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The effect of enhanced responsibility on attentional bias in obsessive–compulsive checkers

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ABSTRACT

The present study investigated whether enhanced responsibility could affect attentional bias in obsessive compulsive checkers. The participants were 69 undergraduate students: 35 students who have obsessive–compulsive checking tendencies and 34 students who have no obsessive–compulsive checking tendencies. All participants were randomly assigned to high or low responsibility conditions and were asked to perform a pill classification task. After performing the task, the vigilance and maintenance of attentional bias toward three emotional words (obsessive–compulsive (OC) threat, negative, positive) were measured by an eye tracker. The results indicate that OC checkers detected OC threat stimuli more quickly than did non-checkers. Furthermore, within the OC checker group, high responsibility conditions revealed a longer latency to initial fixation and a longer maintenance toward OC threat words than low responsibility conditions. However, this difference was not observed in the non-checker group. This result suggests that OC checkers are more anxious under high responsibility situations, leading to vigilance and maintenance patterns toward OC threat words. Therefore, it is necessary to use cognitive strategies to reduce perceived responsibility for OC checkers.

1. Introduction

Checking compulsions are one of the most common symptoms of obsessive–compulsive disorder (OCD) (Rachman, 2002; Hermans, Martens, De Cort, Pieters, & Eelen, 2003) and are characterized by the repeated checking of objects, such as the gas switch, doors, and letters. These checking behaviors occur due to the thinking that their actions may harm others and/or oneself (Jenike, Baer, & Minichiello, 1990; Rachman, 2002). Consequently, OC checkers repeatedly check their actions to prevent the catastrophic events that could possibly occur. Although OC checkers know that their compulsive checking behaviors are irrational, they have an intrusive doubt as to whether a task was performed properly and thus, they feel the urge to check repeatedly (Rachman, 2002; Omori et al., 2007).

Given that OC checkers have intrusive thoughts that are often catastrophically misinterpreted (Rachman, 2002), it can be concluded that OC checkers are sensitive to threatening information due to their particular patterns of information processing (Tallis, 1997). The attentional resources of OC checkers tend to be allocated to threatening information (Lavy, van Oppen, & van den Hout, 1994; Irak & Flament, 2009). Therefore, OC checkers, similar to individuals with other anxiety disorders, have a greater ability to encode threatening information (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van Ijzendoorn, 2007). Specifically, OC checkers exhibit attentional biases to threatening stimuli related to their particular concerns, which can be referred to as OC threat stimuli (Diniz et al., 2004; Muller & Roberts, 2005). Accordingly, they do not regard all negative stimuli as threatening.

The development of such biases may be facilitated under states of emotional arousal, such as anxiety (Bower, 1981; Kovacs & Beck, 1978). According to Beck's information processing theory, a particular environmental event activates the schema of an individual with anxiety disorder, thereby affecting cognitive processing, which includes attentional bias (Beck, Emery, & Greenberg, 1985). Thus, when individuals feel more anxious, their ability to encode emotionally threatening stimuli tends to increase, and consequently, they have greater cognitive resources to process the threatening stimuli that lead to attentional bias (Foa & McNally, 1986; Williams, Watts, MacLeod, & Mathews, 1988).

With respect to OCD, enhanced responsibility can lead to greater emotional arousal than other situations (Radomsky, Rachman, & Hammond, 2001). According to Salkovskis' cognitive theory, enhanced responsibility represents a core factor in OCD, especially for OC checkers (Salkovskis et al., 2000). As this excessively perceived responsibility is likely to cause automatic negative thoughts that

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could be catastrophically misinterpreted, checkers behave compulsively to reduce this anxious state (Rachman, 1998; Boschen & Vuksanovic, 2007; Starcevic et al., 2011). OC checkers are likely to feel more anxious in high responsibility situations, as was recently proven by experiments that manipulated responsibility situations for subjects with OCD (Ladouceur et al., 1995; Ladouceur, Rhéaume, & Aublet, 1997; Arntz, Voncken, & Goosen, 2007).

Taking these data together with the aim of expanding on the previous studies, we expect OC checkers to demonstrate greater attentional bias for OC threat stimuli than non-checkers when placed in an enhanced responsibility situation. This attentional bias is measured by facilitated attention orientation, delayed disengagement, or both (Posner & Petersen, 1990; Hollitt, Kemps, Tiggemann, Smeets, & Mills, 2010). Because OC threat stimuli that are related to particular concerns are significant to OC checkers (Irak & Flament, 2009), OC checkers will quickly detect OC threat stimuli from among other emotional stimuli due to their preoccupied thoughts and disproportionately allocated attention, thus resulting in a vigilance pattern (Eysenck, 1992). Furthermore, OC checkers will find it difficult to disengage their attention from OC threat words to neutral words. In other words, they will present with longer maintenance during the initial fixation and gaze dwell time. Consequently, OC checkers are expected to show vigilance and maintenance patterns toward OC threat stimuli.

To date, most studies measuring attentional bias in OCD have used the dot-probe task, Stroop task, or dichotic listening task (Foa & McNally, 1986; Hartston & Swerdlow, 1999). As these tasks regard reaction time as a measurement of attentional bias, they are limited in their ability to assess sustained information processing (Kellough, Beevers, Ellis, & Wells, 2008). On the other hand, eye-tracking technology, a superior method of attentional bias measurement, provides indices of continuous eye movement, such as attentional shifting, engagement, and disengagement biases (Hermans, Vansteenwegen, & Eelen, 1999). By measuring the visual attention as demonstrated by eye movement, we can observe the direction of initial fixation, the duration of initial fixation, and the areas of interest (AOI) (Hermans et al., 1999). Therefore, eye-tracking methodology may be suitable for continuous attentional processing in OC checkers.

The aim of the present study is to investigate whether enhanced responsibility affects attentional bias toward OC threat words in the OC checker group compared with the non-checker group as measured using eye tracking methodology. To examine attentional bias toward words, three emotional words (OC threat, negative, positive) are used, and the components of attentional bias per emotional word are measured.

2. Methods

2.1. Participants

Participants included 69 undergraduate students screened using the Maudsley Obsessive Compulsive Inventory (MOCI; Hodgson & Rachman, 1977) and the Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996). The OC checker group was comprised of 35 undergraduates who received scores higher than 4 on the checking subscale of the MOCI and lower than 13 on the BDI-II. The non-checker group was composed of 34 undergraduates who received scores of 0 or 1 on the checking subscale of the MOCI and lower than 13 on the BDI-II. The MOCI score criteria followed previous studies (Rubenstein, Peynircioglu, Chambless, & Pigott, 1993; MacDonald, Antony, Macleod, & Richter, 1997; Irak & Flament, 2009). The BDI-II questionnaire was administered to control for the depression level of both groups. Then, half of each group was assigned to either a high or a low responsibility condition.

2.2. Materials and apparatus

2.2.1. Self-questionnaires

2.2.1.1. Maudsley Obsessive Compulsive Inventory. To screen for the OC checker and non-checker groups, the Korean version of the Maudsley Obsessive Compulsive Inventory (MOCI; Hodgson & Rachman, 1977) questionnaire was administered. The MOCI is a self-report questionnaire consisting of 30 true/false items that assess four subtypes of obsessive–compulsive symptoms: checking (nine items), cleaning (eleven items), slowness (seven items), and doubting (seven items). Because the four items belong to two subscales, the score range from 0 to 34, the higher of the two was used rather than "total score" of 30. A higher score for each subtype indicates more severe OC symptoms. Cronbach's α in the current sample was .80.

2.2.1.2. Checking subscale of the Padua Inventory. To assess checking obsessions and compulsions, a checking subscale of the Korean version of the Padua Inventory (PI; Sanavio, 1988) was administered. The checking subscale consists of 10 items on a five-point Likert scale (0=not at all to 4=very much). The score range of the checking subscale was from 0 to 40 where a higher score indicated more severe checking obsessions and checking compulsions. Cronbach's α in the current sample was .91.

2.2.1.3. State subscale of the State-Trait Anxiety Inventory. To assess the anxiety level before and after a responsibility task, the state subscale of the Korean version of the State-Trait Anxiety Inventory (STAI-S; Spielberger, Gorsuch, & Lushene, 1970) was administered. The STAI-S consists of 20 items on a four-point Likert scale (1=not at all to 4=very much so). The score range was from 20 to 80 where a higher score indicated a more severe level of current anxiety. Cronbach's α in the current sample was .90 for the pre STAI-S and .92 for the post STAI-S.

2.2.1.4. Beck Depression Inventory-Second edition. To rule out participants with higher than minimal levels of depression, the Korean version of the Beck Depression Inventory-Second Edition (BDI-II; Beck et al., 1996) was administered. Because OCD is associated with depression (Overbeek, Schruers, Vermetten, & Griez, 2002; Yap, Mogan, & Kyrios, 2012), it was necessary to control for the depression level. The BDI-II questionnaire consists of 21 items on a four-point Likert scale ranging from 0 to 3 and measures depressive symptoms. The total score ranges from 0 to 63, where a higher score indicated a higher level of depression. Cronbach's α in the current sample was .70.

2.2.2. Pill classification task

To manipulate perceived responsibility, a pill classification task was performed. This task was modified based on the previous pill classification task (Ladouceur et al., 1995; Arntz et al., 2007). There was a large pot with 200 capsules of mixed colors and 10 small jars labelled with pill colors that were lined up on a desk in front of the participants. All participants had to classify 200 capsules in the large jar into 10 small jars according to their colors. Each participant was given different instructions according to their assigned conditions.

The participants with the low responsibility condition were instructed to classify 200 capsules in the large jar into 10 small jars according to color. The participants with the high responsibility condition were told that the current study was a joint research project being conducted with a pharmaceutical company for drug development and because machines could not accurately recognize the pill colors, the participants were asked to classify them using their hands. Further, they were told that this experiment was a re-test due to the mistakes that had been made in the previous experiment. Thus, they would consciously be aware not to make any mistakes. During the task, they wore plastic gloves and were instructed to handle the capsules carefully, as the drugs were for oral administration and needed to stay clean.

2.2.3. Eye movement measurement

To perform free viewing tasks, three emotional words (OC threat, negative, positive) and matching words (neutral) were selected from the Korean affective word list, a list frequently used in modern Korean research (Jo, 2002) and in previous studies on OC checking (Moritz & von Muehlenen, 2008; Moritz et al., 2008). All words were either nouns or adjectives. For the selected OC threat words, 15 OCD patients rated the relevance of the words to OCD (1=not at all related to 7=very much related), the valance level (1=negative to 7=positive), and the arousal level (1=sedated to 7=aroused). For the negative, positive, and matching neutral words, 15 undergraduate students who did not participate in the current study rated the valance level (1=negative to 7=positive) and the arousal level (1=sedated to 7=aroused). Finally, 60 emotional words out of 120 words and 60 matching neutral words out of 120 words were selected based on the results of these ratings. The word length and word frequency, according to their frequent use in modern Korean research (Jo, 2002), was controlled.

In the free viewing task, the words were presented in three pairs (OC threat-neutral, negative-neutral, positive-neutral) in a 1×2 horizontal array on a screen, and the location of each pair was counterbalanced. After performing 16 practice trials consisting of pairs (neutral-neutral), participants completed 60 experimental trials separated into two blocks of 30 trials each. During the task, participants were asked to view the words freely, as if they were watching TV. After presenting the fixation cross for 700 ms, each word pair was presented for 3 s (Armstrong, Olatunji, Sarawgi, & Simmons, 2010) and the inter-trial interval was randomly set from 1500 ms to 2500 ms to alleviate the monotony of the task (Garner, Mogg, & Bradley, 2006). The stimuli were presented using a Dell P2210 monitor (22 inches, 1680×1050 pixel), and the scanning rate was set at 60 Hz. The eye movements