Brazilian Journal of Psychiatry. 2019 May-Jun;41(3):257–260
Brazilian Psychiatric Association
Revista Brasileira de Psiquiatria
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BRIEF COMMUNICATION

No evidence of attentional bias toward angry faces in patients with obsessive-compulsive disorder

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Objective: Although attentional bias (AB) toward angry faces is well established in patients with anxiety disorders, it is still poorly studied in obsessive-compulsive disorder (OCD). We investigated whether OCD patients present AB toward angry faces, whether AB is related to symptom severity and whether AB scores are associated with specific OCD symptom dimensions.
Methods: Forty-eight OCD patients were assessed in clinical evaluations, intelligence testing and a dot-probe AB paradigm that used neutral and angry faces as stimuli. Analyses were performed with a one-sample *t*-test, Pearson correlations and linear regression.
Results: No evidence of AB was observed in OCD patients, nor was there any association between AB and symptom severity or dimension. Psychiatric comorbidity did not affect our results.
Conclusion: In accordance with previous studies, we were unable to detect AB in OCD patients. To investigate whether OCD patients have different brain activation patterns from anxiety disorder patients, future studies using a transdiagnostic approach should evaluate AB in OCD and anxiety disorder patients as they perform AB tasks under functional neuroimaging protocols.

Keywords: Threat; anxiety; cognition; reaction time; emotion; attention

Introduction

Obsessive-compulsive disorder (OCD) is a mental disorder affecting 2.3% of the population.[1] It typically leads to functional impairment and distress in individuals and their families. Study of the psychological processes involved in OCD can help clinicians better understand and treat OCD and OCD-related disorders. Although many psychological processes characterizing OCD have been described, its pathophysiology remains elusive.[2] Therefore, efforts to investigate psychological processes associated with OCD are still needed.

In the present context, attentional bias (AB) refers to greater allocation of attention to threatening stimuli than to neutral stimuli.[3] In general, a bias toward threat-related information has been demonstrated in anxiety disorders such as social and specific phobia and generalized anxiety disorder,[3] disorders that frequently co-occur with OCD. Extensive research on AB has been conducted, particularly studies involving angry faces. Generally, patients with a moderate to high anxiety level are vigilant against threats.[4-6] Although investigation into whether OCD involves AB is underway,[7-9] there are still relatively few studies about it. These studies have involved different tasks and have resulted in mixed findings.[10-13]

For example, the emotional Stroop task,[12-14] the visual probe task[9,15] and the spatial cueing paradigm[7,8,16] have been used to study AB in OCD patients, with inconsistent findings. Although there has been no meta-analysis regarding AB in OCD, a review of the literature indicates that some studies have found positive results, especially when focusing their analysis on specific symptom dimensions,[8,12,13,15] while the majority have found negative results.[7,9,14,17,18]

Although the dot-probe task is one of the most widely used methodologies for assessing AB,[5] to the best of our knowledge, this is the first study in which threatening faces have been used as a stimulus with this task to evaluate OCD patients. Therefore, the objective of this study was to identify whether OCD patients have AB toward angry faces and whether this bias is related to symptom severity. We hypothesized that patients would be biased towards angry faces and that the bias scores would be associated with clinical symptomatology (OCD and anxiety symptom severity). We also explored the associations between specific OCD symptom dimensions and attention bias.

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Submitted Apr 19 2018, accepted Sep 12 2018, Epub Dec 06 2018.

How to cite this article: Skinazi M, de Mathis MA, Cohab T, de Marco e Souza M, Shavitt RG, Miguel EC, et al. No evidence of attentional bias toward angry faces in patients with obsessive-compulsive disorder. Braz J Psychiatry. 2019;41:257-260. http://dx.doi.org/10.1590/1516-4446-2018-0130

Methods

Participants and procedures

This study was approved by the medical ethics committee of Hospital das Clínicas, Faculdade de Medicina, Universidade de São Paulo, and all subjects gave their written informed consent. Forty-eight participants with OCD (18 males, age range 19-63 years) were recruited from the outpatient clinic of the Obsessive-Compulsive Spectrum Disorders Program, Faculdade de Medicina, Universidade de São Paulo, or by Internet announcements. Inclusion and exclusion criteria can be found in the supplementary material.

We used the following instruments: 1) the Structured Clinical Interview for the DSM-III-R (SCID) to evaluate psychiatric disorders[19,20]; 2) the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) to measure OCD severity and scores for obsession and compulsion[21]; 3) the Dimensional Y-BOCS (DY-BOCS), which investigates five OCD symptoms dimensions and their severity (aggression, sexual/religious, symmetry, cleaning and hoarding)[22]; 4) the Beck Depression and Anxiety Inventories (BDI and BAI, respectively) for measuring depression and anxiety symptoms[23,24]; 5) the Wechsler Abbreviated Scale of Intelligence (WASI) to measure IQ. Although IQ was evaluated, it was not an inclusion criterion.[25]

Dot probe paradigm

AB was evaluated with the dot-probe task, using faces depicting angry (closed mouth) and neutral expressions: 10 different pairs of pictures (5 male, 5 female) were used (Figure 1A). After the stimuli were shown for 500 ms, subjects had to push a button as quickly as possible when a cue appeared below one of the pictures (an arrow to the right or the left). We analyzed the response time (RT), in milliseconds (ms), which can be considered a snapshot of the subject's attention. The existence of AB was calculated by the difference between the RT in congruent and incongruent trials for each participant. More details about the paradigm and the preprocessing of the data can be found in the supplementary material. The task was performed on a laptop using two sets of pictures of facial expressions from the NimStim face stimulus set.[26]

Statistical analysis

A one-sample *t*-test was used to calculate whether the mean AB of all participants was significantly different from zero. We also calculated AB scores according to DY-BOCS dimensions: i.e., we ran analyses to test whether the AB was different from zero when subjects that did not present that particular OCD dimension were excluded. Finally, we performed a linear regression analysis to see if any of the individual DY-BOCS scores (independent variables) helped explain the mean AB scores (dependent variable).

After calculating the AB, we also correlated these values with clinical data, using Pearson correlations to test any associations between AB and global OCD severity, OCD-specific dimension severity and anxiety and depression symptoms. Demographic variables were analyzed with descriptive statistics and a one-sample chi-square test. JASP version 0.8.4.0 was used for all statistical analyses. All tests were two-sided with an alpha value of < 0.05.

Results

The mean age and IQ of participants were 39 and 100, respectively (Table 1). Most patients had undergone psychiatric treatment previously: 91% (n=44) had used psychiatric medication, mainly serotonin selective reuptake

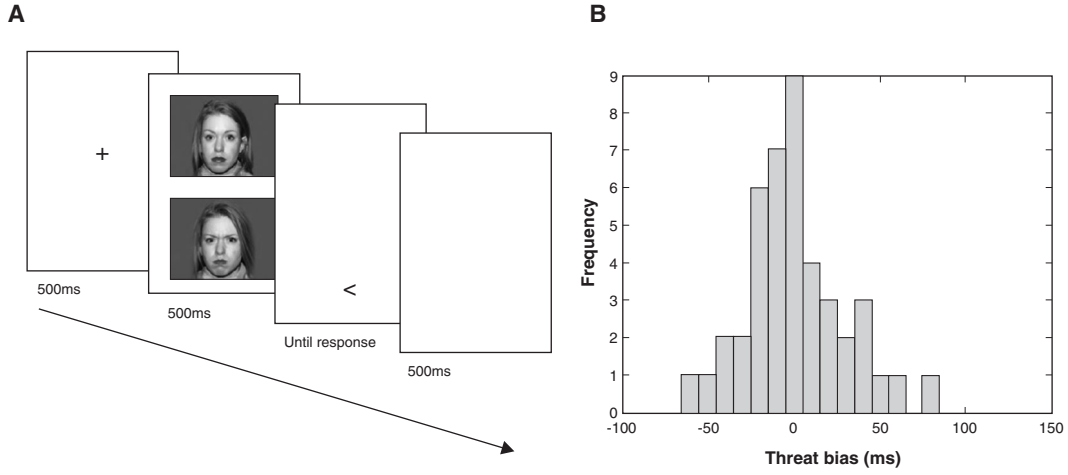

Figure 1 A) Timeline in a dot-probe trial. After 500 ms of cross-fixation, two pictures were shown for another 500 ms and then an arrow appeared in the top or bottom part of the screen. The subject was instructed to press the mouse button that corresponded to the arrow as quickly as possible without compromising accuracy. Patients were instructed to press the bottom left or right touchpad button when $<$ or $>$ appeared, respectively. B) Histogram of the AB score distribution (ms) to angry faces in 48 obsessive-compulsive disorder (OCD) patients. According to the Kolmogorov-Smirnov test, this histogram is normally distributed (p = 0.711).

Table 1 Clinical and demographic data and attentional bias scores of 48 OCD patients

	OCD patients (n=48)	p-value	*r*
Demographic measures			
Gender - male, n (%)	18 (37%)	-	-
Age	39.3 (10.6) [19-63]	-	-
IQ	100.5 (14.0) [58-125]	-	-
Clinical measures and correlations with AB*			
Age of symptom onset	12.8 (6.8) [4-34]	0.135	0.23
Y-BOCS obsession	15.3 (3.2) [8-20]	0.182	0.20
Y-BOCS compulsion	15.1 (3.7) [1-20]	0.712	-0.05
Y-BOCS total	30.4 (5.8) [18-40]	0.622	0.08
DY-BOCS aggression	7.2 (5.4) [0-15]	0.365	0.14
DY-BOCS sexual and religious	5.3 (6.1) [0-15]	0.205	0.20
DY-BOCS symmetry	9.9 (4.0) [0-15]	0.579	-0.08
DY-BOCS cleaning	7.91 (5.48) [0-15]	0.447	-0.12
DY-BOCS hoarding	2.5 (4.1) [0-13]	0.175	-0.21
BDI	21.93 (9.86) [1-49]	0.566	0.09
BAI	18.04 (10.47) [0-41]	0.611	0.08
RT and AB scores p-value, n (%)†			
RT for all trials (ms)	656 (126)	-	-
RT for Angry-congruent (ms)	656 (124)	-	-
RT for Angry-incongruent (ms)	656 (129)	-	-
AB	0.04 (30.4)	0.993	-

Data presented as mean (standard deviation) [range], unless otherwise specified.
AB = attentional bias; BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; DY-BOCS = Dimensional Yale-Brown Obsessive Compulsive Scale; IQ = intelligent quotient; OCD = obsessive-compulsive disorder; RT = response time; Y-BOCS = Yale-Brown Obsessive Compulsive Scale.
* Pearson's correlation; † one-sample *t*-test.

inhibitors, and 79% (n=38) had undergone psychotherapy. Psychiatric comorbidities did not play a role in our results and can be seen in the supplementary material.

The accuracy was above 0.98, which indicates that our subjects were paying attention to the task. The mean RT are presented in Table 1 and the observed AB was 0.04 ms, indicating no evidence of AB in these patients. Figure 1B shows the AB score distribution in our sample.

In addition, there were no significant results when the subjects were analyzed according to separate OCD dimensions (Table 1). Furthermore, null results were obtained when analyzing only subjects who presented DY-BOCS scores > 0 for each dimension: aggression (n=30); sexual/religious (n=20); symmetry (n=42); cleaning (n=34); and hoarding (n=14) (all $p > 0.075$).

No significant correlation between AB and clinical data were observed (Table 1). Likewise, the age of OCD symptom onset did not play a role in AB: we tested the correlation between AB and the age of OCD symptom onset, including dividing the subjects into groups according to onset age (> 18 and < 18 years); however, all analyses gave non-significant results. Finally, we found no positive results in a linear regression model that included all OCD symptom dimension (DY-BOCS) scores as independent variables.

Discussion

Although consistent positive AB results indicate a threat bias in anxiety disorder patients,[5] no evidence of AB was found in this study. In OCD, the AB results are inconclusive and divergent so far.[8,13-15] The first hypothesis regarding our negative results is that no previous study has used faces as a stimulus: most have used OCD-relevant stimuli, such as OCD-related words[12,15] or OCD-relevant visual stimuli.[8] Thus, it is possible that having specific OCD-related pictures in our task might have led to different outcomes. Given the phenomenology of OCD (highly heterogeneous), it is possible that idiosyncratic stimuli would be more recommended for eliciting symptoms and disrupting task behavior. Moreover, the type of paradigm has differed among studies – we used the dot-probe task, whereas others have used the emotional Stroop task or emotional spatial-cueing tasks.

The different attention orientation findings for anxiety disorders and OCD could be related to the involvement of distinct neural systems. Anxiety disorders have been linked to individual differences in the amygdala, an important neural mechanism that mediates automatic threat vigilance.[5] Although neuroimaging studies of OCD patients have suggested amygdala abnormalities, most studies point to the involvement of frontal-striatal circuits.[2] Therefore, neurobiological differences between OCD and anxiety disorders could explain why OCD patients did not present AB toward angry faces in our study.

Furthermore, we found no correlations between age of OCD symptom onset, OCD severity, severity of specific-OCD symptom dimensions, or anxiety and depression severity with AB. Although we observed normally distributed AB scores (Figure 1B), our results support the idea that AB is independent of and unrelated to OCD severity. Additionally, specific-OCD symptom dimension scores did not correlate with AB, which may suggest that the circuitry underlying each dimension, as evidenced by previous studies,[11] is not associated with AB. Similarly, depression and anxiety severity did not influence

AB scores. It is possible that our patients' anxiety levels were not high enough to interfere with AB; perhaps only patients with a full diagnosis of an anxiety disorder will have the level of brain circuitry impairment necessary to disrupt attention and produce AB.[20] Moreover, since OCD is a heterogeneous condition, it is possible that a subgroup of OCD patients (and related disorders) could present AB, along with neurobiological characteristics similar to anxiety patients. These questions and hypotheses should be further evaluated in transdiagnostic studies using neuroimaging techniques.

Some limitations should be pointed out. First, this study's lack of a control group prevents us from comparing subjects with and without OCD who have similar characteristics. However, a previous meta-analysis of 2,906 non-anxious individuals indicated no presence of threat-related bias.[3] Therefore, comparing threat bias scores against 0 is likely to be sufficient for testing the study hypothesis. Second, the negative AB results in our sample of OCD patients could be related to the method or the stimuli. Third, although the patients had been medically stable for at least 12 weeks, the use of medication may have interfered. In conclusion, our analyses revealed no AB toward threat stimuli in OCD patients. Future studies should dedicate attention to specific OCD-related content that is tailored to the dimensions and specific symptoms of each patient.

Acknowledgements

Financial support was provided by the Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP; grants 2016/05865-8 to MCB and 2011/21357-9 to ECM).

We thank Sonia Borcato and Aline Simionato for their assistance with data collection, and Giovanni A. Salum and Abend Rany for their valuable comments.

Disclosure

The authors report no conflicts of interest.

References

1 Armstrong T, Sarawgi S, Olatunji BO. Attentional bias toward threat in contamination fear: overt components and behavioral correlates. J Abnorm Psychol. 2012;121:232-7.
2 Bar-Haim Y, Lamy D, Pergamin L, Bakermans-Kranenburg MJ, van IJzendoorn MH. Threat-related attentional bias in anxious and nonanxious individuals: a meta-analytic study. Psychol Bull. 2007; 133:1-24.
3 Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: psychometric properties. J Consult Clin Psychol. 1988;56:893-7.
4 Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. Arch Gen Psychiatry. 1961;4:561-71.
5 Bradley BP, Mogg K, Millar NH. Covert and overt orienting of attention to emotional faces in anxiety. Cogn Emot. 2000;14:789-808.
6 Cisler JM, Olatunji BO. Components of attentional biases in contamination fear: evidence for difficulty in disengagement. Behav Res Ther. 2010;48:74-8.
7 Frewen PA, Dozois DJ, Joanisse MF, Neufeld RW. Selective attention to threat versus reward: meta-analysis and neural-network modeling of the dot-probe task. Clin Psychol Rev. 2008;28:307-37.
8 Goodman WK, Price LH, Rasmussen SA, Mazure C, Fleischmann RL, Hill CL, et al. The Yale-Brown Obsessive Compulsive Scale. I. Development, use, and reliability. Arch Gen Psychiatry. 1989;46: 1006-11.
9 Harkness EL, Harris LM, Jones MK, Vaccaro L. No evidence of attentional bias in obsessive compulsive checking on the dot probe paradigm. Behav Res Ther. 2009;47:437-43.
10 van den Heuvel OA, Remijnse PL, Mataix-Cols D, Vrenken H, Groenewegen HJ, Uylings HB, et al. The major symptom dimensions of obsessive-compulsive disorder are mediated by partially distinct neural systems. Brain. 2009;132:853-68.
11 Kyrios M, Iob MA. Automatic and strategic processing in obsessive-compulsive disorder: attentional bias, cognitive avoidance or more complex phenomena? J Anxiety Disord.1998 Jul-Aug;12(4): 271-92.
12 Lavy E, van Oppen P, van den Hout M. Selective processing of emotional information in obsessive compulsive disorder. Behav Res Ther. 1994;32:243-6.
13 Mogg K, Bradley BP. Anxiety and attention to threat: Cognitive mechanisms and treatment with attention bias modification. Behav Res Ther. 2016;87:76-108.
14 Moritz S, von Mühlenen A. Investigation of an attentional bias for fear-related material in obsessive-compulsive checkers. Depress Anxiety. 2008;25:225-9.
15 Moritz S, Fischer BK, Hottenrott B, Kellner M, Fricke S, Randjbar S, et al. Words may not be enough! No increased emotional Stroop effect in obsessive-compulsive disorder. Behav Res Ther. 2008;46: 1101-4.
16 Moritz S, Von Mühlenen A, Randjbar S, Fricke S, Jelinek L. Evidence for an attentional bias for washing- and checking-relevant stimuli in obsessive-compulsive disorder. J Int Neuropsychol Soc. 2009;15: 365-71.
17 Pauls DL, Abramovitch A, Rauch SL, Geller DA. Obsessive-compulsive disorder: an integrative genetic and neurobiological perspective. Nat Rev Neurosci. 2014;15:410-24.
18 Rosario-Campos, M C, E C Miguel, S Quatrano, P Chacon, Y Ferrao, D Findley, Rosario-Campos MC, Miguel EC, Quatrano S, Chacon P, Ferrao Y, Findley D, et al. The Dimensional Yale-Brown Obsessive-Compulsive Scale (DY-BOCS): an instrument for assessing obsessive-compulsive symptom dimensions. Mol Psychiatry. 2006;11: 495-504.
19 Ruscio AM, Stein DJ, Chiu WT, Kessler RC. The epidemiology of obsessive-compulsive disorder in the National Comorbidity Survey Replication. Mol Psychiatry. 2010;15:53-63.
20 Salum GA, Mogg K, Bradley BP, Gadelha A, Pan P, Tamanaha AC, et al. Threat bias in attention orienting: evidence of specificity in a large community-based study. Psychol Med. 2013 Apr;43(4):733-45.
21 First MB, Williams JBW, Spitzer RL, Gibbon MStructured Clinical Interview for DSM-IV Axis I disorders (SCID) [Internet]. 1996 [cited 2018 Sep 19]. https://www.ptsd.va.gov/professional/assessment/adult-int/scid-ptsd-module.asp
22 Sizino da Victoria M, Nascimento AL, Fontenelle LF. Symptom-specific attentional bias to threatening stimuli in obsessive-compulsive disorder. Compr Psychiatry. 2012;53:783-8.
23 Tata PR, Leibowitz JA, Prunty MJ, Cameron M, Pickering AD. Attentional bias in obsessional compulsive disorder. Behav Res Ther. 1996;34:53-60.
24 Tottenham N, Tanaka JW, Leon AC, McCarry T, Nurse M, Hare TA, et al. The NimStim set of facial expressions: judgments from untrained research participants. Psychiatry Res. 2009;168:242-9.
25 Wechsler DWechsler abbreviated scale of intelligence (WASI). New York: Psychological Corporation: Harcourt Brace & Company; 1999.
26 Zhang ZM, Wang MY, Guo X, Miao X, Zhang T, Gao D, et al. Attentional avoidance of threats in obsessive compulsive disorder: an event related potential study. Behav Res Ther. 2017;97:96-104.