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Look for Good and Never Give Up: A Novel Attention Training Treatment for Childhood Anxiety Disorders

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Abstract

Attention bias modification training (ABMT) is a promising treatment for anxiety disorders. Recent evidence suggests that attention training towards positive stimuli, using visual-search based ABMT, has beneficial effects on anxiety and attention biases in children. The present study extends this prior research using distinctive techniques designed to increase participant learning, memory consolidation, and treatment engagement. Fifty-nine clinically anxious children were randomly assigned to the active treatment condition (ATC) (N = 31) or waitlist control condition (WLC) (N = 28). In the ATC, children completed 12 treatment sessions at home on computer in which they searched matrices for a pleasant or calm target amongst unpleasant background pictures, while also engaging in techniques designed to consolidate learning and memory for these search strategies. No contact was made with children in the WLC during the wait period. Diagnostic, parent- and child-reports of anxiety and depressive symptoms, externalising behaviour problems and attention biases were assessed pre- and post-condition and six-months after treatment. Children in the ATC showed greater improvements on multiple clinical measures compared to children in the WLC. Post-treatment gains improved six-months after treatment. Attention biases for angry and happy faces did not change significantly from pre- to post-condition. However, larger pre-treatment attention bias towards threat was associated with greater reduction in anxiety at post-treatment. Also, children who showed greater consolidation of learning and memory strategies during treatment achieved greater improvement in global functioning at post-treatment. Attention training towards positive stimuli using enhanced visual-search procedures appears to be a promising treatment for childhood anxiety disorders.

Keywords: Anxiety; children; attention; modification

Introduction

Pediatric anxiety disorders are common, debilitating, and costly conditions (Andrews, Issakidis, Sanderson, Corry, & Lapsley, 2004; Bodden, Dirksen, & Bogels, 2008; Cartwright-Hatton, McNicol, & Doubleday, 2006) that predict multiple problems throughout life (Bittner et al., 2007; Essau, 2005; Pine et al., 1998; Strauss, Frame, & Forehand, 1987). There is a need for novel treatments, and attention bias modification therapy (ABMT) appears promising. The current paper presents preliminary results from a novel application of ABMT.

Cognitive-behavioural therapy (CBT) and selective serotonin reuptake inhibitors (SSRIs) are treatments for childhood anxiety disorders with the strongest empirical support. Approximately 55 to 65% of youth with anxiety disorders respond to these treatments (e.g., see Rapee, Schniering, & Hudson, 2009 for a review), leaving a sizable minority in need of other treatments. Moreover, many who do respond exhibit residual symptoms, which predict high rates of relapse at long term follow-up (Ginsburg et al. 2014). As a result, there is a need for novel interventions, particularly ones that are cost-effective and can be accessible to wide groups of affected children (Kendall, Settipani, & Cummings, 2012).

Guided by well-established models (e.g., Clark & Beck, 2010; Eysenck, 1997; Mogg & Bradley, 1998; Williams, Watts, MacLeod, & Matthews, 1997), a notable research finding is biased attention to threat stimuli in anxiety *(i.e., a threat attention bias),* which has been implicated in the aetiology and/or maintenance of anxiety disorders (see Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & Van-Ijzendoorn, 2007; van Bockstaele et al., 2014 for reviews). Most empirical studies assess threat attention bias via the visual probe task in which participants view a series of face pairs, comprising a threat face paired with a neutral face, and press a button to locate a probe following one of the faces (Mogg & Bradley, 1999) umerous experimental studies with anxious adults have found an attention bias towards threat stimuli using the visual probe task (Bar-Haim et al., 2007).

This work stimulated the development of ABMT, often using a modified visual probe paradigm (MacLeod, Rutherford, Campbell, Ebsworthy, & Holker, 2002) which trains threat avoidance by pairing threat-neutral stimuli followed by the visual probe appearing at the location of the neutral stimulus. Earlier studies found that ABMT-threat avoidance altered attention to threat stimuli and decreased anxiety symptoms (e.g., Amir, Beard, Burns, & Bomyea, 2009; Amir, Weber, Beard, Bomyea, & Taylor, 2008; Amir et al., 2009; Amir & Taylor, 2012; Hazen, Vasey, & Schmidt, 2009; See, MacLeod,& Bridle, 2009), with meta-analyses indicating significant effects in adults relative to placebo (see Hakamata et al., 2010; Hallion & Ruscio, 2011; Linetzky, Pergamin-Hight, Pine & Bar-Haim, 2015; Mogoase, David, & Koster, 2014). However, mixed findings have accumulated (e.g., Behar, McHugh, Peckham, & Otto, 2010; Eldar & Bar-Haim, 2010; Julian, Beard, Schmidt, Powers, & Smits, 2012; McNally, Enock, Tsai, & Tousain, 2013; Neubaeur et al., 2013; Rapee et al., 2013; Van Bockstaele, Verschuere, De Houwer, & Crombez, 2010). Consequently, meta-analyses have raised questions about the consistency of ABMT effects (Cristea, Kok, & Cuijpers, 2015). On the other hand, others have argued that positive outcomes are reliably observed when evidence of the successful modification of threat bias is demonstrated (MacLeod & Clarke, 2015).

Anxious children are just as likely to show threat vigilance as threat avoidance compared to healthy controls who show no bias (see Salum et al., 2013; Waters, Bradley, & Mogg, 2014). ABMT-threat avoidance may be contraindicated for anxious children who avoid threat. Some studies addressed this issue by excluding children who do not show a pre-treatment attention bias towards threat stimuli and found significant reductions in threat attention bias scores and anxiety symptoms at post-treatment in the ABMT-threat avoidance condition compared to control conditions (e.g., Eldar et al., 2012). While this might minimize deleterious effects, it limits applicability to subsets of anxious children. Other studies that have not pre-selected on the basis of pre-treatment bias direction have found mixed results regarding bias modification and anxiety reductions (e.g., Bechor et al., 2014; Cowart & Ollendick, 2011; Rozenman et al., 2011; Shechner et al., 2014).

Training anxious children to preferentially focus attention on positive stimuli could address some of these problems. Using visual-search ABMT with adults, Dandeneau and colleagues (2007) were among the first to train participants to search matrices for one smiling face embedded amongst disapproving faces. In the control condition, participants searched for a particular flower embedded among other flowers. Participants in the 'attention to positive' condition experienced significant reductions in physiological and self-report stress responses, relative to participants in the control condition. Other similar findings have since accumulated in adults (Johnson, 2009; Wadlinger & Isaacowitz, 2008; Heeren, Reese, McNally, & Philippot, 2012; but see McNally et al., 2013 for null results) and anxious children and adolescents (De Voogd, Wiers, Prins, & Salemink, 2014; Waters, Pittaway, Mogg, Bradley, & Pine, 2013; Waters, Farrell et al., 2014). Several factors may account for the beneficial effects of such training. For example, it might enhance attention to information related to safety, success and mastery which could assist with the violation of danger expectancies and the reappraisal of the objective threat value of stimuli that children fear (Waters, Farrell et al., 2014). It might enhance approach motivation which in turn might counteract avoidance tendencies (Pessoa, 2009) and assist with emotion regulation during stressful situations (Taylor, Bomyea, & Amir, 2011; Zimmer-Gembeck & Skinner, 2011).

With such training, enhancing the learning and retention of the strategy to look for positive stimuli may improve effects. Cognitive-developmental theories emphasise overt verbalization as a key process in the development of self-regulated learning among children

(Luria, 1961; Meichenbaum, 1977; Vygotsky, 1962). In particular, overt private speech can include information relevant to learning and emotion regulation that could consolidate the benefits of training and enhance the generalisation of learning to other tasks and situations (see Schunk, 1986 for a review). Verbalization might enhance children's attention to important task features (Fuson, 1979), and assist with emotion regulation by including coping statements (Kendall & Treadwell, 2007; Meichenbaum & Asarnow, 1979). It also makes salient the particular strategies that can improve task performance and enhances explicit memory of such strategies over time (Schunk, 1986; Forrin, MacLeod, & Ozubko, 2012).

One way that verbalizations can become more salient and memorable is through their expression as rhythmic melodies. The production of such melodies (e.g., jingles) is associated with numerous cognitive benefits (Rainey & Larsen, 2002; Silverman, 2010; Wolfe & Noguchi, 2009) and is a widely-used strategy in classroom settings with children to facilitate learning (e.g., the melodic production of the alphabet) (Brewer, 1995). Thus, verbalizing distinctive catch-phrases expressed as rhythmical jingles that reinforce the search strategies required during attention training (i.e., to look for positive stimuli) and other situations (i.e., to never give up doing this), might enhance children's learning and memory of these search strategies and in turn, improve outcomes after treatment and over time. It may also increase children's enjoyment and engagement during attention training, a treatment which is repetitive and has been described by participants as tedious (Rapee et al., 2013).

This study provides the first initial test of efficacy for a novel form of attention training towards positive stimuli for anxious children using visual-search ABMT supplemented with distinctive verbalization techniques designed to increase children's learning, memory consolidation, and engagement. The ABMT paradigm used pleasant and calm targets to encourage generalization across a wide range of stimuli and enhance ecological validity, given that explicitly pleasant stimuli will not be present in all situations children encounter. Treatment was delivered on PCs in the participants' homes. We hypothesised that relative to the waitlist control condition (WLC), the active treatment condition (ATC) would produce significantly greater reductions in children's anxiety symptoms and diagnoses across clinician-, parent- and child-report measures by post-treatment, and that these gains would be maintained at a six-month follow-up assessment. As additional goals, we evaluated whether pre-treatment threat attention bias predicted outcome, and whether changes in attention bias for threat and positive stimuli predicted treatment outcome. Also, we examined whether greater consolidation of the learning and memory strategies during treatment predicted outcome.

Method

Participants

Parents of 139 children contacted the research team between 2012 and 2014 as part of a series of trials examining outcomes from this novel treatment. This study was approved by the Griffith University Human Research Ethics Committee. Parents responded to study advertisements circulated through local schools, paediatricians, GPs, other mental health and community health agencies, and local newspapers. Children in the final sample satisfied the following criteria: (i) meeting criteria for a principal anxiety diagnosis of generalised anxiety disorder, separation anxiety disorder, social phobia, or specific phobia, (ii) no diagnoses of organic brain injury, psychosis, pervasive developmental disorder or learning disability, vision impairment or physical disability that would prevent using a computer; (iii) no psychological or pharmacological treatment at the time of enrolment in or during the study, and (iv) between 6.0 and 12 years of age. Comorbid externalising behavioural disorders, attention deficit hyperactivity disorder, major depressive disorder and dysthymia were not exclusionary criteria providing they were not the principal diagnosis (i.e., most severe).

After exclusion (see Figure 1 for the flow of participants through the study), a final sample of 64 participants was randomly assigned to ATC or WLC. Five participants were excluded or ineligible prior to being notified of condition: three were excluded as they were not contactable and had not returned questionnaires, one was ineligible because of lack of computer access, and another was ineligible because of ongoing treatment. Thus, 59 participants were randomised and notified of their condition allocation and included in the intent-to-treat (ITT) analyses: ATC (n=31) and WLC (n=28). In the ATC condition, one participant withdrew due to a family crisis mid-way through treatment, three participants elected to discontinue, and one participant completed treatment but was unavailable to complete the post-treatment assessment. Of the 28 participants in the WLC, one was not contactable at the post-treatment assessment and one needed treatment during the wait period.

Insert Figure 1

The principal, most severe anxiety disorder diagnoses of the 59 ITT children were separation anxiety disorder (*n* =13), generalized anxiety disorder (*n* = 14), social phobia (*n* = 20) and specific phobia (*n* = 12). In terms of comorbidity, 88% of children met criteria for a secondary anxiety disorder, 25% for attention-deficit/hyperactivity disorder, 14% for other externalising behavioural disorders (e.g., oppositional defiant disorder), 2% for post-traumatic stress disorder, and 5% for major depressive disorder.

Children in the WLC received treatment after the post-wait period assessment. Of the 26 children completing the post-wait period assessment, 21 subsequently completed both treatment and the post-treatment assessment (three were not contactable after the post-wait period assessment; and 2 discontinued during treatment). Therefore, a total of 47 children were assessed before and after treatment (26 children before and after ATC, and 21 children in the WLC who completed treatment after the wait period). Forty-three of these children completed the 6-month follow-up assessment (four children were not contactable at six-month follow-up).

Design

Children were randomised using a computer-generated list to either ATC (*n* = 31) or WLC (*n* = 28), with assignment managed by the project coordinator. The design involved two components: (a) a mixed factorial comparison with repeated measures of the two conditions (ATC; WLC) across two time-points (pre- and post-treatment/wait period); followed by (b) repeated-measures comparisons of all children across three time-points (pre- and post-treatment and six-month follow-up) (see Figure 1).

Materials

Diagnostic status. The Anxiety Disorders Interview Schedule for DSM-IV, Parent and Child Interviews (ADIS-IV-C/P; Silverman & Albano, 1996) were used to assess children's diagnostic status. Children received diagnoses for any disorder assessed with the ADIS-IV-C/P for which they received a clinician severity rating (CSR) of four or higher (scale 0-8). The ADIS-IV-C/P was administered over the telephone with parents (all mothers) and face-to-face with children. The telephone version of the ADIS-IV-C/P is as reliable as face-to-face administration (Lyneham & Rapee, 2005) and has excellent reliability and strong concurrent validity with other measures of childhood anxiety (Silverman, Saavedra & Pina, 2001; Wood, Piacentini, Bergman, McCracken & Barrios, 2002). The ADIS-IV-C/P interviews were administered by eleven postgraduate clinical students trained by clinical psychologists experienced in anxiety assessment and ADIS-IV-C/P administration. Independent assessors were used at each assessment time-point and were blind to children's assigned condition and diagnostic profile at the previous assessment/s. The outcomes of the two interviews were reviewed with the project team during weekly consensus meetings to arrive at consensus diagnoses and CSRs. All assessments were reviewed with the project team blind to child identifying details, condition, assessment time-point and prior diagnostic profile. Twenty percent of interviews were digitally recorded and coded by an independent rater blind to children's diagnostic status and treatment condition. Inter-rater reliability showed excellent agreement for both disorders present and absent (e.g., disorders present: principal diagnosis κ = .90; second diagnosis κ = 0.89; third diagnosis κ = 0.86).

Symptoms. The Spence Children's Anxiety Scale, Parent and Child version (SCAS-P & SCAS-C; Spence, 1998) are 39-item (parent report measure) and 45-item (child self-report measure; 6 positive filler items) questionnaires that both contain 4-point response scales (0 = never true to 3 = always true), yield total scores reflecting symptom severity, and possess sound psychometric properties. Mean SCAS-P total scores of 14.2 and 31.8, and mean SCAS-C total scores of 18.8 and 32.2 are reported for non-clinical and clinically-anxious children, respectively (Nauta et al., 2004; Spence, 1998). The SCAS-P and SCAS-C were completed at pre- and post-treatment/wait period and at 6-month follow-up.

The Short Mood and Feelings Questionnaire, Parent and Child versions (SMFQ-P and SMFQ-C; Angold, Costello, & Messer, 1995) were used to assess children's depressive symptoms. Both versions of the SMFQ comprise 13 items which ask the respondent to rate the child's feelings and actions (0 = not true; 1 = sometimes true; 2 = always true) over the preceding two-week period. A score of 8 or more is considered significant (Angold et al., 1995). The SMFQ-P and SMFQ-C were completed at pre- and post-treatment/wait period and at 6-month follow-up.

Parents also completed the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001) to assess broader internalising and externalising behaviour problems. The CBCL provides standardised T-scores across a range of internalizing (CBCL-Int) and externalizing

(CBCL-Ext) subscales, has good psychometric properties (Achenbach & Rescorla, 20011) and was completed by parents at pre- and post-treatment/wait and at 6-month follow-up.

Global functioning. The Children's Global Assessment Scale (CGAS; Shaffer et al., 1983) is a 0-100 clinician-rated measure to assess change in severity of overall disturbance in functioning (81-100 = normal functioning, 61-80 = slight disability, 41-60 = moderate disability, 1-40 = serious disability) (Shaffer et al., 1983). The CGAS has been shown to be reliable between raters and across time and has demonstrated both discriminant and concurrent validity (Dyrborg et al., 2000; Rey, Starling, Wever, Dossetor, & Plapp, 1997; Shaffer et al., 1983). This measure was completed by assessors at pre- and post-treatment/wait period and at 6-month follow-up.

Attention bias. The visual probe task was programmed in Java and presented on a Dell Optiplex computer with a 17 inch, 75 Hz CRT colour monitor in a research laboratory at Griffith University. Briefly, the task stimuli included grey-scaled photographs of 64 pairs of faces (half male, half female), each face pair was the same person and each photograph illustrated an emotional expression (happy, angry, and neutral). The task consisted of 80 trials, 32 trials were happy-neutral face pairs and 32 trials were angry-neutral face pairs, and 16 trials comprised of neutral-neutral face pairs. The facial stimuli were the same as those utilised in prior paediatric studies (e.g. Monk et al., 2006; Pine et al., 2005; Waters et al., 2008; Waters, Bradley, & Mogg, 2012).

Each trial began with a fixation cross presented in the centre of the screen for 500ms, followed by a face pair for 500ms. The face-pair was replaced with an asterisk (probe) for 1100ms in the spatial location previously occupied by one of the faces. For emotional face trials (i.e. angry – neutral, happy – neutral pairs), the emotional face and the asterisk were presented equally on the left or right side of the screen, therefore for half of the trials, the probe was presented in the same spatial location as the emotional face (congruent trials), and for the other half of the trials the probe was presented in the opposite spatial location as the emotional face (incongruent trials). Participants were required to immediately, and as accurately as possible, indicate the spatial location of the probe (left or right) using the corresponding computer keys. The task began with 10 random practice trials, followed by one block of 80 trials. Data are reported from the ATC and WLC groups at pre- and post-treatment/wait period assessments and combined at the six-month follow-up assessment.

Treatment ratings. Children and parents completed four questions assessing learning and satisfaction each time the child completed the program; (1) *How keen were you/was your child to complete the Program today?* (2) *How well could you/your child keep your/his or her mind on the Program today?* (3) *How much did you/your child enjoy completing the Program today?* (4) *How useful is the Program in helping you/your child to feel happy and calm?* Children and parents used a 0-8 rating scale (0 = not at all; 8 = very much) to provide their answers. Children completed the ratings at the end of the treatment program and their recordings were saved in the output file. Parents completed a hard copy questionnaire and returned the forms via a reply-paid envelope.

Children's verbalizations about what they were learning at the end of each treatment session (see Treatment program) were recorded word-for-word, coded and then summed according to the number of verbalisations that were treatment-related (e.g., child said 'look for good'; 'look for calm'; 'use both options', 'never give up'), treatment-unrelated (e.g., any other comments), or there was no response. The number of verbalisations after each session ranged from 0 to 4. Therefore, total scores in each category could range from 0 to 48.

Treatment program. The treatment was programed in Java and completed on a PC with headphones and a microphone in the family home. Picture stimuli were taken from the International Affective Picture Scheme (Centre for the Study of Emotion and Attention, 1999), the NimStim set (Tottenham et al., 2009), and stimuli sourced by the authors in previous studies (e.g., Waters & Lipp, 2008). The program involves 12 treatment sessions with each one including nine blocks of trials: four blocks of 20 trials, four blocks of 26 trials and one block of 40 trials (total 224 trials). Each trial consisted of either a 3x3 or a 4x4 picture array containing unpleasant background images (e.g. house on fire, person in hospital) and between one and three positive targets which are either ‘good’ targets (e.g., happy children; cute animals) or ‘calm’ targets (e.g., a vase; a book), which are less positive than ‘good’ targets but still positive to focus on given that not every situation will contain an explicitly pleasant stimulus to focus on. Half the trials in each block were 3x3 picture arrays, the other half were 4x4 picture arrays, and half the trials for each array size showed the pictures grouped together in the centre of the screen and the other half showed them spaced apart to promote search over a varying visual field.

The four blocks containing 20 trials included ‘calm’ target arrays and the four blocks containing 26 trials included ‘good’ target arrays. Within each set of these four blocks all containing trials of 3x3 and 4x4 spaced and grouped picture arrays, one block contained trials with three target pictures in each array; one block contained trials with two target pictures in each array, and two blocks contained trials with one target picture in each array. The ninth and final block contained 40 trials consisting of 3x3 and 4x4 spaced and group picture arrays with one good and one calm target in each array. The 3x3 and 4x4 spaced and grouped arrays within each block and the pictures within each array were presented in random order for each participant at each training session.

At the start of the program, children received instructions on the screen and via headphones that the program was designed to help them learn a couple of important skills namely, to ‘look for good’, to ‘look for calm’, to ‘use both options’ and to ‘never give up’ doing this. Children were informed that they would see picture panels showing a mixture of good, calm and unpleasant pictures, and to use the mouse to click on a good or calm target picture. This was signalled by a pleasant tone and then the next picture panel was presented. Children completed six random practice trials.

Prior to each block, children received instructions about which type of target (i.e., good or calm) and how many target pictures would be shown in each picture panel. Then each strategy was presented over the headphones as a jingle e.g., “Look for good. Look for good. Look for good, good, good!” or “Look for calm. Look for calm. Look for calm, calm, calm!” and children were prompted to say the jingle out loud. In the final block of 40 trials, children received instructions to ‘use both options’ of ‘look for good’ and ‘look for calm’ by finding one good and one calm target in each picture panel. They were told that there would be more picture panels in this final game because it was important to keep using ‘look for good’ and ‘look for calm’ even when the situation was challenging (i.e., more trials each with two targets) or they did not feel like it (i.e., fatigue). Before starting, they heard and said out loud “Never give up. Never give up. Never give up, up, up!”

Children completed one of three short intermission games after blocks two and six; one game during sessions 1-4 in which they popped balloons that displayed one of the four jingles in each balloon; another during sessions 5-8, in which emotional cartoon faces cascaded down the screen and children clicked on as many happy faces as possible within 30 sec; and a third during sessions 9-12 in which they remembered between two and four happy cartoon faces which subsequently disappeared and they had to click on them when they reappeared amongst distracting faces.

After each session, children said out loud what they were learning and they answered the four treatment rating questions. Reaction-time and number of mouse clicks to get a correct target/s for all 224 trials of the visual-search training task, plus the treatment ratings and verbalization data were recorded in output files and sent back to the project coordinator via email either automatically when the program closed if children were online or manually by parents if children completed the program offline.

Procedure

Pre-treatment/wait period assessment phase. An initial telephone screen with a parent addressed the exclusion criteria and assessed the presence of an anxiety disorder. If the child met inclusion criteria, the information sheet and consent form was sent to parents and signed copies returned via post or email. Next, the parent interview schedule of the ADIS-IV-C/P was conducted over the telephone, and then both the parent and child attended an appointment at the University during which time the child completed the child version of the ADIS-IV-C/P, and the visual probe task and questionnaires in counterbalanced order with the assigned clinician, and parents completed questionnaires. The outcomes of the two ADIS-IV-C/P interviews were discussed with the project team during weekly supervision to arrive at consensus diagnoses, CSRs and CGAS scores. Eligible children were then randomised to condition by the project coordinator following the computer-generated schedule.

Treatment/wait period phase. Parents of children randomly assigned to the ATC were sent the treatment CD, a headset containing a microphone and earphones if required, and a set-up manual that introduced the research team, gave background information about the project, and explained how to download Java and install the program. The manual provided an introduction to the key messages that children learn during the program of “look for good’, ‘look for calm’, ‘use both options’, and ‘never give up’, including their use as jingles and encouraged parents to remind their child to use these search strategies.

A telephone call was scheduled with the project coordinator who followed a standardised script to explain the contents of the manual and oversee the installation of Java and the treatment program. The project coordinator and parent completed a weekly timetable to plan the treatment sessions over three weeks. Parents were encouraged to ensure children completed the treatment in a quiet location without disruption. This call lasted approximately 1 hour, of which 20% were digitally-recorded and checked for adherence and fidelity with the telephone script by an independent assessor with no involvement in this project.

Next, children commenced the treatment phase and their progress was monitored via the automatic or manual email of output from completed sessions to the project coordinator. Initial piloting revealed that families were sometimes slow to start the treatment due to busy family schedules. Based on previous studies of home-based interventions (e.g., Rapee et al., 2006), a short 5 min tracking call was held with parents once per week by either the project coordinator or research assistant using a telephone script to check on treatment scheduling . Children's clinical presentation and progress was not discussed. Twenty percent of these calls were digitally-recorded and checked for adherence and fidelity by an independent assessor not involved in this project.

Each child in the waitlist control condition was matched with a child in the active treatment condition and completed a wait period of the same duration (6.5 weeks on average from the last pre-treatment assessment session to the first post-treatment assessment session). No contact was made with families assigned to the WLC during the wait period.

Post-treatment/wait period assessment phase. Within two weeks of completing the treatment/wait period, the parent version of the ADIS-IV-C/P was conducted over the telephone, and children and parents attended an appointment at the University during which time the ADIS-IV-C/P child version, questionnaires, and the visual probe task were completed while parents completed the questionnaires. These interviews were completed by another independent assessor blind to children's previous diagnoses and assigned condition.

The WLC group commenced treatment after the post-wait period assessment, following the same procedures as outlined above for the ATC group (see Treatment/wait period phase). After completing treatment, these children completed their post-treatment assessment as outlined above in the Post-treatment/Wait period assessment phase.

Six-month follow-up assessment phase. Six months after completing treatment, the parent version of the ADIS-IV-C/P was completed over the telephone, and children and parents attended an appointment at the University during which time the ADIS-IV-C/P child version, parent and child questionnaires and the visual probe task were completed. These interviews and assessments were completed by another independent assessor blind to children's previous diagnostic profile and assigned condition.

Response definitions, data screening and statistical analyses

Statistical overview. Analyses are based on the ITT sample (i.e., ATC = 31; WLC n = 28). Multiple methods exist for handling missing data in such analyses (Gupta, 2011). In the present study, ITT analyses were completed using the last data point carried forward method (Shechner et al., 2014; Waters, Farrell et al., 2014). This method was used as it is often the best method for study designs with two repeated assessments (pre/post) of both the treatment and waitlist groups, and a modest attrition/dropout rate (Gupta, 2011). Completer analyses, which use data from participants who completed both pre- and post- assessments (ATC = 26; WLC = 26), are also briefly reported to allow comparison with previous research, as some report only completer analyses (De Voogd et al., 2014; Rapee et al., 2013), whereas others report both completer and ITT analyses (Shechner et al., 2014; Waters et al., 2012).

Treatment outcome data and treatment ratings data were analysed using analysis of variance (ANOVA), chi square, and t-tests. For all outcome measures, separate analyses were conducted to compare the ATC and the WLC from pre- to post-treatment using 2 Group (ATC; WLC) x 2 Time (Pre-; Post-Assessment) mixed design ANOVA. Then, separate repeated measures ANOVAs with three levels of Time (Pre-; Post-; Six-Months) were used to examine long-term effects on all outcome measures for all participants combined.[1] The Greenhouse-Geisser correction was applied as required, Bonferroni adjustments were made for multiple comparisons, and partial eta squared (η^2) was calculated to estimate effect sizes. Correlation analyses examined associations between treatment verbalisations and outcomes.

Visual probe task. Attention bias scores were determined using correct reaction time (RT) to probes in milliseconds. Prior to calculating attention bias scores, RT outliers were excluded (defined as RTs <200 ms, >1100 ms, and then >3 SD above the participant's mean RT) (e.g., Waters et al., 2008). Six children did not complete the task at pre- or post-treatment/wait period (n = 3 ATC; n = 3 WLC); data from another six children were excluded due to >50% RT data missing due to errors or outliers (n = 1 ATC; n = 5 WLC). There were no significant differences between groups at either pre- or post-treatment/wait period assessment in errors (3.8%, 4%), missing data (7.6%, 9.4%) or overall mean RT (608 ms, 574 ms). Thus, analyses were based on data from 22 children in the ATC condition and 18 children in the WLC condition from pre- to post-treatment/wait period comparisons.

Attention bias scores were calculated by subtracting the average RT on congruent trials (probe presented in the same location as the emotional face) from the average RT on incongruent trials (probe presented in the opposite spatial location as the emotional face). Attention bias scores for angry and happy faces were subjected to separate 2 (Group) x 2 (Time) mixed factorial ANOVAs.

Correlation analyses were also performed to examine if pre-treatment attention bias predicted reduced symptoms at post-treatment and six-month follow-up than pre-treatment (cf. Waters et al., 2012). Anxiety reduction from pre- to post-treatment was calculated by subtracting pre-treatment SCAS-C total anxiety scores from post-treatment SCAS-C total scores. Anxiety reduction from pre-treatment to six-month follow-up was computed in the same way. Negative values of difference scores reflect reduction in anxiety at post-treatment relative to pre-treatment/six-month follow-up. In addition to examining the correlations between symptom change and pre-treatment threat bias scores, the latter was also dichotomised to reflect 'threat bias direction' in order to allow direct comparison with previous research (Price et al., 2011; Waters et al., 2012), whereby children were classified as threat vigilant (pre-treatment threat bias score > zero; n = 15) or avoidant (score < zero; n = 22). The effect of pre-treatment happy face bias scores was examined in the same way.

Results

Initial Group Comparisons

The ATC and WLC groups did not differ significantly with respect to child gender, country of birth, parent marital status, or mothers' occupational prestige, all $p > .10$ (see Table 1). Fathers of children in the WLC condition had significantly lower occupational prestige compared to fathers of children in the ATC group, $t(51) = 2.22$, $p = .03$. Groups did not differ significantly in terms of pre-treatment severity of principal diagnosis or number of diagnoses, all $t < 1.12$, all $p > .30$ (see Table 2), severity of anxiety and depressive symptoms, overall internalising and externalising symptoms, or global functioning at pre-treatment, all $t < 0.92$, all $p > .35$ (see Table 2).

Insert Table 1

Change in Diagnostic and Symptom Measures from Pre- to Post-Assessment

Diagnostic status. The Time x Group mixed factorial ANOVA of principal diagnosis CSRs revealed significant main effects of Time, $F(1, 57) = 37.05$, $p < .001$, $\eta^2 = .39$, and Group, $F(1, 57) = 6.02$, $p = .02$, $\eta^2 = .10$, and a significant Time x Group interaction, $F(1, 57) = 5.62$, $p = .02$, $\eta^2 = .09$, respectively (see Table 2). CSRs were significantly lower in the ATC compared to the WLC group at post-assessment, $t(57) = 2.72$, $p = .009$, but not at pre-assessment, $t(57) = 0.88$, $p = .38$ (see Table 2). Yet, CSRs reduced significantly from pre- to post-assessment in each group (both $p < .01$).

Insert Table 2

The Time x Group mixed factorial ANOVA of the number of diagnoses for which children met criteria revealed a significant main effect of Time, $F(1, 57) = 26.89$, $p < .001$, $\eta^2 = .32$, and a significant Time x Group interaction, $F(1, 57) = 6.83$, $p = .01$, $\eta^2 = .11$. The number of diagnoses reduced significantly from pre- to post-treatment in the ATC group, $t(30) = 5.79$, $p < .001$, but not over the wait period in the WLC group, $t(27) = 1.71$, $p = .10$, such that the number of diagnoses at post-assessment was significantly lower in the ATC group compared to the WLC group, $t(57) = 2.11$, $p = .047$.

Analyses of the number of children no longer diagnosed with their principal anxiety disorder and all disorders at post-treatment revealed significant condition effects, $\chi^2_1 = 6.88$, p = .01 (Fisher's exact test), and , $\chi^2_1 = 10.87$, p = .001 (Fisher's exact test) respectively. At post-treatment, 11 of 31 children (35%) in the ATC condition and 2 of 28 children (7%) in the WLC condition did not meet diagnostic criteria for their principal disorder; 10 of 31 children (32%) in the ATC group and 0% of children in the WLC group no longer met criteria for all diagnoses (see Table 2).

Symptom measures. The Time x Group mixed factorial ANOVA of parent-reported anxiety symptoms (SCAS-P total scores) revealed a significant main effect of Time, $F(1, 57) = 14.53$, $p < .001$, $\eta^2 = .20$, as well as a significant Time × Group interaction, $F(1, 57) = 7.73$, $p = .007$, $\eta^2 = .12$, (see Table 2). Anxiety symptoms declined significantly from pre- to post-treatment in the ATC group, $t(30) = 4.94$, $p < .001$, but not from pre- to post-wait period in the WLC group, $t(27) = 0.69$, $p = .50$. At post-assessment, lower anxiety symptoms in the ATC compared to the WLC group was marginally significant ($p = .06$).

In the analysis of child-reported anxiety symptoms, (SCAS-C total scores), a significant main effect of Time was found, $F(1, 57) = 15.34$, $p < .001$, $\eta^2 = .22$. Self-reported anxiety symptoms declined significantly from pre- to post-assessment for children in each condition ($p < .001$) (see Table 2). No other significant effects were found in the analyses of child-reported anxiety symptoms.

For parent-reported depressive symptoms, analyses of SMFQ-P total scores revealed a significant main effect of Time, $F(1, 57) = 30.05$, $p < .001$, $\eta^2 = .35$, and a significant Time x Group interaction, $F(1, 57) = 8.01$, $p = .006$, $\eta^2 = .12$. Depressive symptoms declined significantly from pre- to post-treatment in the ATC group, $t(30) = 3.72$, $p = .001$, but not in the WLC group, $t(27) = 1.61$, $p = .12$. Also, depressive symptoms were marginally lower in the ATC compared to the WLC group at post-assessment ($p < .068$) (see Table 2). The same analyses for child-reported depressive symptoms (SMFQ-C) revealed only a significant main effect of Time, $F(1, 57) = 16.05$, $p < .001$, $\eta^2 = .23$, and no other effects were significant.

In terms of internalizing problems, the Time x Group mixed factorial ANOVAs of CBCL Int T-scores revealed a significant main effect of Time, $F(1, 57) = 17.82$, $p < .001$, $\eta^2 = .25$, and a significant Time x Group interaction, $F(1, 57) = 5.17$, $p = .027$, $\eta^2 = .09$ (see Table 2). Children's internalizing symptoms declined significantly from pre- to post-treatment in the ATC group, $t(30) = 4.08$, $p < .001$, but not from pre- to post-wait period in the WLC group, $t(27) = 1.67$, $p > .11$. The difference between conditions in internalizing symptoms at post-assessment was marginally significant ($p = .08$).

For externalizing behaviour problems, the Time main effect was marginally significant, $F(1, 57) = 3.75$, $p = .058$, $\eta^2 = .06$, but there were no significant effects.

Global functioning. The Time x Group mixed factorial ANOVA of children's global functioning (CGAS scores) revealed significant main effects of Time, $F(1, 57) = 27.06$, $p < .001$, $\eta^2 = .32$, and Group, and $F(1, 57) = 8.57$, $p = .005$, $\eta^2 = .13$ respectively. Also, a significant Time x Group interaction was found, $F(1, 57) = 10.00$, $p = .003$, $\eta^2 = .15$. CGAS scores improved significantly from pre- to post-treatment in the ATC group, $t(30) = 4.96$, $p < .001$, but not from pre- to post-wait period in the WLC group, $t(27) = 1.68$, $p = .15$. Moreover, global functioning was significantly better in the ATC than the WLC group at post-assessment, $t(57) = 3.58$, $p = .001$ (see Table 2).

Maintenance of Treatment Gains at Six-month Follow-up after Treatment

Diagnostic status. The repeated measures ANOVA of principal diagnosis CSRs across time revealed a significant main effect, $F(2, 57) = 54.02$, $p < .001$, $\eta^2 = .66$. Pairwise comparisons confirmed that CSRs declined from pre- to post-treatment ($p < .001$) and from post-treatment to six-month follow-up ($p = .013$) (see Table 2). The repeated measures ANOVA of change in number of diagnoses also revealed a significant main effect of Time $F(2, 57) = 40.57$, $p < .001$, $\eta^2 = .59$. There were significant reductions from pre- to post-treatment ($p < .001$), and from post-treatment to six-month follow-up ($p = .007$).

In terms of diagnostic status at the six-month follow-up assessment after the ATC and WLC received treatment, 35 of 59 children (60%) no longer met criteria for their principal diagnosis. Moreover, 31 of 59 children (53%) no longer met criteria for any diagnosis.

Symptom measures. Parent and child symptom measures confirmed the same pattern of results (see Table 2). Parent- and child-reported anxiety symptoms (SCAS-P and SCAS-C total scores) declined significantly over time, $F(2, 57) = 16.09$, $p < .001$, $\eta^2 = .36$ and $F(2, 57) = 28.04$, $p < .001$, $\eta^2 = .51$ respectively. Pairwise comparisons on each measure confirmed that anxiety symptoms declined significantly from pre- to post-treatment (all $p < .009$) and from post-treatment to six-month follow-up (all $p < .028$).

Parent and child-reported depressive symptoms (SMFQ-P and SMFQ-C scores) also declined significantly $F(2, 116) = 16.33$, $p < .001$, $\eta^2 = .22$, and $F(2, 89) = 8.92$, $p = .001$, $\eta^2 = .14$ respectively. Depressive symptoms on each measure declined significantly from pre- to post-treatment (all $p < .035$) but did not change significantly from post-treatment to six-month follow-up (all $p > .15$).

Finally, internalizing and externalizing behaviour problems (CBCL-Int T and CBCL-Ext T scores) also declined significantly, $F(2, 110) = 31.81$, $p < .001$, $\eta^2 = .47$, and $F(2, 110) = 22.84$, $p < .001$, $\eta^2 = .29$. Internalizing and externalizing behaviour problems declined significantly from pre- to post-treatment (both $p < .001$). Internalizing behaviour problems declined further from post-treatment to six-month follow-up ($p < .02$). However, further reductions in externalizing behaviour problems from post-treatment to six-month follow-up were not significant ($p > .078$).

Global functioning. Clinician-rated global functioning improved significantly over time, $F(2, 57) = 49.49$, $p < .001$, $\eta^2 = .64$ (see Table 2). Pairwise comparisons confirmed that global functioning improved significantly from pre- to post-treatment ($p < .001$), and from post-treatment to six-month follow-up ($p < .001$).

Completer Analyses

The pattern of significant results from completer analyses was the same as those from the ITT analyses for all clinician-, parent- and child-reported measures. In terms of diagnostic status, completer analyses showed significant Condition differences in the number of children no longer diagnosed with their principal anxiety disorder, $\chi^2_1 = 6.25$, $p = .02$ (Fisher's exact test), and all disorders at post-treatment, $\chi^2_1 = 12.38$, $p < .001$ (Fisher's exact test). At post-treatment, 11 of the 26 children (42%) in the ATC condition and 2 of the 26 children (8%) in the WLC condition did not meet diagnostic criteria for their principal disorder; 10 of 26 children (38%) in the ATC group and 0% of children in the WLC group no longer met criteria for all diagnoses (see Table 2). In terms of diagnostic status at the six-month follow-up after the ATC and WLC received treatment, 32 of 43 children (75%) (combined across conditions) no longer met criteria for their principal diagnosis, and 29 of 43 children (63%) no longer met criteria for any diagnosis.[2]

Attention Biases and Treatment Outcomes

Table 2 presents the mean attention bias scores for angry and happy faces at pre- and post-assessment as a function of group. The Time x Group mixed factorial ANOVA of threat attention bias scores revealed no significant effects, all $Fs < 1.4$, $p > .72$. Similarly, the same analysis of bias scores for happy faces found no significant effects, all $Fs < 1.2$, $p > .30$. Overall, children did not show significant attention biases for angry (M = -2.2 ms, SD = 48.8) or happy faces (M = 6.1 ms, SD = 41.05) before treatment, one-sample t-tests versus zero: $t(39) = 0.35$, $p = .73$ and $t(39) = 0.80$, $p = .43$, respectively.

Analyses to test the hypothesis regarding prediction of post-treatment change in symptom severity by pre-treatment attention bias revealed significant associations (see Figure 2). Greater pre-treatment threat bias predicted significantly greater reduction in child-reported SCAS total anxiety scores from pre- to post-treatment , $r(37)= -.44$, $p<.007$. Dichotomous classification of children as threat vigilant versus avoidant before treatment (cf. Waters et al., 2012) similarly predicted anxiety symptom reduction, $r_{pb}(37) = -.46$, $p < .004$. When the effect of pre-treatment child-reported anxiety was controlled, symptom reduction showed a trend-level association with pre-treatment threat bias scores, $r(37)= -.31$, $p=.058$, and a significant relationship with the dichotomous index of pre-treatment threat bias direction (i.e., vigilant versus avoidant), $r_{pb}(26) = -.39$, $p < .05$. These associations were not significant at six-month follow-up, all $r_{pb} < .14$, $p > .48$. Correlations between pre-treatment threat bias scores and parent-reported anxiety symptoms (SCAS-P total scores) and parent- and child-reported depressive symptoms (SMFQ and SMFQ-C scores) were not significant at post-treatment and six-month follow-up relative to pre-treatment, all $r_{pb} < .10$, all $p > .71$. There were no significant correlations involving pre-treatment happy face biases, all $r_{pb} < .17$, $p >$ .32.

Insert Figure 2 here

Learning and Memory Strategies and Treatment Outcomes

Greater verbalization of treatment-related catch phrases (i.e., look for good; look for calm; use both options; never give up) (M = 31.29; SD = 13.61) was significantly associated with higher global functioning at post-treatment (CGAS scores) (M = 70.93; SD = 8.18), r(41) = .33, p = .03. Also, more verbalization of treatment-unrelated content (M = 2.51; SD = 5.86) was significantly related to lower global functioning at post-treatment, $r(41) = -.39$, $p = .02$. There were no significant correlations involving non-responses (M = 13.27; SD = 11.41), or between verbalization of catch phrases and six-month follow-up outcome measures, all $r < .28$, $p > .10$.

Parent and Child Treatment Ratings

Table 3 displays the mean child and parent treatment evaluation ratings averaged across the first two and the last two treatment sessions as a function of group. A series of Session (First two; Last two) x Group mixed factorial ANOVAs of child and parent satisfaction and learning ratings revealed no significant differences on all child ratings, all $F < 2.7$, all $p > .10$, and parent ratings, all $F < 1.7$, all $p > .21$. Thus, receiving treatment immediately (i.e., ATC group) or after the wait period (i.e., WLC group) did not affect ratings. Results suggest that treatment evaluations were high as a rating of 5 indicated ‘quite a bit’ and a rating of 6 indicated ‘a lot’ on each item.

Insert Table 3

Discussion

These results demonstrated that a novel treatment had multiple benefits over a waitlist control condition. Specifically, children repeatedly searched picture arrays for good and calm targets among unpleasant distractors since both types of targets are positive, i.e., constructive, stimuli to focus on. They listened to and verbalized out loud distinct catch phrases expressed as melodic jingles to help them learn and remember these search strategies, and they played brief intermission games that encouraged these same search strategies with the goals of enhancing engagement during treatment and making the search strategies sustainable and generalizable over time. Children completed this treatment over 12 sessions on PCs within the family home with brief telephone contact with parents.

Relative to a waitlist control group, the treatment more strongly reduced clinician-derived diagnostic measures of anxiety, parent-reports of children's anxiety and depressive symptoms, and children's report of depressive symptoms. Moreover, 35% of those in the active condition (42% of children who completed treatment) no longer met criteria for their principal anxiety disorder after treatment. Also, parent- and child-reports of anxiety symptoms and broader internalizing problems continued to decline six-months after treatment, with 63% of those who entered the study (75% of those completing treatment) no longer meeting criteria for their principal anxiety disorder at six-month follow-up. Moreover, pre-treatment attention bias towards threat and greater consolidation of treatment-related catch phrases during treatment predicted larger anxiety reductions and better global functioning respectively, at post-treatment but not at six-month follow-up.

Initial diagnostic outcome rates are similar to those from a preliminary trial of home-based visual search ABMT to positive stimuli, which used emotional face stimuli without learning and memory consolidation strategies (33% in treatment group versus 6% in control group; Completer analyses: 50% versus 8%, respectively) (Waters et al., 2013). However, unlike that study, the present treatment also produced significant reductions in parent- and child-reported anxiety and/or depressive symptoms, and was followed by continued improvements in treatment outcomes at six-month follow-up. Diagnostic outcomes are also similar to those reported from clinic-based randomised controlled trials and case series studies of visual probe ABMT-threat avoidance training for clinically anxious children (33%-60%) (Bechor et al., 2014; Eldar et al., 2012; Rozenman et al., 2011; Shechner et al., 2014). However, long-term follow-up data were not reported in these prior studies, and applicability may be limited to children with a pre-treatment bias towards threat (Eldar et al., 2012; Shechner et al., 2014).

A notable finding of the current study was that in addition to declines in anxiety symptoms, the current treatment resulted in significant declines in depressive symptoms and possibly other behavioural problems. Because pre-treatment depression and externalising behaviour scores were not in the clinical range, future studies might further examine effects in these populations.

In terms of attention biases, treatment did not alter attention biases to angry faces at post-treatment, though no threat attention bias occurred at pre-treatment. Other studies have found mixed results regarding the effect of visual probe ABMT-threat avoidance on attention bias for threat and change in child anxiety symptoms (Bechor et al., 2014; Cowart & Ollendick, 2011). Those that have found a positive effect on both attention bias and anxiety have either preselected children with an attention bias towards threat (e.g., Eldar et al., 2012) or participants have shown a significant bias towards threat at baseline (e.g., De Voogd et al., 2013; Shechner et al., 2014). Studies that have included children regardless of bias direction found positive outcomes for anxiety but not threat attention bias (Cowart & Ollendick, 2011; Rozenman et al., 2011). Such variability may in part be due to variation in the direction of attention to threat in anxious children (e.g., Salum et al., 2013; Waters Bradley et al., 2014).

Indeed, consistent with our hypothesis, larger pre-treatment attention bias towards threat predicted greater reduction in child-report of anxiety symptoms at post-treatment. Similar effects have been observed for CBT (Niles et al., 2013; Price et al., 2011; Waters et al., 2012) and ABMT (Eldar et al., 2012). One study found mixed results: better initial response to low-intensity CBT was associated with pre-treatment avoidance of severe threat, while subsequent response to more intensive CBT was associated with greater pre-treatment threat vigilance (Legerstee et al., 2010). In general, threat vigilant anxious children appear to be more responsive to treatments that involve exposure to threat and they might experience greater activation of fear circuits when exposed to threat (Craske et al., 2014; Waters et al., 2012). Moreover, as threat cues may be represented as an amalgam of both the stimulus and associated environmental cues (Pearce, 1987), threat vigilant anxious children may be more efficient at learning new contingencies between threat cues and associated environmental cues (including calm and pleasant stimuli) relative to threat avoidant anxious children. This might speed up the accumulation of corrective information that violates danger expectancies and enhances the reappraisal of the objective stimulus threat value, thereby, contributing to greater declines in anxiety symptoms (Waters et al., 2012; Waters, Farrell, et al., 2014; Waters & Kershaw, 2015). Further research is needed on the underlying mechanisms and why threat avoidant anxious children do not respond as well to variants of ABMT and CBT.

The treatment did not increase attention bias towards happy faces, as found in Waters et al. (2013) and De Voogd et al. (2014). Compared to face stimuli used during training in the previous studies, a broad range of picture stimuli was utilised in the present treatment in order to enhance ecological validity. Perhaps the stimuli and tasks used during treatment and test were too dissimilar for generalisation to occur (i.e., attention bias assessed via the visual probe task with face stimuli compared to visual search ABMT with mixed picture stimuli).

Consistent with hypotheses, greater use of the treatment-relevant catch phrases during treatment was linked with better outcomes i.e., improved adaptive functioning. Consistent with prior research (see Schunk, 1986), the verbalization of catch phrases that emphasised specific (i.e., “look for good” and “look for calm”) and general statements (i.e., “use both options" and "never give up") may have encouraged the generalization of the strategy of focusing attention on positive and calm stimuli to a broad range of situations, contributing to higher global functioning rather than to anxiety symptom reduction specifically.

Treatment ratings were high from both parents and children and did not decline significantly over the course of treatment (ratings averaging between 5 and 7 out of a maximum rating of 8 i.e., in the 'a lot' range). This is a substantial improvement compared to a previous study of visual search ABMT (Waters et al., 2013) (ratings averaged between 1 and 2 out of a maximum of 5 i.e., in the 'very little' range) in which children simply searched picture arrays for a smiling face without augmentation by verbalization strategies, intermission games and parent psycho-education about treatment.

Six children (10%) dropped out during treatment (four in the ATC and two in the WLC when they completed treatment). This rate is similar to drop-out or exclusion rates in clinic-based and online visual probe ABMT-threat avoidance studies (6 to 33%) (e.g., Calbring et al., 2012; McNally et al., 2013), and clinic-based CBT plus visual probe ABMT studies (12-14%) (e.g., Rapee et al., 2013; Shechner et al., 2014). Although the sample sizes exceeded those of all published ABMT trials with clinically anxious children, i.e., between 12 and 15 children in active ABMT conditions (e.g., Waters et al., 2013; Eldar et al., 2012; Shechner et al., 2014), studies with larger samples are required to examine predictors and moderators of change. Also, the aim of this study was to first test whether the treatment was effective above and beyond no treatment (Chambless & Hollon, 1998). However, the inclusion of an active control condition will be an important next step in future research. More importantly, as the current treatment blends several strategies, including active visual search for positive and calm targets, verbalization strategies, intermission games and parent psychoeducation, the precise treatment components contributing to beneficial outcomes remain unclear. Future studies could address this by comparing active visual search with and without the additional techniques designed to increase participant learning, memory consolidation, and treatment engagement. Finally, our effect sizes were in the range of those obtained in randomised controlled trials of home-based, parent-assisted and computer-based variants of CBT relative to clinic-based CBT and wait list conditions (e.g., Lyneham & Rapee, 2006; Rapee, Abbott, & Lyneham, 2006; Spence, Holmes, March & Lipp, 2006) (e.g., ADIS-IV-C/P CSR: η^2 = .25 - .30; SCAS-P: η^2 = .05-.12; CBCL-Int: η^2 = .06 - .12). This also encourages larger studies that compare visual search ABMT towards positive stimuli with variants of CBT.

In summary, this study showed that visual search ABMT towards positive stimuli augmented with learning and memory consolidation strategies reduced multiple clinical measures of anxiety and depressive symptoms compared to a waitlist control condition. Treatment gains continued to improve six-months after treatment. Children with a pre-existing attention bias towards threat achieved greater reduction in anxiety symptoms by post-treatment, and children who engaged in more verbalisation of treatment-related catch-phrases had the greatest improvement in global functioning.

Footnote

[1] Preliminary analyses with Group included revealed no significant effects of the wait period in any analyses and is not reported further.

[2] A supplementary report of the statistical results of the completer analyses is available on request.

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Table 1: Socio-demographic and diagnostic information

Measure	ATC (N = 31)	WLC (N = 28)
Gender (M:F)	12:19	16: 12
Age (Y:M)	9.0 (1.9)	8.5 (1.4)
% Born Australia	94	93
% Parents Married	71	68
Parent socio-economic status[a]:		
Mother	4.16 (0.9)	4.57 (1.1)
Father [b*]	4.42 (1.2)	3.90 (0.9)

[a] Occupational prestige rated using Daniel Prestige Scale (1983): 0 high – 7 low occupational prestige.

[b] Analyses based on data from 28 fathers in the ATC condition and 25 fathers in the WLC.

* indicates significant difference.

Table 2: Diagnostic, symptom and attention bias measures at pre- and post-treatment as a function of condition and at six-month follow-up after all participants in both conditions completed treatment

Measure	Pre-treatment			Post-treatment			Six-month Follow-up
	ATC N=31	WLC N=28	Combined N=59	ATC N=31	WLC N=28	Combined N=59	Combined N=59
% (N) Princ Diag Free	-	-	-	35 (11)	7 (2)		60 (35)
% (N) Free All Diag	-	-	-	32 (10)	0 (0)		53 (31)
Princ Diag CSR (0-8)							
M	5.61	5.86	5.73	3.18	4.96	3.61	2.92
SD	1.05	1.08	1.06	2.26	1.52	2.27	2.19
Number of Diagnoses							
M	3.58	3.50	3.54	2.06	3.00	1.83	1.44
SD	2.08	1.86	1.95	2.07	2.89	2.01	0.27
SCAS-C Anxiety							
M	33.06	32.33	33.00	26.87	25.52	23.65	18.68
SD	17.85	18.06	18.72	18.31	17.52	16.51	15.65
SCAS-P Anxiety							
M	26.84	25.93	26.43	20.00	24.86	20.42	18.58
SD	12.36	11.33	11.49	13.11	14.69	12.33	11.56
SMFQ-C Depression[a]							
M	5.94	5.11	5.63	3.94	5.26	3.96	3.05
SD	5.77	4.97	5.40	3.86	5.41	4.31	3.49
SMFQ-P Depression[a]							
M	4.77	5.68	5.20	2.61	4.64	3.42	2.90
SD	2.81	4.73	3.84	2.20	4.24	4.33	3.81
CBCL-Intern T							
M	65.14	64.00	64.45	59.83	62.41	59.02	56.55
SD	7.03	7.74	7.39	8.82	8.30	9.36	10.02
CBCL-Extern T							
M	52.45	55.33	53.77	49.93	55.15	50.39	48.77
SD	10.28	10.63	10.44	10.77	10.84	11.40	11.77
CGAS (0-100)							
M	59.12	57.50	58.39	67.79	59.82	68.22	72.37
SD	5.83	7.14	6.59	10.88	7.64	10.07	11.90
Attention bias-Angry[b]							
M	-6.2	1.8	-2.2	-12.9	0.61	-6.15	3.4
SD	51.5	46.1	48.8	48.5	41.1	44.8	35.4
Attention bias-Happy[b]							
M	-2.6	14.8	6.1	-3.6	-4.4	-4.0	-.43
SD	47.5	34.6	41.05	44.5	41.9	43.2	28.6

Note. SCAS-P and SCAS-C = Spence Children's Anxiety Scale, Parent Version and Child Version; SMFQ-P and SMFQ-C = Short Mood and Feelings Questionnaire, Parent Version and Child Version; CBCL Internalising T and Externalising T = Child Behavior Checklist Internalising T score and Externalising T score; CGAS = Children's Global Assessment Scale

[a] Analyses of SMFQ-P and SMFQ-C were based on log transformed data due to skewed distributions. Raw scores presented in the table.

[b] Analyses of combined attention bias data based on N = 39 with usable pre-treatment data.

Table 3:

Descriptive information for parent and child program ratings averaged across the first and the last two treatment sessions.

Sessions	Enthusiastic Mean (SD)	Enjoyed Mean (SD)	Concentrate Mean (SD)	Helping Mean (SD)
		Parent-report		
First Two	5.88 (1.57)	5.47 (1.56)	6.14 (1.51)	5.75 (1.63)
Last Two	5.46 (2.11)	5.06 (2.05)	5.88 (2.05)	5.61 (1.85)
		Child-report		
First Two	6.00 (1.98)	5.64 (2.15)	6.06 (2.04)	6.25 (1.84)
Last Two	5.60 (2.69)	5.03 (2.42)	5.60 (2.34)	5.76 (2.60)

Note: Child ratings based on data from the total sample of 47 children who completed treatment (n = 26 in ATC and n = 21 in WLC). Parent ratings are based on data from 38 parents (n = 24 in ATC and n = 14 in WLC condition due to unreturned forms). Descriptive statistics reported for all participants combined as there were no significant effects involving Condition (ATC; WLC).

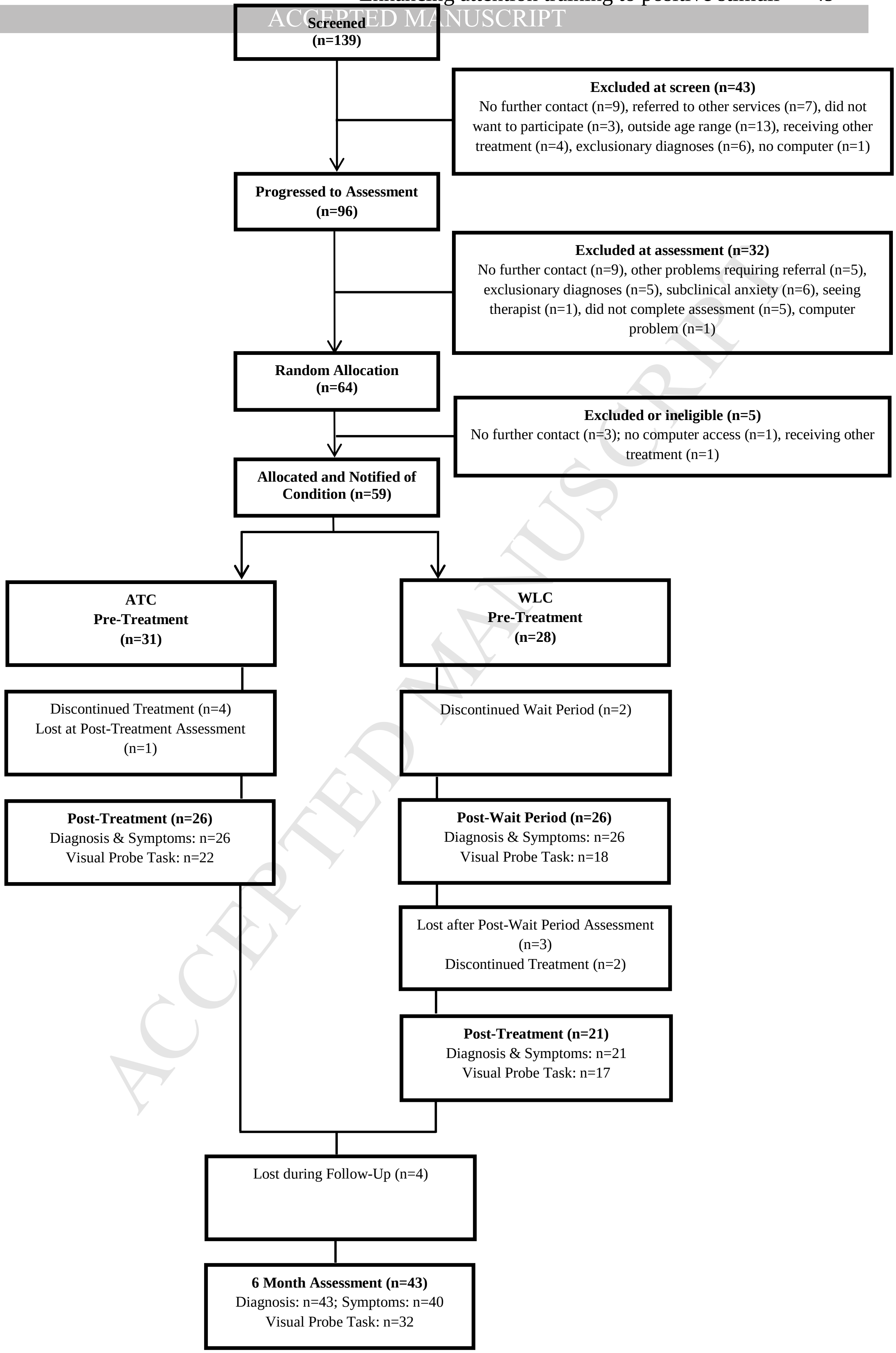

Figure 1: Flow diagram of participants through the study

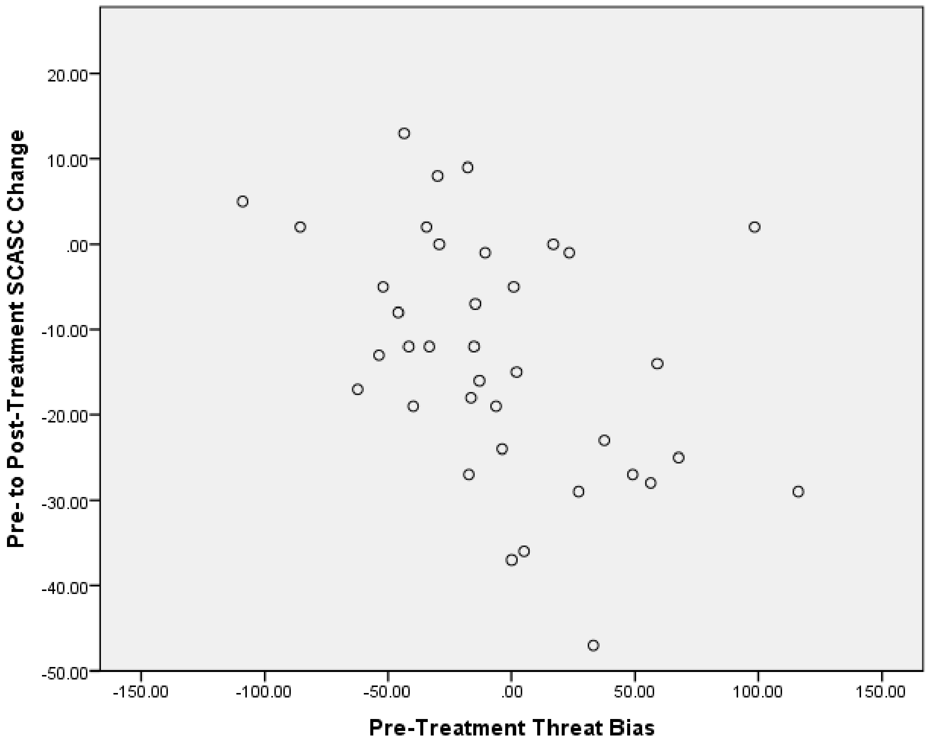

Figure 2: Scatterplot showing relationship between pre-treatment threat bias and change in SCAS-C total anxiety scores at post- compared to pre-treatment. Greater pre-treatment attention towards threat is associated with greater reduction in anxiety. (Negative values of change scores reflect reduction in anxiety symptoms at post-treatment relative to pre-treatment.)

Examined attention training to positive stimuli enhanced with learning and memory strategies

Anxious children receiving the treatment showed greater gains on clinical measures compared to waitlist

Pre-treatment attention bias towards threat predicted better treatment outcomes

More use of learning and memory strategies during treatment predicted better outcomes