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Trait emotional intelligence and attentional bias for positive emotion: An eye tracking study

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ABSTRACT

Emotional intelligence (EI) may promote wellbeing through facilitation of adaptive attentional processing patterns. In the current study, a total of 54 adults (43 females, mean age = 25 years, SD = 10 years) completed a Trait Emotional Intelligence (TEI) scale and took part in three eye-tracking tasks, where they viewed (1) faces with different emotions (happy, angry, fearful, neutral), (2) 16-face crowds with varying ratios of happy to angry faces, and (3) 4 visual scenes (physical threat, social threat, positive social, neutral). Findings showed that higher TEI was associated with more attention to positive emotional stimuli (happy faces, positive social scenes), relative to negative and neutral stimuli. An attentional preference for positive rather than negative emotional stimuli may be one way that TEI affords protection from stressors to promote mental health.

1. Introduction

Emotional intelligence (EI) captures individual differences in how people perceive, regulate, use, and understand their own emotions and the emotions of others (Nelis, Quoidbach, Mikolajczak, & Hansenne, 2009). EI can be conceptualised in two ways: (1) trait EI (TEI), referring to a constellation of emotional perceptions assessed through questionnaires and rating scales (Petrides, Pita, & Kokkinaki, 2007); and (2) ability EI (AEI), which concerns emotion-related skills and competencies, measured as 'maximum performance', akin to cognitive ability (Mayer, Roberts, & Barsade, 2008). EI is seen as a core individual difference, relating to positive behavioural outcomes across multiple areas of functioning, including relationships, educational achievement, and occupational success (Brackett, Rivers, & Salovey, 2011; Petrides et al., 2016). In particular, EI is a robust predictor of mental health (Martins, Ramalho, & Morin, 2010).

Researchers tend to study the 'static' structure of EI and its descriptive associations with life outcomes rather than its mechanisms of action. In order to substantiate claims of EI as an agent of improved wellbeing, we need to better understand *how* EI works, and specifically how EI relates to key cognitive processes, such as attention (Fiori, 2009; Gutiérrez-Cobo, Cabello, & Fernández-Berrocal, 2016). Since TEI maps onto temperament and personality-related factors (e.g. optimism) that have been shown to influence attentional processing of emotion (Kress & Aue, 2017), it is expected that TEI would also have a role in these processes. Although investigating the input of AEI is also important, there is a pressing need to verify the nomological net of TEI as a non-cognitive, lower order personality trait (Petrides et al., 2016). The focus for the current study is therefore on TEI, rather than AEI.

1.1. Attentional bias to emotion: A role for trait emotional intelligence?

The allocation of attentional resources to emotional stimuli may be one way that EI buffers the effects of stress, ultimately, promoting wellbeing (Davis, in press; Matthews et al., 2015). Fiori (2009) postulates that EI should facilitate attention to emotional information. However, if TEI is adaptive, according to extant literature on adaptive attentional processing (Mogg & Bradley, 1998; Weierich, Treat, & Hollingworth, 2008, Yiend, 2010), higher levels should relate to reduced attention towards threatening/negative emotional material in non-stressful conditions, and vice versa in stressful conditions. Such an attentional profile would also be consistent with findings indicating an attention and memory bias towards positive emotional content in optimistic people (Kress & Aue, 2017), given measures of TEI tap that trait.

A systematic review assessed the relationship between EI and

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cognition (e.g. attention, memory, decision-making processes) through laboratory tasks (Gutiérrez-Cobo et al., 2016). Of the 26 studies identified, only four used attention for the primary cognitive focus (3 TEI; 1 AEI), making drawing conclusions about attentional processes and EI challenging. Mikolajczak, Roy, Verstrynge, and Luminet (2009) identified significant effects in a word dot probe task: those with high TEI (though only trait self-control) allocated more attentional resources towards emotional words (versus neutral words) under stressful conditions. In a word-based emotional Stroop task, Coffey, Berenbaum, and Kerns (2003) found a positive relationship between TEI (attention to emotion subscale) and attention towards emotional (relative to non-emotional) words, whereas Fisher et al. (2010) identified a *negative* relationship between TEI and attention to negative stimuli. However, Matthews et al. (2015) found no association between TEI and attentional processing of either emotional (faces) or neutral (nuts) stimuli. Overall, findings linking EI to attentional processing of emotional stimuli are mixed.

A limitation of the above studies concerns ecological validity, namely the use of words, or isolated faces, as a stimuli source, rather than salient emotional images (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van IJzendoorn, 2007). Because emotional faces are rarely presented in isolation in everyday life, stimuli such as the "face in the crowd" paradigm, or emotional scenes, are more socially relevant (Pinkham, Griffin, Baron, Sasson, & Gur, 2010; Yiend, 2010). It is also worth noting that studies only examined the link between TEI and attention towards emotional stimuli in general (versus neutral), without testing whether the relationship is contingent on emotion type (i.e. positive, negative). Furthermore, in the field of attentional processing, eye-tracking techniques provide a more rigorous paradigm whereby attention can be directly and continuously measured, compared to behavioural measures such as reaction time data (Waechter, Nelson, Wright, Hyatt, & Oakman, 2013). Only one study has examined the relationship between EI and attention to emotion via eye movements (Davis, in press). In that dot-probe study, participants' attentional fixation towards happy, sad, angry, and neutral faces were captured in either stressful or non-stressful conditions. A complex myriad of effects were found for TEI and AEI, with findings challenging the notion of TEI as an adaptive construct because it was associated with *hypervigilance* towards angry and sad faces.

1.2. The present study

The current study is the first to use a range of ecologically valid emotional stimuli ("face in the crowd" paradigm; emotional scenes) to probe the influence of TEI on attentional processing using eye-tracking technology. Based on theory that threat avoidance in non-stressful situations confers adaptive processing (Mogg & Bradley, 1998), and the assumption that high TEI individuals might have similar attentional bias towards positive stimuli to those high in trait Optimism (e.g., Kress & Aue, 2017), two hypotheses were tested. H1 predicted that there would be a negative association between TEI and fixation time for negative emotional material, relative to positive and neutral material; H2 predicted that finding would generalise to different stimuli types (i.e. faces, crowds, scenes). An implicit assumption prevails in the literature that higher EI is always adaptive, but that may not be the case. Both Davis and Nichols (2016) and Qualter, Whiteley, Hutchinson, and Pope (2007) discuss the idea of an EI threshold, where there is an *optimum* level before effects plateau (or become negative). Hence, the present study included quadratic analyses to capture any non-linear effects of EI on attention processing.

2. Method

2.1. Participants and procedure

54 UK adults (43 females; 11 males) with a mean age of 25 years (SD = 10 years) were recruited from staff and student cohorts at a University in the North West of England, UK. Ethical approval was obtained from the University Ethics Committee. The same sample participated in all three experimental tasks. Upon arrival to the experimental room, informed consent was obtained, and participants completed the Trait Emotional Intelligence Questionnaire – Short Form (Petrides, 2009). Participants took part in three passive picture-viewing tasks outlined below (with presentation order counterbalanced) where eye movements were monitored using eye-tracking technology. The eye-tracker was calibrated for each participant. Total testing time was approximately 45 min.

2.2. Materials and measures

2.2.1. Emotional intelligence

Emotional intelligence was measured using the TEIQue-SF (Petrides, 2009), where individuals indicate their level of agreement/disagreement with a set of 30 brief statements using a 7-point Likert scale ('Completely disagree' [1] to 'Completely agree' [7]). Global scores and scores on four emotional self-perception factors: 'wellbeing' (e.g. 'On the whole, I'm pleased with my life'), 'self-control' (e.g. 'I tend to change my mind frequently'), 'emotionality' (e.g. 'I often pause and think about my feelings') and 'sociability' (e.g. 'I can deal effectively with people') were calculated. The TEIQue-SF has a robust factor structure, excellent reliability (α = 0.88–0.92), and good item discrimination (Cooper & Petrides, 2010). The present study achieved adequate reliability scores ranging from α = 0.67 (emotionality) to α = 0.80 (sociability; global score).

2.2.2. Eye-tracking system

A fixed Eyelink II eye-tracker, with monocular recording at 500 Hz (SR Research, US), was used to track eye movements on an individual basis for each task. Attention was conceptualised in terms of eye fixations on specified areas of interest (i.e. images of faces, scenes etc.), with this information captured using EyeLink Data Viewer. An eye fixation was recorded when the participant had a saccade in any of the areas of interest that were previously coded in the software. A fixation occurrence was determined according to a standard logarithm of at least 100 ms in a given radius of 0.5° of visual angle.

2.2.3. Experimental tasks

2.2.3.1. Task 1: EI and attentional bias to emotional faces. The first task examined the relationship between TEI and attentional bias towards emotional faces. Emotional facial stimuli were selected from the Karolinska directed emotional faces database (KDEF; Lundqvist, Flykt & Öhman, 1998). All KDEF images have been validated, with excellent (88%) test-retest reliability (Goeleven, De Raedt, Leyman, & Verschuere, 2008). In a 2 × 2 matrix, four emotional expressions (happy, angry, afraid, neutral) of the same person were presented simultaneously. Happy faces reflected positive emotion, angry and fearful faces represented threatening cues, and neutral faces were non-emotive control stimuli. Each matrix was randomised such that any of the four expressions could present in one of four locations (i.e. top left, top right, bottom left, bottom right), with an equal number of male and female faces. Participants viewed all 24 picture slides (each containing one 2 × 2 matrix) in a random order. Each slide was viewed for 8 s, followed by a 5 s blank screen, and a central fixation point (which participants focussed on between trials).

2.2.3.2. Task 2: EI and attentional bias to emotional faces in a crowd. The second task examined the relationship between TEI and attentional bias towards emotional faces in a crowd. Adjusting the ratio of happy to angry faces is employed by studies (e.g. Lange et al., 2011) to test sensitivity to social threat. Photographs of 16 male individuals with happy and angry facial expressions were selected from the KDEF (Lundqvist et al., 1998), resized to 170 × 113 pixels, and used to