Attention Bias Modification Treatment Reduces Depression Symptoms in Youth

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Major depression is a commonly occurring, serious, and recurrent disorder that often starts at a young age. According to the World Health Organization, depression is ranked among the leading causes of disability worldwide.[1] In 2013, an estimated 2.6 million adolescents 12 to 17 years old in the United States had at least 1 major depressive episode in the past year, representing 10.7% of the population in this age range.[2] Efficacious treatments for major depression, including cognitive-behavioral therapies and pharmacotherapy, have been available for decades. However, the prevalence rates of major depression remain notably consistent, with fewer than 15% of potential patients receiving minimally adequate treatment.[3] This observation has led to a call for interventions that take advantage of technology to increase patient access and lower cost through the use of computer-based procedures. One such intervention, attention bias modification treatment (ABMT), was originally designed to directly target a posited cognitive mechanism of anxiety, namely selective attention to threat stimuli. Recently, ABMT has been tested for depression.

Cognitive theories of depression implicate attention biases in the processing of emotional information as a key factor in the etiology and maintenance of the disorder. Two types of attentional biases have been reported in major depression: increased attention allocation to negatively valenced stimuli compared with positive or neutral stimuli[4] and a lack of attentional bias toward positive stimuli that typically characterizes healthy individuals.[5] Therefore, computerized ABMT protocols have started to emerge that target these specific biases in adult patients with depression.

ABMT protocols are typically designed to implicitly modify biased attentional patterns. For instance, in a dot-probe task,[6] 2 stimuli, 1 related to threat and 1 neutral (e.g., threat and neutral words), are shown briefly at each trial, and their removal is followed by a small target probe in the location just occupied by one of the stimuli. Patients are required to discriminate as quickly as possible between 2 variants of the probe (e.g., 1 or 2 dots) without compromising accuracy. In the classic format of this task, designed to measure attention biases, targets appear with equal probability at the location of threat and neutral stimuli. Thus, attention bias toward threat is shown when participants are faster to respond to probes that replace threat-related stimuli rather than neutral stimuli. In attention training variants of the dot-probe task, target location is systematically manipulated to increase the proportion of targets appearing at the location of the intended training bias. It is assumed that because attending to such contingencies can assist in task performance, the desired rectification of attention bias is implicitly and gradually induced with a systematic repetition of trials.[7,8]

Studies examining the efficacy of ABMT protocols for major depression were typically designed to shift attention away from dysphoric and toward neutral or positive stimuli and focused on adult populations. These studies have yielded mixed results, highlighting the need to further examine the clinical significance of ABMT for major depression in randomized controlled trials.[9] Importantly, ABMT effects on major depression symptoms in youth were not tested. In the current issue of the *Journal,* Yang *et al.*[10] examine the effect of an active 2-stage ABMT protocol on adolescents' depression levels by targeting a decrease of attention bias toward dysphoric stimuli (8 sessions, neutral ABMT) and then increasing attention to more positive stimuli (4 sessions, positive ABMT). Attention biases and depression levels were compared with a control group of adolescents with major depression who received a placebo protocol that was identical to active ABMT but not designed to change attention patterns. Changes in attention bias and clinical outcomes were tested after each of the ABMT stages and at 8- and 12-month follow-ups.

Results indicated greater decreases in negative attention biases after neutral ABMT and positive ABMT in the active versus placebo condition, confirming the efficacy of the training procedures in modifying the targeted cognitive bias. According to clinician reports, the 2 groups showed significant and comparable decreases in depression symptoms from pretreatment to posttreatment follow-up. Such decreases concur with the natural course of depression remission. However, these decreases were achieved significantly faster in the active training group than in the placebo group, appearing immediately after the first ABMT stage. Indeed, a larger number of participants in the active ABMT group (87%) no longer met the diagnostic criteria for major depressive disorder compared with the placebo group (59%) after this early stage of treatment. Achieving fast therapeutic effects in major depression, especially in youth, is of great importance, with far-reaching implications for children's ability to return to a normative developmental course. Importantly, a different pattern of results emerged for self-reported depression. Although depression symptoms gradually and equally decreased from pretreatment to posttreatment follow-up in the 2 groups, a greater decrease in symptoms was noted in the active ABMT group at 12-month follow-up. These results suggest long-term subjective benefits of ABMT for youth dealing with a major depressive episode.

These findings lend support to the role of initial attention training away from dysphoric stimuli and toward neutral stimuli in speeding recovery rates. However, the role of positive bias induction (stage 2 training) remains unclear, highlighting the need for further mechanisms research into its therapeutic contribution. Although self-reported depression at 12 months was significantly lower in the active ABMT group than in the placebo control group, one cannot infer whether this effect is due to the initial training to neutral stage, the addition of the positive training stage, or both. Future controlled studies could further elucidate this issue and test the concept of dual-stage ABMT comprised of an initial training stage augmented by booster sessions.

In conclusion, the results of Yang *et al.*[10] in this issue of the *Journal* provide promising initial evidence for the ability of ABMT to effectively modify targeted attention biases and speed up and enhance symptom decreases in adolescents diagnosed with major depressive disorder. These results extend previous findings of efficacy of ABMT in youth with anxiety[11] and adults with depression.[12] &

Accepted December 21, 2015.

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Disclosure: Drs. Lazarov and Bar-Haim report no biomedical financial interests or potential conflicts of interest.

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0890-8567/$36.00/©2016 American Academy of Child and Adolescent Psychiatry

http://dx.doi.org/10.1016/j.jaac.2015.12.009

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