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Cognitive Behavior Therapy for Anxiety: Adapting Interventions for Children with Autism  
and Intellectual Disability

A thesis submitted in partial satisfaction of the requirements for the degree Master of  
Arts in Education

by

John Tarek Danial

2013



## ABSTRACT OF THE THESIS

Cognitive Behavior Therapy for Anxiety: Adapting Interventions for Children with Autism  
and Intellectual Disability

by

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Masters of Arts in Education

University of California, Los Angeles 2013

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Recent studies have indicated Cognitive Behavioral Therapy (CBT) as a promising treatment for anxiety in children with autism. However, this line of treatment has only been investigated in high-functioning children with autism. The purpose of this study is to investigate the effectiveness of an adapted CBT protocol in treating anxiety for children with autism and IQ's < 70. Several adaptations, such as play-based techniques, incorporation of mantras, and simplified rating systems, were employed with an 11-year old boy with autism and anxiety symptoms. A single-case pre-post design was employed. The primary measures included session-by-session parent ratings of the participant's three highest rated anxiety symptoms, as well as a pre-post clinical anxiety interview conducted with the parent. Results indicate that this treatment was effective at treating the anxious symptoms of the participant based on Simulation Modeling Analysis, visual inspection, and standard mean difference calculations. This study provides preliminary evidence for this intervention protocol in treating the anxiety of children with autism and an intellectual delay.

The thesis of John Tarek Danial is approved.

Connie Kasari

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# Cognitive Behavior Therapy for Anxiety: Adapting Interventions for Children with Autism and Intellectual Disability

## **Introduction**

Autism Spectrum Disorder (ASD) has been described as a spectrum due to the large variability in symptoms and differences in cognitive levels of functioning. Primarily, ASD affects a child's social functioning, communication, and is associated with repetitive behaviors and interests. For some children with autism, intelligence remains unaffected. Though individuals in this group may experience varying levels of autism symptoms, they are generally characterized as "high-functioning," as these individuals usually have normal IQ levels and relatively normal language skills. Other children with autism may also have intellectual disability (ID), which reflects lower cognitive capabilities. This group is sometimes referred to as "lower-functioning," but will be referred to here as having ASD/ID. Another feature of ASD is the common co-occurrence of psychological disorders. Anxiety is frequently found among individuals with ASD, and is often associated with significantly impaired functioning (Bellini, 2004; de Bruin et al., 2007). To date, most anxiety treatments for youth with autism have focused on those without ID. The goal of the present study is to develop a developmentally appropriate cognitive-behavioral treatment of anxiety for youth with ASD/ID.

Anxiety has been found to be highly co-morbid among those with a diagnosis of ASD regardless of whether the child has a diagnosis of ASD alone (de Bruin, Ferdinand, Meesters, de Nijs, & Verheij, 2007; Klin et al., 2005; Wood & Gadow, 2010), or ASD/ID (Hill & Furniss, 2006; Bradley, Summers, Wood, & Bryson, 2004; Tsakanikos, Sturmey, Costello, Holt, & Bouras, 2007). A number of studies have

indicated that the prevalence of co-morbid anxiety is approximately 30% (de Bruin et al., 2007; Leyfer et al., 2006; Sukhodolsky et al., 2008). For children with autism, an additional diagnosis of anxiety can exacerbate the already existing social and communication deficits as well as the proclivity to engage in restricted and repetitive behavior. Coupled with the core deficits of autism, the behavioral rigidity and excessive worry often associated with anxiety can greatly affect a child's life at school, home, and in the community (Brereton, Tonge, & Einfeld, 2006). While individuals with ASD/ID seem to experience anxiety more commonly than those with ID alone (Brereton, Tonge, & Einfeld, 2006; Hill & Furniss, 2006), focus on co-morbid psychiatric disorders (e.g., anxiety) among individuals with autism has largely been limited to the minority of a high-functioning subgroup (Bradley, Summers, Wood, & Bryson, 2004). Due to the frequency of anxiety among those with ASD/ID and the paucity of interventions targeting the adaptive functioning of this group (Matson & Shoemaker, 2009), it has become increasingly important to develop appropriate and effective treatments for children with ASD/ID.

Cognitive Behavioral Therapy (CBT) is a talked-based therapy, with integral behavior components (e.g., exposure to fears) designed to help participants identify negative thoughts and develop coping strategies. This treatment has been effective in improving anxiety among high-functioning youth with ASD, and in addition, has been amenable to modification (Chalfant et al., 2007; Sofronoff et al., 2005; Wood et al., 2009). Because of its ability to be adapted to meet the needs of various groups, and its evidence base among anxious youth with autism, CBT seems to be a promising foundation on which to develop an anxiety intervention for children with ASD/ID.



This report describes a case-study pilot test of an adapted CBT program specifically designed to meet the needs of children with ASD/ID who have co-morbid symptoms of anxiety. It is predicted that enrollment in a CBT program designed to meet the cognitive level of children with ASD/ID will result in measurable decreases in anxiety. In addition to measuring anxiety reduction, a secondary purpose of this project is to improve the treatment manual based on the results.

### **Anxiety**

To define anxiety, this study will rely on the description set forth by Craske (1999). In her book, Craske states that anxiety is not an emotion, but a mood state associated with fear. The initial presence of anxiety can be due to a multitude of factors including life experience, vicarious learning, and genetic predisposition. Whatever the cause, the presentation of anxiety-provoking stimuli often leads to panic, avoidance, or high levels of distress. This process corresponds with the evolutionary perspective of anxiety, which stresses threat-avoidance as the primary function of anxiety. Even objects related to fearful stimuli may themselves begin to evoke anxiety. To prevent experiencing the distress of anxiety, an individual may resolutely avoid these situations. Anxiety then becomes firmly associated with the stimuli and avoidance is seen as the only relief. Thus, anxiety is unlikely to diminish without treatment and may even worsen over time (Craske, 1999). Because of the lasting effects of untreated anxiety, it becomes important to examine the effectiveness of promising treatments, such as CBT, among affected populations.

For children, anxiety seems to be associated with physical threat and social threat (Campbell & Rapee, 1994). Anxious children tend to have an interpretation bias

and are more likely than non-anxious children to interpret ambiguous situations as threatening (Barrett, Rapee, Dadds, & Ryan, 1996). As a result of this bias, they may learn to avoid a number of various situations. Targeting these intrinsic cognitions can be used an avenue to stimulate behavioral change.

### **Cognitive Behavioral Therapy**

The overarching goal of most CBT programs is to help participants identify their anxiety and provide them with coping strategies to face feared situations in order to challenge maladaptive thoughts and fears about these situations. Teaching individuals to recognize why they are experiencing anxiety (i.e., what negative events they expect to occur) allows them to develop specific and testable hypotheses. Participants are then gradually placed in progressively more difficult anxiety-provoking situations, in which they are able to practice their newly developed coping strategies. By successfully facing fears, participants can gather evidence against their negative expectations, suppress the previous negative thoughts associated with feared objects and situations, and replace them with more adaptive cognitions (Wood, Fujii, & Renno, 2010). Common components of CBT include cognitive restructuring, affective training, emotion recognition, parent education, and gradual exposure to fearful stimuli. Many studies have demonstrated that these components of CBT, when coupled with key adaptations, are accessible for high-functioning children with ASD (Chalfant et al., 2007; Sofronoff et al., 2005; Wood et al., 2009).

Presenting key topics in relatable ways has allowed children with ASD to effectively challenge negative expectations and begin to build more positive understandings of previously fearful situations. As a result, well-executed CBT

programs designed for children with ASD often result in diminished anxiety and collateral gains in social skills and daily-living skills (e.g., Wood et al, 2009).

However, likely due to high verbal demands of treatment, this type of program has been limited to the subpopulation of high-functioning children with autism and is yet to be tested among children with ASD/ID. There remains a need to investigate whether cognitive components of therapy can be adapted for children with ASD/ID and if an adapted program can ameliorate the symptoms of anxiety for this population.

While it may seem a sophisticated level of cognitive functioning is required to achieve successful treatment through CBT, this is not necessarily the case. CBT has been effective in treating the anxiety of typically developing preschool children (e.g., Hirshfeld-Becker, et al., 2010). Also, children with ASD /ID have benefitted from gradual exposure to fearful stimuli (Koegel et al., 2004; Luiselli, 1978; Luscre & Center, 1996), a key component of CBT. Therefore, the key to effective treatment is not the cognitive level of the participant but the adaptation of the program to the participants' specific needs. Focusing on ways to adapt cognitive components of CBT to meet the unique needs of children with ASD/ID will provide them access to a previously unavailable treatment.

The goal then becomes to identify ways to effectively adapt the treatment for children with ASD/ID. Successful adaptation will require modifying a program to limit verbal demands and simplify higher-level concepts to become more accessible for this group. This project will use an adaptation of an established family-based cognitive therapy, which was adapted for high-functioning children with autism and anxiety. The *Building Confidence* program (Behavioral Interventions for Anxiety in Children with

Autism [BIACA]; Wood et al., 2009), specifically addresses the core deficits of autism that may act as barriers to treatment. By incorporating children's preservative interests, focusing on social skills deficits, and encouraging independence, the program addresses issues that may prevent children with ASD from benefiting from a typical CBT program. In order to adapt this program for children with ASD/ID, we must continue to address the common deficits central to autism, while also attending to the unique needs of children with ID.

### **Adaptations**

Wood et al. (2009) identify key adaptations necessary to reduce the barriers to treatment for children with ASD. As well as incorporating visual stimuli and providing emotion education (e.g. Sofronoff et al., 2005), CBT for children with ASD must also focus on social skills deficits, encourage the development of independence skills, and concentrate on circumscribed interests. Equipping the child with basic social skills will promote positive interactions between the child and people in the community as well as increase the likelihood of the child experiencing success when facing feared social situations. Encouraging the development of adaptive skills will promote the ability of the child to successfully face feared situations without the help of a parent. Lastly, while preferred topics can be incorporated into treatment to promote understanding and increase motivation (Attwood, 2003; Baker et al., 1998), it may also be necessary to suppress excessive repetition in order to promote positive experiences in social and community-based situations. These and other modifications will be necessary for children with ASD/ID.

While the areas of focus for children with ASD/ID should be similar to those for high-functioning children, specific methods will have to vary. Children with autism and intellectual delay often have increased levels of rigidity and repetitive behaviors as well as less verbal and auditory processing skills. Thus adapting a CBT program specifically for this population will require methods that circumvent these challenges, promote engagement in the program, and present concepts in an accessible way. Language demands must be minimized by presenting topics in a visual format. Also, children with ASD/ID are likely to benefit from a more structured and frequent program (i.e. twice a week instead of once a week). This more intensive approach will increase the likelihood of concepts and strategies becoming readily retrievable by participants. Consistent with common techniques found in interventions for children with ID (Eldevik et al., 2010), incorporating realistic and relatable visual stimuli can promote understanding and engagement among participants. Concepts should be presented in play-based, low demand situations (e.g. with preferred figurines). This play-based approach is developmentally appropriate for the child's cognitive level, will lessen the verbal demands placed on the child, promote positive therapeutic rapport, and present otherwise unappealing concepts in a way that is more acceptable to the child. There is a long history of incorporating play into therapy with children, including children with developmental disabilities, in an effort to create a safe and fun environment to discuss important treatment concepts (Alvarez & Phillips, 1998). The goal of play-based presentation of concepts is to promote engagement in order to achieve deeper processing. Actively participating in these play-based scenarios may promote deep semantic processing as opposed to mere repetition (Brewin, 2006). Some aspects of

CBT will need to be simplified to match the children's cognitive level of functioning. For example, some programs require participants to rate anxiety on complex scales (e.g. Wood & Mcleod, 2008), but a CBT program designed for children with ASD/ID may need to simplify these rating scales to ensure understanding. An adapted rating system may include fewer rating points (high, medium, low anxiety) with corresponding visual cues (Macklem, 2008). Many CBT programs teach children to identify their worries and generate new, more adaptive thoughts, but a CBT program designed for ASD/ID children may need to equip participants with simple, pre-determined "mantras" that address specific areas of worry. Mantras have been incorporated in relaxation programs that integrate yoga-based strategies for children with autism (Ehleringer, 2010). Mantras have also been suggested as a means to provide school-aged children, including those with and without autism, with a quick and useful strategy to combat stress (Macklem, 2008; Kluth, 2009). These types of modifications increase the probability of a CBT protocol leading to treatment gains in children with ASD/ID. Lastly, in light of the lower cognitive and linguistic abilities of children in this group, behavioral exposures are emphasized as the active ingredient most responsible for promoting behavioral changes. While cognitive strategies should be incorporated throughout treatment according to the child's level of understanding, gradual exposures to anxiety-evoking stimuli will be the prominent method supporting behavioral change.

These adaptations are in line with the memory retrieval competition model of CBT (Brewin, 2006), which argues that the success of CBT is based on its ability to build strong positive representations of previously negative stimuli to "compete" against negative thoughts. Thus, the present study will promote engagement and incorporate

visual and relatable stimuli in an effort to build more adaptive representations. These concepts will be paired with emotion recognition and coping strategies to allow participants to identify the role positive thoughts can play on the presence of anxiety. Finally, participants will have an opportunity to practice these strategies during increasingly difficult in-vivo exposures. Presumably, the adaptive strategies presented will promote more positive experiences with anxiety-evoking stimuli. The positive experiences, being paired with deep processing of adaptive representations developed during therapy, then become readily retrievable by participants, directly compete with previous negative associations, and are more likely to become activated.

The present study aims to gather preliminary data examining whether the *Building Confidence* program (Wood et al., 2009) can be successfully adapted for children with ASD/ID who experience symptoms of anxiety. Considering the prevalence of anxiety among children with ASD/ID, the lack of intervention research among this population, and the promising evidence for CBT among individuals with ASD, this study is timely and important. The appropriateness and feasibility of implementing the program among children with ASD/ID will be assessed through a case study example, which is the first to test this modified treatment program. The primary research question is to determine whether enrollment in a modified CBT program will lead to a reduction of anxiety in a participant with ASD/ID and co-occurring anxious behaviors. The secondary aim is to examine feasibility of the program for the family and the effectiveness of treatment adaptations.

## **Method**

## **Intervention**

Following a baseline period, the participant and parent(s) received 8 weeks of treatment, consisting of bi-weekly sessions lasting 90 minutes each (60 min. with child and 30 min. with parent). Therapy consisted of an adapted version of *Building Confidence* (Wood et al., 2009) modified for children with ASD/ID. The program primarily consisted of coping skills training (e.g. emotion-recognition, cognitive restructuring, and mantras) and in-vivo exposures. Initial focus was spent on helping the child identify physiological signs of anxiety (e.g. fast heart rate, or rapid breathing). The therapist helped the child learn to identify reasons for anxiety (e.g. unrealistic fears) and develop adaptive cognitions through the use of relevant mantras. The child was encouraged to utilize these skills to face feared situations and challenge the likelihood of actually observing negative expectations. A hierarchy was developed and feared situations were ranked from least to most anxiety-evoking. As the child worked his way up the hierarchy, he was rewarded for facing feared situations and incorporating coping strategies. The flexible nature of the program and modular format allow for individualized implementation of treatment. The first 4 modules cover coping strategies and the remaining 12 sessions consist of a minimum of 8 in-vivo exposures and may include varying modules which are presented based on a child's specific needs. A recent study reported individual, modular cognitive therapy outperformed an invariant structured format of CBT in typically developing youth with emotional problems (Weisz et al., 2011). The flexible format allows for modules to be selected on a session-to-session basis in order



to continually focus on the child's most pressing needs (Chorpita et al., 2004; Wood et al., 2009). Changes in anxiety were measured by pre and post-treatment *ADIS* scores, as well as weekly ratings by the parent on Youth Top Problems.

## **Measures**

Autism Diagnostic Interview-Revised (ADI-R). The ADI-R (Lord, Rutter, & Couteur, 1994) is a standardized semi-structured interview designed to assess the presence and severity of symptoms based on the diagnostic criteria for autism in the DSM-IV-TR (APA, 2000). The ADI-R will be administered to the primary caregiver at baseline. Interrater reliability is excellent (kappas from .62-.89). The ADI-R has demonstrated validity across a wide range of ages including early adolescence (Seltzer et al., 2003; Shattuck et al., 2007) and has been shown to discriminate subjects with autism from mental age-matched subjects without autism. It is administered at screening. Participants must meet criteria for autism on the ADI-R to be eligible to enroll in the program.

Anxiety Disorders Interview Schedule for DSM-IV: Parent Version (ADIS-IV-P). The ADIS-IV-P (Silverman & Albano, 1996) is a clinician-administered, semi-structured interview that assesses for the presence and severity of DSM-IV anxiety disorders as well as other co-occurring disorders (e.g., oppositional defiant disorder) The ADIS-IV-P yields separate diagnoses and severity ratings based on the parent interviews. Independent evaluators make a composite diagnosis based on youth and parent report using guidelines recommended by the creators (Silverman & Albano, 1996). Excellent

psychometric properties have been reported in classifying different anxiety-related disorders (See Brown & Barlow, 2001). Wood et al. (2009) reported kappas (Social Phobia, .84; Separation Anxiety Disorder, .86; and OCD, .71). It is administered by an independent evaluator at baseline and post assessments and participants must meet criteria for at least one anxiety diagnosis to be eligible for enrollment in the program.

Wechsler Intelligence Scale for Children-IV (WISC-IV). Cognitive ability was assessed using four subtests of the WISC-IV (Wechsler, 2003). This scale is designed to provide IQ estimates for children aged 6-16. The manual reported a high full-scale IQ reliability coefficient (.97) and test-retest reliability (.89). The Vocabulary, Letter-Number Sequencing, Coding, and Matrix Reasoning subtests were administered to generate an estimated IQ score. These subtests are individual components of verbal comprehension, perceptual reasoning, working memory, and processing -speed sections of the WISC-IV. Each subtest is scored based on average scaled score of 10, with a standard deviation of 3. These scores are then combined to produce an estimated IQ score. All of the included subtests have large reliability coefficients (.85-.90). An IQ <70 was an eligibility requirement for enrollment in the program.

Youth Top Problems (YTP). Youth Top Problems (Weisz et al. 2011) is a psychometrically sound, client-guided approach that complements empirically derived standardized assessment. The measure is conducted with parents immediately after completion of a standardized assessment (i.e. *ADIS*) to promote the generation of the most concerning problems that fall under the same symptom domain (i.e. anxiety). The

approach can help focus attention and treatment planning on the problems that youths and caregivers consider most important and can generate evidence on trajectories of change in those problems during treatment. The parent will decide three specific problems they would like addressed and record progress at each session. These top problems allow therapists to focus specific attention on issues that are the most concerning to their clients. This helps ensure parents are invested in the treatment and the problems that are addressed are in fact substantially meaningful to them. By providing session-by-session ratings, the measure allows researchers to examine *if* and *when* these problems decrease in severity. Parents and researchers are then able to compare severity ratings of each problem from the beginning of the program throughout the treatment to map improvement.

### **Procedure**

Richard was an 11-year old male diagnosed with autism who was attending a public school in southern California. Richard's estimated IQ on the WISC-IV was 62. He was in 5<sup>th</sup> grade and mainstreamed in most classes, but received pullout services for reading. He also received support from a one-on-one aide during school. Richard's parents were divorced, and he lived with his biological mother most days of the week, but lived with his father one weekday and on most weekends.

Richard was initially assessed for a program for high-functioning children with autism. During this assessment, Richard's autism diagnosis was confirmed on the Autism Diagnostic Observation Schedule –Module 3 (ADOS; Lord, Rutter, DiLavore, & Risi, 2002) and the ADI-R (Lord, Rutter, LeCouteur, 1994). However, because Richard's estimated IQ score on the WISC-IV was 62, he was referred to this treatment program.

Richard's father then participated in a phone screen to determine if Richard met basic eligibility requirements. The brief (15-20 minutes) telephone screen was designed to inquire as to the child's: 1) diagnostic status, 2) level of anxiety symptoms, and 3) overall level of adaptive functioning (i.e. independent self-help skills). After meeting these preliminary criteria, the family was invited to come back for a formal assessment.

During the assessment, an independent evaluator conducted the Anxiety Disorders Interview Schedule (ADIS) with Richard's father. Richard's primary diagnosis was separation anxiety; he also met criteria for social phobia, generalized anxiety disorder, and obsessive-compulsive disorder. After this anxiety-focused interview, Richard's father reported three specific behaviors that were rated as the most concerning on the YTP rating scale. These behaviors were tracked and targeted throughout treatment using the YTP procedure. The first behavior was Richard's difficulty waiting for things he wanted and inability to move on to other activities if he did not receive what he wanted immediately. Richard's father reported this as very impairing as Richard would remain focused on a specific desired item (e.g., going to the store to get candy) and would not be able to focus on any other activity until the demand had been met. Richard's father described this behavior as a "need" for Richard to get what he was focused on or else he appeared distressed until he was able to obtain the item. The second target behavior was Richard's consistent avoidance of academic tasks. Richard would consistently only engage in academic tasks, such as homework, for less than five minutes. He would become visibly upset, complain constantly, and was unable to return to the homework. Richard's father reported

this as particularly impairing as it required a lot of prompting and negotiation to keep Richard on task. Richard would complain that even easy tasks were “too hard,” and sometimes complain that he felt “dumb.” The last target behavior was Richard’s constant nail biting when anxious or “bored.” This was reported to increase when Richard seemed anxious and was not directly involved in an activity, such as when he was sitting in the car. Richard’s father reported that this behavior appeared and increased since Richard’s parents separated nearly a year before participating in the program. Richard’s father also reported that as the new school year approached, the instances of nail biting were on a steady increase.

### **Baseline Ratings**

Following the assessment, Richard’s father provided baseline severity ratings for each of the three top problems over a period of two weeks (3 ratings total). The first two baseline ratings were provided over the phone and the final baseline rating was provided immediately before the first session (see Figures 1-3). These three baseline ratings illustrated pre-treatment severity ratings of each top problem and served as the comparison for the rest of treatment.

### **Course of Treatment**

Treatment consisted of 16 bi-weekly sessions. Sessions lasted between 60-90 minutes. Richard attended all sessions. Richard’s parents were divorced and Richard’s father opted to be the primary parent involved in treatment, though both parents were invited to sessions. Richard’s mother came to one session to learn about the program and in order to promote consistency in both households.

Richard's father provided YTP ratings every session. Behavioral exposures were conducted during sessions and home-based exposure tasks were assigned for Richard to practice new skills in a different setting.

**Initial child sessions.** The initial child sessions focused on introducing Richard to the program. Rapport building was established by the therapist chatting with Richard about his interests. To increase his incentive to participate in session, Richard earned computer time for working with the therapist during the session and for completing his at-home assignments. The first four sessions served as an introduction to the main coping skills of the program, referred to as the *KICK* plan. The *KICK* plan is an acronym that stands for "Knowing I'm Nervous," "Icky Thoughts," "Calm Thoughts," and "KeeP Practicing." Each of these components was addressed in separate sessions. In light of his preferred interest in SpongeBob, metaphors were created with SpongeBob cartoons and a SpongeBob doll to illustrate each of the steps of the *KICK* plan in an engaging manner.

When discussing the first K step ("Knowing I'm Nervous"), Richard was taught basic emotion recognition skills with emphasis on recognizing his own emotions. Sessions focused on distinguishing between physiological signs of happiness and signs of nervousness. Specific behaviors associated with emotions (i.e. a smile for happy or shaking for nervous) were also emphasized to help Richard recognize concrete signs of emotions. Richard reported his body felt "calm" when he was happy and his body felt "crazy" when he was upset or nervous. As Richard had a hard time paying attention to specific physiological

responses (e.g. increased heart rate or rapid breathing), Richard's own descriptions were used verbatim when discussing feelings. When various exposures were presented in later sessions, Richard was asked if this made his body feel "calm" or "crazy." Additionally, a simplified visual rating scale ("easy," "medium" and "hard" with corresponding happy, neutral, and sad faces) was presented to Richard, and he was asked to rate the difficulty level of different tasks. This system helped Richard report the *level* of apprehension he was feeling, while reducing difficult verbal demands.

The next step was introduced at Session 2, but was explicitly reviewed and built upon at each subsequent session. For the second step (Icky Thoughts), Richard was taught to recognize and report uncomfortable thoughts that arose when feeling nervous. To teach this skill, the SpongeBob doll was used to role-play anxiety-provoking situations. For example, Richard was told that SpongeBob has a fear of roller coasters and asked to role-play what SpongeBob might be thinking. At first, Richard was able to come up with only generic examples of possible thoughts (e.g. "He is scared"). When asked what he might think would happen, Richard was unable to independently generate examples. The therapist provided scaffolding to offer Richard appropriate choices with accompanying drawings and role-play scenarios (e.g. "Maybe he thinks the roller coaster will fly off the track like this! Why would that be bad?"). With scaffolding from the therapist, Richard was able to generate appropriate examples (e.g. "because he might get hurt"). This type of support reduced verbal demands on Richard, and helped focus his attention on ways negative expectations can affect behavior.

The skill was practiced and reinforced in each subsequent session. As each target problem was addressed, the therapist continued to provide scaffolding as necessary and limit the verbal demands placed on Richard. First, the therapist presented similar low-demand, play-based situations that were reflective of each specific target behavior. Richard was encouraged to generate appropriate thoughts in pretend scenarios related to his target behaviors (see the following section for detailed descriptions). As Richard became familiar with the process, he was encouraged to “help SpongeBob” come up with “icky thoughts.” After mastering this skill, Richard was eventually able to generate his own appropriate “icky thoughts” for each of his target behaviors.

The third session focused on “Calm Thoughts.” As with the first two skills, this technique was initially presented in a single session, but was reviewed and practiced in each subsequent session. In this step, Richard was taught to come up with thoughts that directly tested the likelihood and true severity of the negative thoughts. Specifically, Richard was taught to ask, “Will this really happen?” and “If it does happen, is it a big deal?” Since Richard was able to read and comprehend simple text, these questions were illustrated in visual format. Again, the skill was modeled by the therapist by using the SpongeBob doll in a pretend situation. For example, the initial “roller coaster” scenario was reviewed and Richard was asked to help SpongeBob develop “calm thoughts.” Initially, Richard did not grasp the concept and continued to provide “icky” thoughts. After reviewing some more examples, Richard was able to provide correct but generic responses (e.g. “it’s not scary”). Richard did not seem to focus his attention on



*why* the situation may be safer than previously thought. The therapist provided scaffolding and Socratic questions to help focus Richard's attention on *evidence* that supports "calm" thoughts (e.g. "Have you ever seen a roller coaster fly off a track before?"). With this support, Richard was able to comprehend the purpose of calm thoughts. The therapist used his responses to Socratic questions to help Richard formulate his calm thoughts (e.g. "So SpongeBob can say "I never\_\_\_\_\_"). This approach introduced Richard to the concept of calm thoughts while limiting verbal demands and allowing Richard to feel successful. Subsequent sessions focused on the development of both "icky" and "calm" thoughts based on Richard's target behaviors. Again, Richard first practiced generating calm thoughts for the SpongeBob doll and eventually began generating appropriate calm thoughts based on each of his target behaviors. His calm thoughts were written down and presented to him visually to promote easier recall. Richard continued to need scaffolding from the therapist throughout the intervention, but the level of prompting decreased as he gained more familiarity with the procedure.

Finally, Richard was taught the "Keep Practicing" step. In this step, the importance of continually practicing facing difficult situations was discussed. A metaphor was created that likened SpongeBob's practicing and eventual mastering of making "crabby patties" to Richard's practicing of anxiety-evoking situations. Richard was taught that SpongeBob acquired this impressive talent by learning one step at a time. Richard agreed that he could practice facing difficult situations by starting with small steps and progressively working his way up to

face more difficult tasks. The metaphor was repeated in subsequent sessions and before addressing target behaviors for the first time. In every subsequent session, Richard completed increasingly difficult *in-vivo* exposures that were directly related to his target behaviors.

**Initial parent sessions.** The initial parent sessions were focused on introducing Richard's father to the rationale of the program. Parent education included discussing the relationship between anxiety and autism, the function of avoidance as providing short term "relief," as well as how CBT targets changing anxious behaviors. Because many children with autism experience adaptive deficits (Liss et al, 2001; Volkmar, Sparrow, Goudreau, & Cicchetti, 1987), a module was also presented to teach Richard's father strategies to promote Richard's independent functioning. By targeting independent functioning, the child begins to feel self-confident and in control, which can help oppose feelings of anxiety. Specifically, Richard began picking out his own clothes and falling asleep by himself. Richard's father encouraged him to fall asleep in bed alone after saying "goodnight" to his father. Richard was also encouraged to choose his own clothes for school. If Richard had trouble choosing, his father provided him with a few choices to select from.

During this portion of treatment, the *KICK* plan was introduced to Richard's father. He was encouraged to provide Richard with opportunities to practice skills learned in the sessions. The therapist reviewed the content of Richard's sessions with Richard's father and provided opportunity to practice how to implement the *KICK* plan. This was designed to ensure when home exposures

were assigned in subsequent sessions, Richard's father would be able to manage the exposures, support Richard in developing a *KICK* plan, ensure the completion of exposures, and reward Richard for his involvement in home exposures. Parent education was also provided centering on common avoidance behaviors that Richard may exhibit, and parental strategies to circumvent these behaviors. Specifically, Richard's and his father collaborated to produce a list of small, medium, and large rewards that could be earned for Richard's participation. In preparation for home exposures, Richard's father was taught to simply remind Richard of his possible reward and deliver the reward contingent on attempting the exposure. He was encouraged to provide choices to help Richard feel in control of the situation, remain calm to model the desired attitude, and ignore excessive complaints or oppositional behavior exhibited by Richard.

**Exposure sessions.** Remaining Sessions were devoted to Richard practicing recognizing emotions and generating "icky" and "calm" thoughts, during sessions and relating them to his specific anxious behaviors. These symptoms were gradually targeted by allowing Richard to practice skills in low-demand situations during treatment sessions and eventually working up to using his newly learned skills in real-life situations.

First, homework avoidance was targeted. Richard readily indicated on the visual rating system that doing homework was "hard." Richard collaborated with the therapist to generate both "icky" and "calm" thoughts for doing homework. The therapist used Socratic questioning with Richard in discussing both the immediate importance (e.g. "to get a good grade") and long-term importance

(e.g. “to have a nice job”) of doing homework. Then Richard developed a KICK plan for doing homework. With support from the therapist, he generated “icky thoughts” (e.g. “Homework is hard and makes me feel dumb”) and “calm thoughts” (e.g. “I can do it” or “I can ask for help”). The calm thoughts were written down as a reminder for Richard. He was encouraged to repeat, “I can do it” as a self-calming mantra for more difficult tasks. Because Richard felt homework was both difficult and boring, breaks were incorporated to improve his engagement in academic tasks. A structured “homework plan” was developed and practiced in sessions, which allowed Richard to do homework problems for small increments of time, take a break and play a short preferred game with the therapist, and immediately go back to the work after the break. With this system in place, Richard was able to generate more “calm thoughts” concerning the “boring” homework (e.g. “If I try hard, I will get to take a break”). As Richard gained more practice with this system, the therapist reminded him to consider past successes when developing calm thoughts. This process required scaffolding to focus Richard’s attention on relevant details (e.g. “So you can tell yourself, ‘Last time I \_\_\_\_\_’) and help him generate his own calm thoughts (e.g. “I did it last time...I can do it this time too”). Once the system was adequately practiced during sessions, it was implemented in the home setting. A plan was made with Richard and his father to have Richard work for five minutes, get a five-minute break, and immediately go back to his homework following the break. If Richard was able to go straight back to his homework after the break, he was rewarded with stickers that could be redeemed for small amounts of money.

Richard's father was encouraged to create a *KICK* plan with Richard before homework time and to praise him when he actively engaged in his academic tasks. Richard's father reported that the system made their homework time easier. He was told to monitor Richard's progress, confidence, and willingness to do homework, and to gradually increase the time spent before Richard needed a break. By the end of the sessions, Richard was able to do 10 minutes of homework followed by a 10-minute break. Richard's father reported that his son was more willing to engage in academic tasks by the end of the treatment.

Secondly, nail biting was targeted. A habit-reversal paradigm (Piacentini & Chang, 2005) was implemented with Richard. The goal of the paradigm was to increase awareness of nail biting and then introduce a competing response that prevents the possibility of nail biting when employed. First, a role-play situation was set up using the SpongeBob doll. The therapist employed a paradoxical approach of slightly *increasing* anxiety about biting nails by discussing the possibility of an infection occurring from too much nail biting. Richard enjoyed role-playing with the SpongeBob doll by having him pretend to bite his nails and then explain to him an exaggerated version of what might happen (e.g. "Oh no! If you get an infection you may have to go to the hospital. Now that's really boring!"). Again, Richard generated these calm thoughts after careful scaffolding by the therapist and these calm thoughts were written down for easy retrieval. A system was created to motivate Richard to track his nail biting and then engage in a competing response. First, Richard tallied all the instances of nail biting during the week. His father was told to help him recognize his nail biting if he did

not independently realize he was doing it. This task was designed to increase Richard's awareness of when and how often he engaged in the behavior. Then Richard was taught a competing response of "Sponge Hands and Sticky Lips." This consisted of Richard clenching a squeeze toy and pursing his lips together for twenty seconds, every time nail biting occurred. The skill was practiced during sessions by having Richard first monitor the therapist's nail biting and then monitor his own nail biting before engaging in the competing response. Richard enjoyed telling the therapist he had to practice "Sponge Hands." Richard also enjoyed practicing by first pretending to bite his own nails. By making the task enjoyable and playful, Richard was motivated to practice the technique during sessions and at home. Since increased nail biting was associated with increased anxiety, Richard practiced avoiding nail biting in other anxiety-evoking situations. For example, he successfully practiced staying in a dark room without engaging in nail biting. Richard was then encouraged to practice the technique at home whenever he engaged in nail biting. His father was encouraged to remind Richard to practice the procedure after any instances of nail biting.

Lastly, Richard's need to get things he desired immediately was targeted. Richard practiced going through a *KICK* plan for waiting for things. Richard indicated on the visual rating system that waiting for things was "hard." The therapist first collaborated with him to develop "icky thoughts" with the SpongeBob doll and then for himself (e.g. "I'll never get it"). As with the previous behaviors, the therapist focused Richard's attention on potential calm thoughts (e.g. "Does this mean SpongeBob will *never* get his toy, or that he has to wait for

it? That's right! So SpongeBob can tell himself 'I \_\_\_\_\_'). Using this approach, Richard was eventually able to generate calm thoughts independently (e.g. "I can get it later") and was introduced to mantras (e.g. "Everybody waits" or "I can do something else"), all of which were employed to help Richard trivialize waiting and motivate him to involve himself in other activities rather than dwelling on desired items. Richard's calm thoughts and mantras were written to provide him with a simple reminder when asked to recall a calm thought. Richard was then given opportunities to practice waiting for preferred items (i.e. chips, candy, computer time) during sessions for increasing increments of time. Before waiting for desired items, Richard worked with the therapist to create a *KICK* plan and was encouraged to engage in less-preferred (but still enjoyable) activities while he waited. If Richard was overly focused on the desired items he was reminded to repeat one of his calm thoughts. Once the period of waiting was over, Richard practiced *calmly* reaching for desired items. After the skill was practiced in sessions, Richard's father provided opportunities for Richard to wait during the week and was encouraged to help Richard develop a *KICK* plan before waiting for desired items.

## **Results**

### **YTP Ratings**

Change in YTP ratings were analyzed by simulation modeling analysis (SMA), visual inspection, and by calculating standard mean differences. Both SMA and standard mean difference calculations provide estimated effect sizes

for single-case data and allow for statistical analysis of the data. Successful decreases in YTP severity were defined as having evidence based on *both* visual inspection and the effect-size calculations.

### *Simulation Modeling Analysis*

Simulation Modeling Analysis (SMA) is a computer-based statistical procedure that allows researchers to evaluate the statistical significance of between phase (i.e. between baseline and intervention) changes by generating thousands of data streams to determine the probability of the observed effect size being due to chance (Borckardt et al, 2008). When generating data streams, the computer incorporates the same amount of baseline and intervention points and corrects for the same autocorrelation that occurred in both phases. This procedure then produces an effect size calculation (*Pearson's r*) and statistical significance for the observed effect.

For YTP1 (nail biting), there was a significant medium effect ( $r = .407$ ,  $p = .0001$ ) indicating that the severity of the problem was significantly lower throughout treatment than at baseline. However, the rise in severity over the last few sessions results in an unclear conclusion if this effect was maintained. For YTP2 (avoidance of academic tasks), there was a medium effect, but the effect only approached significance ( $r = .465$ ,  $p = .08$ ). Lastly, reductions in YTP3 (needing what he wants immediately) severity revealed a significant large effect ( $r = .551$ ,  $p = .0001$ ), indicating clear and substantial reduction in the severity of this problem.

### **Visual Inspection**



Visual inspection reveals that two of the YTP problems showed clear decreases in severity by the end of treatment. The YTP scale ranges from 0 being “not at all a problem,” to 10 “a huge problem.” For YTP1, the mean severity level during baseline ( $m_b=8.00$ ) reduced throughout intervention ( $m_i= 4.87$ ), but was higher during the final 3 ratings ( $m_{final3}=5.67$ ). The frequency of nail biting lowered by session 7, but rose again in two of the last three sessions (see Figure 1). Richard’s father reported that this was due to one instance of nail biting at school in both of those two days. The first problem addressed was YTP2, which also decreased from baseline ( $m_b=8.33$ ) throughout the treatment ( $m_i= 5.47$ ), and was lowest at the end of treatment ( $m_{final3}=3.33$ ). YTP2 started decreasing towards the beginning of treatment, and remained low throughout the rest of treatment (see Figure 2). Lastly, severity ratings for YTP3 decreased from baseline ( $m_b= 10.00$ ) throughout the rest of treatment ( $m_i=6.47$ ) and were lowest at the end of treatment ( $m_{final3}=4.33$ ). The severity of this problem was variable throughout treatment, but became steadily lower by the end of treatment (see Figure 3).

### **Standard Mean Difference**

The Standard Mean Difference (SMD) provides an effect size calculation for single-case data. This approach can be used by calculating the mean of all baseline and intervention points ( $SMD_{all}$ ), or by calculating the mean of the last three baseline and intervention points ( $SMD_3$ ). This study employs  $SMD_{all}$ , which is a conservative approach, as  $SMD_{all}$  does not take into account when a particular behavior was targeted, but instead incorporates all intervention points

into the analysis. SMD is calculated by subtracting the mean baseline points by the mean intervention points and dividing by the standard deviation of baseline (Olive & Smith, 2000; Busk & Serlin, 1992; Marquis et al., 2000). The standard deviation of all baseline points across the three top problems was used as the standard in the analysis. This method provides a statistic similar to Cohen's *d* (Ross, 2012), and has been recommended as an effect size calculation in single-case designs (Manolov & Solanas, 2008).

For YTP1 (nail biting),  $d= 1.72$ , which indicates a large effect. However, this should be interpreted with caution as visual analysis reveals the severity of the ratings returned to baseline levels at the end of treatment, as discussed above (one nail-biting incident on two days of the final 3 ratings). The large effect size is due to the many lower ratings throughout intervention. For YTP2 (academic avoidance),  $d=1.63$ , which indicates a large effect. This is consistent with the visual inspection of YTP2, which indicates a relatively steady decrease in severity ratings. For YTP3 (needing desired items immediately),  $d= 3.24$ , which also indicates a large effect. This again is consistent with visual inspection of YTP3, which indicates a stable decrease in severity by the end of treatment.

### **ADIS Ratings**

The *ADIS* was administered before and after treatment to indicate an overall measure of anxiety reduction beyond the three target behaviors (see Figure 4). The cutoff score for a clinical diagnosis is a clinical severity rating (CSR) of 3. A CSR of 4 or higher indicates the presence of a clinically relevant diagnosis. At the post-assessment, Richard no longer met criteria for separation

anxiety (CSR=2), his primary anxiety disorder, or obsessive-compulsive disorder (CSR=3). However, he showed no improvement for generalized anxiety (CSR=4) and minimal improvement for social phobia (CSR=4).

### **Discussion**

This paper describes the first test of treatment adaptations designed for children with autism and below average verbal IQ scores. Based on the results from this single participant, the effectiveness of this program remains unclear. Based on the statistical analysis, each of the top problems decreased in severity. However, visual inspection of YTP1 (nail biting) indicates that the problem lowered throughout treatment but then reemerged at the end of treatment. Though two separate incidents of nail biting resulted in high ratings during sessions 14 and 16, Richard's father reported that the frequency of nail biting was much lower by the last treatment session. Both SMA and SMD analyses indicate significant overall reductions in the behavior despite the rise at the end of treatment. For the other two problems (avoidance of academic tasks and needing what he wants immediately), visual inspection and both statistical analyses indicated the consistent finding that both problems decreased in severity throughout treatment, remained low at the end of treatment, and had large effect sizes. *ADIS* ratings also produced positive results with Richard no longer meeting criteria for his primary diagnosis of separation anxiety or obsessive-compulsive disorder, but retaining clinically relevant scores for social phobia and generalized anxiety.

A major aim of the current study was to further develop and refine treatment adaptations intended for children with autism and below-average IQ to determine their potential for further study and refinement. Some of the adaptations seemed to make the treatment material more accessible for Richard. The use of a simplified rating system seemed helpful in allowing Richard to accurately report the difficulty level of various anxiety-evoking tasks. As he continued to improve in each symptom area, he was reminded of how “hard” these things were when he first started and praised for his improvement. This type of simplified, visual, and concrete rating system is likely important in allowing children with ASD/ID an easy means of reporting feelings and noting increases in self-confidence as tasks become easier to accomplish. Secondly, incorporating Richard’s preferred interest throughout treatment appeared critical in keeping Richard engaged with treatment concepts. Since Richard already had difficulty with academic tasks and “boring” activities, it was especially important to present material in an enjoyable, low-demand format. Richard became excited when role-playing with the SpongeBob doll and would often laugh during these role-plays. He especially enjoyed making a “SpongeBob voice” during these activities and practicing with the doll seemed to help Richard come up with his own “calm thoughts.” This adaptation clearly seemed to help Richard engage in treatment material. Participating in concrete role-played examples of each top problem likely aided his comprehension of treatment concepts. Incorporating preferred interests in treatment has been previously employed in CBT studies for children with high-functioning autism (e.g. Sze & Wood, 2007) and seems equally

important for children with ASD/ID. The use of mantras was also incorporated to promote the accessibility of “calm thoughts.” Richard was able to quickly learn simple mantras, such as “I can do it.” These mantras were used as a means of summarizing Richard’s “calm thoughts,” and allowed for easier retrieval during in-session and at-home exposures. When reviewing previous sessions, the mantras were the “calm thoughts” that Richard was most readily able to generate. It seems once the rationale is adequately understood, equipping a child with ASD/ID with simple mantras will allow for readily retrievable “calm thoughts” to help combat negative feelings in feared or difficult situations. This adaptation may be even more important for children who are less verbal than Richard.

Several issues arose in this study that have implications for refining the treatment. First, the 16-session treatment may be delivered in the traditional once per week format as opposed to twice per week to allow more time for treatment strategies to be practiced and mastered before moving on to new skills. Breaks may also be important to prevent the child from feeling tired or bored. Richard often earned a break for his participation at the beginning of the sessions and then joined his father and the therapist at the end of sessions to practice skills or discuss upcoming homework assignments. This seemed to make Richard more willing to fully engage in treatment both at the beginning and end of each session. Finally, incorporating small rewards during the session seems promising to encourage active participation, make treatment sessions fun, and leave the child feeling successful. During sessions, Richard seemed to enjoy earning small rewards (e.g. snacks and computer time). This reward system was therapist-

mediated and offered during sessions. This was applied in addition to the already established home reward system that was implemented to encourage Richard completion of home exposures. Embedding these types of small rewards every session may be valuable in producing maximal accessibility of treatment for children with ASD/ID.

Certain limitations preclude drawing definitive conclusions from this study. First, the single case approach is not as clear-cut in drawing conclusions as a multiple baseline approach. Since no generalization probe was included, we do not know if the decreased severity ratings were maintained after the treatment completed. Another limitation of this study is the three target YTP behaviors, though described by Richard's father as anxiety-related, could also be viewed as behavioral problems or autism symptoms. If anxiety was not the true source of the YTP symptoms, the anxiety-focused treatment manual may not have been the most effective way of treating the symptoms. The anxiety focused measure (*ADIS*) indicated positive treatment response, but not complete remission of all anxiety disorders. This finding is similar to other studies of CBT in children, which found decreases in participants' primary diagnoses, but not full remission of other comorbid diagnoses (e.g. Kendall, Brady, & Verduin, 2001). Future implementations of the treatment might beneficially ensure that target problems fall directly under the child's *ADIS* diagnoses.

Overall, this study provides a preliminary framework on which to develop a revised version of the treatment manual. Several of the adaptations seemed effective, whereas the bi-weekly treatment sessions seemed to preclude maximal

benefits of treatment. Examining the revised manual using a multiple-baseline approach will allow for clearer conclusions. The results presented here indicate a promising direction for the treatment of anxiety for children with ASD/ID.

Focusing on key adaptations such as incorporating preferred interests, using visual stimuli, and use of simple mantras seems to make treatment concepts accessible and enjoyable. Further refinement of this approach could produce a meaningful treatment avenue for an underserved population.

Figure 1 YTP1: Nail Biting

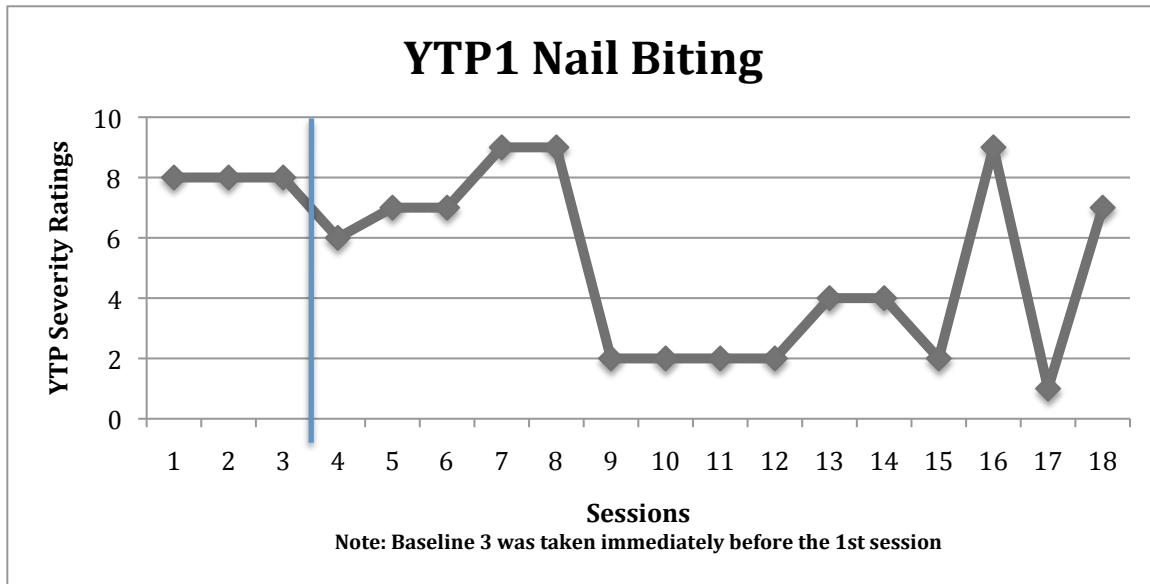
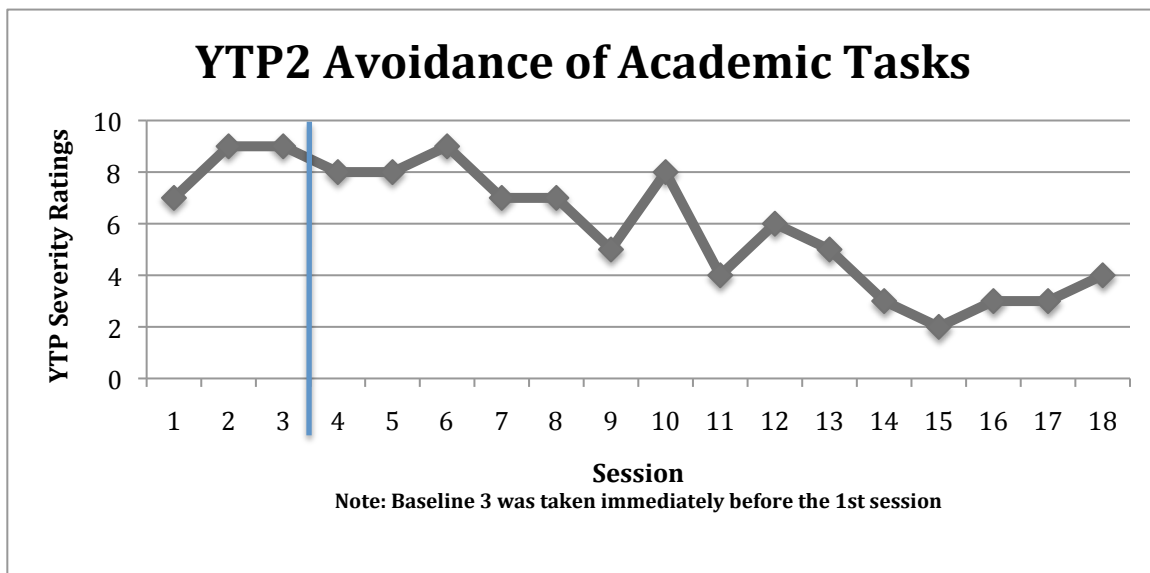
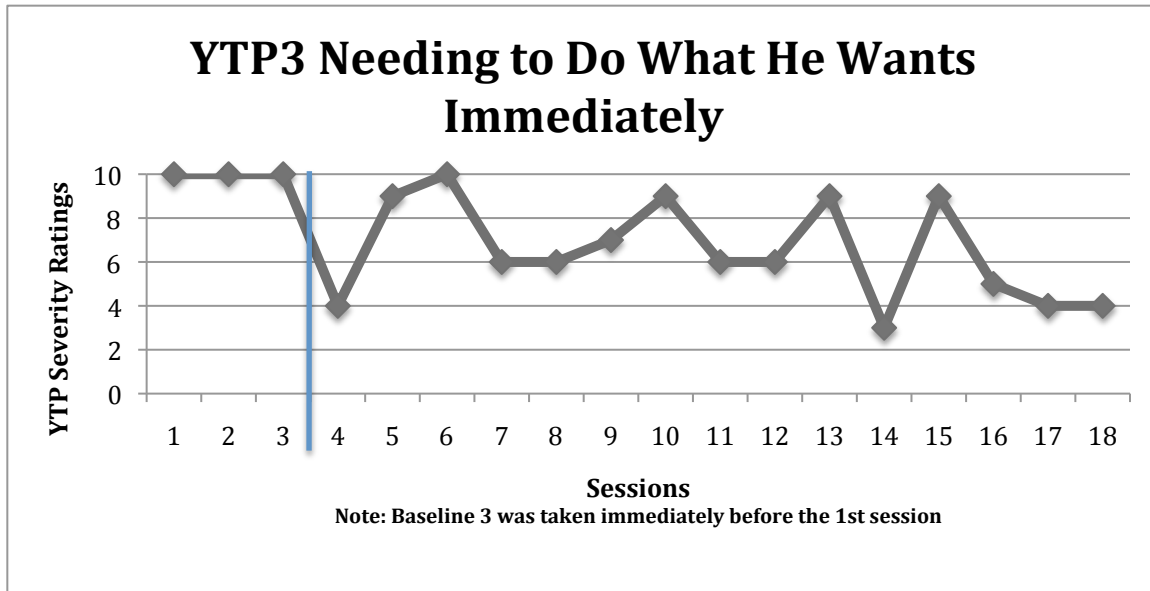


Figure 2 YTP2 Avoidance of Academic Tasks

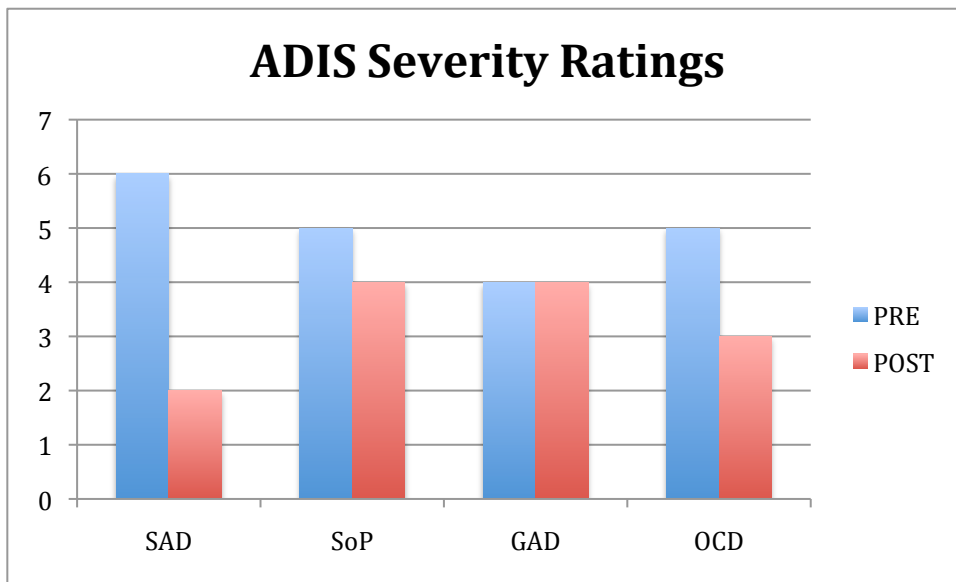




**Figure 3** YTP3 Needing to do What He Wants Immediately



**Figure 1** Pre-Post ADIS Ratings



## References

- APA. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed. – text revision). Washington, DC: American Psychiatric Association.
- Alvarez, A. and Phillips, A. (1998), The Importance of Play: A Child Psychotherapist's View. *Child and Adolescent Mental Health*, 3: 99–103. doi: 10.1111/1475-3588.00223
- Attwood, T. (2003). Frame work for behavioral interventions. *Child and Adolescent Psychiatric Clinics of North America*, 12, 65–86. doi: 10.1016/S1056-4993(02)00054-8.
- Baker, M. J., Koegel, R. L., & Koegel, L. K. (1998). Increasing the social behavior of young children with autism using their obsessive behaviors. *Journal of the Association for Persons with Severe Handicaps*, 23(4), 300–308. doi <http://dx.doi.org/10.2511/rpsd.23.4.300>.
- Barrett, P. M., Rapee, R. M., Dadds, M. M., & Ryan, S. M. (1996). Family enhancement of cognitive style in anxious and aggressive children. *Journal of Abnormal Child Psychology*, 24(2), 187-203. 10.1007/BF01441484
- Beaumont R, & Sofronoff K. A multi-component social skills intervention for children with Asperger syndrome: The junior detective training program. *The Journal of Child Psychology and Psychiatry*, 2008; 49(7): 743–753.
- Bellini, S. (2004). Social skill deficits and anxiety in high-functioning adolescents with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities*, 19(2), 78-86. doi: 10.1177/10883576040190020201
- Borckardt, J. J., Nash, M. R., Murphy, M. D., Moore, M., Shaw, D., & O'Neil, P. (2008). Clinical practice as natural laboratory for psychotherapy research: a guide to case-based time-series analysis. *American psychologist*, 63(2), 77. doi 10.1037/0003-066X.63.2.77
- Bradley, E.A., Summers, J.A , Wood, H.L., & Bryson, S.E (2004) Comparing rates of psychiatric and behavior disorders in adolescents and young adults with severe intellectual disability with and without autism. *Journal of Autism and Developmental Disorders*, 34, pp. 151–161. doi 10.1023/B:JADD.0000022606.97580.19
- Brereton, A., Tonge, B., & Einfeld, S. (2006). Psychopathology in children and adolescents with autism compared to young people with intellectual disability. *Journal of Autism and Developmental Disorders*, 36, 863–870. 10.1007/s10803-006-0125.
- Brown, T. A., & Barlow, D. H. (in press). Classification of anxiety disorders. In D. H. Barlow, *Anxiety and its disorders: The nature and treatment of anxiety and panic* (2nd ed.). New York: Guilford Press.
- Brewin, C. R. (2006). Understanding cognitive behaviour therapy: A retrieval competition account. *Behaviour Research and Therapy*, 44, 765–784. doi:10.1016/j.brat.2006.02.005
- de Bruin, E. I., Ferdinand, R. F., Meester, S., de Nijs, P. F., & Verheij, F. (2007). High rates of psychiatric comorbidity in PDD-NOS. *Journal of Autism and Developmental Disorders*, 37, 877–886. doi: 10.1007/s10803-006-0215.

- Busk, P. L., & Serlin, R. C. (1992). Meta-analysis for single-case research. In T. R. Kratochwill & J. R. Levin (Eds.), *Single-case research design and analysis: New directions Jbr psychology and education* (pp. 187-212). Mahwah, NJ: Erlbaum.
- Campbell, J. M. (2000). *Efficacy of behavior interventions to reduce problematic behaviors in persons with autism: A quantitative synthesis of single-subject research*. Unpublished doctoral dissertation, University of Memphis, TN.
- Campbell, M. A., & Rapee, R. M. (1994). The nature of feared outcome representations in children. *Journal of abnormal child psychology*, 22(1), 99-111. 10.1007/BF02169258
- Campbell, D. and Stanley, J. (1963). *Experimental and Quasi-Experimental Designs for Research*. Rand McNally College Publishing
- Chalfant, A. M., Rapee, R., & 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. doi: 10.1007/s10803-006-0318-4
- Chorpita, B.F., Taylor, A.A., Francis, S.E., Moffitt, C., & Austin, A.A. (2004). Efficacy of modular cognitive behavior therapy for childhood anxiety disorders. *Behavior Therapy*, 35, 263–287. doi:10.1016/S0005-7894(04)80039-X
- Craske, M.G. (1999). *Anxiety disorders: Psychological approaches to theory and treatment*. Boulder, CO: Westview Press.
- Guy W (ed) (1976) ECDEU Assessment manual for psychopharmacology (revised). National Institute of Mental Health, Psychopharmacology Research Branch, Rockville, MD
- Hill, J., & Furniss, F. (2006). Patterns of emotional and behavioural disturbance associated with autistic traits in young people with severe intellectual disabilities and challenging behaviours. *Research in Developmental Disabilities*, 27(5), 517-528. doi:10.1016/j.ridd.2005.07.001.
- Hirshfeld-Becker, D. R., Masek, B., Henin, A., Blakely, L. R., Pollock-Wurman, R. A., McQuade, J., et al. (2010). Cognitive behavioral therapy for 4- to 7-year-old children with anxiety disorders: A randomized clinical trial. *Journal of Consulting and Clinical Psychology*, 78, 498–510. doi: 10.1037/a0019055.
- Howard, B., & Kendall, P. C. (1996). Cognitive-behavioral family therapy for anxiety-disordered children: A multiple baseline evaluation. *Cognitive Therapy and Research*, 20, 423–443. doi: 10.1007/BF02227906
- Kendall, P. C., Brady, E. U., & Verduin, T. L. (2001). Comorbidity in childhood anxiety disorders and treatment outcome. *Journal of the American Academy of Child & Adolescent Psychiatry*, 40(7), 787-794. doi 10.1097/00004583-200107000-00013
- Koegel, R.L., Openden, D., & Koegel, L.K. (2004). A systematic desensitization paradigm to treat hypersensitivity to auditory stimuli in children with autism in family contexts. *Research & Practice for Persons with Severe Disabilities* 29(2), 122-134. doi: 10.2511/rpsd.29.2.122.

- Klin, A., Pauls, R., Schultz, R., & Volkmar, F. (2005). Three diagnostic approaches to Asperger syndrome: Implications for research. *Journal of Autism and Developmental Disorders*, 35, 221–234. doi: 10.1007/s10803-004-2001.
- Kluth, P. (2009). *Teaching Students with Autism & Asperger's Syndrome In The Inclusive Classroom*. Dude Publishing
- Leyfer, O. T., Folstein, S. E., Bacalman, S., Davis, N. O., Dinh, E., 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. doi: 10.1007/s10803-006-0123-0.
- Liss, M., Harel, B., Fein, D., Allen, D., Dunn, M., Feinstein, C., ... & Rapin, I. (2001). Predictors and correlates of adaptive functioning in children with developmental disorders. *Journal of Autism and Developmental Disorders*, 31(2), 219-230. 10.1023/A:1010707417274
- Lord, C., Rutter, M., & 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(5), 659-685.
- Lord, C., Rutter, M., DiLavore, P. C., & Risi, S. (2002). *Autism diagnostic observation schedule: ADOS*. Western Psychological Services.
- Luiselli, J.K. (1978). Treatment of an autistic child's fear of riding a school bus through exposure and reinforcement. *Journal of Behavior Therapy and Experimental Psychiatry*, 9, 169-172. doi:10.1016/0005-7916(78)90065-4.
- Luscre, D.M. & Center, D.B. (1996). Procedures for reducing dental fear in children with autism. *Journal of Autism and Developmental Disorders*, 26(5), 547-556. doi: 0.1007/BF02172275.
- Macklem, G. L. (2008). Emotion Regulation in the Classroom. *Practitioner's Guide to Emotion Regulation in School-Aged Children*
- Manolov, R., & Solanas, A. (2008). Comparing N= 1 effect size indices in presence of autocorrelation. *Behavior modification*, 32(6), 860-875. <http://dx.doi.org/10.1177/0145445508318866>
- Marquis, J. G., Horner, R. H., Carr, E. G., Turnbull, A. P., Thompson, M., Behrens, G. A., et al. (2000). A meta-analysis of positive behavior support. In R. Gersten, E. P. Schiller, & S. Vaughn (Eds.), *Contemporary special education: Syntheses of the knowledge base on critical instructional issues*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Matson, J.L., Shoemaker, M. (2009). Intellectual disability and its relationship to autism spectrum disorder. *Research in Developmental Disabilities*, 30, 1107-1114. doi:10.1016/j.ridd.2009.06.003.
- Nauta, M.H., Scholing, A., Rapee, R.M., Abbott, M., Spence, S.H., & Waters, A. (2004). A parent-report measure of children's anxiety: Psychometric properties and comparison with child-report in a clinic and normal sample. *Behaviour Research and Therapy*, 42, 813–839. doi:10.1016/S0005-7967(03)00200-6

- O'Brien, S., & Repp, A. C. (1990). Reinforcement-based reductive procedures: A review of 20 years of their use with persons with severe or profound retardation. *Journal of the Association for Persons with Severe Handicaps*, 15, 148–159.
- Olive, M. L., & Smith, B. W. (2005). Effect size calculations and single subject designs. *Educational Psychology*, 25(2-3), 313-324. doi: 10.1080/0144341042000301238
- Parker, R. I., & Brossart, D. F. (2003). Evaluating single-case research data: A comparison of seven statistical methods. *Behavior Therapy*, 34, 189–212. doi: [10.1016/S0005-7894\(03\)80013-8](https://doi.org/10.1016/S0005-7894(03)80013-8)
- Piacentini, J., & Chang, S. (2005). Habit reversal training for tic disorders in children and adolescents. *Behavior Modification*, 29(6), 803-822. doi: [10.1177/0145445505279385](https://doi.org/10.1177/0145445505279385)
- Seltzer, M. M., Krauss, M. W., Shattuck, P. T., Orsmond, G., Swe, A., & Lord, C. (2003). The symptoms of autism spectrum disorders in adolescence and adulthood. *Journal of Autism and Developmental Disorders*, 33(6), 565–581. doi: 10.1023/B:JADD.0000005995.02453.0b
- Shattuck P. T., Seltzer M. M., Greenberg J. S., Orsmond G. I., Bolt D., Kring S. et al. (2007) Change in autism symptoms and maladaptive behaviors in adolescents and adults with an autism spectrum disorder. *Journal of Autism and Developmental Disorders* 37, 1735–47. doi 10.1007/s10803-006-0307-7
- Silverman, W. K., & Albano, A. M. (1996). *The anxiety disorders interview schedule for DSM-IVTR—child and parent versions*. San Antonio, TX: Graywind.
- Sofronoff, K., Attwood, T., & Hinton, S. (2005). A randomised controlled trial of CBT intervention for anxiety in children with Asperger syndrome. *Journal of Child Psychology and Psychiatry*, 46, 1152–1160. doi: 10.1111/j.1469-7610.2005.00411.x
- Sukhodolsky, D. G., Scahill, L., Gadow, K. D., Arnold, L. E., Aman, M. G., et al. (2008). Parent-rated anxiety symptoms in children with pervasive developmental disorders: Frequency and association with core autism symptoms and cognitive functioning. *Journal of Abnormal Child Psychology*, 36, 117–128 doi: 10.1007/s10802-007-9165-9.
- Sze, K., & Wood, J. (2007). Cognitive behavioral treatment of comorbid anxiety disorders and social difficulties in children with high-functioning autism: A case report. *Journal of Contemporary Psychotherapy*, 37(3), 133-143 doi: 10.1007/s10879-007-9048-y
- Tsakanikos, E., Sturmey, P., Costello, H., Holt, G., & Bouras, N. (2007). Referral trends in mental health services for adults with intellectual disability and autism spectrum disorders. *Autism*, 11, 9–17. doi: 10.1177/1362361307070987.
- Volkmar, F. R., Sparrow, S. S., Goudreau, D., Cicchetti, D. V., Paul, R., & Cohen, D. J. (1987). Social deficits in autism: An operational approach using the Vineland Adaptive Behavior Scales. *Journal of the American Academy of Child & Adolescent Psychiatry*, 26(2), 156-161. doi: 10.1097/00004583-198703000-00005
- Wechsler, D. (2003). *WISC-IV: Administration and scoring manual*. Psychological Corporation.
- Weisz, J.R., Chorpita, B.F., Frye, A., Ng, M.Y., Lau, N., Bearman, S.K., Ugueto, A.M., Langer, D.A., Hoagwood, K., and the Research Network on Youth Mental Health (2011). Youth top problems:

Using idiographic, consumer-guided assessment to identify treatment needs and track change during psychotherapy. *Journal of Consulting and Clinical Psychology*, 79 (3), 369-380. doi: 10.1037/a0023307

Weisz, J.R., Chorpita, B.F., Palinkas, L.A., Schoenwald, S.K., Miranda, J., Bearman, S.K., Daleiden, E.L...the Research Network on Youth Mental Health (2011). Testing standard and modular designs for psychotherapy treating depression, anxiety and conduct problems in youth: A randomized effectiveness trial. *Archives of General Psychiatry* doi:10.1001/archgenpsychiatry.2011.147

Wood, J. J., Drahota, A., Sze, K., Har, K., Chiu, A., & Langer, D. A. (2009). Cognitive behavioral therapy for anxiety in children with autism spectrum disorders: A randomized, controlled trial. *Journal of Child Psychology and Psychiatry*, 50, 224–234. doi: 10.1111/j.1469-7610.2008.01948.x

Wood JJ, Fujii C, & Renno P. Cognitive behavioral therapy in high-functioning autism: review and recommendations for treatment development. *Evidence-Based Practices and Treatments for Children with Autism*. 2011; 2: 197-230. doi: 10.1007/978-1-4419-6975-0\_7

Wood, J. J., & Gadow, K. D. (2010). Exploring the nature and function of anxiety in youth with autism spectrum disorders. *Clinical Psychology: Science and Practice*, 17(4), 281-292. doi:10.1111/j.1468-2850.2010.01220.

Wood, J. J., & McLeod, B. M. (2008). *Child anxiety disorders: A treatment manual for practitioners*. New York: Norton.