Attention Bias Modification Treatment Augmenting Effects on Cognitive Behavioral Therapy in Children With Anxiety: Randomized Controlled Trial

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Objective: Attention bias modification treatment (ABMT) is a promising novel treatment for anxiety disorders, but clinical trials have focused largely on stand-alone formats among adults. This randomized controlled trial examined the augmenting effects of threat-based ABMT on cognitive behavioral therapy (CBT) in clinically anxious youth. **Method:** Sixty-three treatment-seeking children with anxiety disorder were randomly assigned to 1 of the following 3 treatment groups: ABMT + CBT; ABMT placebo + CBT; and CBT-alone. Participants in the 2 ABMT conditions received repeated training on dot–probe tasks either designed to shift attention away from threats (active) or designed to induce no changes in attention patterns (placebo). Primary outcome measures were frequency and severity of anxiety symptoms as determined by a clinician using a semi-structured interview. Self- and parent-rated anxiety measures and threat-related attention bias scores were also measured before and after treatment. **Results:** Both the active and placebo ABMT groups showed greater reductions in clinician-rated anxiety symptoms than the CBT-alone group. Furthermore, only the active ABMT group showed significant reduction in self- or parent-rated anxiety symptoms. Finally, all groups showed a shift in attention patterns across the study, starting with a bias toward threat at baseline and shifting attention away from threat after treatment. **Conclusions:** Active and placebo ABMT might augment the clinical response to CBT for anxiety. This effect could arise from benefits associated with performing computer-based paradigms such as the dot–probe task. Given the absence of group differences in attention-bias changes during treatment, possible mechanisms and methodological issues underlying the observed findings are discussed. Clinical trial registration information—Augmenting Effects of ABMT on CBT in Anxious Children: A Randomized Clinical Trial; http://clinicaltrials.gov/; NCT01730625. J. Am. Acad. Child Adolesc. Psychiatry, 2014;53(1):61–71. **Key Words:** anxiety, attention bias, attention bias modification treatment (ABMT), cognitive behavioral therapy (CBT)

The development of easily disseminated, safe, and efficacious treatments is an important goal for translational neuroscience research. To that end, attention bias modification treatment (ABMT) shows promise based on its ability to target threat-related attention biases[1,2] and associated heightened anxiety in adults.[3-5] A small series of randomized controlled trials also suggests the potential efficacy of ABMT in pediatric anxiety.[6-10] The current RCT examined the degree to which threat-focused ABMT augments the response to cognitive behavioral therapy (CBT), an established treatment for pediatric anxiety disorders.

CG Clinical guidance is available at the end of this article.

ABMT emerged from work linking anxiety to threat-related biases in attention. Anxious individuals commonly show excessive vigilance toward minor threats.[2] The dot–probe task is 1 common method for quantifying such threat-related attention biases.[11] In this task, a pair of stimuli, 1 threat and another neutral, appears concurrently in 2 different spatial locations on a computer screen. Their offset is followed by a probe that appears in the location previously

occupied by 1 of the 2 stimuli. Allocation of attention is measured by the reaction time (RT) difference for identifying probes across the 2 spatial conditions. A faster RT to probes appearing in the location previously occupied by threat-related stimuli, relative to probes appearing in the location of neutral stimuli, indicates an attention bias toward threat.

ABMT uses the dot–probe task not merely to measure attention biases but also to implicitly modify such biases in anxious individuals. During ABMT, the location of the probe is manipulated to implicitly train attention. For example, training intended to reduce bias toward threat repeatedly presents probes in the location of the neutral rather than the threat stimulus. Over time, an implicitly learned bias away from threat is induced because such contingency provides prediction about target location.[1]

Because CBT and ABMT may target different cognitive aspects of anxiety, they may provide complementary benefits for anxious children. CBT modifies explicit and voluntary attention through verbal intervention (top–down approach); ABMT alters implicit and involuntary attention biases through computer-based training (bottom–up approach). Thus, ABMT may augment the response to CBT. To date, only 1 study has examined this potential synergistic effect in adult patients with generalized anxiety disorder.[12] However, this study tested only the application of these 2 interventions together in an open trial without a control group affording a test of the augmenting effects of ABMT on CBT.

Although recent studies suggest that anxious children, like anxious adults, may also manifest attention bias toward threat,[13] more ABMT studies focus on anxious adults than on anxious children. Only 2 studies to date on threat-focused ABMT in clinically anxious children found preliminary evidence of efficacy.[6,10] And yet, as in similar RCTs of other computer-based treatments,[7,8] ABMT was offered as a stand-alone treatment[6] or compared only with the 2 ABMT groups without including a CBT-alone group.[10] Available data in pediatric anxiety suggest that medications augment response to CBT.[14,15] ABMT might provide similar augmenting benefits without the potential adverse side effects associated with medication. The current study examined the clinical response to CBT in groups of anxious children randomized to 1 of 3 treatments as follows: CBT with active ABMT (ABMT + CBT); CBT with placebo ABMT (ABMT placebo + CBT); or CBT with no additional intervention. The study tested the hypothesis that children randomized to ABMT + CBT would show greater reduction in anxiety symptoms than children randomized to either of the other 2 treatments.

METHOD

Participants

Participants were children or adolescents seeking treatment in a large child anxiety clinic (mean age = 11.5 years, SD = 2.91, range = 6.5–18). Children were invited to enroll in the study if, based on a structured psychiatric interview, they met *DSM-IV* criteria for separation anxiety disorder (SAD), social phobia (SoPh), specific phobia (SpPh), or generalized anxiety disorder (GAD). Exclusion criteria were as follows: lifetime history of psychosis; a clinical judgment that the child could not comply with CBT; a primary diagnosis of post-traumatic stress disorder (PTSD), obsessive compulsive disorder (OCD), or selective mutism.

Of 119 assessed children, 63 who met inclusion criteria agreed to participate. All 63 children received CBT and were randomly assigned to 1 of 3 groups: ABMT condition (ABMT+CBT), trained to induce an attentional bias away from threat (n = 18); attention bias placebo training (ABMT Placebo + CBT) (n = 25); CBT-alone, with no ABMT add-ons (n = 20). Differences in sample sizes in the 3 groups were the result of using random assignment. Of the 63 children assigned to the study, 8 children were not able to complete it, resulting in a total of 55 participants who were included in the final analysis (ABMT + CBT, n = 15; ABMT placebo + CBT, n = 22; CBT-alone, n =18). This sample size is consistent with our power calculation. Based on a previous study, in the same clinic,[6] we used effect sizes of Cohen's d = 2.10 for the Anxiety Disorders Interview Schedule (ADIS) symptom count and d = 2.25 for symptom severity to calculate the required sample size with 80% power, yielding an estimate of 15 participants per group.

Sample demographics are presented in Table 1. The final sample included 7 anxious children diagnosed with comorbid ADHD: 2 children in the ABMT group, 2 children in the ABMT placebo group, and 3 in the CBT-alone condition. All of these patients received pharmacological treatment (methylphenidate) as described in Table 1.

Materials and Tasks

Anxiety Disorders Interview Schedule for DSM-IV: C/P (ADIS). Diagnosis was established with a structured psychiatric interview, the ADIS for DSM-IV: C/P,[16] which assesses the major anxiety, mood, and externalizing *DSM-IV* disorders experienced by children and adolescents 7 to 18 years old. Patients and parents are presented with the same detailed list of symptoms (e.g., "when you are not with your parents,