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Are emotional action tendencies and attentional bias related to temperament dimensions in patients with borderline personality disorder?

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ABSTRACT

Disturbances in emotion regulation have been identified as a core feature of patients with a borderline personality disorder (BPD). Findings of studies using experimental measures of emotion processing are mixed, which may be partially explained by the heterogeneity of the BPD population. To address this issue, we investigated differences in experimental measures of emotional action tendencies (approach-avoidance behaviour) and attentional bias to emotional stimuli in BPD subtypes. Data of the Approach-Avoidance Task (AAT) and the Emotional Stroop Task (EST) were collected in 140 BPD patients, previously clustered into four BPD subtypes based on temperament dimensions. We investigated (1) the relationship between temperament dimensions and the performance on the AAT and EST and (2) compared performance on these tasks in previous defined BPD subtypes. The results of the present study demonstrated a positive relationship between effortful control (EC) and AAT effect-scores. A higher level of EC was positively associated with a general emotional action tendency towards faces with directed gaze, even when controlling for gender, age and BPD severity. Preliminary results on the comparison of the BPD subtypes demonstrated no significant differences in AAT and EST performance. These findings emphasize the relevance of EC in emotional action tendencies in BPD patients.

1. Introduction

Emotional dysregulation is viewed as a core feature of borderline personality disorder (BPD; e.g., Glenn and Klonsky, 2009). Emotion regulation deficits have been linked to impulsive or maladaptive behaviours such as non-suicidal self-injury, suicidal behaviour and treatment drop-out (e.g., Schmahl et al., 2014). Although characteristics of emotion processing in BPD have been extensively investigated, results of studies using experimental measures are mixed (Rosenthal et al., 2008). The inconclusive results may be partially explained by the heterogeneous traits present in the BPD population.

In an earlier study (Sleuwaegen et al., 2017) an attempt was made to disentangle the heterogeneity in BPD based on differences in patients temperament. Reactive and regulative temperament traits were measured using the Behavioral Inhibition and Behavioral Activation Scales (BIS/BAS; Carver and White, 1994) and the Effortful Control Scale (ECS-ATQ; Evans and Rothbart, 2007) respectively. Results of the study enabled four BPD subtypes to be distinguished. The ‘Low Anxiety’ subtype (21%) was characterized by low levels of BIS reactivity (low

punishment sensitivity/low avoidance). Patients of this subtype reported less anxiety, more expression of emotions and had higher scores relating to antisocial personality disorder (PD) features. The ‘Inhibited’ subtype (24%) was characterized by low levels of BAS reactivity (low reward sensitivity/low approach). These patients reported less hostility, less expression of emotions, and had higher scores relating to avoidant PD features. The last two subtypes showed similar reactive temperaments with moderate levels of BIS and BAS, but differed in their regulative temperament. The ‘High Self-control’ subtype (10%) was characterized by very high levels of effortful control. Patients of this subtype reported fewer clinical symptoms, more adaptive coping strategies and fewer comorbid personality disorder features. On the other hand, the ‘Emotional/Disinhibited’ subtype (45%) demonstrated very low levels of effortful control. These patient were characterized by higher levels of anxiety, less adaptive coping strategies and higher cluster B (histrionic) PD features (see Sleuwaegen et al., 2017). Thus, the two subgroups presenting with the lowest and highest levels of psychopathology (‘High Self-control’ and ‘Emotional/Disinhibited’) only differed on the level of effortful control.

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In support of this, evidence from an earlier study found that levels of effortful control contributed to BPD symptoms (Hoermann et al., 2005). Using self-reported measures, BPD patients with the highest level of effortful control reported the least symptoms and fewest problems in interpersonal functioning and personality organization, whereas those with the lowest level of effortful control reported the most problems in these areas. An additional study demonstrated that lower effortful control and higher BIS in BPD patients resulted in worse performance on a task measuring cognitive control (conflict resolution) (Posner et al., 2002). Preti et al. (2016) therefore concluded that failure of regulatory processes negatively affects performances.

As evidence relating to emotion processing in BPD is inconclusive, temperament dimensions, specifically effortful control might account for some important differences in presentation and reactions to emotional stimuli as measured by performance on experimental tasks (Posner et al., 2003).

Recent studies in BPD patients have demonstrated a biased processing of emotional stimuli (Winter, 2016). Attentional bias to emotional stimuli is often investigated with interfering emotional stimuli being presented during a task. For example, in the Emotional Stroop Task (EST), patients have to name the colour of ink in which emotional or neutral words are printed as fast as possible. In this task, the emotional content of the words may capture attention. Kaiser et al. (2017) found that patients with BPD required more time to name the colour of negative words during the EST, suggesting a negative attentional bias in BPD patients. In addition, Portella et al. (2011) reported that higher severity of BPD psychopathology led to more difficulties in processing information measured by the EST.

Another important emotion-related process is the response to emotional stimuli, often labelled emotional action tendencies. Research on this topic has grown widely since the introduction of the Approach-Avoidance Task (AAT; Rotteveel and Phaf, 2004), where participants have to respond to pictures of happy or angry faces by pushing or pulling a joystick depending on the emotional expression. In general, people respond faster if asked to approach a happy face and to avoid an angry face, compared with the task of approaching an angry face and avoiding a happy face, which need more control to apply counter-intuitive action (Roelofs et al., 2009). Disturbed approach-avoidance tendencies on the AAT are seen in different patient samples. In socially anxious patients, for example, increased avoidance tendencies toward angry and happy faces are observed, whereas in depressed patients a decreased overall approach tendency is observed (Radke et al., 2014; Roelofs et al., 2010). As far as we know, no research to date has explored the emotional action tendencies with the AAT in BPD patients.

As indicated by previous studies, the distinction between BPD patients based on temperament dimensions may provide a framework to better understand the mixed findings relating to emotion processing in BPD (Suvak et al., 2012; Unoka and Richman, 2016, Winter, 2016). To test this, (1) the relationship between temperament dimensions and performance on EST and AAT was investigated and (2) a comparison was made between the previously mentioned BPD subtypes based on temperament dimensions on these two experimental tasks.

Concerning research question 1, the associations between AAT and EST-effects and temperament dimensions were investigated. Since gender, age, and BPD severity may influence the aforementioned associations (e.g., Price et al., 2012), it was explored whether the associations would remain after controlling for these variables. The first hypothesis of this research question was that there would be positive associations between effortful control and both experimental measures (Posner et al., 2003) above and beyond gender, age and BPD severity. It was additionally hypothesized that the level of effortful control would be related to AAT performance, since this task demands some voluntary counterintuitive actions. However, this association was mainly expected in the condition in which faces with a direct gaze were used, since they evoke more intense automatic activation (Roelofs et al., 2009; 2010). The final hypothesis of this research question was that EST

performance may be explained by the level of effortful control, since this task depends on the ability to make subdominant responses.

Concerning research question 2, the four BPD subtypes were compared on their AAT and EST performance. Although the current study compared subtypes with limited sample sizes, it can provide preliminary evidence for differences on action tendencies and attentional bias to emotional stimuli between BPD subtypes. Since this part of the study was more explorative in nature, the only hypothesis was that there would be differences between the two BPD subtypes with contrasting effortful control. The High Self-control subtype (high EC) would perform better on the AAT and EST, while the Emotional/Disinhibited subtype (low EC) would display more approach-avoidance deficits and attentional bias to emotional stimuli (Portella et al., 2011; Posner et al., 2003).

2. Methods

2.1. Participants and procedure

The present study is an extension of research on BPD subtypes based on reactive and regulative temperament (see Sleuwaegen et al., 2017). The original sample consisted of 146 patients (85.6% female), recruited from two psychiatric hospitals in Belgium and diagnosed with BPD by means of the Structured Clinical Interview for DSM-IV Axis I Personality Disorders (SCID-II; First et al., 1997). Within the context of the present study, the AAT and EST were administered in a session following the interview-session. Due to technical error, two patients (of the 'Emotional/Disinhibited' subtype) were excluded, resulting in a dataset of 144 patients. Of this BPD sample, 125 (86.8%) are female and 19 are male (13.2%), with a mean age of 29.30 years ($SD = 8.35$, range 18 to 65 years). 'Low Anxiety' ($n = 31$), 'Inhibited' ($n = 34$), 'High Self-control' ($n = 15$) and 'Emotional/Disinhibited' subtypes ($n = 66$) did not significantly differ with regard to gender, education, marital status or type of medication used (see Sleuwaegen et al., 2017). The study was developed in accordance with the Declaration of Helsinki and approved by the Ethics Committee of Antwerp University and the local ethical committee of the participating hospitals.

2.2. Measures

Reactive temperament was assessed by means of the Behavioral Inhibition/Behavioral Activation System Scales (BIS/BAS; Carver and White, 1994; translated into Dutch by Franken et al. (2005)). The BIS/BAS scales consist of 24-items, rated on a 4-point Likert scale, of which seven items assess BIS reactivity (sensitivity to punishment) and 13 items assess BAS reactivity (sensitivity to reward). The BIS and BAS scales demonstrated acceptable internal consistency in the present sample (both $\alpha = 0.75$).

Regulative temperament was assessed by means of the Effortful Control Scale (ECS) from the short form of the Adult Temperament Questionnaire (ATQ; Evans and Rothbart, 2007), consisting of 19-items, rated on a seven-point Likert scale. The alpha coefficient of the ECS in the present study was 0.78.

Severity of symptoms related to the Borderline Personality disorders were assessed by means of the Assessment of DSM-IV Personality Disorders (ADP-IV; Schotte and De Doncker, 1994), a 94-item Dutch self-report questionnaire used to assess the presence of 10 personality disorders defined in the DSM-IV-TR. Dimensional scores were computed by summing the trait scores on the individual items for each PD scale. The alpha coefficients in the present study for the BPD was $\alpha = 0.67$.

Action tendencies to emotional stimuli were assessed by means of the gaze variant of Approach-Avoidance Task (AAT; developed by Heuer et al. (2007); Radke et al. (2013)). In this task, patients have to respond to pictures of facial expressions (happy, angry) of eight different actors (4 male, 4 female), with different gazes (direct or averted gaze), presented on a computer screen. Patients were instructed to

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