% with an anxiety disorder.

1.2. Procedure

All participants completed written informed consent approved by the Vanderbilt Institutional Review Board. Participants were then seated at a computer where they first completed several self-report questionnaires to assess OCD symptoms, anxiety and self-reported attentional ability, after which they completed the emotional attentional blink task.

1.3. Symptom assessment

The *Dimensional Obsessive–Compulsive Scale* (DOCS; Abramowitz et al., 2010) is a 20-item measure of the severity of obsessive–compulsive symptoms across four dimensions: (1) contamination, (2) responsibility for harm, injury, or bad luck, (3) unacceptable obsessional thoughts, and (4) symmetry, completeness, and exactness. The DOCS had excellent internal consistency in the present study ($\alpha = .96$).

The *State-Trait Anxiety Inventory–Trait* (STAI–T; Spielberger et al., 1983) is a 20-item measure of proneness towards experiencing anxiety and distress (trait anxiety). The STAI–T had good internal consistency in the present study ($\alpha = .94$).

The *Attentional Control Scale* (ACS; Derryberry and Reed, 2002) is a 20-item measure of control of attention across two domains; *focusing*, the ability to maintain attention on a given task, and *shifting*, the ability to reallocate attention to a new task or to engage attention on multiple tasks. The ACS had adequate internal consistency ($\alpha = .86$).

1.4. Rapid serial visual presentation (RSVP) task

The visual stimuli were images consisting of 168 distractor images drawn from four categories of emotional images (42 disgusting, 42 erotic, 42 fear evoking, 42 neutral), 252 upright landscapes/architectural filler images (appearing before the distractor, between the distractor and the target, and after the target) and 80 target images consisting of landscape/architectural photos 40 rotated 90° degrees to the left and 40 rotated 90° to the right. One trial consisted of 17 images, including one distractor image and one target image that was rotated 90° to the left or right (see Fig. 1). Each image was presented for 100 ms. Each trial consisted of a disgust (contaminated or diseased items including roaches, feces, and maggot-ridden food products), fear (animals bearing teeth in a threatening manner, humans brandishing weapons, and explosions), erotic (nude male–female couples engaging in sexual scenarios), or neutral (scenic in style and including both animals and humans) distractor image that appeared 200 ms (Lag 2) or 800 ms (Lag 8) before the rotated image.

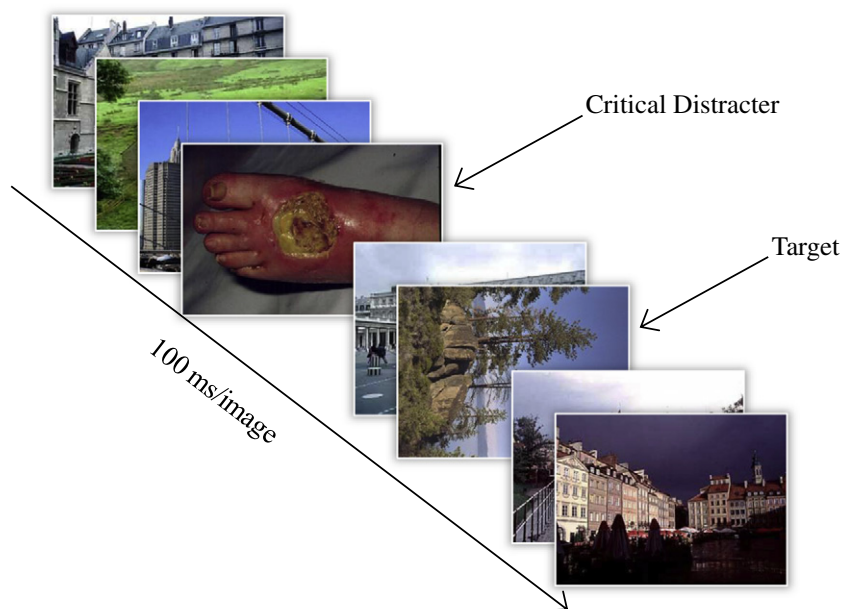


Fig. 1. The trial procedure for the emotional attentional-blink paradigm. Note that the distracter consisted of four distinct categories (disgust, erotic, fear, and neutral) presented at 200 and 800 ms time lags.

Fear, disgust, and neutral pictures were partially drawn from the International Affective Picture System (IAPS; Lang et al., 1999) and were supplemented with similar images found from publicly available sources.¹ Erotic images were mainly obtained from publicly available sources and have been employed in previous research (Most et al., 2007). Participants completed 6 blocks with 28 trials per block. Of the total 168 trials, each distractor type was presented 42 times with 2 trials per distractor type containing no target; the 2 lags were equally distributed for 40 trials with targets present per distractor type. The position of the distractors was equally distributed by emotion category and lag positions in the visual stream. Participants were instructed to indicate by key press if they saw a rotated image (yes, no; *detection*) and which direction it was rotated (right, left; *accuracy*). Participants received 16 practice trials to ensure mastery of the task with 4 of the trials containing no rotated target image, 6 trials with the target image rotated to the right, and 6 trials with the target image rotated to the left. A response was considered accurate if the participant both said they saw the target, and correctly identified the direction of its rotation.

1.5. Data analysis

Demographic and clinical symptoms were compared between patients with OCD and NCCs. A 2 (Group; OCD, NCC) × 2 (Lag; 2, 8) × 4 (emotion; disgust, fear, erotic, neutral) mixed model Analysis of

¹ An independent sample of participants ($n=23$; 65.2% female; 65.2% Caucasian, mean age = 20.35, $SD=2.57$) rated each Disgust (valence = -24.69, $SD=7.29$; arousal = 46.26, $SD=14.65$), Erotic (valence = 4.45, $SD=15.59$; arousal = 41.77, $SD=20.42$), Fear (valence = -15.83, $SD=7.17$; arousal = 31.98, $SD=10.36$), and Neutral (valence = 4.87, $SD=3.66$; arousal = 6.18, $SD=5.05$) image for valence (-50 = extremely negative, +50 = extremely positive, 0 = being no positive or negative valence/neutral) and arousal (0 = none to 100 = extremely/most imaginable). A significant difference for valence ratings between disgust images and all other categories was found such that disgust images were rated the most negative ($ps<.001$). Fear images were rated as significantly more negative than erotic and neutral images ($ps<.001$). However, the valence of erotic and neutral images did not significantly differ from each other ($p>.90$). Neutral images were rated significantly less arousing than all other images ($ps<.001$). Fear images were significantly less arousing than disgust images ($p<.001$), but not erotic images ($p>.05$). Lastly, arousal ratings for disgust and erotic images did not significantly differ from each other ($p>.05$).

Variance (ANOVA) was then conducted on percent accuracy on the RSVP. Consistent with prior research that have computed a difference score between Lags in the RSVP to assess the magnitude of the attentional blink (i.e., Dux and Marois, 2008), a 'disengagement efficiency score' (DES) was computed by subtracting performance at Lag 2 from performance at Lag 8, with higher scores indicating greater disengagement efficiency. The DES was then subjected to a 2 (group; OCD, NCC) × 4 (emotion; disgust, fear, erotic, neutral) mixed model ANOVA. Lastly, Pearson correlation coefficients were computed to examine the association between the DES for each emotional distractor and various symptoms in the full sample.

2. Results

2.1. Participant characteristics

As shown in Table 1, OCD participants and NCCs were well-matched on all demographic characteristics with no significant differences between the two groups. As expected, Table 2 shows that OCD participants reported significantly more severe symptoms of OCD, trait anxiety, depression, and difficulty with attentional control

Table 1
Demographic information by diagnostic group.

	OCD	NCC
N	30	30
% Female	50	50
Age	39.23 (11.91)	39.50 (10.29)
% Caucasian	96.7	73.3
% Income		
<\$39,999	63.3	66.7
\$40,000–\$69,999	16.7	30.0
>\$70,000	20.0	3.3
Marital status		
% Married	30.0	30.0
% Single	56.7	50.0
% Divorced	13.3	20.0
Highest education level		
% High school	43.3	26.7
% College degree	43.3	46.6
% Masters/doctorate	13.4	26.7

Note: OCD = Obsessive–Compulsive Disorder; and NCC = Non-clinical control.

Table 2
Means and standard deviation by group on symptom measures.

Symptom measures	OCD M (SD)	NCC M (SD)	<i>t</i>	<i>d</i>
DOCS	31.93 (15.95)	5.40 (4.71)	8.73	1.50
STAI-T	53.66 (10.41)	35.50 (8.73)	7.32	1.37
ACS-focus	20.06 (5.35)	26.00 (4.08)	4.77	1.06
ACS-shift	27.26 (5.22)	32.51 (4.22)	4.23	0.97

Note: all *t*-values significant at $p < .001$. OCD = Obsessive-Compulsive Disorder; NCC = Non-clinical control; DOCS = Dimensional Obsessive-Compulsive Scale; STAI-T = State Trait Anxiety Inventory-Trait Subscale; and ACS = Attention Control Scale. Cohen's *d* was calculated as the difference between the mean scores in each group divided by the pooled standard deviation.

than NCCs ($ps < .001$). Examination of subscale scores on the DOCS suggests that the OCD sample is well characterized by heterogeneous symptoms. Scores on the four dimensions of contamination ($M = 7.73$, $SD = 6.35$), responsibility for harm, injury, or bad luck ($M = 8.40$, $SD = 5.53$), unacceptable obsessional thoughts ($M = 9.83$, $SD = 4.72$), and symmetry, completeness, and exactness ($M = 5.96$, $SD = 5.24$) generally did not significantly differ from each other with the exception of symmetry, completeness, and exactness symptoms being significantly less endorsed than responsibility for harm, injury, or bad luck symptoms [$t(29) = 2.17$, $p < .05$] and unacceptable obsessional thoughts [$t(29) = 4.47$, $p < .001$].

2.2. RSVP task accuracy

A 2 (Group) \times 2 (Lag) \times 4 (Emotion) mixed model ANOVA on percent accuracy² revealed a significant main effect of Lag [$F(1, 58) = 209.78$, $p < .001$, partial $\eta^2 = .78$], reflecting higher accuracy at Lag 8 than Lag 2, and Emotion [$F(3, 174) = 78.68$, $p < .001$, partial $\eta^2 = .58$], reflecting differential performance across stimulus categories. These main effects were qualified by a significant Group \times Lag [$F(1, 58) = 5.75$, $p < .03$, partial $\eta^2 = .09$] and Lag \times Emotion [$F(3, 174) = 74.69$, $p < .001$, partial $\eta^2 = .56$] interaction. The predicted Group \times Lag \times Emotion interaction was also significant [$F(3, 174) = 3.59$, $p < .02$, partial $\eta^2 = .06$].³ To examine this 3-way interaction, a 2 (Group) \times 2 (Lag) mixed model ANOVA was conducted for percent accuracy for each emotion. This analysis revealed a significant main effect of Lag for disgust [$F(1, 58) = 44.15$, $p < .001$, partial $\eta^2 = .43$], fear [$F(1, 58) = 12.70$, $p < .01$, partial $\eta^2 = .18$], erotic [$F(1, 58) = 329.58$, $p < .001$, partial $\eta^2 = .85$], and neutral [$F(1, 58) = 7.21$, $p < .01$, partial $\eta^2 = .11$] distractors. However, the Group \times Lag interaction was significant for target accuracy only when erotic distractors were present [$F(1, 58) = 10.68$, $p < .01$, partial $\eta^2 = .16$]. As depicted in Fig. 2, examination of this interaction revealed no significant group differences in percent accuracy in identifying the target when erotic images were distractors at Lag 2 [$t(58) = 1.45$, $p = .15$]. However, percent accuracy at Lag 8 was significantly lower for OCD patients relative to NCCs when erotic images were distractors [$t(58) = 2.02$, $p < .05$]. The Group \times Lag interaction when fear distractors were present did approach significance [$F(1, 58) = 3.41$, $p = .07$, partial $\eta^2 = .06$]. However, there were no significant group differences in percent accuracy in identifying the target when fear images were distractors at Lag 2 [$t(58) = -.263$, $p = .79$] and Lag 8 [$t(58) = 1.35$, $p = .18$]. Means and standard deviations of percent accuracy on the RSVP by emotion, lag, and group are presented in Table 3.

² Analyses for accuracy, rather than detection, are presented as they reflect more precise performance on the RSVP. Furthermore, the pattern of findings did not differ when detection is employed as the dependent variable.

³ The mixed model ANOVA on percent accuracy was also conducted without the erotic trials. The predicted Group \times Lag \times Emotion interaction was no longer significant [$F(2, 116) = 1.67$, $p = .19$] suggesting that the observed group differences are accounted for by the erotic trials.

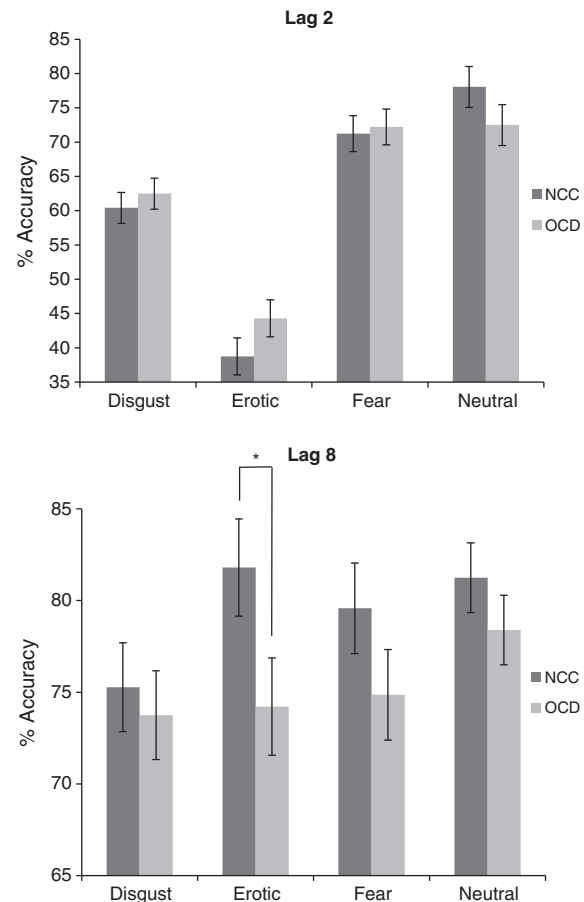


Fig. 2. Percent accuracy by group and emotion at Lag 2 (left panel) and Lag 8 (right panel) on the rapid serial visual presentation task. Bars represent standard error. * $p < .05$.

2.3. Disengagement efficiency

A 2 (Group) \times 4 (Emotion) mixed model ANOVA on the DES revealed a significant main effect of Group [$F(1, 58) = 5.75$, $p < .03$, partial $\eta^2 = .09$] and Emotion [$F(3, 174) = 74.69$, $p < .001$, partial $\eta^2 = .56$]. These main effects were also qualified by a significant Group \times Emotion interaction [$F(3, 174) = 3.59$, $p < .02$, partial $\eta^2 = .06$]. Fig. 3 shows that examination of this interaction revealed no significant group differences on the DES for fear [$t(58) = 1.84$, $p = .07$], disgust [$t(58) = 0.91$, $p = .36$], or neutral [$t(58) = -0.79$, $p = .42$]. However, the DES for erotica was significantly larger for NCCs compared to OCD patients [$t(58) = 3.26$, $p < .01$].

2.4. Symptom correlates

After a Bonferroni correction for multiple correlations ($p < .003$), Table 4 shows that only the OCD symptoms as assessed by the DOCS correlated inversely with the DES when erotic images served as the distractor ($r = -.43$, $p < .001$), indicating that subjects with greater OCD symptoms showed a weakened ability to disengage their attention.

3. Discussion

This investigation examined the extent to which erotic stimuli modulate attention in OCD during a RSVP task. The present findings showed that performance on the RSVP task varied significantly between patients with OCD and NCC as a function of lag. That is, patients with OCD and NCCs did not significantly differ in target detection accuracy when Lag 2 distractors were present. However,

Table 3

Means and standard deviations of percent accuracy by group, emotion, and lag on the rapid serial visual presentation task.

Group	OCD				NCC			
	Disgust M (SD)	Erotic M (SD)	Fear M (SD)	Neutral M (SD)	Disgust M (SD)	Erotic M (SD)	Fear M (SD)	Neutral M (SD)
Lag 2	62.49 (12.14)	44.31 (16.36)	72.22 (16.28)	72.50 (18.72)	60.42 (12.61)	38.75 (13.05)	71.25 (12.05)	78.05 (13.58)
Lag 8	73.75 (14.81)	74.22 (17.02)	74.86 (15.42)	78.40 (12.24)	75.28 (11.52)	81.80 (11.50)	79.58 (11.34)	81.25 (8.17)

Note: OCD = Obsessive–Compulsive disorder; and NCC = Non-clinical control.

target detection accuracy was significantly lower for OCD patients compared to NCCs when Lag 8 distractors were present. This finding helps delineate the components of attention contributing to the attentional bias in OCD. Different components of attention and associated mechanisms are thought to distinctly reflect automatic vs. strategic stages of information processing (Shiffrin and Schneider, 1977). Automatic processing typically reflects processing that is capacity free and occurs without intent, control, or awareness, whereas strategic processing generally refers to processing that is intentional, controllable, capacity-limited, and dependent on awareness. Lag 2 deficits appear to heavily reflect bottom-up (i.e., stimulus driven) automatic processes. In contrast, as one moves further out in time from the attention capturing stimulus, strategic processes allowing a refocusing of attention become more prominent (Dux and Marois, 2009). As such, the disengagement difficulty observed in OCD patients, indexed by poorer target detection accuracy when distractors occurred at Lag 8 compared to Lag 2 suggests that attentional deficits in OCD may occur at the strategic, rather than automatic, stage of information processing.

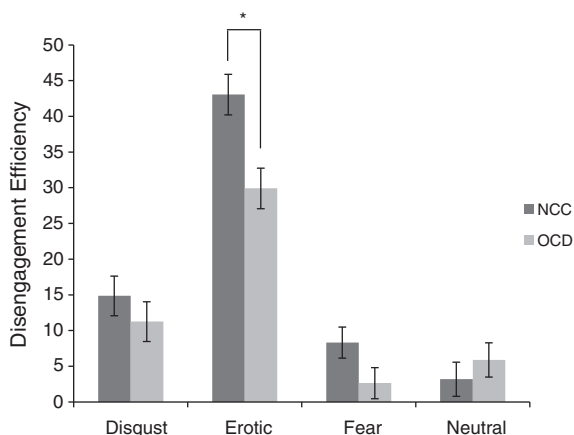
The present findings also show that the emotional content of the distractor modulates group differences in target detection accuracy at Lag 8. Specifically, NCC attention is impaired by erotica (as indicated by Lag 2 effects) but they appear to recover (no Lag 8 effect). In contrast, patients with OCD appear to be impaired at Lag 2 and Lag 8, suggesting that what is impaired is “disengagement recovery time”, which may be necessary to recoup attentional control. The specificity of the effects to erotica suggests that traditionally ‘threatening’ stimuli may not always access deficits that define OCD. Indeed, the overall effects in the present study appear to be driven by difficulty disengaging from erotica, while threat and disgust disengagement did not differ between groups (albeit there was a modest association between fear disengagement and OCD symptoms).

While the findings indicate that difficulty disengaging from erotic stimuli differentiates OCD patients from NCCs, Fig. 2 also shows higher target detection accuracy after erotic images at Lag 8 among NCCs rather than a deficit in target processing among OCD patients per se. This view raises the interesting possibility that NCCs are able to

employ a compensatory mechanism in response to a strong attention grabbing arousing stimulus, which enhances information processing in the period after an attentional blink. This compensatory mechanism may indeed be the adaptive default mode. In contrast, OCD patients may be unable to employ such a strategic compensatory mechanism. This can be construed as a deficit in a ‘top-down’ regulatory ability (Posner and Rothbart, 2000) that inhibits the ‘bottom-up’ influence of emotional distracters (Eysenck et al., 2007). Difficulty in one’s ability to apply this regulation may account for the likelihood that erotic content will intrude into consciousness and interfere with target detection accuracy.

The present study also found that symptoms of OCD, but not general trait anxiety, correlated with difficulty disengaging from erotic images. This finding suggests that difficulty disengaging from erotic images is uniquely linked to OCD symptoms. However, alternative explanations for the specific effects of erotic images on attention in OCD do warrant consideration. For example, erotica may come to serve different functions for OCD patients and NCCs subsequent to cognitive elaboration. Specifically, erotic images may function more as a ‘reward’ in NCCs, and more as a ‘punisher’ for patients with OCD. A negative semantic shift in mental representations of erotic images among patients with OCD relative to NCCs and difficulty disengaging from such images may reflect underlying maladaptive beliefs (e.g. “Enjoying erotic images means that I am a bad person”) and subsequent feelings of guilt that have been proposed to give rise to OCD (e.g., Mancini and Gangemi, 2004; Salkovskis, 1999). As such, differences in meanings may dramatically alter the effects of such stimuli in OCD.

This is the first investigation, to our knowledge, demonstrating that erotic content differentiates attention disengagement difficulty in OCD relative to controls. However, inferences based on these findings must be considered within the context of the study limitations. For example, psychological processes (inflated responsibility, guilt) that characterized OCD which are hypothesized to explain poorer target detection among OCD patients compared to NCCs when Lag 8 distractors consist of erotic images were not assessed. This presents an opportunity for future research to delineate if psychological processes that are transdiagnostic across various OCD subtypes account for emotion modulation of attention among patients with OCD. The amount of time spent viewing erotica prior to arrival at the lab was also not assessed. Given that the amount of guilt or perception of taboo regarding erotic images is highly variable and value laden,

**Fig. 3.** Disengagement efficiency score (Lag 8–Lag 2) by emotion and group. Bars represent standard error. * $p < .01$.**Table 4**

Pearson correlation coefficients for symptom measures and disengagement efficiency scores for each emotional distracter for the full sample.

Symptom measures	Disengagement efficiency score			
	Disgust	Erotic	Fear	Neutral
DOCS	-.04	-.43*	-.28	.09
STAI-T	-.06	-.25	-.15	.04
ACS-focus	.11	.28	.02	.00
ACS-shift	.21	.06	.01	-.11
M (SD)	13.06 (15.20)	36.48 (16.79)	5.48 (12.16)	4.54 (13.06)

Note: DOCS = Dimensional Obsessive–Compulsive Scale; STAI-T = State Trait Anxiety Inventory–Trait Subscale; and ACS = Attention Control Scale.

* $p < .001$.

individual differences along these lines may be a moderator for future consideration. Although both men and women rate erotic images as appealing, men tend to do so to a greater degree and show greater levels of physiological reactivity to them (Most et al., 2007). Accordingly, future research with ample sample size may also consider gender as a potential moderator of these attentional effects. Although the association between OCD symptoms and difficulty disengaging from erotica was not accounted for by trait anxiety or depression, inclusion of a psychiatric control group (that does not overlap with OCD in symptom phenomenology) in future research may further clarify the extent to which these findings are unique to OCD (and associated beliefs of inflated responsibility). Research along these lines may further elucidate causal mechanisms that are specific to OCD that can be directly targeted during treatment.

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