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The Coping Cat Program for Children with Anxiety and Autism Spectrum Disorder: A Pilot Randomized Controlled Trial

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Abstract

The purpose of this pilot study was to evaluate whether a modified version of the Coping Cat program could be effective in reducing anxiety in children with autism spectrum disorder (ASD). Twenty-two children (ages 8–14; IQ = 70) with ASD and clinically significant anxiety were randomly assigned to 16 sessions of the Coping Cat program (cognitive-behavioral therapy; CBT) or a 16-week waitlist. Children in the CBT condition evidenced significantly larger reductions in anxiety than those in the waitlist. Treatment gains were largely maintained at two-month follow-up. Results provide preliminary evidence that a modified version of the Coping Cat program may be a feasible and effective program for reducing clinically significant levels of anxiety in children with high-functioning ASD.

Keywords

cognitive-behavioral therapy; autism spectrum disorder; anxiety disorders; randomized controlled trial

Since autism was originally described (Kanner, 1943), anxiety has been accepted as an associated feature of the disorder. Previous studies have reported that 11 to 84% of individuals with autism spectrum disorder (ASD) experience clinically significant levels of anxiety, with variables such as specific ASD subtype, level of intellectual ability, degree of social impairment, and method of assessment influencing reported rates (White, Oswald, Ollendick, & Scahill, 2009). Thus, this population experiences higher levels of anxiety than typically developing (TD) children (APA, 2000). Individuals with ASD may be at a greater risk for developing anxiety due to inhibited temperament, physiological hyperarousal (Bellini, 2006), and information-processing biases (Happé & Frith, 2006). In addition, it has been proposed that individuals with ASD are more vulnerable to stress and anxiety because they often lack an appropriate repertoire of skills to navigate social situations (Bellini, 2006) and fail to develop adaptive coping mechanisms (Gillott & Standen, 2007).

Anxiety in children with ASD is associated with pervasive consequences including increased maladaptive behavior (Kim, Szatmari, Bryson, Streiner, & Wilson, 2000), social skills deficits (Bellini, 2004), and negative life experiences (Farrugia & Hudson, 2006). Further, without treatment, anxiety in children with ASD appears to run a chronic course into adulthood (Farrugia & Hudson, 2006; Gillott & Standen, 2007). Despite the clear need for effective treatments for children with ASD and anxiety, there have been few treatment studies to date. Cognitive-behavioral therapy (CBT) has been deemed the treatment of choice for TD children with anxiety (Ollendick & King, 1998). Kendall and colleagues

(1994; Kendall et al., 1997) have pioneered the most empirically supported (Albano & Kendall, 2002) and disseminated (Velting, Setzer, & Albano, 2004) cognitive-behavioral treatment protocol for TD children with anxiety disorders (i.e., Coping Cat Cognitive-Behavioral Therapy for Anxious Youth). The Coping Cat program has demonstrated efficacy in several randomized controlled trials across cultures (Barrett, Dadds, & Rapee, 1996; Treadwell, Flannery-Schroeder, & Kendall, 1995) and has been shown to be effective in the maintenance of treatment gains over time (Kendall, 1994; Kendall et al., 1997; Kendall, Safford, Flannery-Schroeder, & Webb, 2004; Kendall & Southam-Gerow, 1996). The Coping Cat program has garnered the distinction of “empirically supported” (Albano & Kendall, 2002) and “probably efficacious” (Ollendick & King, 1998) due to the abundance of evidence supporting this treatment protocol. Preliminary evidence suggests that this program may be successfully adapted for children with attention deficit/hyperactivity disorder, physical impairments, selective mutism, and comorbid depression (Hudson, Krain, & Kendall, 2001). To date, there are no studies that have examined whether the Coping Cat program may be modified to successfully reduce anxiety in children with ASD.

Some authors (e.g., Chalfant, Rapee, & Carroll, 2007) have hypothesized that the lack of exploration into the effectiveness of CBT for children with ASD may be due to the notion that children with ASD are impaired in their ability to identify and understand emotions and cognitions in themselves and others (Baron-Cohen, Leslie, & Frith, 1985). However, since Baron-Cohen and colleagues’ (1985) first reported on “Theory of Mind” in children with ASD, there has been mixed support for the ubiquitous nature of these deficits. For example, chronological age and intellectual ability have been found to moderate Theory of Mind abilities in children with ASD (Bauminger & Kasari, 1999; Happe, 1995; Yirmiya et al., 1998). Meyer and colleagues (2006) found that children with ASD are able to report on their own stress and social attributions; further, this relatively spared self and social awareness may play a role in the development of psychopathology, including anxiety. Evidence supporting relatively intact emotion recognition abilities in individuals with age appropriate intellectual and verbal abilities suggests that CBT may be a plausible and appropriate intervention for this population.

A small, growing body of literature has demonstrated preliminary support for the use of CBT to treat anxiety in children with ASD. Three non-randomized (Ooi et al., 2008; Reaven et al., 2009; White, Ollendick, Scahill, Oswald, and Albano, 2009) and three randomized (Chalfant, et al., 2007; Sofronoff, Attwood, & Hinton, 2005; Wood et al., 2009) treatment studies have demonstrated empirical evidence that CBT treatments effectively reduce anxiety. Two of these studies (Wood et al., 2009; White et al., 2009) have employed specific multimodal cognitive-behavioral treatments aimed at targeting the core deficits of ASD that some authors have proposed may render typical CBT approaches ineffective. Wood and colleagues (2009) conducted the first randomized controlled trial of CBT delivered in an individual format for children with ASD and anxiety. Participants were school aged children with ASD and co-occurring diagnoses of separation anxiety disorder, social phobia, and/or obsessive compulsive disorder. A standard CBT program was augmented with multiple treatment components designed to accommodate or remediate the social and adaptive skill deficits of children with ASD that could pose barriers to anxiety reduction. This treatment model incorporated individual treatment, parent training, and school consultation across 16 sessions. The authors found that CBT significantly outperformed the waitlist group in terms of diagnostic outcome, a clinician rated standardized measure of treatment response, and parent measures of anxiety symptoms. Treatment gains were maintained at three-month follow up.

More recently, White and colleagues (2009) conducted an additional promising preliminary treatment study targeting both anxiety and social competence in four adolescents with ASD.

The intervention program, Multi-Component Integrated Treatment (MCIT; White, Albano, Johnson, Kasari, Ollendick, & Klin, 2010), is based on principles of CBT and integrates techniques for social skills development in ASD (e.g., modeling, specific feedback, social reinforcement) and evidenced-based approaches for the treatment of anxiety (e.g., exposure, cognitive restructuring, education). The treatment was delivered via three separate modalities including individual therapy, parent education, and group therapy skills practice across 11 weeks. Three of four participants evidenced a statistically significant reduction in parent reported anxiety symptoms and all four experienced improvement in parent reported social skills.

Preliminary reports in the literature (e.g., White et al., 2009; Wood et al., 2009) provide evidence of promising preliminary support for the use of CBT to treat anxiety symptoms in children with ASD. However, it is unclear whether these treatments are feasible for managed care clinical settings due to their multimodal nature, which requires integrated clinic, school, and peer-based interventions. Because children with ASD and their families most often access psychological services in managed care settings, it is critical that effective treatments be practical, efficient, and generalizable across these settings. The central purpose of this pilot study was to determine whether an empirically supported, individually-based cognitive-behavioral treatment could be modified to effectively reduce anxiety in children with ASD. This is the first known empirical study using the Coping Cat program for children with ASD. Extending the existing support for the Coping Cat program to those with ASD has clinically significant implications. Because this treatment package has been widely disseminated and already exists in many clinicians' repertoires, if found to be effective, it could be a primary resource for use with children with ASD across many clinical settings.

Method

Participants

Participants were 22 children, ages 8 – 14 ($M = 11.26$; $SD = 1.53$), diagnosed with ASD and at least one primary anxiety disorder of separation anxiety disorder (SAD), generalized anxiety disorder (GAD), or social phobia (SP) (see Table 1 for demographic data). Twelve children were randomized to the CBT condition and 10 children were randomized to the waitlist (WL) condition. Sample size was determined a priori by conducting a power analysis using G*Power 3 (Faul, Erdfelder, Lang, & Buchner, 2007). A large effect size was specified for group differences at post-treatment/waitlist based on the recent report of Wood and colleagues (2009) in a RCT of CBT for anxiety in children with ASD. Participants were recruited from several sources in the Southern California area including local agencies and non-profit organizations for children and families affected by ASD. Informed assent and consent was obtained from all participating children and parents in accordance with the Alliant International University Institutional Review Board.

Children were included if they met the following criteria: (a) diagnosis of ASD based on the Autism Diagnostic Observation Schedule (ADOS; Lord, Rutter, DiLavore, & Risi, 2002), Autism Diagnostic Interview- Revised (ADI-R; Rutter, Le Couteur, & Lord, 2003), and expert clinical judgment based on DSM-IV criteria, (b) diagnosis of SAD, SP, or GAD, made on the basis of the Anxiety Disorders Interview Schedule-Parent Version (ADIS-P; Silverman & Albano, 2004), (c) Full-Scale IQ ≥ 70 as confirmed by the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999), (d) age 7–14 (no children age 7 were recruited, thus the age of children in the study ranged from 8 to 14 years), and (e) English as the primary language. Children receiving additional pharmacological and/or psychosocial interventions at the time of intake were included (no children received concurrent CBT or anxiety-based interventions).

Measures

Diagnostic Measures—The ADOS (Lord et al., 2002) and ADI-R (Rutter et al., 2003) were used to confirm ASD diagnoses for study inclusion purposes. The ADOS and ADI-R were administered to study participants by evaluators who were trained to research reliability on administration and coding.

Anxiety and comorbid (non-ASD) diagnoses were made using the ADIS-P (Silverman & Albano, 2004), administered to parents of study participants by trained graduate student evaluators. The ADIS-P was also employed as the primary measure of outcome. Evaluators were blind to intervention assignment at all phases of assessment. The ADIS-P is a structured clinical interview that enables the assessor to obtain information about past and current symptomatology, course, etiology, and severity of anxiety and problem behaviors and to screen out additional disorders. Parent-reported Interference Ratings 4 (0 – 8 scale) were considered to be indicative of clinically significant impairment. The ADIS-C/P has sound psychometric properties (Silverman, Saavedra, & Pina, 2001) and has shown sensitivity to treatment effects in CBT outcome studies with TD children (e.g., Kendall et al., 1997). Further, the ADIS-C/P has demonstrated utility for diagnosing anxiety disorders and measuring treatment outcome in children with ASD across a number of recent studies (e.g., Chalfant et al., 2007; Wood et al., 2009). ADIS-P evaluators were considered reliable administrators when they met 85% reliability with a trained clinician across three consecutive interviews (coding audiotaped interviews and co-scoring during live administrations).

Parent- and Child-Report Anxiety Measures—The Spence Children's Anxiety Scale (SCAS; Spence, 1998) and the parallel parent version (SCAS-P; Nauta et al., 2004) were used as secondary outcome measures. The SCAS is a 45-item (4-point Likert scale) self-report questionnaire designed to assess children's report of anxiety and provide information about specific childhood anxiety disorders (Spence, 1998). The parent report version of the SCAS is identical to that of the child report except that it assesses the parent's perceptions of the child's current anxiety. The Total Score (sum of the 38 anxiety items) ranges from 0 to 114 with higher scores indicating greater levels of anxiety. The SCAS and SCAS-P have positive psychometric properties (Spence, Barrett, & Turner, 2003; Nauta et al., 2004) and have been used to measure anxiety symptoms and treatment outcome with high levels of internal validity and reliability (Sofronoff et al., 2005) in anxious children with ASD (e.g., Chalfant et al., 2007; Sofronoff et al., 2005).

Cognitive-Behavioral Intervention

Children in the CBT condition received a 16-week manualized cognitive-behavioral intervention according to the Coping Cat program (Kendall & Hedtke, 2006a; 2006b). The Coping Cat program is designed for children and young adolescents with SAD, SP, and GAD (Kendall & Hedtke, 2006a). The primary goal of the treatment program is to teach children to recognize signs of anxious arousal and to let these signs serve as a cue to implement anxiety management techniques. The 16 sessions are divided into two content-based parts; sessions one through eight are focused on skills training (e.g., affective education, awareness of somatic sensations associated with anxiety, cognitive restructuring, developing a coping plan, and evaluating performance and administering self-reinforcement) and sessions nine through 16 are focused on exposure tasks in a hierarchical sequence of anxiety-provoking situations. Two parent-only sessions (i.e., at sessions 4 and 9) are included to provide psychoeducation on the child's treatment goals, collaborate regarding the parent's input, impressions, and ideas, and encourage parental cooperation with treatment. Homework tasks from the Coping Cat workbook are assigned weekly to reinforce and generalize skills.

Several modifications to the Coping Cat program, judged to remain within treatment fidelity (Kendall & Hedtke, 2006a), were made in order to accommodate the learning style of children with ASD and increase treatment success. Previous reports in the literature (e.g., Anderson & Morris, 2006; Reaven, 2009) have suggested that specific modifications to traditional CBT techniques may make these interventions more accessible to children and adolescents with ASD. Therefore, the following modifications to the Coping Cat program were made:

1. Following each session, 10–15 minutes were spent on reviewing the content covered, skills learned, and homework assigned with parents in order to increase children's homework compliance and skill generalization.
2. Session duration was lengthened to 60–90 minutes to allow more time to thoroughly cover session content at a pace appropriate for children with ASD.
3. Additional written and visual materials (e.g., written schedules, pictorial scale of anxiety) were utilized to accommodate children's visual style of learning.
4. Concrete language was used to accommodate children's literal and sometimes rigid language and thought patterns.
5. Children's specific interests and preoccupations were integrated into the treatment when appropriate in order to build rapport, increase understanding of therapeutic material, and motivate participation.
6. Children with attention and concentration difficulties were offered frequent sensory input through the use of sensory stimulating objects or proactive movement breaks.
7. For children with motor difficulties, in-session writing tasks were completed with the help of the therapist or computer in order to reduce motor burden.
8. In order to adhere to the stated goals of each session, all components of the treatment were administered to each child. However, in keeping with a child-centered, individualized approach, the particular learning style of each child was respected. For example, for some children who had more difficulty with cognitive restructuring due to their particular learning profile, behavioral components of the program were emphasized over cognitive components (e.g., more time was spent on relaxation, role-plays, and exposure tasks than on cognitive restructuring).
9. Reinforcement strategies were enhanced and/or tailored to each child individually.

Procedure

Within several days of initial parent contact, a phone screen was conducted and an intake evaluation was scheduled. All study related assessment and treatment took place at Alliant International University. During the intake evaluation, diagnostic and IQ measures and parent-and child-report measures of anxiety were administered.

Included participants were block randomized to either the 16-week CBT intervention or 16-week WL using a stratified randomization procedure. Children were stratified based on age, intellectual ability, and pre-treatment anxiety severity. All children, regardless of condition, were permitted to receive treatment as usual (i.e., pharmacological or psychosocial interventions) concurrent to study participation. The primary author (RMK) delivered all of the treatment. All participants in the CBT condition completed 16 sessions, including the seven exposure sessions as prescribed in the Coping Cat program manual. Homework compliance was calculated for each participant by averaging the percentage of homework completed across all treatment sessions. Across all participants receiving treatment, the mean homework compliance score was 66%. Anxiety measures were administered within

one week of completion of the 16-week CBT intervention or WL period as well as at two-month follow-up for those in the CBT condition. Data were collected on the types of pharmacological and psychosocial interventions each participant received (as well as changes in intervention usage) during the study (see Table 1). Children initially randomized to the WL condition were offered the opportunity to receive the CBT treatment following WL completion. Children were offered \$20 for completing the study.

Results

For between-condition (CBT, WL) comparisons, treatment-completer sample sizes were 12 and 10, respectively. No participant dropouts occurred during the study, rendering intent-to-treat analyses unnecessary (see Figure 1). Recruitment occurred from June – September 2009; post-treatment/WL and follow-up assessments were completed by April 2010.

Pre-treatment Comparability

Pre-treatment group differences were assessed using chi-square and t-tests. There were no statistically significant pre-treatment differences across any of the demographic, diagnostic, or intervention variables with one exception; a larger proportion of children in the WL condition were using stimulant medications at pre-treatment than those in the CBT condition (see Table 1). Additionally, no statistically significant pre-treatment differences were found across the stratification variables (see Table 2).

ADIS-P Inter-rater Reliability

ADIS-P diagnostic assessments were audiotaped to assess for agreement between raters. Fifteen percent of all ADIS-P assessments ($n = 9$) were randomly chosen for inter-rater reliability analyses. Agreement among raters for ADIS-P Interference Ratings across all diagnoses was good ($ICC = .83$).

Treatment Adherence

In order to evaluate therapist adherence to the Coping Cat program session goals, all sessions were videotaped. Twelve percent of sessions were randomly selected across participants and sessions. Coding for treatment adherence was conducted by trained graduate research assistants who had familiarity with the concepts of CBT and the treatment protocol. Coders viewed sessions and simultaneously completed a checklist according to whether clearly operationalized session goals, as outlined in the Coping Cat program manual, were sufficiently addressed. For example, goals from Session 2 include: 1) build rapport, 2) review homework, 3) introduce concept that different feelings have physical sensations, 4) normalize experience of fears and anxiety, 5) construct fear hierarchy, and 6) assign homework task. The study therapist adhered to session goals at a rate of 95% (inter-rater reliability among coders was good; $ICC = .88$).

Treatment Outcome

Outcome at Post-Treatment/WL—Using ADIS-P primary anxiety diagnosis Interference Ratings at post-treatment/WL as the recovery criterion, 58% (7 of 12) of children receiving CBT no longer met criteria for their primary anxiety diagnosis at post-treatment; 100% (10 of 10) of those in the WL condition continued to meet criteria for the primary anxiety diagnosis at post-WL assessment ($\chi^2(1) = 8.56, p = .003$).

A mixed-model repeated measures ANOVA with group (CBT, WL) as a between-subject factor and time (pre-treatment/WL, post-treatment/WL) as a within-subject factor was conducted to assess treatment outcome using both primary and secondary outcome

measures. All effect sizes were calculated using G*Power 3 (Faul, et al., 2007). For ADIS-P primary anxiety diagnosis Interference Ratings, a significant main effect for time, $F(1, 20) = 25.94$, $p < .001$, Cohen's $d = 1.15$, and significant group $\times$ time interaction, $F(1, 20) = 12.53$, $p < .01$, Cohen's $d = 1.35$, was found (see Figure 2; Table 3).

For child-report SCAS scores, a non-significant main effect for time, $F(1, 19) = 2.58$, $p = .13$, Cohen's $d = .40$, and a marginally significant group $\times$ time interaction, $F(1, 19) = 3.10$, $p = .09$, Cohen's $d = .51$, was found (see Table 3). For parent-report SCAS-P scores, a significant main effect for time, $F(1, 20) = 7.22$, $p = .01$, Cohen's $d = .61$, and significant group $\times$ time interaction, $F(1, 20) = 6.31$, $p = .02$, Cohen's $d = 1.17$, was found (see Table 3).

In order to examine changes in total number of comorbid diagnoses (e.g., anxiety and other psychiatric conditions based on ADIS-P Interference Ratings), a mixed-model repeated measures ANOVA with group (CBT, WL) as a between-subject factor and time (pre-treatment/WL, post-treatment/WL) as a within-subject factor was conducted using total number of ADIS-P diagnoses as the dependent variable. A significant main effect for time, $F(1, 20) = 13.80$, $p = .001$, Cohen's $d = .83$, and significant group $\times$ time interaction, $F(1, 20) = 29.73$, $p < .001$, Cohen's $d = 1.22$, was found (see Table 3).

Outcome at 2-Month Follow-Up—Data from 92% (11 of 12) of participants who received the CBT intervention were collected at two-month follow-up. Using ADIS-P primary anxiety diagnosis Interference Ratings at post-treatment/WL as the recovery criterion, 36% (4 of 11) of participants remained free from meeting diagnostic criteria for their primary anxiety diagnosis at 2-month follow-up. One participant relapsed and again met criteria for the primary anxiety diagnosis; ten participants retained their diagnostic status from post-treatment.

Using only the data from the CBT group, a repeated measures ANOVA with within-subject factor time (pre-treatment, post-treatment, follow-up) was conducted to assess maintenance of treatment gains using both primary and secondary outcome measures. For ADIS-P primary anxiety diagnosis Interference Ratings, a significant main effect for time was found, $F(2, 20) = 16.60$, $p < .001$, Cohen's $d = 1.29$ (see Figure 2; Table 3). Follow up comparisons show a significant difference between ADIS-P Interference Ratings at pre-treatment and follow-up, $t(10) = 3.68$, $p = .004$, Cohen's $d = 1.12$, and a non-significant difference between ADIS-P Interference Ratings between post-treatment and follow-up, $t(10) = -1.90$, $p = .09$, Cohen's $d = .31$.

For child-report SCAS scores, a non-significant main effect for time was found, $F(2, 20) = .30$, $p = .74$, Cohen's $d = .17$ (see Table 3). For parent-report SCAS-P scores, a significant main effect for time was found, $F(2, 20) = 10.85$, $p = .001$, Cohen's $d = 1.04$ (see Table 3). Follow up comparisons show a significant difference between SCAS-P scores at pre-treatment and follow-up, $t(10) = 4.57$, $p = .001$, Cohen's $d = 1.38$, and a non-significant difference between SCAS-P scores between post-treatment and follow-up, $t(10) = -.87$, $p = .40$, Cohen's $d = .27$.

Clinical Significance—Number Needed to Treat (NNT) was calculated using return to non-clinical levels for the primary anxiety diagnosis on the ADIS-P (i.e., ADIS-P Interference Rating < 4) at post-treatment/WL as the recovery criterion. Results indicate that approximately two children must participate in the Coping Cat program in order for one child to return to non-clinical levels for their primary anxiety diagnosis at post-treatment (NNT = 1.72).

Discussion

Given the high rates of co-occurring anxiety disorders in children with ASD, finding efficacious treatments for this population has been an area of recent interest. This is the first study to evaluate whether a modified version of the Coping Cat program could be effective for reducing anxiety in children with ASD. Overall, the results provide promising initial evidence that, despite high levels of anxiety and comorbidity, children with ASD who complete the 16-week Coping Cat Program experience a larger reduction in anxiety symptoms than those receiving no treatment or treatment as usual and these gains are largely maintained at two-month follow-up.

Over half (58%) of all children who participated in CBT treatment demonstrated a remission in clinically-significant anxiety symptoms, no longer meeting diagnostic criteria (based on parent report) for their primary anxiety disorder at post-treatment. This finding is comparable to estimates of primary anxiety disorder remission for TD children completing the Coping Cat program (53–70%; Barrett et al., 1996; Kendall, 1994; Kendall et al., 1997) and to findings from studies of children with ASD completing alternative CBT interventions (64 – 71%; Chalfant et al., 2007; Wood et al., 2009). In addition, participants in the CBT group demonstrated a greater reduction in total number of psychiatric diagnoses at post-treatment than those in the waitlist group, suggesting that the Coping Cat program may ameliorate symptoms of co-occurring internalizing and externalizing conditions.

Cicchetti and colleagues (2010) recently emphasized that the ultimate test of a new treatment is not whether it has produced a statistically significant result, but instead whether the result is clinically meaningful (i.e., using measures of effect size and NNT). Large effect sizes for comparisons in reduction of anxious symptoms among children in the active treatment versus waitlist were found. Furthermore, mean ADIS-P Interference Ratings for primary anxiety disorders in the CBT group, but not the WL group, dropped below the clinical cutoff at post-treatment. Analysis of clinical significance examined using NNT suggest that approximately two children must be treated in order for one child to evidence a clinically significant remission in anxiety symptoms. These results are promising and comparable to studies of Coping Cat efficacy for TD children (NNT = 2.8; Walkup et al., 2008).

Secondary outcomes based on parent, but not child, report yielded clinically meaningful reductions in anxiety and are in line with those previously reported in the literature (e.g., Chalfant et al., 2007). Based on SCAS-P scores, children receiving CBT evidenced a decrease in anxious symptomatology at post-treatment. While these results were not replicated by child version of the SCAS, previous studies have brought into question the accuracy of child-reported symptoms in children with ASD (e.g., Reaven et al., 2009; Sofronoff et al., 2005; Wood et al., 2009). In light of the discrepant findings between parent and child reported symptoms at outcome, it is possible that children in the current study may not be accurate reporters of their own psychiatric symptoms or that the instruments used to measure anxiety may not be reliable or valid in this population. An alternative hypothesis may be that, although children did not experience a significant change in their experience of anxiety (e.g., as reflected in statistically equivalent self-reported SCAS scores), they learned coping strategies in order to manage and face their fears in a more adaptive manner. This hypothesized skill acquisition could be related to parents' perceptions of anxiety reduction in their children.

Although only 36% of children remained free of their primary anxiety diagnosis at two-month follow-up, statistical differences in anxiety scores from pre-treatment to follow-up suggest that treatment gains were maintained. These results are consistent with those

previously reported in CBT outcome studies with children with ASD and anxiety (Sofronoff et al., 2005; Wood et al., 2009). Although treatment gains were largely maintained at follow-up, it may be that children with ASD require booster treatment sessions to fully maintain skills learned in the initial dose of intervention.

Clinical Implications

Results of this pilot study can be taken as a first step in providing evidence that a modified version of the Coping Cat program may be a feasible and effective intervention package for reducing clinically significant levels of anxiety in children with high-functioning ASD. These results have clinically significant implications given that: 1) children with ASD are at an increased risk for developing co-occurring anxiety disorders, 2) little evidence exists for effective treatments for children with ASD and co-occurring psychiatric conditions, and 3) results of this study are in accordance with a small body of literature providing support for the use of CBT to treat anxiety in children with ASD. It appears that the Coping Cat program was acceptable to children with ASD and their families as no dropouts occurred during the treatment phase of the study. Further, this program appears to be a feasible treatment to modify and implement for children with ASD and anxiety.

Modifications to the Coping Cat program in the present study, though considered to be within treatment fidelity (Kendall & Hedtke, 2006a), included such additions as bolstering the parent-training component, lengthening session duration, utilizing additional visual supports, adjusting language to be more concrete, incorporating children's interests into treatment, providing sensory and motor accommodations, emphasizing behavioral over cognitive aspects of the treatment, and tailoring reinforcement to meet individual needs. These modifications are consistent with many of the recommendations outlined by previous authors (Anderson & Morris, 2006; Reaven, 2009) for accommodating the challenging clinical profile of children with ASD.

Kendall and colleagues have been very successful in effectively disseminating the Coping Cat program not only to research groups internationally, but have also made Coping Cat treatment materials available to clinicians in a variety of settings via resources available for purchase over the internet. Availability of treatment and training materials as well as promising initial evidence make Coping Cat a possible first line treatment for children with ASD and anxiety across a range of clinical settings.

Limitations and Future Research

Despite the significant contribution that this pilot study makes to the current literature on effective interventions for children with ASD and anxiety, several important limitations warrant discussion. First, although large enough to produce statistically significant and clinically meaningful results for most measures of outcome, the sample size of the current study is small and thus, statistical results and effect sizes should be interpreted with caution (Kraemer et al., 2006). Second, outcome measures used in this study were, in large part, based on parent report. Parents were not blind to treatment condition and likely had considerable investment in the success of the treatment (e.g., due to time spent, hope that it would help their children, etc.). Parent reported improvements in children's anxiety could have been due to perceptions of treatment credibility and expectancy for change, increased education about their child's anxiety, or facilitation of their child's engagement in the treatment process (e.g., through completion of homework and out of session exposure tasks). Nevertheless, parent perception of improved anxiety is clinically meaningful as this type of perceived change may have significant impact on family quality of life. Additionally, relying on measures designed for typical children may have a significant impact on accurately measuring outcome as previous researchers have suggested that children with

ASD may have a differential pattern and manifestation of anxiety symptoms than typically developing children (Gillott et al., 2001). Third, the primary author delivered all of the treatment. There are many challenges in working with this highly complex clinical population. It may be that the author's clinical training and experience working with children with ASD limits the generalizability of the results to other treatment providers. It is unclear at this point exactly what type of clinical experience is required to flexibly modify the treatment and achieve successful outcomes.

Although initial results are promising, future research is needed to replicate and expand upon this pilot study. Future research on the efficacy of the Coping Cat program for children with ASD would benefit from: a) replication with a larger sample size, b) employing outcome measures based on more objective sources instead of relying on parent and child report, and c) examining treatment response across therapists.

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Figure 1.
Participant flow diagram.

Figure 2.

ADIS-P Interference Ratings for primary anxiety diagnoses across time. Error bars represent standard error of the mean. Bold line represents ADIS-P clinical cutoff (i.e., Interference Rating 4 is considered to be in the clinical range).

Table 1

Pre-treatment comparability across demographic, diagnostic, and intervention usage variables

	CBT (n= 12)	WL (n= 10)		
	n (%)	n (%)	χ^2	p value
Child Gender			1.26	.26
Male	12 (100%)	9 (90%)		
Parent Highest Education			2.72	.26
High School Graduate	4 (33%)	1 (10%)		
College Graduate	7 (59%)	6 (60%)		
Graduate Degree	1 (8%)	3 (30%)		
Parent Marital Status			2.06	.26
Single	1 (8%)	2 (20%)		
Married/Remarried	11 (92%)	7 (70%)		
Cohabiting	0 (0%)	1 (10%)		
Child Ethnicity			3.18	.37
Caucasian	8 (66%)	4 (40%)		
Native/American Indian	0 (0%)	0 (0%)		
Black/African American	0 (0%)	0 (0%)		
Asian/Pacific Islander	0 (0%)	0 (0%)		
Hispanic/Latino	2 (17%)	1 (10%)		
Other/Mixed Ethnicity	2 (17%)	1 (10%)		
Not Reported	0 (0%)	4 (40%)		
ASD Diagnosis			1.43	.49
Autism	3 (25%)	3 (30%)		
Asperger syndrome	9 (75%)	6 (60%)		
PDD-NOS	0 (0%)	1 (10%)		
Baseline Anxiety Diagnoses				
Separation Anxiety Disorder	5 (42%)	3 (30%)	.32	.57
Generalized Anxiety Disorder	11 (92%)	7 (70%)	1.72	.19
Social Phobia	8 (67%)	7 (70%)	.03	.87
Specific Phobia	8 (67%)	7 (70%)	.07	.79
Obsessive Compulsive Disorder	2 (17%)	0 (0%)	1.83	.18
Baseline Comorbid Diagnoses				
ADHD	8 (67%)	8 (80%)	.49	.47
Oppositional Defiant Disorder	4 (33%)	5 (50%)	.63	.43
Major Depressive Disorder	1 (8%)	0 (0%)	.87	.35
Pharmacological Intervention Usage				
SSRI	2 (17%)	1 (10%)	.21	.65
Anti-Psychotic	3 (25%)	0 (0%)	2.90	.09
Stimulant	0 (0%)	4 (40%)	5.87	.02*
Psychosocial Intervention Usage				
Psychological/Behavioral	3 (25%)	2 (20%)	.08	.78

	CBT (n= 12)	WL (n= 10)		
	n (%)	n (%)	χ^2	p value
School-Based	5 (42%)	5 (50%)	.15	.70

*
p > .05;

Note. At post-treatment, 3 of 22 (CBT = 1/12; WL = 2/10) of children had changed medication type and 1 of 22 (CBT = 1/12) of children had discontinued psychosocial intervention services received over the course of treatment.

Table 2

Pre-treatment comparability across stratification variables

	CBT (n=12)	WL (n=10)		
	Mean (SD)	Mean (SD)	<i>t</i>	<i>p</i> value
Child Age	11.65 (1.41)	11.02 (1.69)	.94	.36
Full Scale IQ	108.42 (17.70)	110.40 (17.39)	-.26	.76
VIQ	105.83 (17.89)	107.00 (15.71)	-.16	.87
PIQ	108.58 (16.96)	111.90 (18.62)	-.44	.67
Anxiety Severity	7.00 (1.21)	7.10 (1.10)	-.20	.84

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Table 3

Means and standard deviations for outcome measures

Measure	Pre-treatment/WL		Post-treatment/WL		Follow-up	
	CBT	WL	CBT	WL	CBT	WL
ADIS-P Interference Rating						
M	7.00	7.10	3.67	6.50	4.45	
SD	1.21	1.10	2.50	1.18	2.54	
ADIS-P Comorbid Diagnoses						
M	4.00	3.70	2.42	4.00	3.00	
SD	1.04	1.06	1.38	1.25	1.67	
SCAS Total Score						
M	27.08	28.89	26.75	36.11	29.00	
SD	19.75	17.15	20.79	16.46	22.43	
SCAS-P Total Score						
M	34.92	32.20	20.08	31.70	21.64	
SD	13.71	16.54	11.34	13.36	9.15	

Note. ADIS-P Interference Rating refers to primary anxiety diagnosis; ADIS-P Comorbid Diagnoses refers to the total number of comorbid (non-ASD) diagnoses based on the ADIS-P.