

Is Attentional Bias To Idiosyncratic Stimuli Related To Borderline Symptomatology?

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Short report

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Abstract

Background: In borderline personality disorder, attentional bias to emotional stimuli may be a fundamental component in their origin and maintenance. However, the authors seem divided between the hypothesis of *hypervigilance for negative stimuli* and the hypothesis of *over-reactivity against any type of stimuli*.

Aims: We aimed to observe the association between borderline symptoms and the allocation of attention to neutral, idiosyncratic negative and general negative emotional words.

Method: We tested thirty-five portuguese university students, aged between 18 and 40 years old with an *Emotional Stroop* paradigm.

Results: Our results suggest that a higher score of *borderline* symptoms are associated with a greater interference of idiosyncratic negative words in the colour identification task.

Conclusions: These results support the hypervigilance hypotheses for idiosyncratic borderline stimuli. In other words, this study suggested that borderline symptoms is linked to an inability to disengage attention from negative words typically of borderline disorder. Based on these findings, mood-dependent therapeutic interventions focusing on attentional processes may represent a useful contribute to established therapies in patients with BPD.

Introduction

Subjects with *borderline* symptoms tend to present an impaired emotional regulation competence regarding attentional development – the ability to direct attention to a neutral or positive emotional situation – and cognitive change, which is the capability to modify the way people assess the situation and its associated emotional significance. *Attentional bias to threat* – typically found on these individuals – leads to the maintenance of their symptoms and to emotional dysregulation (Bland, Williams, Scherer, & Manning, 2004; Unoka, Fogd, Füzy, & Csukly, 2011).

Emotional Stroop is a useful approach to experimentally investigate the emotional regulation, more particularly the attentional bias for emotionally charged stimuli (Gross, 2014). This task is an adaptation of the original test (Stroop, 1935), in which the stimuli are coloured words with an emotional meaning for the subjects, thus taking more time in naming the colours in which those words are written, due to the interference of automatic emotional processes (Cabaco, 1998). Several studies have concluded that individuals with an emotional disorder have a selective processing for negative or idiosyncratic stimuli (i.e. related to their disorder), which will result in a delay in the naming colours task when faced with an *Emotional Stroop* (Arntz, Appels & Sieswerda, 2000; Gilboa-Schechtman, Reville & Gotlib, 2000; Herreras & Cela, 2006).

The assessment of *borderline* subjects with the *Emotional Stroop* task was primarily made by Arntz and colleagues (2000), who demonstrate that *borderline* patients are slower in naming all negative emotional words, regardless of whether they are associated with their disorder or not, when compared to the control group; however, were not slower than other patients with others personality disorders. Hypervigilance was therefore directed to negative emotional words, although it wasn't restricted to *borderline* patients. On the other hand, Portella and colleagues (2011) failed to replicate this study, because *borderline* patients had longer response times than controls for all words, regardless of their valence. This result led the authors to speculate that these subjects present an over-reactivity to all emotional stimuli, rather than the specific hypervigilance suggested by Arntz and colleagues (2000). In this way, confrontation with idiosyncratic words may trigger negative subjective experiences that persist during the test, impairing the reaction to subsequent words, whether neutral or positive – due to the inability in emotional regulation after seeing a personally relevant stimulus (Linehan, 1993; Portella et al., 2011).

Given the inconsistency between these two studies that used *Words Emotional Stroop* in patients with *borderline* disorder, we intended to investigate whether there is primacy of any hypotheses (hypervigilance vs. over-reactivity) relative to the attentional bias for emotion in subjects with *borderline* symptoms. Our main objective was to clarify the association between *borderline* personality symptoms and attentional processing of emotional and neutral words.

Method

Participants

Thirty-five university students aged between 18 and 40 years ($M = 22.1$; $SD = 1.88$; $\bar{x} = 26$) were included in this study. The mean of educational level was 13.8 years ($SD = 1.7$). All participants were assessed for *borderline* personality symptoms. The sample was non-stratified and selected from the general population. Exclusion criteria included the presence of previous neurological or psychiatric illness, determined by a sociodemographic and clinical questionnaire.

Measures

A sociodemographic questionnaire was applied to record individual data and clinical history. After that, the Portuguese version of the Borderline Symptom List - Short version (BSL23; Albuquerque & Medina, 2010 cit. in Silva, 2014; Bohus et al., 2009) was administered. BSL23 is a self-report questionnaire used to assess the presence and severity of *borderline* symptomatology, consisting of 23 items answered on a 5-point scale (from “1 – None” to 5 – Very Much”). This instrument has good psychometric properties ($\alpha = .94$ to $.97$ for the original version and $\alpha = .96$ for the portuguese version). The BSL23 is divided into seven subscales: *Negative Self-Perception*, *Affective Regulation*, *Self-Destruction*, *Dysphoria*, *Solitude*, *Intrusions* and *Hostility*. It also includes the Global Score, resulting from the sum of the results obtained in each subscale.

Task

Emotional Stroop. The stimuli of the *Emotional Stroop* task were 15 words carefully selected from the study by Portella (2011), which are divided into three valences: *borderline* negative words (Depression, Suicide, Solitude, Abandonment and Lack of Control), generic negative words (Hate, Corpse, Sorrow, Failure and Catastrophe) and neutral words (Clock, Crossing, Custom, Mountain and Dancer). The words were randomly presented in four colours (yellow, red, green and blue), placed on a grey background screen. The answer was given using a box with a four-button keyboard (yellow, red, green and blue) placed in front of the participants. The presentation of the stimuli and the recording of responses and reaction times were done using *Presentation 0.76* software. In agreement with previous studies, a block design was used (Shin et al., 2001). Four blocks were organized for each category, in a total of 12 blocks; in each of them, the five words in that category appeared four times (once in each colour, resulting in 20 items per block). Words' presentation time within each block is shown in Fig. 1. Each block had a duration of approximately 30s.

Procedure

All participants signed an informed consent and completed the sociodemographic questionnaire, as well as the BSL23, to assess the subclinical symptoms of *borderline* personality. Finally, the *Emotional Stroop* task was administered in a laboratory room, ensuring a completely noise-free environment. The task procedure was explained verbally and there was a training phase to familiarize the patients before it started.

Statistical analysis was used to evaluate the association between *borderline* symptoms and the *Stroop effect*, assessing the interference of words' content in the response latency. To test these associations, *Pearson* correlations were made using SPSS (*Statistical Package for the Social Sciences, version 20.0*).

Results

Effect of Emotional Stroop and association with BSL23 (global and subscales)

The effect of word content interference on the latency of colour identification responses (*Emotional Stroop* effect) was estimated. It was understood by effect of *Emotional Stroop* an increase in the colour identification time due to the interference of the emotional words' content. Thus, the difference between the response latency to the *borderline* words and the latency of the neutral word responses was calculated, this difference being a measure of the specific interference effect of *borderline* stimuli; the difference between responses latency to negative words and responses latency to neutral words was calculated, this being an effect of generic negative stimuli interference; and the difference between the responses latency to *borderline* words and responses latency to the negative words was calculated, this difference being a measure of the specific interference effect of the *borderline* stimuli against the generic negative stimuli.

Analysis of the association between the variations observed in the *Stroop effect* indicators and the *borderline* symptoms is shown in Table 1. Generally, there are significant positive coefficients only when the *Stroop effect* involves *borderline* words. There were positive correlations between the *Stroop effects* expressed by the comparison of *borderline* words with neutral words ($r = .347$; $p = .04$) and with negative words ($r = .369$; $p = .03$) and the overall score of BSL23. An equivalent interference pattern is observed for the scores on the *Negative Self-perception, Dysphoria, Solitude* and *Intrusion* subscales. These results show some consistency and suggest that more marked *borderline* symptoms are associated with a greater slowdown in responding to idiosyncratic words of this personality disorder (compared to negative and neutral words).

Table 1
Pearson correlations between BSL23 subscales and *Emotional Stroop* effect

	SE Negative-Neutral	SE Borderline-Neutral	SE Borderline-Negative
BSL23 Global Score	-.063	.347*	.369*
Self-Perception	-.253	.372*	.564**
Affective Regulation	-.235	.179	.366*
Self-Destruction	.087	.258	.155
Dysphoria	.043	.403*	.328
Solitude	-.128	.326	.413*
Intrusions	-.083	.308	.350*
Hostility	.005	.095	.078
Note. SE: <i>Stroop</i> Effect.			
* $p \leq .05$, ** $p \leq .01$.			

Discussion

Emotional dysregulation, associated with an attentional bias to threat, has been studied as a factor of origin and/or maintenance of *borderline* personality disorder. In this context, our objective was to evaluate if there was an association between the attentional bias for emotion and *borderline* symptoms – trying to identify the stimuli load that activated this bias.

Our results suggest that *borderline* symptoms are associated with an *Emotional Stroop* effect for idiosyncratic negative words. Negative words related to *borderline* symptoms (e.g, "Solitude" or "Abandonment") elicit slower colour identification responses in participants with *borderline* symptoms than when they are responding to neutral or generic negative words. These results seem to be partially coincident with the results obtained by Arntz and collaborators (2000), Linehan (1993) and Sieswerda, Arntz, Mertens and Vertommen (2007), in which it was possible to support that subjects with *borderline*

symptoms develop an information processing bias, therefore suffering from a hypervigilance mediated by their cognitive schema directed toward negative signs associated with the disorder.

Another empirical evidence that seems to go toward our results concerns the absence of a significant association between the non-idiosyncratic *Stroop effect* and the *borderline* personality symptoms: the interference of generic negative words (as opposed to neutral words) seems to be a cross-sectional effect and not be heightened in participants with *borderline* symptoms. Once again, this result reinforces the hypothesis of a hypervigilance specific for idiosyncratic stimuli.

In conclusion, the results of this investigation seem to reinforce the notion that *Emotional Stroop* is particularly relevant for *borderline* personality research, both in investigative and clinical perspectives, because it's an implicit measure that allows to determine the *borderline* diagnosis and its features. The results obtained with this task contribute to the discussion around attentional bias in subjects with *borderline* personality disorder, supporting the hypothesis that individuals with *borderline* symptoms present a specific hypervigilance for words idiosyncratically associated with their disorder. Furthermore, based on these findings, mood-dependent therapeutic interventions focusing on attentional processes may represent a useful contribute to established therapies in patients with BPD.

Despite the consistency of the results, this study presents some limitations. The reduced size of the sample and the disparity between sexes prevented more robust and generalizable analyses. As future work proposals, it would be interesting to evaluate a clinical group with *borderline* personality and to add psychophysiological measures (e.g. galvanic skin response and heart rate) to verify if the observed interference has repercussions at a physiological level.

Declarations

Ethical approval and consent to participate: The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Scientific Committee of Faculty of Human and Social Sciences, Universidade of Algarve (Ethical approval code CC-24/2018). Informed consent was obtained from all subjects involved in the study.

Consent for publication: All authors read and agreed to the published version of the manuscript.

Availability of data and materials: The datasets generated during and analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare no conflict of interest.

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Teresa Martins, Luis Faisca and Laura Ferreira –review & editing: all authors.; Supervision, Ana Teresa Martins and Luís Faísca. All authors have read and agreed to the published version of the manuscript.

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Figures

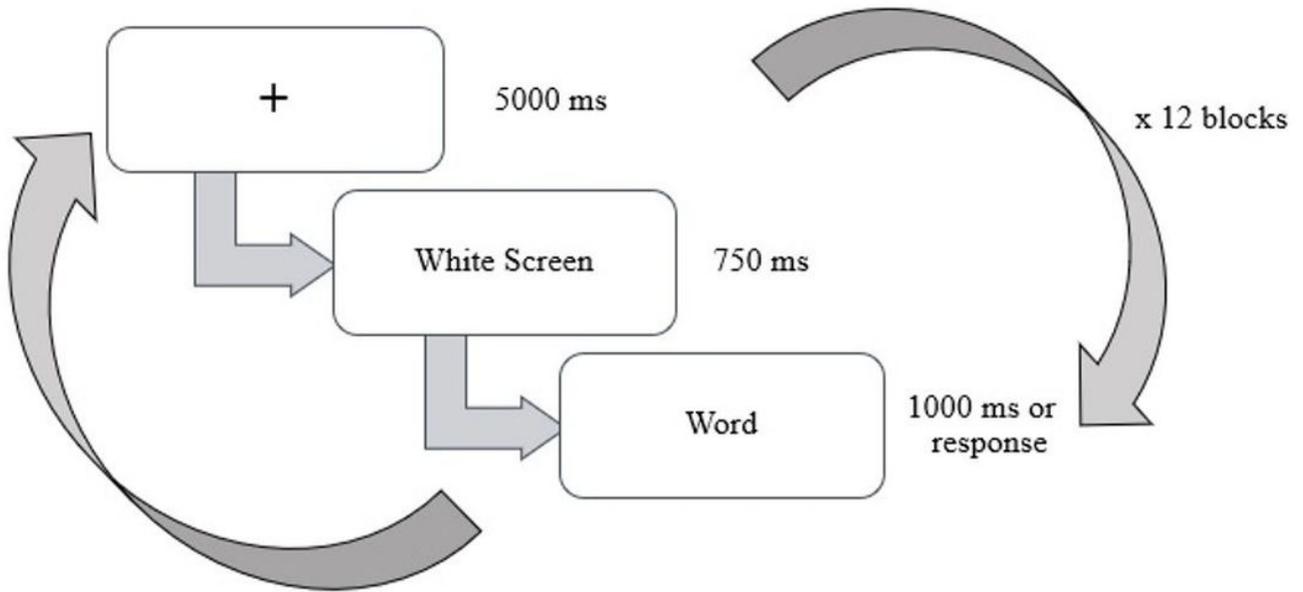


Figure 1

Stimuli presentation time in each block (Emotional Stroop Task)