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Cognitive-behavioral therapy for anxiety in youth with an autism spectrum disorder: A follow-up study

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Abstract

Cognitive-behavioral therapy for anxiety in youth with an autism spectrum disorder appears efficacious; however, maintenance of treatment gains has not yet been studied. Using a sample of 32 youth who had benefited at least minimally from a past trial of cognitive-behavioral therapy for anxiety in autism spectrum disorder, this study assessed anxiety symptoms in youth 10–26 months following treatment completion. Compared to baseline, follow-up scores were associated with large effects for treatment. Relative to post-treatment, a small effect for return in symptoms was present and significantly fewer individuals were rated as responders at follow-up. Future studies should investigate factors associated with poor treatment maintenance and modifications or additions to treatment that may help maintain treatment gains..

Keywords

efficacy, maintenance, relapse, treatment

Co-occurring psychiatric/psychological disorders are common in youth with an autism spectrum disorder (ASD), with as many as 75% meeting criteria for a second disorder (De Bruin et al., 2007; Leyfer et al., 2006; Simonoff et al., 2008). In particular, co-occurring anxiety disorders, which include specific phobia (8.5%–44.3%), social phobia (7.4%–29.2%), obsessive compulsive disorder (OCD; 6.4%–37%), agoraphobia (6.4%–7.9%), generalized anxiety disorder (GAD; 2.4%–13.4%), panic disorder (1.1%–10.1%), and separation anxiety disorder (SAD; 0.5%–12%; De Bruin et al., 2007; Leyfer et al., 2006; Simonoff et al., 2008), are of note due to their frequency, severity, and impact on functioning (De Bruin et al., 2007; Gillott et al., 2001; Kim et al., 2000; Russell and Sofronoff, 2005; Russell et al., 2005). Increases in anxiety severity among this population are associated with increased aggressive and oppositional behavior, limited social engagement, poorer relationships with parents, teachers, and peers (Kim et al., 2000), as well as increased non-psychiatric hospitalizations and occurrences of medical illness (Gadow et al., 2008). Ranking second among the most common concerns parents of youth with ASD have regarding their child (Mills and Wing, 2005), it is clear that co-occurring anxiety presents a serious concern for these youth and their families.

The treatment of anxiety with cognitive-behavioral therapy (CBT) in typically developing populations has strong empirical support (Cartwright-Hatton et al., 2004; In-Albon and Schneider, 2007). Based on these positive data, nine controlled trials to date have examined the use of CBT-based approaches for anxiety in ASD (Chalfant et al., 2007; McNally Keehn et al., 2013; Reaven et al., 2012; Russell et al., 2013; Sofronoff et al., 2005; Storch et al., 2013; Sung et al., 2011; White et al., 2013b; Wood et al., 2009). Generally, results have been very promising with, in most cases, high levels of treatment response (e.g. 71.4% and 76.5% in Chalfant et al. (2007) and Wood et al. (2009), respectively) and large treatment effects observed for CBT (i.e. $d > 1.0$; McNally Keehn et al., 2013; Reaven et al., 2012; Storch et al., 2013; Wood et al., 2009).

While the immediate outcomes of CBT for anxiety in youth with ASD are promising, the long-term efficacy of CBT treatments for individuals with anxiety in ASD is

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currently unknown. On the one hand, CBT for anxiety in neurotypical youth is highly durable, with studies generally finding non-significant differences between post-treatment and follow-up, as well as large treatment effects when compared to baseline (Barrett et al., 2005; Kendall, 1994; Spence et al., 2006, 2011; Sportel et al., 2013). For example, in Spence et al. (2006), remission of primary anxiety diagnosis increased from 55% ($n = 27$) at post-treatment to 63% at 1-year follow-up ($n = 31$). Longer-term follow-ups at various intervals up to 14 years following treatment end have found similar results, suggesting gains made during CBT are robust and stable over time (Durham et al., 2003; Garcia-Lopez et al., 2006; O'Leary et al., 2009; Rufer et al., 2005). Although data are limited, preliminary evidence from controlled trials for anxiety in ASD suggests maintenance of treatment gains up to 6 months post-treatment (Reaven et al., 2012; Sofronoff et al., 2005; Storch et al., 2013; Wood et al., 2009).

Cognitive-behavioral interventions are time- and cost-intensive for both patients and practitioners, so determining the extent of treatment maintenance is an important component of deciding the true effectiveness of a treatment. If treatment gains were maintained well after treatment conclusion, this would add significant validity to the usefulness of this treatment approach. If, however, they were not, it would be important for researchers to determine what factors may have contributed to relapse and how the treatment could be modified or supported to improve its long-term outcomes. Therefore, the current study intended to determine the maintenance of treatment gains of responders (i.e. youth who demonstrated at least minimal improvement in symptoms) to a CBT protocol for anxiety in ASD at a 10- to 26-month follow-up. First, this study aimed to evaluate the robustness of treatment gains still present in the sample at follow-up when scores were compared to initial baseline ratings. Second, the extent that gains have been maintained until follow-up was examined by comparing follow-up scores to youth's ratings at post-treatment.

Method

Participants

Following approval by the local institutional review board (IRB), youth were recruited from a pool of participants who had previously provided written parent consent and child assent for participation in one of three IRB-approved, funded studies. For inclusion in any of the initial treatment trials, participants met criteria for a diagnosis of autistic disorder, Asperger's syndrome, or pervasive developmental disorder–not otherwise specified, as defined by the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; DSM-IV-TR; APA, 2000), had a primary anxiety diagnosis of either SAD, GAD, social phobia, or OCD, had an IQ > 70 on a standardized test, and had stable medication (if applicable) for 8 weeks (antipsychotics) or 12 weeks (antidepressants) before study enrollment. Furthermore, participants were excluded if they displayed suicidal behaviors within the 6 months prior to treatment start or if they had histories of bipolar, schizophrenia, or schizoaffective disorders. Initial treatment eligibility was established at screening procedures by a trained independent evaluator as described below.

All participants received a 16-session, 60- to 90-min, family-based CBT treatment protocol, either the *Behavioral Interventions for Anxiety in Children with Autism* (BIACA; Wood and Drahota, 2005; Wood et al., 2009) or the slightly modified adolescent version *Anxiety-Focused Interventions for Youth with Autism* (AFIYA; Ehrenreich et al., 2009). While the initial studies included control conditions (treatment as usual (TAU) or waitlist (WL)), all participants received CBT following completion of TAU/WL, and therefore, participants from both treatment arms were included.

For inclusion in the current study, participants must have demonstrated some level of treatment response (i.e. be rated as minimally, much, or very much improved on the Clinical Global Impression–Improvement (CGI-Improvement; Guy, 1976) and have completed study procedures between 10 and 26 months prior to the follow-up assessment. While the inclusion of participants who did not demonstrate a treatment response in the original studies may have provided a control condition, they were excluded from this study for two reasons: (a) this study was interested in evaluating the maintenance of treatment gains, which suggests that individuals must have demonstrated at least partial response to treatment and (b) individuals who did not respond to the initial treatment were immediately removed from the initial study and referred for additional treatment services. Youth who achieved at least minimal improvement were included because it was hypothesized that these youth gained some benefit from treatment and could, over time, continue to improve. In total, 45 participants were identified for recruitment. Of those recruited, 8.89% ($n = 4$) declined to participate and 20% ($n = 9$) could not be reached and/or scheduled. All together, 32 youth (M = 12.13, SD = 2.27, range: 8–16 years old) consented and completed study procedures (see Table 1 for demographics). When compared to individuals who participated in the follow-up interview, youth lost to follow-up did not significantly differ at post-treatment on the Pediatric Anxiety Rating Scale (PARS; RUPP, 2002), $t(41) = -0.08$, $p = 0.94$, or in rating of treatment improvement ($\chi^2 = 0.08$, $p = 0.96$). No direct compensation for participation was provided.

Materials

Initial screening for diagnosis of an ASD was completed using combined data from the Autism Diagnosis Interview–Revised (ADI-R; Le Couteur et al., 2003; Lord et al.,

Table 1. Demographic and clinical information.

Measure	*n* (%)
Child sex (male)	24 (75.0)
Study type	
Pilot trial	11 (34.4)
Child study	19 (59.4)
Adolescent study	2 (6.3)
Ethnicity/race	
Caucasian	29 (90.6)
Latino/Hispanic	1 (3.1)
Middle Eastern	1 (3.1)
Mixed Race	1 (3.1)
Primary ASD diagnosis	
Autistic disorder	11 (34.4)
Asperger's syndrome	12 (37.5)
PDD-NOS	9 (28.1)
Primary anxiety diagnosis	
SAD	2 (6.3)
Social phobia	12 (37.5)
GAD	13 (40.6)
OCD	5 (15.6)
Post-treatment response status	
Minimally improved	5 (15.6)
Much improved	16 (50.0)
Very much improved	11 (34.4)
Interim treatment	
On medications	21 (67.7)
Anxiety-focused psychotherapy	4 (12.5)
General psychotherapy	10 (32.3)
Social skills training	6 (18.8)
Occupational, physical, and speech therapy	11 (34.4)
In-school assistance	10 (31.3)

ASD: autism spectrum disorder; GAD: generalized anxiety disorder; SAD: separation anxiety disorder; OCD: obsessive compulsive disorder; PDD-NOS: pervasive developmental disorder–not otherwise specified.

1994) and the Autism Diagnostic Observation Schedule (ADOS; Lord et al., 2000, 2001) as is recommended (Le Couteur et al., 2003, 2008), and diagnosis of anxiety disorders was established using the Anxiety Disorders Interview Schedule for DSM-IV (ADIS; Silverman and Albano, 1996). Anxiety severity was evaluated using reports from both child and parent for the: (a) the ADIS Clinician Severity Ratings (CSRs), scored from 0 (absent) to 8 (extremely severe); (b) the PARS; and (c) the Clinical Global Impression–Severity Scale (CGI-Severity; Guy, 1976). At post-treatment, treatment response was evaluated using the CGI-Improvement Scales (Guy, 1976) and diagnostic remission was evaluated using the ADIS (CSR < 4 indicated diagnostic remission). See the initial treatment studies for detailed procedures and psychometrics.

This study re-evaluated anxiety symptoms at follow-up using the ADIS, PARS, CGI-Severity, and CGI-Improvement. Only diagnoses endorsed at baseline were re-evaluated on the ADIS. Considering that parent report typically demonstrates better agreement with clinicians than child report and youth with ASD often lack insight into anxiety symptoms (Storch et al., 2012), only parent report of symptoms was collected at follow-up; however, final CSR ratings were still made by the clinician. Regarding improvement, CGI-Improvement ratings were based on comparison to baseline in order to maximize comparability of time points. A brief interview based on the Service Assessment for Children and Adolescents–Service Use Scale (Horwitz et al., 2001) was used to assess treatment obtained during the interim period.

Procedure

All research procedures were reviewed and approved by the local IRB. All evaluators were extensively trained on the administration of clinician-rated measures (e.g. ADIS, PARS, CGI-Improvement, CGI-Severity), including instructional didactics, extensive observation of administrations by certified raters, supervised administration of the measures, and completion of reliability tapes. Prior to involvement in the current study, all parents provided written informed consent. Because children were not involved in this aspect of the study, child assent was not required. As part of the initial CBT study, an independent evaluator administered and collected the relevant measures at baseline and post-treatment, which were used for comparison of treatment maintenance at follow-up. The post-CBT treatment measure of those initially enrolled to the TAU condition served as their baseline measure.

Participants were contacted by the first author (R.R.S.) regarding their participation in this study, between 10 and 26 months following completion of CBT. For all willing participants, assessments were administered and collected in person by the evaluator; however, individuals not available to complete the assessment in person were administered the clinician-rated assessments by phone. The inclusion of telephone assessments provided flexibility for participants and should not have reduced the accuracy of outcome measures (Lyneham and Rapee, 2005).

Data analysis

Power analysis determined that given a sample of $N = 32$, power of 0.80 ($\alpha = 0.05$) would be present to detect "medium" size (continuous comparisons: $d > 0.51$; categorical comparisons: $d > 0.49$) effects. For the first aim, which examined the treatment effect present at follow-up, a medium size effect would indicate youth demonstrated clinically meaningful decrease in symptom severity. Given that initial treatment effects were large ($d > 1.0$), for the second aim, which examined the extent that treatment gains were maintained at follow-up compared to post-treatment, a medium effect would represent a concerning return of symptoms or decrease in the value of treatment.

Table 2. Comparisons for baseline, post-treatment, and follow-up on continuous measures of symptom severity.

	Baseline, mean[a] (SD)	Post-treatment, mean[a] (SD)	Follow-up, mean (SD)	Baseline vs follow-up		Post-treatment vs follow-up	
				z	*r*	*z*	*r*
CGI –Severity	3.69 (0.59)	2.50 (0.67)	2.56 (0.95)	4.28**	0.76	−0.23	−0.04
Primary CSR	5.44 (0.80)	2.97 (2.16)	3.00 (2.37)	4.39**	0.78	−0.03	−0.01
				t	*d*	*t*	*d*
PARS (5 items)	16.41 (2.07)	11.19 (3.55)	12.56 (4.89)	5.09**	1.03	−1.58	−0.32
Total anxiety CSR	14.84 (6.00)	7.69 (4.79)	8.50 (5.89)	6.41**	1.07	−0.77	−0.15

CGI-Severity: Clinical Global Impression–Severity; CSR: Clinician Severity Rating; PARS: Pediatric Anxiety Rating Scale.
[a]Baseline and post-treatment outcomes are presented in for a subset of youth.
** $p < 0.001$; * $p < 0.01$.

Dependent samples *t*-tests were used to compare scores on continuous and normally distributed measures of anxiety severity (summed total of CSRs for all anxiety diagnoses; PARS), while Wilcoxon signed-rank tests were used to compare scores on measures of anxiety severity with non-normal distributions (CSR from the primary anxiety diagnosis; CGI-Severity). For categorical measures of improvement (remission of primary anxiety diagnosis; treatment response), McNemar's chi-square test was used as it is recommended for testing the equivalence of dependent groups (McNemar, 1947).

In order to capture and evaluate individual change over the follow-up period, participants' scores at follow-up were compared to post-treatment and rated as either more severe (0), comparable (1), or less severe (2) on the CGI-Severity (> 1-point difference indicated change), CGI-Improvement (> 1-point difference indicated change), PARS (> 2-point difference indicated change), and total CSR for all anxiety disorders (> 25% difference indicated change). Summed together, change scores ranged from 0 (more severe on all scales) to 8 (less severe on all scales), with a sum score of 0–2 indicating symptom relapse/reduction in treatment gains, 3–5 indicating maintenance of treatment gains, and 6–8 indicating further improvement of treatment gains. Combined change scores were chosen, rather than scores on a single scale, in order to broadly capture the trajectory of youth over the follow-up period.

Results

Baseline comparison

Follow-up data were compared to baseline data to determine the magnitude and significance of the treatment effects 10–26 months (M = 17.16 months; SD = 4.32) following treatment completion. Results suggest that treatment effects were robust with large reductions in anxiety severity on all measures, including the PARS ($t(31) = 5.09$, $p < 0.001$, $d = 1.03$), CGI-Severity ($z(31) = 4.28$, $p < 0.001$, $r = 0.76$), primary anxiety CSR ($z(31) = 4.39$, $p < 0.001$, $r = 0.78$), and total anxiety CSR ($t(31) = 6.41$, $p < 0.001$, $d = 1.07$; see Table 2 and Figure 1). Based on clinician ratings on the CGI-Improvement, 53% ($n = 17$) of the sample was considered treatment responders at follow-up, though an additional 25% ($n = 8$) was rated as minimally improved, with 19% ($n = 6$) rated as demonstrating no change from baseline, and 3% ($n = 1$) reporting minimally worse symptoms at follow-up. In addition, approximately 47% ($n = 15$) of the total sample had demonstrated remission of their primary anxiety disorder as determined at baseline.

Post-treatment comparison

Follow-up data were compared to post-treatment data to determine the extent to which treatment gains were maintained or had returned at 10–26 months following completion. Results suggest that treatment gains were generally well-maintained, although not for all participants. In particular, scores on the CGI-Severity ($z(31) = -0.23$, $p = 0.82$, $d = -0.07$), and the ADIS CSR for primary anxiety ($z(31) = -0.03$, $p = 0.98$, $d = -0.01$) suggested full maintenance of treatment gains. Scores on total anxiety CSR ($t(31) = -0.77$, $p = 0.44$, $d = -0.15$) and the PARS ($t(31) = -1.58$, $p = 0.12$, $d = -0.32$) indicated a small effect toward symptom relapse (see Table 2 and Figure 1).

Categorical measures of improvement suggested that on average treatment gains were well-maintained, but that a considerable group of participants experienced symptom relapse. The number of individuals demonstrating remission of their primary anxiety diagnosis did not differ from post-treatment to follow-up (47% vs 47%); however, a number of participants changed status between time points with 22% ($n = 7$), experiencing a return of their primary anxiety diagnosis, and 22% ($n = 7$), demonstrating remission of their primary anxiety diagnosis during the follow-up period (see Figure 2). Regarding response status, the percentage of individuals deemed treatment responders was significantly less at follow-up as compared

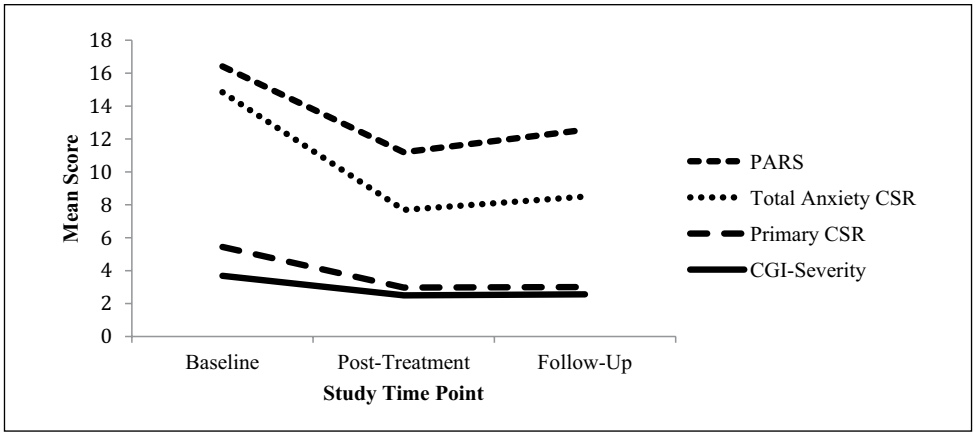

Figure 1. Change in anxiety symptom severity across treatment and follow-up.
PARS: Pediatric Anxiety Rating Scale; CSR: Clinician Severity Rating; CGI-Severity: Clinical Global Impressions–Severity Scale.

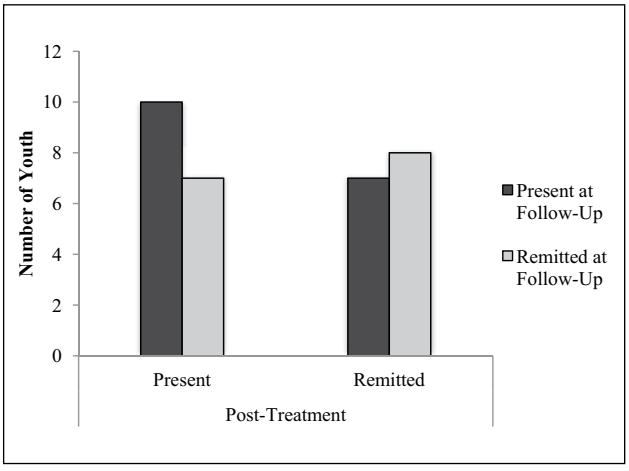

Figure 2. Composition of the status of primary anxiety diagnosis at post-treatment and follow-up.

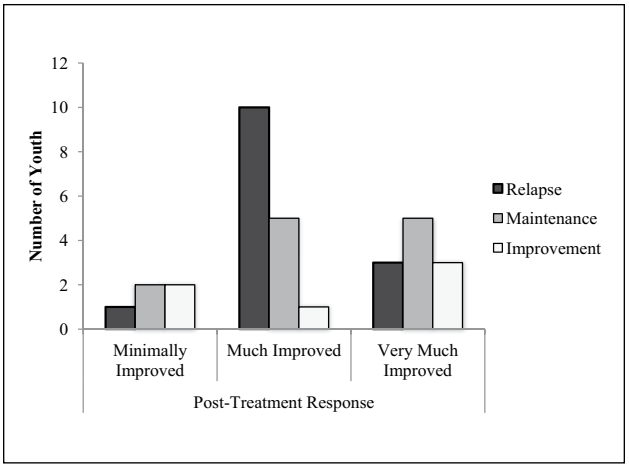

Figure 3. Composition of individual ratings of treatment response at post-treatment and treatment maintenance at follow-up. Ratings of treatment response at post-treatment are based on CGI-Improvement ratings. Treatment-maintenance at follow-up is based on changes in scores on the Anxiety Disorders Interview Schedule, Pediatric Anxiety Rating Scale, CGI-Severity Scale, and CGI-Improvement Scale between post-treatment and follow-up.
CGI: Clinical Global Impression.

to post-treatment (84% vs 53%; McNemar $\chi^2 = 5.56$, $p = 0.03$). All together, 44% ($n = 14$) of participants were rated as having reductions in treatment gains, 38% ($n = 12$) demonstrated maintenance of treatment gains, and 19% ($n = 6$) demonstrated continued improvement of treatment gains. Maintenance status did not appear related to post-treatment response (see Figure 3).

Discussion

This study examined the maintenance of CBT gains for anxiety in youth with ASD 10–26 months following the completion of treatment. Initial investigations have established CBT as a probably efficacious acute treatment for anxiety disorders in youth with ASD (e.g. Reaven et al., 2012; Storch et al., 2013); however, maintenance of treatment gains beyond 6-months had not yet been examined. This study found treatment improvement from CBT to be relatively well-maintained over time, but to a lesser extent than observed in follow-up data of CBT in neurotypical populations (e.g. Barrett et al., 2005; Spence et al., 2006). In support of the maintenance of CBT for anxiety in youth with ASD, the study found that (a) on average, youth's anxiety ratings were relatively similar between follow-up and post-treatment, demonstrating a minimal decline in overall improvement; (b) on average, severity levels, and improvement scores at follow-up were significantly different from baseline, indicating that on average a large effect for treatment was still present; and (c) individually, the majority of individuals had either comparable or further improvement from post-treatment. However, these results are tempered by the fact that: (a) significantly less

individuals were rated as treatment responders at follow-up as compared to baseline and (b) a sizable minority demonstrated some level of symptom relapse.

The results of this study provide some initial support for the durability of CBT for anxiety in ASD and suggest that CBT may be a particularly promising treatment option for this population. In comparison, other psychosocial treatment approaches for youth with ASD, such as social skills interventions, have not been particularly successful in maintaining treatment gains at follow-up, with symptom levels returning to baseline as short as 2 months after treatment end (Hwang and Hughes, 2000; Rao et al., 2008; Warren et al., 2011). Furthermore, when compared to psychotropic medications aimed at reducing anxiety, to which youth with ASD may be at an increased risk for adverse side effects (Vahabzadeh et al., 2013), in neurotypical populations CBT is a low-risk treatment and is generally acceptable to families (Patel and Simpson, 2010; Stevens et al., 2009). Yet, despite the promising nature of the overall results, categorical data from this study suggest that when compared to neurotypical follow-up studies, a slightly larger portion of this sample did not fully maintain treatment gains. In addition, changes in individual status of response and remission, in both positive and negative directions, were common (see Figures 2 and 3).

Several factors may account for variation in individual maintenance of treatment gains. First, primary anxiety diagnosis, anxiety severity, and the number of co-occurring anxiety disorders could play a role in a youth's likelihood to maintain symptoms. For example, individuals with multiple diagnoses may have a larger number of target symptoms and therefore, despite improvements, still have more residual symptoms at post-treatment than those with a single diagnosis. The nature of anxiety within individuals with ASD may also be of importance. While individuals with ASD experience comparable anxiety severity to neurotypical youth (Russell and Sofronoff, 2005), the extent to which the youth's ASD diagnosis and anxiety symptoms are related varies (Wood and Gadow, 2010). Hypothetically, individuals who experience clear neurotypical-like anxiety symptoms could be demonstrating better treatment maintenance than youth with overlapping anxiety and autism symptoms (e.g. anxiety due to rigidity, sensory sensitivity, social deficits; Green et al., 2011; Spiker et al., 2011; Zandt et al., 2007). Similarly, considering the wide range of deficits, symptoms, and levels of functioning observed in youth with ASD, individuals may have presented with different barriers to successful maintenance of treatment. For example, the extent to which social, communication, and/or cognitive deficits are present may play a part in treatment maintenance, as well as the extent and severity of attention deficits.

Given that many individuals obtained treatment during the interim period, these variables may also have had an impact on the likelihood of treatment response. On the one hand, if effective, additional care may support individuals in maintaining their treatment gains; however, if not effective, its obtainment may be associated with individuals who were not successful in maintaining treatment gains. Another potential impact on course could be the presence or onset of a non-anxiety psychiatric disorder (e.g. depressive disorder, disruptive behavior disorder) during or following therapy. As this study only evaluated participants for disorders endorsed at the baseline time point, it is unclear what percentage of individuals developed other conditions during the follow-up period. Considering many youth were entering adolescence during the follow-up period, onset of a depressive disorder could be possible (Lewinsohn et al., 1994) and may have impacted the treatment gains made by youth. Finally, the extent of family accommodation of anxiety (Merlo et al., 2009), level of insight (Himle et al., 2006), and treatment dose/adherence (Glenn et al., 2013) may play a role in treatment maintenance in youth with ASD, as these variables have been associated with treatment outcome of CBT for neurotypical youth.

Several limitations of this study should be noted. First, the study included a relatively small and ethnically/geographically homogenous sample. Therefore, generalizability of these data may be limited. Second, the sample was self-selected, in that individuals who agreed to participate may be different (e.g. better maintainers) than those who declined or could not be reached, although the data comparing those who participated in the follow-up assessment versus those lost to follow-up did not suggest this was the case. Third, in contrast to the baseline and post-treatment assessments, only parent report was obtained at the follow-up assessment. This did not take into account the child's perspective regarding symptoms and therefore, may have slightly altered outcomes. However, previous research suggests that child report of symptoms is often poor, with clinicians more likely to base ratings off of parent report (Storch et al., 2012). Fourth, the assessors of this study differed from those originally used for ratings and were not blinded to participant history. However, use of different raters is typically considered a more stringent method, as it eliminates familiarity between the assessor and the participant, and as long as evaluators are well trained, blinding of evaluators does not appear to have a large impact on ratings (Lewin et al., 2012). Fifth, examination of the impact of interim characteristics (e.g. time to follow-up, other treatments) was not possible within this study due to the small sample size. Finally, this study is a naturalistic follow-up of treatment responders, and therefore lacks a control condition. As a result, the findings of this study may be due to other non-measured influences, including those mentioned above.

While this study provides valuable information on the maintenance of CBT for anxiety in youth with ASD, future research would be beneficial in further examining this treatment and this population. Study of possible predictors of treatment maintenance may provide additional

information on what participants may be at risk for symptom relapse. In particular, factors related to ASD diagnosis (e.g. the relationship between anxiety and core ASD symptoms, level of functioning), the level of family accommodation, insight, treatment compliance, the presence and severity of attention deficit hyperactivity disorder (ADHD) symptoms or oppositional behavior, time to follow-up, and frequency/type of interim treatments, may be worth investigating. Second, attempts to improve maintenance of treatment gains should be made both within the context of treatment, as well as during the interim period. Within the context of treatment, future research should examine whether adding or removing ASD modifications and modifying/bolstering relapse prevention material influences how well treatment gains are maintained. In addition, the use of a modified time schedule that allows for treatment fading (Eyberg et al., 1998) and additional contact with participants (e.g. booster sessions; White et al., 2013a) have demonstrated empirical support in increasing maintenance of treatment gains in other psychological disorders and may hold similar promise for CBT for anxiety in youth with ASD. Finally, future CBT trials should consider extending the follow-up period for longer durations. This extended follow-up may provide additional information about the natural course of symptoms and reduce unexplained variance present in the current sample.

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References

APA (2000) *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR)*. 4th ed. Text revision. Washington, DC: APA.

Barrett P, Farrell L, Dadds M, et al. (2005) Cognitive-behavioral family treatment of childhood obsessive-compulsive disorder: long-term follow-up and predictors of outcome. *Journal of the American Academy of Child and Adolescent Psychiatry* 44: 1005–1014.

Cartwright-Hatton S, Roberts C, Chitsabesan P, et al. (2004) Systematic review of the efficacy of cognitive behaviour therapies for childhood and adolescent anxiety disorders. *British Journal of Clinical Psychology* 43: 421–436.

Chalfant AM, Rapee R and Carroll L (2007) Treating anxiety disorders in children with high functioning autism spectrum disorders: a controlled trial. *Journal of Autism and Developmental Disorders* 37: 1842–1857.

De Bruin EI, Ferdinand RF, Meester S, et al. (2007) High rates of psychiatric co-morbidity in PDD-NOS. *Journal of Autism and Developmental Disorders* 37: 877–886.

Durham RC, Chambers JA, MacDonald RR, et al. (2003) Does cognitive-behavioural therapy influence the long-term outcome of generalized anxiety disorder? An 8–14 year follow-up of two clinical trials. *Psychological Medicine* 33: 499–509.

Ehrenreich JT, Simpson G and Wood JJ (2009) *Anxiety-Focused Intervention for Youth with Autism: Manual for Adolescents Transitioning to Adulthood (Unpublished treatment manual)*. Coral Gables, FL: University of Miami.

Eyberg SM, Edwards D, Boggs SR, et al. (1998) Maintaining the treatment effects of parent training: the role of booster sessions and other maintenance strategies. *Clinical Psychology: Science and Practice* 5: 544–554.

Gadow KD, Devincent C and Schneider J (2008) Predictors of psychiatric symptoms in children with an autism spectrum disorder. *Journal of Autism and Developmental Disorders* 38: 1710–1720.

Garcia-Lopez LJ, Olivares J, Beidel D, et al. (2006) Efficacy of three treatment protocols for adolescents with social anxiety disorder: a 5-year follow-up assessment. *Journal of Anxiety Disorders* 20: 175–191.

Gillott A, Furniss F and Walter A (2001) Anxiety in high-functioning children with autism. *Autism* 5: 277–286.

Glenn D, Golinelli D, Rose RD, et al. (2013) Who gets the most out of cognitive behavioral therapy for anxiety disorders? The role of treatment dose and patient engagement. *Journal of Consulting and Clinical Psychology* 84(4): 639–349.

Green SA, Ben-Sasson A, Soto TW, et al. (2011) Anxiety and sensory over-responsivity in toddlers with autism spectrum disorders: bidirectional effects across time. *Journal of Autism and Developmental Disorders* 42(6): 1112–1119.

Guy W (1976) The Clinical Global Impressions Scale. In: Guy W (ed.) *ECDEU Assessment Manual for Psychopharmacology, Revised*. Rockville, MD: National Institute of Mental Health, pp. 218–222.

Himle JA, Van Etten ML, Janeck AS, et al. (2006) Insight as a predictor of treatment outcome in behavioral group treatment for obsessive-compulsive disorder. *Cognitive Therapy and Research* 30: 661–666.

Horwitz SM, Hoagwood K, Stiffman AR, et al. (2001) Reliability of the services assessment for children and adolescents. *Psychiatric Services* 52: 1088–1094.

Hwang B and Hughes C (2000) The effects of social interactive training on early social communicative skills of children with autism. *Journal of Autism and Developmental Disorders* 30: 331–343.

In-Albon T and Schneider S (2007) Psychotherapy of childhood anxiety disorders: a meta-analysis. *Psychotherapy and Psychosomatics* 76: 15–24.

Kendall PC (1994) Treating anxiety disorders in children: results of a randomized clinical trial. *Journal of Consulting and Clinical Psychology* 62: 100–110.

Kim JA, Szatmari P, Bryson SE, et al. (2000) The prevalence of anxiety and mood problems among children with autism and Asperger syndrome. *Autism* 4: 117–132.

Le Couteur A, Haden G, Hammal D, et al. (2008) Diagnosing autism spectrum disorders in pre-school children using two standardised assessment instruments: the ADI-R and the ADOS. *Journal of Autism and Developmental Disorders* 38: 362–372.

Le Couteur A, Lord C and Rutter M (2003) *The Autism Diagnostic Interview: Revised (ADI-R)*. Los Angeles, CA: Western Psychological Services.

Lewin AB, Peris TS, De Nadai AS, et al. (2012) Agreement between therapists, parents, patients, and independent evaluators on clinical improvement in pediatric obsessive-compulsive

disorder. *Journal of Consulting and Clinical Psychology* 80: 1103–1107.

Lewinsohn PM, Clarke GN, Seeley JR, et al. (1994) Major depression in community adolescents: age at onset, episode duration, and time to recurrence. *Journal of the American Academy of Child and Adolescent Psychiatry* 33: 809–818.

Leyfer OT, Folstein SE, Bacalman S, et al. (2006) Comorbid psychiatric disorders in children with autism: interview development and rates of disorders. *Journal of Autism and Developmental Disorders* 36: 849–861.

Lord C, Risi S, Lambrecht L, et al. (2000) The autism diagnostic observation schedule-generic: a standard measure of social and communication deficits associated with the spectrum of autism. *Journal of Autism and Developmental Disorders* 30: 205–223.

Lord C, Rutter M and Le Couteur A (1994) Autism Diagnostic Interview-Revised: a revised version of a diagnostic interview for caregivers of individuals with possible pervasive developmental disorders. *Journal of Autism and Developmental Disorders* 24: 659–685.

Lord C, Rutter M, DiLavore PC, et al. (2001) *Autism Diagnostic Observation Schedule*. Los Angeles, CA: Western Psychological Services.

Lyneham HJ and Rapee RM (2005) Agreement between telephone and in-person delivery of a structured interview for anxiety disorders in children. *Journal of the American Academy of Child and Adolescent Psychiatry* 44: 274–282.

McNally Keehn RH, Lincoln AJ, Brown MZ, et al. (2013) The Coping Cat program for children with anxiety and autism spectrum disorder: a pilot randomized controlled trial. *Journal of Autism and Developmental Disorders* 43: 57–67.

McNemar Q (1947) Note on the sampling error of the difference between correlated proportions or percentages. *Psychometrika* 12: 153–157.

Merlo LJ, Lehmkuhl HD, Geffken GR, et al. (2009) Decreased family accommodation associated with improved therapy outcome in pediatric obsessive-compulsive disorder. *Journal of Consulting and Clinical Psychology* 77: 355–360.

Mills R and Wing L (2005) *Researching Interventions in ASD and Priorities for Research: Surveying the Membership of the NAS*. London: National Autistic Society.

O'Leary EM, Barrett P and Fjermestad KW (2009) Cognitive-behavioral family treatment for childhood obsessive-compulsive disorder: a 7-year follow-up study. *Journal of Anxiety Disorders* 23: 973–978.

Patel SR and Simpson HB (2010) Patient preferences for OCD treatment. *Journal of Clinical Psychiatry* 71: 1434–1439.

Rao PA, Beidel BC and Murray MJ (2008) Social skills interventions for children with Aspergers syndrome or high-functioning autism: a review and recommendations. *Journal of Autism and Developmental Disorders* 38(2): 353–361.

Reaven J, Blakeley-Smith A, Culhane-Shelburne K, et al. (2012) Group cognitive behavior therapy for children with high-functioning autism spectrum disorders and anxiety: a randomized trial. *Journal of Child Psychology and Psychiatry and Allied Disciplines* 53: 410–419.

Rufer M, Hand I, Alsleben H, et al. (2005) Long-term course and outcome of obsessive-compulsive patients after cognitive-behavioral therapy in combination with either fluvoxamine or placebo: a 7-year follow-up of a randomized double-blind trial. *European Archives of Psychiatry and Clinical Neuroscience* 255: 121–128.

RUPP (2002) The Pediatric Anxiety Rating Scale (PARS): development and psychometric properties. *Journal of the American Academy of Child and Adolescent Psychiatry* 41: 1061–1069.

Russell AJ, Jassi A, Fullana MA, et al. (2013) Cognitive behavior therapy for comorbid obsessive-compulsive disorder in high-functioning autism spectrum disorders: a randomized controlled trial. *Depression and Anxiety* 30(8): 697–708.

Russell AJ, Mataix-Cols D, Anson M, et al. (2005) Obsessions and compulsions in Asperger syndrome and high-functioning autism. *British Journal of Psychiatry* 186: 525–528.

Russell E and Sofronoff K (2005) Anxiety and social worries in children with Asperger syndrome. *Australian and New Zealand Journal of Psychiatry* 39: 633–638.

Silverman WK and Albano AM (1996) *The Anxiety Disorders Interview Schedule for DSM-IV: Child and Parent Versions*. San Antonio, TX: Psychological Corporation.

Simonoff E, Pickles A, Charman T, et al. (2008) Psychiatric disorders in children with autism spectrum disorders: prevalence, comorbidity, and associated factors in a population-derived sample. *Journal of the American Academy of Child and Adolescent Psychiatry* 47: 921–929.

Sofronoff K, Attwood T and Hinton S (2005) A randomised controlled trial of a CBT intervention for anxiety in children with Asperger syndrome. *Journal of Child Psychology and Psychiatry and Allied Disciplines* 46: 1152–1160.

Spence SH, Donovan CL, March S, et al. (2011) A randomized controlled trial of online versus clinic-based CBT for adolescent anxiety. *Journal of Consulting and Clinical Psychology* 79: 629–642.

Spence SH, Holmes JM, March S, et al. (2006) The feasibility and outcome of clinic plus internet delivery of cognitive-behavior therapy for childhood anxiety. *Journal of Consulting and Clinical Psychology* 74: 614–621.

Spiker MA, Lin CE, Van Dyke M, et al. (2011) Restricted interests and anxiety in children with autism. *Autism* 16(3): 306–320.

Sportel BE, de Hullu E, de Jong PJ, et al. (2013) Cognitive bias modification versus CBT in reducing adolescent social anxiety: a randomized controlled trial. *PLoS One* 8: e64355.

Stevens J, Wang W, Fan L, et al. (2009) Parental attitudes toward children's use of antidepressants and psychotherapy. *Journal of Child and Adolescent Psychopharmacology* 19: 289–296.

Storch EA, Arnold EB, Lewin AB, et al. (2013) The effect of cognitive-behavioral therapy versus treatment as usual for anxiety in children with autism spectrum disorders: a randomized, controlled trial. *Journal of the American Academy of Child and Adolescent Psychiatry* 52: 132–142.

Storch EA, Wood JJ, Ehrenreich-May J, et al. (2012) Convergent and discriminant validity and reliability of the Pediatric Anxiety Rating Scale in youth with autism spectrum disorders. *Journal of Autism and Developmental Disorders* 42(11): 2374–2382.

Sung M, Ooi YP, Goh TJ, et al. (2011) Effects of cognitive-behavioral therapy on anxiety in children with autism

spectrum disorders: a randomized controlled trial. *Child Psychiatry & Human Development* 42: 634–649.

Vahabzadeh A, Buxton D, McDougle C, et al. (2013) Current state and future prospects of pharmacological interventions for autism. *Neuropsychiatry* 3: 245–259.

Warren Z, Veenstra-VanderWeele J, Stone W, et al. (2011) Therapies for children with autism spectrum disorders. Comparative effectiveness review, Agency for Healthcare Research and Quality, Rockville, MD, 12 August.

White KS, Payne LA, Gorman JM, et al. (2013a) Does maintenance CBT contribute to long-term treatment response of panic disorder with or without agoraphobia? A randomized controlled clinical trial. *Journal of Consulting and Clinical Psychology* 81: 47–57.

White SW, Ollendick T, Albano AM, et al. (2013b) Randomized controlled trial: multimodal anxiety and social skill intervention for adolescents with autism spectrum disorder. *Journal of Autism and Developmental Disorders* 43: 382–394.

Wood JJ and Drahota A (2005) *Behavioral Interventions for Anxiety in Children with Autism (BIACA) (Unpublished intervention manual)*. Los Angeles, CA: UCLA.

Wood JJ and Gadow KD (2010) Exploring the nature and function of anxiety in youth with autism spectrum disorders. *Clinical Psychology: Science and Practice* 17: 281–292.

Wood JJ, Drahota A, Sze K, et al. (2009) Cognitive behavioral therapy for anxiety in children with autism spectrum disorders: a randomized, controlled trial. *Journal of Child Psychology and Psychiatry and Allied Disciplines* 50: 224–234.

Zandt F, Prior M and Kyrios M (2007) Repetitive behaviour in children with high functioning autism and obsessive compulsive disorder. *Journal of Autism and Developmental Disorders* 37: 251–259.