

Efficacy of Attention Bias Modification for Patients with Generalized Anxiety Disorder: Using Emotional Attention Network Test as an Evaluation of the Underlying Mechanism

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Attention bias modification (ABM) can correct the attention bias of patients with generalized anxiety disorder (GAD) and improve their symptoms. However, the therapeutic mechanism of ABM is poorly understood (MacLeod & Clarke, 2015). In this study, 28 patients (18 women and 10 men; average age = 46.04 years) with GAD were recruited. In addition, 28 healthy people (22 women and 6 men; average age = 45.43 years) were recruited as the control group. All participants were randomly assigned to either the ABM group (receiving neutral stimuli for attention training) or the placebo-training group (receiving no specific stimuli). Before and after training, both groups received two types of attention network test (ANT)-the standard ANT and the emotion ANT (e-ANT)-to assess changes in the alerting network, the orienting network, and the executive control network of the participants; e-ANT, in which threatening and neutral words serve as clues, is used to assess alertness to neutral or threatening stimuli as well as orientations, from neutral to threatening and from threatening to neutral stimuli. The results indicated that the attention allocation of the patients with GAD was inflexible. Compared with the control group, the patients' conflict-monitoring abilities were unsatisfactory. Moreover, the patients were significantly highly alert to symbols, neutral stimuli, and threatening stimuli. Compared with the control group, shifting attention from threatening stimuli to neutral stimuli was more difficult for patients with GAD. After receiving training (of any type), the ability of patients with GAD to shift their attention from threatening stimuli to neutral stimuli improved significantly, possibly because the participants responded strategically during attention training. These results clarify the processes underlying attention bias in patients with GAD as well as the relationship between such processes and ABM, from the perspectives of the alerting, orienting, and executive control networks proposed by Posner.

Keywords: *ABM, ANT, attentional bias, attention control, generalized anxiety disorder*

Researchers have found that patients with generalized anxiety disorder (GAD) are particularly sensitive to threat-related stimuli. This information-processing bias is known as an attentional bias (Bradley, Mogg, White, Groom, & de Bono, 1999; Mogg & Bradley, 2005). The severity of anxiety in patients with GAD may be significantly related to the degree of their attentional bias to threatening stimuli (Berenbaum, 2010; Hirsch & Mathews, 2012; Mogg & Bradley, 2005). Attention bias modification (ABM) training has been found to mitigate attentional bias and improve symptoms in patients with

GAD, but its therapeutic mechanism remains unclear (MacLeod & Clarke, 2015). This study applied the cognitive hypothesis of GAD (Berenbaum, 2010; Hirsch & Mathews, 2012) and also referenced attentional system theory (Petersen & Posner, 2012; Posner & Petersen, 1990). An attention network test (ANT) and an emotional ANT (e-ANT) were then developed to explore the potential mechanism of attentional bias in patients with GAD and for clarifying the effect of ABM training on the operation of the attention network system.

Method

The patient group comprised 28 patients with a diagnosis of GAD recruited from a psychiatric outpatient clinic. Eighteen patients were women and the mean age was 46.04 years. The control group comprised 28 healthy individuals (22 women) with a similar mean age (45.43 years). The two groups were randomly assigned to ABM (attention training toward neutral stimuli) and placebo training (attention training toward no particular object) scenarios. Before and after the training, both groups of participants completed the ANT and e-ANT. The e-ANT consisted of threatening words paired with neutral words as cues. The two ANTs aimed to determine changes in the alerting, orienting, and executive control networks of the participants in response to symbolic, emotionally neutral, and threat-related stimuli.

Results

Prior to the attention training, the patient group scored significantly higher than the control group on the ANT in alerting, orienting, and executive control functions. Control group participants' scores for alerting and orienting were higher after undergoing either type of attention training than before. The alerting and orienting functions of the patient group did not differ significantly before and after either type of attention training; however, their executive control scores did drop significantly after attention training. The main findings of this study with respect to the use of the e-ANT are as follows. (1) Before attention training, the patient group scored higher on

alerting toward neutral and threat-related stimuli than did the control group. Participants in the control group scored higher after undergoing either type of attention training than before. (2) Prior to attention training, the patient group's scores for the ability to orient attention away from threat-related toward neutral stimuli was significantly lower than that of the control group. Participants in the patient group scored significantly higher after either type of attention training than before. (3) Prior to attention training, the patient group scored significantly higher on the ability to orient their attention away from neutral toward threat-related stimuli than did the control group.

Conclusion

The research findings revealed that participants in the patient group were less flexible in their ability to allocate their attention, as demonstrated by their inferior executive control function compared with the control group. The patient group also exhibited substantial alerting in response to symbolic, emotionally neutral, and threat-related stimuli. Compared with the control group, the patient group found it difficult to shift attention from threat-related stimuli toward neutral stimuli. Notably, the patient group participants considerably improved their executive control function and ability to orient their attention away from threat-related toward neutral stimuli after undergoing either type of attention training. In addition to determining the changes in the attention control mechanism of patients with GAD before and after ABM intervention, the results of this study may serve as a reference for improving subsequent ABM studies.

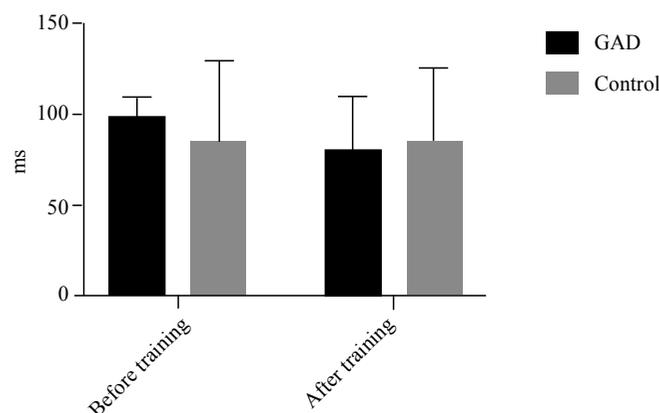


Figure. The executive control scores of the GAD group and the control group on the ANT task.