Published in final edited form as:

Depress Anxiety. 2013 September ; 30(9): 822–828. doi:10.1002/da.22127.

Augmentation of Youth Cognitive Behavioral and Pharmacological Interventions with Attention Modification: A Preliminary Investigation

Bradley C. Riemann¹, Jennie M. Kuckertz², Michelle Rozenman², V. Robin Weersing², and Nader Amir²

¹ Rogers Memorial Hospital, Oconomowoc, WI, USA

² Joint Doctoral Program in Clinical Psychology, San Diego State University/University of California, San Diego, San Diego, CA, USA

Abstract

Background—Recent research suggests the efficacy of attention modification programs (AMP) in treating adult anxiety [1]. Though some research supports the success of AMP treatment in anxious youths [2, 3], to date no study has examined the efficacy of AMP as an adjunctive treatment to other psychosocial and pharmacological interventions for anxious youths within the community.

Methods—In the current study we examined the efficacy of AMP as an adjunctive treatment to standard care at a residential anxiety treatment facility. Adolescents ($N = 42$) completed either an active (attention modification program, AMP; $n = 21$) or a control (attention control condition, ACC; $n = 21$) condition, in addition to the facility's standard treatment protocol, which included cognitive behavioral therapy with or without medication.

Results—While anxiety symptoms decreased for participants across both groups, participants in the AMP group experienced a significantly greater decrease in anxiety symptoms from point of intake to point of discharge, in comparison to participants in the ACC group.

Conclusions—These results suggest that AMP is an effective adjunctive treatment to the standard treatments of choice for anxiety disorders, and may hold promise for improving treatment response in highly anxious youths.

Keywords

anxiety disorders; attention training; cognitive bias modification; dissemination; treatment; youth

Anxiety disorders in youth are prevalent [4], causing distress, disability, and lifelong impairment [5, 6]. Psychological (i.e., cognitive behavioral therapy [CBT]) and

Correspondence to: Nader Amir, Ph.D. 6386 Alvarado Ct., Suite 301 San Diego, CA 92120, USA namir@sciences.sdsu.edu Tel: 619-229-3740 Fax: 619-594-6780.

Dr. Riemann and Dr. Amir have financial interest in Cognitive Retraining Technologies Incorporated, which has licensed elements of the technology described in this study for commercial purposes. Jennie Kuckertz, Michelle Rozenman, and Dr. Weersing report no conflicts of interest.

pharmacological (selective serotonin reuptake inhibitors [SSRIs]) interventions are effective in treating youth anxiety. However, even when receiving CBT and/or pharmacological intervention, only 60% of clinically-anxious youths lose their diagnosis after monotherapy [7], leaving a substantial proportion unresponsive to current treatments.

In order to improve psychological treatments for youths, researchers have attempted to identify core cognitive processes that may be causally linked with pathological anxiety [8, 9]. For example, an early and automatic (i.e., fast, involuntary, outside awareness) [10] attention bias towards threatening information [11, 12] with downstream effects on higher-level cognitive processes (e.g., memory) may be a candidate cognitive process involved in the pathogenesis of anxiety. Indeed, there is now ample evidence that anxious youths have an attention bias toward threat-relevant information [13].

More recently, researchers have developed computerized attention modification programs (AMP) [1, 14] that direct attention away from threatening information in anxious adults. If attention bias is causally involved in the maintenance of anxiety, such modification of basic attentional processes should result in reduction of anxiety symptoms. At least four randomized double-blind clinical trials support the efficacy of AMP in adults with social anxiety [15-17] and generalized anxiety disorder [18].

Similarly, there are a number of studies of AMP in youths under the age of 18 [2, 3, 19, 20]. Rozenman et al. [3] found that after completing four weeks of AMP, 75% of youths with a primary anxiety disorder (12 of 16 youths) no longer met diagnostic criteria for any anxiety disorder. Additionally, both youths and primary caregivers indicated that AMP was a feasible and acceptable treatment. However, conclusions based on reported diagnostic change within the four-week period reported by Rozenman et al. are limited given that diagnostic criteria for anxiety disorders are generally based on a longer time frame. Moreover, this study did not include a control group. Bar-Haim and colleagues [19] examined the effects of a similar cognitive bias modification (CBM) program in a randomized placebo controlled trial (RCT) with undiagnosed youths reporting elevated levels of anxiety ($N = 35$). The authors found that CBM resulted in reduced stress reactivity and reduced attentional bias compared to a control condition.

Most recently, Eldar and colleagues [2] completed the first RCT of AMP in a sample of clinically anxious youths. In this study, youths with a primary anxiety diagnosis of separation anxiety disorder, generalized anxiety disorder, social phobia, or specific phobia completed four weeks of AMP ($n = 15$) or one of two control conditions ($ns = 15$ and 10). At post-treatment, the group completing AMP experienced a larger decrease in anxiety symptoms and attention bias for familiar threat stimuli, relative to control conditions. While this study suggests that AMP may be a useful treatment for youth anxiety, questions remain regarding the use of AMP as treatment of anxious youth in community settings. For example, in the Eldar et al. study participants were excluded if they had obsessive-compulsive disorder (OCD), post-traumatic stress disorder (PTSD), depression, or recurrent learning or conduct problems. However, childhood anxiety disorders are commonly comorbid with each other, as well as with other internalizing and externalizing disorders [21-23]. Moreover, participants were included in the study only if they presented with an

attention bias towards threat at pre-treatment. Therefore, the results may have limited generalizability to typical clinical settings.

In summary, there is some support for the efficacy of AMP in youth. However, there are at least two issues that need further examination. First, current effective treatments for youths often employ a multidimensional treatment model involving CBT and medication [7]. Therefore, it is likely that effective use of AMP in youths would involve a multidimensional approach combining AMP with current treatments. Second, although the majority of youths experiencing anxiety are treated in outpatient settings, anxiety is so debilitating for some youths that it necessitates residential treatment. Therefore, it would be useful to examine the effects of AMP in addition to standard care in such real-world clinical settings where youth anxiety is especially severe. As many youths who receive CBT and pharmacotherapy are not treated to remission, the National Institute of Mental Health called for augmentation treatments for psychotherapy and pharmacotherapy [24]. Similarly, recent reviews of CBM [1, 14, 25] have emphasized the need for research investigating the potential augmentation effects of CBM in conjunction with traditional CBT and/or pharmacotherapy.

In the current study we examined the effects of AMP, as compared to an attention control condition (ACC), in a sample of clinically anxious youths admitted to a residential facility that specializes in treating severe and complicated anxiety. Youths completed AMP (or ACC) as an adjunctive service to typical psychosocial and pharmacological intervention.

Method

Participants

Participants were 42 youths in a residential treatment facility specializing in CBT for severe and complicated cases of anxiety disorders in children and adolescents. Participants were randomly assigned to either AMP ($n = 21$) or ACC ($n = 21$). Youths ranged in age from 13-17 ($M = 15.57$, $SD = 1.17$), with similar numbers of males ($n = 20$) and females ($n = 22$) in each condition. Participants were primarily Caucasian (in the placebo condition, one participant was African-American and one participant was Asian). The majority of participants were receiving medication (88%). The most common primary diagnosis was OCD ($n = 30$). Participants had an average of 2.19 clinical diagnoses ($SD = 0.92$). All parents and participants voluntarily consented to treatment. Detailed demographic information are presented in Table 1 and diagnostic information for both groups presented in Table 2.

Program Description

All youths were enrolled in a residential treatment facility utilizing a multi-disciplinary team approach including psychiatrists, psychologists, social workers, behavioral specialists, dietitians, teachers, recreational therapists and residential counselors. The program is staffed 24 hours per day, seven days per week. Residents receive approximately four and one-half hours of CBT per weekday and three hours on weekend days. The treatment was based on individualized treatment plans that incorporate necessary elements of CBT to meet youths'

diagnostic needs. Each resident also attends school 90 minutes per weekday. The capacity of the program is 23 residents with an average length of stay 74.4 days.

Design

The design of the study was a 2 (Group: AMP, ACC) $\times$ 2 (Time: Pre-treatment, Post-treatment) mixed design. Diagnostic status at pre-treatment was determined by an unstructured clinical interview completed by a psychiatrist blind to attention training condition, and self-report measures were completed both before and after treatment. All participants were enrolled in the standard CBT treatment program, and thus all study participants received active cognitive-behavioral intervention throughout the course of the study. The majority of youths ($n = 37$) were also treated with concomitant medication. The purpose of this study was to examine whether adding AMP to CBT would result in greater symptom improvement than CBT paired with an attention control condition (ACC). This procedure was double-blind, in that both youths and staff members were unaware of treatment assigned. The computer randomly assigned 50% of participants to the AMP condition and 50% to the ACC condition.

Materials

Participants completed a computerized probe detection task consisting of neutral and disgust facial stimuli from a standardized set of eight individuals [26]. This task comprised 160 trials, and has been used in a number of anxiety-related studies [3, 15, 27]. The same set of stimuli was used for each training session, which took participants approximately 10-15 minutes to complete. In brief, in each trial two faces appeared on the screen, one above the other. For both the AMP and ACC conditions, 80% of trials consisted of neutral and disgust face pairs, while the remaining 20% of trials consisted of two neutral faces. Following a 500ms presentation, the images disappeared, and a letter (either “E” or “F”) appeared replacing either the top or bottom face. Participants were instructed to decide whether the letter was an “E” or an “F” with a left or right click of a mouse button. Participants did not receive feedback indicating the accuracy of their responses. In AMP, on trials where a neutral and a disgust face are present (80% of the trials), the probe always replaced the neutral face. Thus, participants are trained to disengage their attention from threat. In ACC, the probe replaced neutral and disgust faces with equal frequency in the trials containing both neutral and disgust faces. We used faces rather than emotional words for several reasons. Faces are the most common stimuli type in AMP trainings, across disorder type [28]. Moreover, facial stimuli have been used in previous AMP studies with youths [3, 20], and may control for developmental differences in youths’ reading ability.

Measures

Screen for Child Anxiety Related Emotional Disorders (SCARED)—The Screen for Child Anxiety Related Emotional Disorders (SCARED) [29, 30] is a 41-item questionnaire designed to assess a variety of anxiety symptoms in youth populations. Items are scored on a 0-2 scale, with 0 = “not true or hardly ever true”, 1 = “sometimes true”, and 2 = “true or often true”. This measure has good psychometric properties, both in clinical [30] and community [31] and settings. Due to the residential nature of the treatment setting, we

utilized the child version of the SCARED, as parents may not have been present during the treatment period and thus less able to report on their children's symptoms.

Beck Depression Inventory-II (BDI-II)—Participants also completed the Beck Depression Inventory-II (BDI-II) [32]. The BDI-II is a reliable and validated 21-item self-report measure of depression. This measure has been shown to have good psychometric properties in clinical adolescent populations [33].

Children's Yale-Brown Obsessive Compulsive Scale-Self report version (CY-BOCS-SR) Severity Rating Scale—The Children's Yale-Brown Obsessive Compulsive Scale – Self-Report version (CY-BOCS-SR) [34] is a measure of obsessions and compulsions in youths. The scale comprises 10 items, which make up an obsessions subscale and a compulsions subscale. Items are scored on a 0-4 scale, with higher scores indicating greater severity of obsessions or compulsions. This self-report measure is adapted from the clinician-administered CY-BOCS [35] and correlates significantly with the clinician-administered measure ($r = .77, p < .001$) [36].

Procedure

Participants completed a diagnostic clinical interview by a child and adolescent psychiatrist specializing in anxiety disorders. All youths and their parents provided informed consent to participate in the study. Participants in the current study received the residential facility's standard fee-for-services treatment, covered through health insurance policy or out-of-pocket. The attention training portion of the study was clearly defined as a voluntary, free adjunctive program that was part of “a research study evaluating the usefulness of a new computer based treatment for anxiety.” Participants and their parents were informed that participation was voluntary, would not affect their treatment, would not influence future relations with the treatment facility, and that they could withdraw at any point.

Participants then completed all baseline measures within 24 hours after being admitted to the residential treatment program. A staff member completed an initial orientation of the computer program with each participant. While enrolled in the treatment program, participants were asked to complete the computer program in the facility during their school time once a day, every weekday, as an adjunct to the standard CBT treatment protocol. Because this study was completed in a residential treatment facility rather than a tightly-controlled research setting, staff members did not strictly regulate participants' completion of this program, therefore, most participants completed the program less than the suggested five times per week. Reasons for not completing the program as scheduled included illness and not attending school for a particular day as well as simple lack of compliance. Participants again completed self-report measures within 24 hours prior to discharge. The Rogers Center for Research and Training Board approved this study.

Statistical Analyses

We first compared groups on demographic and clinical characteristics at pre-treatment using *t* tests and chi-squared analyses. To examine the effects of treatment on our measures of anxiety (SCARED) and depression (BDI-II), we submitted scores from each measure to a 2

(Group: AMP, ACC) $\times$ 2 (Time: Pre-treatment, Post-treatment) repeated measures analysis of variance (ANOVA). Significant interaction effects were followed up with between- and within-groups *t* tests. Effect sizes (Cohen's *d*) [37] were calculated as follows: (a) between-groups, $d = \text{group mean difference} / \text{pooled standard deviation}$, (b) within-group, $d = (\text{pre-treatment mean} - \text{post-treatment mean}) / \text{pooled standard deviation}$.

Because the majority of youths had a diagnosis of OCD, we also examined whether attention training had an effect on obsessive-compulsive symptoms. We did not expect the training to have an effect on obsessive-compulsive symptoms for youths who did not present with significant obsessive-compulsive symptoms at baseline, therefore we tested a regression model in which we examined baseline CY-BOCS-SR scores as a moderator of the relationship between condition and CY-BOCS-SR change scores.

To examine clinical significance of symptom improvements, we examined clinically significant change for SCARED scores, as defined by Jacobson and Truax [38]. According to these authors, a change is clinically significant if it meets two criteria. First, the change must be statistically reliable, as indicated by the reliable change index (RCI)¹. Second, an individual's post-treatment score must be closer to the mean of the functional population than that of the non-functional population (see criterion C, which is recommended for measures for which functional and non-functional populations have overlapping distributions) [38]. Normative data for the functional [39] and non-functional populations [30] were obtained from prior research. We also calculated number needed to treat (NNT) for clinically significant change, as described by Kraemer and Kupfer [40]. For binary outcome measures such as clinically significant change (yes/no), the formula for NNT is as follows: $1/\text{success rate difference (SRD)}$, where SRD = success rate of the treatment group – success rate of the control group. Numbers closer to 1 indicate that the active treatment is always superior to control, whereas increasingly positive numbers indicate less superiority of the treatment.

Results

Preliminary Analyses

The AMP and ACC groups did not differ on any demographic characteristics, including age [$t(40) = .79, p = .436$], education [$t(40) = .48, p = .636$], gender [$\chi^2(1) = .00, p = 1.0$], or ethnicity [$\chi^2(2) = 2.10, p = .350$]. Groups did not differ in medication status [$\chi^2(1) = .23, p = .634$], primary diagnosis [$\chi^2(4) = 4.0, p = .406$], or number of diagnoses [$t(40) = -.40, p = .694$]. Participants' average length of stay in the program did not differ between groups [$t(40) = .20, p = .840$].

¹ $RCI = \frac{x_1 - x_2}{S_{diff}}$ where $S_{diff} = \sqrt{2(S_E)^2}$, $S_E = s_1 \sqrt{1 - r_{xx}}$, x_1 = pretreatment score, x_2 = post-treatment score, s_1 = standard deviation at pre-treatment, r_{xx} = test-retest reliability of the measure. An RCI > 1.96 represents reliable change ($\alpha = .05$). Test-retest reliability was obtained from Birmaher et al. ($r_{xx} = .86$) [30].

Effect of Attention Training on Symptom Measures

Analysis of SCARED scores revealed a significant effect of Time [$F(1, 40) = 42.24, p < .001, d = 0.95$] that was modified by a Group $\times$ Time interaction [$F(1, 40) = 4.48, p = .041, d = 0.69$]. Follow-up analysis revealed that the AMP group had significantly lower SCARED scores at Post-treatment when compared to the ACC group [$t(40) = 2.09, p = .043, d = 0.64$]. Groups did not differ in SCARED scores at Pre-treatment [$t(40) = .32, p = .750, d = -0.10$]. Participants in both groups experienced a significant decrease in SCARED scores from Pre- to Post-treatment [AMP: $t(20) = 5.63, p < .001, d = 1.43$; ACC: $t(20) = 3.41, p = .003, d = 0.64$].

Depression symptoms also dropped from Pre- to Post-Treatment [$F(1, 38) = 48.54, p < .001, d = 1.27$]. However, the Group $\times$ Time interaction was not significant [$F(1, 38) = 0.59, p = .446, d = 0.24$].

Examination of CY-BOCS-SR scores revealed an effect of Group (unstandardized beta = 11.34, $t = 2.10, p = .043$), indicating that participants in the AMP group experienced significantly larger reductions in CY-BOCS-SR scores than participants in the ACC group. Neither the effect of baseline CY-BOCS-SR scores (unstandardized beta = 24.44, $t = 1.06, p = .294$) nor the Group $\times$ Baseline CY-BOCS-SR interaction was significant (unstandardized beta = -.25, $t = 1.10, p = .278$).

Clinical Significance

According to the criteria outlined by Jacobson and Truax [38], our analyses of SCARED scores indicated that 11 of 21 youths in the AMP group (52.4%) demonstrated reliable change in symptoms, compared to 1 of 21 youths in the ACC group (4.8%). This difference was significant [$\chi^2(1) = 11.67, p = .001$]. For the current study, number needed to treat for clinically significant change was 2.10.

Discussion

The current study represents the first investigation of AMP as an augmentation to CBT in a sample of clinically anxious youths. Our results suggest that AMP augments CBT and medication, when compared to a placebo condition, in a residential and highly clinically complex sample. Although some previous studies [2, 3] have found effects of AMP on anxiety, other studies have not found differential effect of active CBM when compared to control conditions [19]. There are at least two potential reasons for some of the discrepancies in the youth CBM research. First, although some studies have examined the effect of AMP in clinically anxious diagnosed youths [2, 3], other studies have examined AMP in unselected samples [19, 20]. Although questions of efficacy of AMP in both clinical and non-clinical samples are informative, these studies address different questions. Second, the paradigms used in CBM studies differ. For example, the current study used a training variation of the probe detection task [41]. However, other studies [19] have used a spatial cueing task [42] as a training tool. Although studies examining AMP in adults have used both paradigms (i.e., probe detection and spatial cueing) to train attention with success, it may be the case that one of these tasks is more effective in training attention in youths.

Future research should examine these factors as well as others in determining the efficacy of AMP in youths with anxiety.

While the majority of youths in this sample were diagnosed with OCD, twelve participants had other primary anxiety diagnoses, and most participants had more than one diagnosis. Based on the highly clinically complex nature of our sample as well as the intervention of interest (inclusion of threat vs. neutral faces rather than OCD-specific stimuli), we selected SCARED as our primary outcome measure. Participants in the AMP group also experienced greater obsessive-compulsive symptom change than participants in the ACC group. We are hesitant to interpret the absence of a statistically significant interaction between baseline CY-BOCS-SR scores and group, given that only five participants in the active group and two participants in the control group did not present with significant OCD symptoms (CY-BOCS-SR ≥ 16) at baseline. Moreover, these findings should be interpreted with caution, as youths with OCD in the current sample likely represent a more severe and complex sample than youths with OCD who do not necessitate residential treatment. Therefore, the version of AMP administered in the current study may not be effective at changing obsessive-compulsive symptoms in non-residential samples. However, our sample does appear to be representative of individuals receiving residential treatment for OCD, both in terms of CY-BOCS-SR scores [36] as well as duration of stay [43, 44].

Although both groups experienced a significant decrease in depression scores from pre- to post-treatment, we did not find differential effects of the treatment on depression. Thus, our intervention may be targeted towards modification of anxiety symptoms, and not depression. This hypothesis is supported by previous research using similar CBM interventions in anxious youths. For example, neither Bar-Haim and colleagues [19] nor Baert, De Raedt, Schacht, and Koster [45] found effects of stand-alone CBM on depression. However, these findings stand in contrast to the effects of AMP on depression found by Rozenman et al. [3], as well as treatment models suggesting the efficacy of integrated psychological interventions designed to target both depression and anxiety [46]. However, it is also possible that the interaction of Group $\times$ Time in the current study was not significant due to a floor effect, as both groups were receiving standard care in addition to AMP or ACC and reported low levels of depression at post-treatment. Future research may help clarify the precise targets of change in AMP interventions with anxious youths.

Because this study was conducted in a community treatment facility, it differed in a number of ways from randomized controlled trials conducted in laboratory settings. While these factors limit the internal validity of this study, our purpose was to focus on dissemination of a laboratory-developed treatment to a typical community setting with an emphasis on external validity. For example, we did not conduct formal structured diagnostic interviews. While the clinical rather than structured diagnostic interviews limits our ability to make diagnosis-specific conclusions, youths in the current study likely experienced clinical levels of anxiety given that their symptoms necessitated residential treatment and all youths responded to interventions targeted towards anxiety. Diagnostic information was not collected at post-treatment, thus preventing examination of diagnostic change as a result of the interventions. Similar to typical clinical settings, reliability checks were not conducted for clinical interviewers. Because we did not have diagnostic data at multiple time points,

and because of the unknown reliability of the clinical diagnoses, we selected self-report outcome measures with established reliability and validity for similar populations. We thus attempted to balance the fundamental tension existing between internal and external validity in this study. Nonetheless, our findings may be limited by our exclusive reliance on self-report data. While all youths received CBT, treatment was conducted in the same manner as routine clinical practice. Because no treatment manual was utilized as in typical randomized controlled trials, we cannot make conclusions regarding the nature of the CBT administered.

Unfortunately, data were not systemically recorded on how many participants were offered the research study or how many participants agreed to participate. Additionally, there was limited monitoring of youths' compliance with the program. More importantly, we did not retain response latency data or measure attention bias using an independent measure of attention.⁴ Instead, we relied on previous studies of attention training for anxiety in both adult [15, 18, 27] and youth [2, 3] populations that have consistently demonstrated a decrease in attention bias following successful AMP treatment. Furthermore, anxious youths demonstrated a decrease in attention bias from pre- to post-treatment when the majority of attention training sessions were completed at home [3].

While it is likely that group differences in anxiety symptoms from pre- to post-treatment resulted from changes in attention bias towards threat in the AMP group, we were not able to test this hypothesis because we did not retain response latencies from all participants. Thus, there are alternate explanations that may account for change in anxiety symptoms. For example, symptom reductions due to AMP may result from changes in attentional control [28, 47], rather than changes in attention bias per se. That is, AMP may strengthen a more general cognitive attentional control that is otherwise deficient in anxious individuals. Consistent with this hypothesis, Eldar et al. [2] suggested that future attention training studies should utilize non-valenced geometric shapes as stimuli to help differentiate these competing hypotheses. Another possibility is that symptom changes independent of AMP resulted in decreases in attention bias. That is, it would have been useful to examine the stability of our measure of attention bias in youths experiencing symptom reductions resulting from CBT and/or medication. Due to data loss for the ACC group, we were not able to answer these questions, although a very small subsample of participants from the ACC group for whom data were retained appeared to suggest stability of attention bias scores.

Finally, we did not obtain follow-up data for participants following discharge from the residential facility. Future studies in community settings should explore whether symptom improvements from AMP as an adjunctive treatment are stable following treatment termination. Follow-up data, in addition to complete attention bias data, would allow for

⁴Although the computer program collected reaction time data, as these computers were used primarily for clinical services, the files were deleted as part of their routine maintenance. However, we were able to conduct analyses using data from a small number of participants ($N = 9$; AMP = 5, ACC = 4), whose data were retained. These analyses revealed a significant Group $\times$ Time interaction in bias before and after treatment ($p = .034$) suggesting that the AMP group experienced a decrease in attention bias towards threat ($p = .058$), whereas the ACC group did not. Moreover, groups did not significantly differ on number of sessions completed (AMP, $M = 11.00$, $SD = 10.79$; ACC, $M = 16.75$, $SD = 7.63$).

more sophisticated analyses of the mediating role of attention bias change and would strengthen conclusions that can be drawn regarding the mechanisms involved in AMP.

Conclusions

In summary, the current study represents the first examination of the efficacy of AMP in anxious youth (a) with clinically complex diagnostic profiles, (b) completing AMP exclusively outside of a laboratory setting, and (c) completing AMP as an adjunctive treatment to CBT and pharmacotherapy. Results indicated that youths who completed an active version of attention training experienced significantly greater reductions in anxiety and obsessive-compulsive symptoms than did controls. Therefore, the above limitations notwithstanding, the current study provides encouraging initial evidence for the utility of AMP in residential settings.

References

1. Beard C. Cognitive bias modification for anxiety: Current evidence and future directions. *Expert Review of Neurotherapeutics*. 2011; 11:299–311. [PubMed: 21306216]
2. Eldar S, Apter A, Lotan D, Perez Edgar K, et al. Attention bias modification treatment for pediatric anxiety disorders: A randomized controlled trial. *Am J Psychiatr*. 2012; 169:213–220. [PubMed: 22423353]
3. Rozenman M, Weersing V, Amir N. A case series of attention modification in clinically anxious youths. *Behav Res Ther*. 2011; 49:324–330. [PubMed: 21444066]
4. Kashani JH, Orvaschel H. A community study of anxiety in children and adolescents. *Am J Psychiatr*. 1990; 147:313–318. [PubMed: 2309948]
5. Bittner A, Egger HL, Erkanli A, Costello E, et al. What do childhood anxiety disorders predict? *J Child Psychol Psych*. 2007; 48:1174–1183.
6. Strauss CC, Frame CL, Forehand R. Psychosocial impairment associated with anxiety in children. *J Clin Child Psychol*. 1987; 16:235–239.
7. Walkup J T, Albano A, Piacentini J, Birmaher B, et al. Cognitive behavioral therapy, sertraline, or a combination in childhood anxiety. *New Engl J Med*. 2008; 359:2753–2766. [PubMed: 18974308]
8. Lonigan CJ, Vasey MW, Phillips BM, Hazen RA. Temperament, anxiety, and the processing of threat-relevant stimuli. *J Clin Child Adolesc*. 2004; 33:8–20.
9. Weersing V, Rozenman M, Gonzalez A. Core components of therapy in youth: Do we know what to disseminate? *Behav Modif*. 2009; 33:24–47. [PubMed: 18955540]
10. McNally RJ. Automaticity and the anxiety disorders. *Behav Res Ther*. 1995; 33:747–754. [PubMed: 7677712]
11. Mathews A, MacLeod C. Cognitive Vulnerability to Emotional Disorders. *Annu Rev Clin Psycho*. 2005; 1:167–195.
12. Roy A, Vasa RA, Bruck M, Mogg K, et al. Attention bias toward threat in pediatric anxiety disorders. *J Am Acad Child Psy*. 2008; 47:1189–1196.
13. Muris P, Field AP. Distorted cognition and pathological anxiety in children and adolescents. *Cognition Emotion*. 2008; 22:395–421.
14. Hallion LS, Ruscio A. A meta-analysis of the effect of cognitive bias modification on anxiety and depression. *Psychol Bull*. 2011; 137:940–958. [PubMed: 21728399]
15. Amir N, Beard C, Taylor CT, Klumpp H, et al. Attention training in individuals with generalized social phobia: A randomized controlled trial. *J Consult Clin Psych*. 2009; 77:961–973.
16. Heeren A, Reese HE, McNally RJ, Philippot P. Attention training toward and away from threat in social phobia: Effects on subjective, behavioral, and physiological measures of anxiety. *Behav Res Ther*. 2012; 50:30–39. [PubMed: 22055280]

17. Schmidt NB, Richey J, Buckner JD, Timpano KR. Attention training for generalized social anxiety disorder. *J Abnorm Psychol.* 2009; 118:5–14. [PubMed: 19222309]
18. Amir N, Beard C, Burns M, Bomyea J. Attention modification program in individuals with generalized anxiety disorder. *J Abnorm Psychol.* 2009; 118:28–33. [PubMed: 19222311]
19. Bar-Haim Y, Morag I, Glickman S. Training anxious children to disengage attention from threat: A randomized controlled trial. *J Child Psychol Psc.* 2011; 52:861–869.
20. Eldar S, Ricon T, Bar-Haim Y. Plasticity in attention: Implications for stress response in children. *Behav Res Ther.* 2008; 46:450–461. [PubMed: 18313034]
21. Chavira DA, Garland A, Yeh M, McCabe K, et al. Child anxiety disorders in public systems of care: Comorbidity and service utilization. *J Beh Health Ser Res.* 2009; 36:492–504.
22. Garber J, Weersing V. Comorbidity of anxiety and depression in youth: Implications for treatment and prevention. *Clin Psychol-Sci Pr.* 2010; 17:293–306.
23. Lewinsohn PM, Zinbarg R, Seeley JR, Lewinsohn M, et al. Lifetime comorbidity among anxiety disorders and between anxiety disorders and other mental disorders in adolescents. *J Anxiety Disord.* 1997; 11:377–394. [PubMed: 9276783]
24. March JS. Looking to the future of research in pediatric anxiety disorders. *Depress Anxiety.* 2011; 28:88–98. [PubMed: 21162058]
25. Hakamata Y, Lissek S, Bar-Haim Y, Britton JC, et al. Attention bias modification treatment: A meta-analysis toward the establishment of novel treatment for anxiety. *Biol Psychiat.* 2010; 68:982–990. [PubMed: 20887977]
26. Matsumoto D, Ekman P. American-Japanese cultural differences in intensity ratings of facial expressions of emotion. *Motiv Emotion.* 1989; 13:143–157.
27. Amir N, Weber G, Beard C, Bomyea J, et al. The effect of a single-session attention modification program on response to a public-speaking challenge in socially anxious individuals. *J Abnorm Psychol.* 2008; 117:860–868. [PubMed: 19025232]
28. Bar-Haim Y. Research review: Attention bias modification (ABM): A novel treatment for anxiety disorders. *J Child Psychol Psc.* 2010; 51:859–870.
29. Birmaher B, Khetarpal S, Brent D, Cully M, et al. The Screen for Child Anxiety Related Emotional Disorders (SCARED): Scale construction and psychometric characteristics. *J Am Acad Child Psy.* 1997; 36:545–553.
30. Birmaher B, Brent DA, Chiappetta L, Bridge J, et al. Psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED): A replication study. *J Am Acad Child Psy.* 1999; 38:1230–1236.
31. Hale W, Raaijmakers Q, Muris P, Meeus W. Psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED) in the general adolescent population. *J Am Acad Child Psy.* 2005; 44:283–290.
32. Beck, AT.; Steer, RA.; Brown, GK. Manual for Beck Depression Inventory-II. Psychological Corporation; San Antonio, TX: 1996.
33. Steer RA, Kumar G, Ranieri WF, Beck AT. Use of the Beck Depression Inventory-II with adolescent psychiatric outpatients. *J Psychopathol Beh.* 1998; 20:127–137.
34. Piacentini, J.; Langley, A.; Roblek, T. Overcoming childhood OCD: A cognitive-behavioral treatment program—therapist guide. Oxford University Press; New York: 2007.
35. Scahill L, Riddle MA, McSwiggin-Hardin M, Ort SI, et al. Children's Yale-Brown Obsessive Compulsive Scale: Reliability and validity. *J Am Acad Child Psy.* 1997; 36:844–852.
36. Conelea CA, Schmidt ER, Leonard RC, Riemann BC, et al. The Children's Yale-Brown Obsessive Compulsive Scale: Clinician versus self-report format in adolescents in a residential treatment facility. *Journal of Obsessive-Compulsive and Related Disorders.* 2012; 1:69–72.
37. Cohen, J. 2nd ed.. Lawrence Earlbaum Associates; Hillsdale, NJ: 1988. Statistical power analysis for the behavioral sciences..
38. Jacobson NS, Truax P. Clinical significance: a statistical approach to defining meaningful change in psychotherapy research. *J Consult Clin Psych.* 1991; 59:12–19.

39. Muris P, Merckelbach H, Ollendick T, King N, et al. Three traditional and three new childhood anxiety questionnaires: Their reliability and validity in a normal adolescent sample. *Behav Res Ther.* 2002; 40:753–772. [PubMed: 12074371]
40. Kraemer H, Kupfer DJ. Size of treatment effects and their importance to clinical research and practice. *Biol Psychiat.* 2006; 59:990–996. [PubMed: 16368078]
41. MacLeod C, Mathews A, Tata P. Attentional bias in emotional disorders. *J Abnorm Psychol.* 1986; 95:15–20. [PubMed: 3700842]
42. Posner MI. Orienting of attention. *Q J Exp Psychol.* 1980; 32:3–25. [PubMed: 7367577]
43. Adams TG, Riemann BC, Wetterneck CT, Cisler JM. Obsessive beliefs predict cognitive behavior therapy outcome for obsessive compulsive disorder. *Cognitive Behaviour Therapy.* 41:203–211. [PubMed: 22309121]
44. Osgood-Hynes D, Riemann B, Björgvinsson T. Short-term residential treatment for obsessive-compulsive disorder. *Brief Treatment and Crisis Intervention.* 3:413–435.
45. Baert S, De Raedt R, Schacht R, Koster EW. Attentional bias training in depression: Therapeutic effects depend on depression severity. *J Behav Ther Exp Psy.* 2010; 41:265–274.
46. Weersing V, Gonzalez A, Campo JV, Lucas AN. Brief behavioral therapy for pediatric anxiety and depression: Piloting an integrated treatment approach. *Cogn Behav Pract.* 2008; 15:126–139.
47. Eysenck MW, Derakshan N, Santos R, Calvo MG. Anxiety and cognitive performance: Attentional control theory. *Emotion.* 2007; 7:336–353. [PubMed: 17516812]

Table 1

Participant Demographics and Symptom Characteristics

	Group	
	AMP	ACC
Gender (% female)	52 _a	52 _a
Age (years)	15.43 (1.16) _a	15.71 (1.19) _a
Education (years)	9.57 (1.25) _a	9.76 (1.34) _a
Length of Stay (days)	61.71 (23.40) _a	60.24 (23.75) _a
Receiving Medication (%)	86 _a	90 _a
SCARED- Pre	34.00 (18.87) _a	32.00 (21.43) _a
SCARED- Post	12.19 (10.37) _a	20.90 (16.10) _b
BDI-II- Pre	21.90 (17.11) _a	21.14 (16.17) _a
BDI-II- Post	4.43 (4.11) _a	8.42 (7.43) _b
CY-BOCS-SR- Pre [†]	25.56 (3.72) _a	24.90 (6.08) _a
CY-BOCS-SR- Post [†]	7.19 (5.11) _a	12.22 (7.07) _b

Note. Means with different subscripts are significantly different ($p < .05$); SCARED = Screen for Child Anxiety Related Disorders; BDI-II = Beck Depression Inventory-II; CY-BOCS-SR = Children's Yale-Brown Obsessive Compulsive Scale-Self report version.

[†] Means and standard deviations reflect values for participants with CY-BOCS-SR scores 16; AMP: $n = 16$, ACC: $n = 18$.

Table 2

Participant Clinical Diagnoses

Group	Primary Diagnosis	Secondary Diagnosis	Tertiary Diagnosis	Quaternary Diagnosis	Quinary Diagnosis
AMP	OCD = 13	OCD = 1	MDD = 2	MDD = 1	n/a
	SAD = 1	SAD = 3	ED = 1		
	GAD = 4	MDD = 9	TRICH = 1		
	PD = 1	ED = 1	ADHD = 3		
	ADNOS = 2	ADHD = 1			
ACC	OCD = 17	GAD = 3	MDD = 4	MDD = 1	ADHD = 1
	SAD = 2	PD = 1	ADHD = 1	ED = 1	
	GAD = 1	MDD = 9	BDD = 1		
	ADNOS = 1	ADHD = 5			

Note. ADHD = attention deficit hyperactivity disorder; BDD = body dysmorphic disorder; ED = eating disorder; GAD = generalized anxiety disorder; MDD = major depressive disorder; ADNOS = anxiety disorder not otherwise specified; OCD = obsessive-compulsive disorder; PD = panic disorder; SAD = social anxiety disorder; TRICH = trichotillomania.