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Interacting effects of worry and anxiety on attentional disengagement from threat

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ABSTRACT

Recent work suggests that the ability to disengage attention from threatening information is impaired in people who suffer from anxiety and dysphoria. It has been suggested that this impaired ability to disengage from threat might specifically be associated with the tendency to perseverate about threat (i.e., worry), which is a main characteristic of anxiety disorders and a wide range of other psychopathologies. However, no studies have yet addressed this issue. The present study examined whether trait worry as well as worry intensity after experimental worry induction are associated with impaired ability to disengage attention from threatening cues (angry faces), independently from or in conjunction with anxiety. Sixty-one participants performed a visual cueing experiment that required detection of a target stimulus at one of two possible locations. Prior to the target neutral, happy or angry facial cues appeared at one of these two locations; when there is a relatively long period between the cue and the target (>300 ms), an overall faster responding to invalidly cued trials relative to validly cued trials is believed to indicate inhibition of return (IOR) to a recently attended location. A reduced IOR for angry faces was only found when both trait worry and anxiety were high. When anxiety was kept constant, both trait worry and state worry were associated with enhanced IOR for neutral faces instead. The results seem to suggest that specific threat-related deficiencies in IOR may be a function of the co-occurrence of worry and anxiety.

Introduction

Perseverative thinking such as worry is a central feature of a wide range of psychopathologies and has been proposed to be an important transdiagnostic process (Harvey, Watkins, Mansell, & Shafran, 2004). Worry predicts anxiety and depressive affect (Hong, 2007), and it is the main characteristic of generalized anxiety disorder (GAD; American Psychiatric Association, 1994). In addition, it is found in social phobia (Mellings & Alden, 2000), panic disorder (Casey, Oei, & Newcombe, 2004), obsessive compulsive disorder (Comer, Kendall, Franklin, Hudson, & Pimentel, 2004), eating disorders (Sassaroli et al., 2005) and in depression (Diefenbach et al., 2001). More recently, it has been suggested that worry prolongs physiological stress responses beyond the actual presence of stressors, thereby contributing to the total wear and tear of stressors on the human body (Brosschot, Gerin, & Thayer, 2006; Brosschot, van Dijk, & Thayer, 2007; Pieper, Brosschot, van der Leeden, & Thayer, 2007). Given this seemingly broad importance of worry in the development and maintenance of mental and somatic health problems, studies that investigate its cognitive underpinnings are warranted.

A large number of studies conducted with extreme worriers, that is, people suffering from GAD, have shown that they show biased processing of threat-related information that is associated with the excessiveness of their worrying. For example, they interpret ambivalent information in a more negative way (Hazlett-Stevens & Borkovec, 2004), have biased explicit memory (Friedman, Thayer, & Borkovec, 2000) and selectively attend to concern-related threatening information (Mathews & MacLeod, 1985; Mathews, Mogg, Kentish, & Eysenck, 1995; Mogg, Bradley, Millar, & White, 1995; Mogg, Mathews, & Weinman, 1989). These biases in the processing of threat are also thought to contribute to the prolongation of worry episodes in GAD. In recent years evidence has been growing that reversing these cognitive biases may reduce symptoms of mood and anxiety disorders suggesting that they have a causal role in these psychopathologies (e.g., Hazen, Vasey, & Schmidt, in press; MacLeod, Rutherford, Campbell, Ebsworthy, & Holker, 2002; Wilson, MacLeod, Mathews, & Rutherford, 2006).

Still, although biased attention seems to be associated with worry, it is not known what aspects of attention are specifically associated with worry. Attention can be divided into three processes (Posner & Petersen, 1990): orienting towards a stimulus, engaging attention and eventually disengaging from it. Especially

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the delayed disengagement from threatening information, or prolonged dwell time, is believed to lead to worry and rumination (Fox, Russo, Bowles, & Dutton, 2001; Georgiou et al., 2005). This makes sense from a phenomenological point of view: A main characteristic of pathological worry is that high worriers find it extremely difficult to disengage from their worry topics, and the same threatening thoughts occur over and over again.

The inability to disengage attention from neutral or threatening information has mainly been studied with regard to enduring negative affect such as in dysphoria (Koster, De Raedt, Goeleven, Franck, & Crombez, 2005) and in trait anxiety (Derryberry & Reed, 2002; Fox, Russo, & Dutton, 2002; Koster, Crombez, Verschuere, & De Houwer, 2004; Waters, Nitz, Craske, & Johnson, 2007; Yiend & Mathews, 2001). These studies showed that negative affect is especially associated with reduced ability to disengage attention from threatening information. Although these studies did not directly address whether delayed disengagement from threat was particularly associated with worry, they all focused on emotions that are likely to be caused by perseverative cognition such as worry (Hong, 2007) or rumination (Nolen-Hoeksema, 2000). Tentatively, it might be that delayed disengagement from threat seen across several psychopathologies is specifically associated with the transdiagnostic process of worrying. We therefore conducted the present study to investigate whether worry is associated with delayed attentional disengagement from threatening information.

To investigate the association between worry and attentional disengagement, we used an emotional modification of Posner's exogenous cueing task (Posner, 1980), which is often used in studies concerned with attentional disengagement. In this task, participants have to respond to a target presented at one of two locations, which is preceded by a cue that has either been presented at the same location as the target (a valid trial) or at the opposite location (an invalid trial). When there is a short period of time between the cue and the target (stimulus onset asynchrony (SOA) $<$300 ms), responses appear to be faster to the valid trials. At longer SOAs ($>$300 ms) responses to the valid trials are instead slower, which is thought to be due to inhibition of attention to the location on the screen that has previously been attended to (because a cue was presented), a phenomenon called inhibition of return (IOR; Posner & Cohen, 1984). A reduced inhibition of return has been suggested to reflect a reduced ability to disengage attention from a cued location (Fox et al., 2002; Moritz & von Muhlenen, 2005). The spatial cueing task is made an emotional one by presenting as cues either schematic or realistic pictures of threatening (angry), neutral or happy faces (Fox et al., 2001; e.g., Fox et al., 2002), IAPS pictures (e.g., Koster, Crombez, Verschuere, & De Houwer, 2006; Yiend & Mathews, 2001) or symbolic cues predictive of wins and losses (Derryberry & Reed, 2002). In the present study, we tested whether people with a strong tendency to worry (high trait worry) show a reduced IOR effect to angry faces, as compared with happy or neutral faces.

In the present study we not only related attentional disengagement to trait worry but also to state worry; trait worry is only one way to measure the tendency to worry, and tests for trait worry actually predict behavior only partially (Verkuil, Brosschot, & Thayer, 2007). Therefore, we also used a worry induction procedure, to test whether induced worry intensity is also associated with a reduced ability to disengage attention from angry faces.

Additionally, we wanted to examine whether the role of anxiety is important in these hypothesized relationships of worry with disengagement. Although worry and anxiety are closely related, several studies have made clear that worry and anxiety have independent associations with health outcomes (e.g., Brosschot & Van Der Doef, 2006) and stress management strategies (Davey, Hampton, Farrell, & Davidson, 1992). We therefore also examined whether the hypothesized association between worry and attentional disengagement from threat was independent of the previously found association for anxiety (Derryberry & Reed, 2002; Fox et al., 2002; Koster et al., 2004; Waters et al., 2007; Yiend & Mathews, 2001), or whether it was the interaction between worry and anxiety that reduces attentional disengagement from threat.

In short, the present study was conducted to examine the following hypotheses: (1) trait worry is associated with decreased attentional disengagement from angry faces, relative to neutral and happy faces, independent of or in interaction with trait anxiety; (2) This association is also found for worry intensity after an experimental worry induction.

Method

Participants

Data were gathered from sixty-one student participants (mean age = 24.61, range 17–50). Sixty-seven percent of the sample were female. This study formed part of a larger study of the cognitive and physiological associates of worry and parts of this larger study have been reported elsewhere (Verkuil, Brosschot, Borkovec, & Thayer, submitted for publication). Participants were asked to perform several tasks for this experiment among which were the exogenous cueing task (see Apparatus and stimuli and Procedure) and the experimental worry induction (see State measures). The order of these tasks was counterbalanced.

Apparatus and stimuli

To measure attentional disengagement, we used a task that was highly similar to the one used by Fox et al. (2002; experiment 2). Three schematic face types: 'angry', 'happy', and 'neutral' faces were used as cues. Each of the faces was 2 cm in diameter on the computer screen. The target that the participants had to localise was a black dot with a diameter of 0.5 cm. The cue and target stimuli were presented inside two light grey boxes that were continuously present on the computer screen. These boxes were 5 cm high by 3.0 cm wide and were displayed 2.25 cm to the left and the right of a central fixation point (shape: +). All stimuli were presented on a Dell computer with a 17″ Dell LCD monitor (resolution: 1280 × 1024).

Procedure

Each trial started with a fixation point which was presented at the centre of the screen for 800 ms. A schematic face cue was then presented for 300 ms in either the left or the right box. This cue was then blanked out and 200 ms later the central cross was presented in bold type for 300 ms. The initial fixation display was then presented for 160 ms. Following this, the target was presented in the lower half of either the left or the right box for 33 ms (Lupiánez, Milán, Tornay, Madrid, & Tudela, 1997). Subsequently, the initial fixation display was presented until the participant responded (or until 2000 ms elapsed). This resulted in a cue–target onset asynchrony (SOA) of 960 ms. We used an intertrial interval of 1000 ms. Similar to the procedure used by Fox et al. (2002), each participant completed 16 practice trials, followed by 360 experimental trials, divided into five blocks of 72 trials. Fifty percent (180) of the experimental trials were valid (i.e., the target appeared in the same box as the cue), and 50% (180) were invalid (i.e., the target appeared in the opposite box to the cue). Angry, happy and neutral face cues appeared 60 times each on valid trials and 60 times each on invalid trials. The probability of any particular cue appearing in the left and right hand side boxes was equal, as was that of the types of faces.

All participants were seated 50 cm from the computer screen. They were told that the position of the cue did not predict the