MODIFYING COGNITIVE-BEHAVIORAL THERAPY TO ADDRESS ANXIETY IN

CHILDREN WITH AUTISM SPECTRUM DISORDERS

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DISSERTATION ABSTRACT

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Anxiety disorders are one of the most commonly re-occurring co-occurring diagnoses of children with ASD, affecting approximately as many as 84% of children with ASD (Chalfant, et al., 2006) as opposed to 13% of children without ASD (van Steensel et al., 2011). A growing body of research indicates that Cognitive Behavioral Therapy (CBT) is an efficacious approach for the treatment of anxiety disorders in typically developing children, as well as with children with ASD (Wood et al., 2009). The proposed research will aim to examine the urgent need of addressing bidirectional anxiety and ASD symptoms through the use of CBT for middle childhood students (ages 7-13), with additional caregiver training. A manualized CBT program will be administered to students with an ASD diagnosis and elevated anxiety symptomatology. Modifications to the manualized program derived from previous research (Attwood, 2004; McNally Keehn, 2012) will be made to address specific characteristics of the ASD population, such as using concrete language, using visual materials, and integrating the students' specific interests. There will be a focus on the behavior aspects of the CBT because of known problems with cognitive inflexibility and executive functioning in the ASD population. The findings of this study will improve our knowledge regarding the utility and preliminary effectiveness

of an adapted caregiver-mediated CBT intervention to address the anxiety symptomatology of school age children with ASD, and if the intervention is effective, will increase the number of feasible interventions addressing anxiety for children with ASD.

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CHAPTER I

INTRODUCTION AND LITERATURE REVIEW

This chapter provides the statement of purpose for the proposed study and a review of

literature pertaining to (a) autism spectrum disorder (ASD) and anxiety, (b) cognitive-behavioral

therapy (CBT) interventions and ASD, (c) intervention studies examining the effectiveness of the

Coping Cat CBT program for children with ASD, (d) studies evaluating caregiver mediated

interventions addressing ASD and anxiety, and (e) intervention literature investigating the use of

telehealth-delivered therapy. The chapter concludes with a review of a pilot study related to the

proposed study and the research questions for the single-case experimental design study.

Introduction

Anxiety disorders are one of the most commonly co-occurring diagnoses of children with

ASD, affecting approximately as many as 84% of children with ASD (Chalfant, et al., 2006) as

compared to 13% of neurotypical children (van Steensel et al., 2011). Anxiety is defined as an

intolerance of uncertainty, having positive beliefs about worry, poor problem orientation, and

cognitive avoidance (Dugas et al., 1998).

Individuals with ASD may be at a greater risk for developing anxiety due to inhibited

temperament, physiological hyperarousal (Bellini, 2007), and information-processing biases

(Happe et al., 2006). Additionally, the difficulty individuals with ASD experience in navigating

social situations (Bellini, 2007) and relatively weak coping skills (Gillott et al., 2007) may

contribute to increased vulnerability to stress and anxiety. Childhood anxiety disorders have a

negative impact on educational outcomes, social outcomes, family outcomes and overall quality

of life (Reaven, 2011); however, anxiety can doubly impact children with ASD and contribute to

the development or worsening of externalizing challenging behavior (Moskowitz et al., 2017; Uljarevic et al., 2016).

A plausible bidirectional relationship may exist between anxiety and ASD with literature suggesting that anxiety contributes to social and academic difficulties, which also contribute to worsening anxiety (Adams et al., 2019). Despite a growing body of research and longstanding evidence of anxiety disorders in children with ASD (Reynolds et al., 2012), more research is needed to examine the effectiveness of interventions aimed at decreasing anxiety symptomatology for children with ASD. The research to practice gap in this core area of co-occurring treating anxiety disorder experienced by children with ASD is defined by (a) difficulties in addressing the communication and social skills support needs inherent in ASD within a CBT intervention, (b) a lack of reliable and valid measures with sufficient sensitivity to differentiate symptoms of anxiety disorders from symptoms of ASD, and (c) challenges of idiosyncratic behavioral expression of anxiety in the ASD population (Moskowtiz et al., 2017). A shortage of therapists skilled in delivering CBT to children with ASD also impacts access to these evidence-based interventions (Kendall et al., 2006). Addressing these barriers will be essential to the development of feasible, effective interventions for school age children with ASD and in the dissemination of existing evidence-based practices for addressing anxiety for children with ASD.

When the National Institute for Health Research (NIHR) asked a group of individuals with ASD to identify priorities in research related to ASD the first priority for ASD intervention was to identify treatments that improve mental health or reduce mental health problems in people with ASD, and to find ways to adapt mental health interventions for the needs of people with ASD (NIHR, 2016).

A growing body of research indicates that CBT is an efficacious approach for the treatment of anxiety disorders in neurotypical children, as well as with children with ASD (Wood et al., 2009). A randomized controlled trial comparing CBT to a waitlist condition yielded post-treatment medium effect sizes (ES = .58) on daily living skills for a group of 40 children with ASD who received CBT (Drahota, et al., 2011).

Adaptations are common when delivering CBT to children with ASD (Attwood, 2004). Children with ASD often have difficulty regulating their emotions, have low levels of motivation, and present with cognitive inflexibility, concrete thinking, executive functioning, and pragmatic communication needs related to perspective taking and Theory of Mind (Gaus, 2007).

Previous research has examined the effects of adapting language requirements in CBT for children with ASD such as providing a list of rules instead of focusing on cognitive restructuring (Attwood, 2004). Past studies have considered parental involvement critical to achieving intervention outcomes (Gouze et al., 2018).

Statement of Purpose

This single-case experimental design study examined the urgent priority of addressing anxiety and ASD symptoms for middle childhood students (ages 7 – 13 years) with an ASD diagnosis and elevated anxiety symptomatology by examining the effectiveness, feasibility, and acceptability of a manualized CBT program (i.e., Coping Cat) delivered via telehealth. The manualized Coping Cat program was adapted to address specific support needs of children with ASD such as using concrete language, using visual materials, and integrating the students' specific interests (Attwood, 2004; McNally Keehn, 2012). Additionally, the intervention emphasized the behavioral aspects of CBT because of known problems with cognitive inflexibility and executive functioning in the ASD population. The intervention also targeted an

intolerance of uncertainty (a core component of anxiety), the ability to describe emotions, and the intervention was caregiver-mediated with caregivers leading exposure activities with their child.

This project examined the preliminary feasibility and effectiveness of an ASD adapted CBT intervention on caregiver implementation of exposure activities, and subsequent decreased anxiety symptoms, decreased externalizing challenging behavior, and improved coping skills of three school aged children with ASD using a rigorous single-case experimental design (i.e., a multiple-probe across caregiver-child dyads design). The participants and their caregivers reported subjective units of distress during the exposure activities providing evidence regarding potential unintended positive and adverse effects. The findings of an Organization for Autism Research funded pilot of the intervention informs the intervention adaptation and design of the current study (St. Joseph et al., in preparation). This pilot study is further discussed on page 39 of this chapter. The findings of this study improve our knowledge regarding the utility and preliminary effectiveness of an adapted caregiver-mediated CBT intervention to address the anxiety symptomatology of school age children with ASD and increases the number of feasible interventions addressing anxiety for children with ASD.

Literature Review

ASD and Anxiety

Around 70- 85% of children with ASD experience co-occurring psychiatric diagnoses with anxiety among the most common diagnoses (Kreslins et al., 2015). Due to the unique interaction between anxiety and core ASD symptomology, the manifestation of anxiety in children with ASD differs in several ways from anxiety seen in neurotypical children. These differences are highlighted by differences such as social skills, stereotypy, and restricted

interests. A quantitative study examined anxiety in toddlers with and without ASD, and results indicated an overall pattern where toddlers with ASD had more severe anxious and avoidant symptoms than the neurotypical toddlers (Davis et al., 2009). Some research has found that anxiety in individuals with ASD was associated with poorer social skills, poorer functioning, and reduced social motivation (Spain et al., 2018). Children with ASD are prone to experience anxiety, perhaps due to the associated challenges with sensory overload, difficulty with change, and the unpredictability of social situations (Spiker et al., 2012). The association of anxiety symptoms with stereotypy also bolsters the contention that anti-anxiety treatments may be beneficial in managing impairing stereotypic behaviors in children with ASD (Sukhodolsky et al., 2008).

Anxiety in ASD is associated with more behavioral difficulties, such as avoidance, repetitive behaviors, and challenging externalizing behaviors. It is thought that individuals with ASD struggle to manage anxiety due to deficits in understanding emotions, and problems with social and communication skills (Lecavalier et al., 2014). Clinical characteristics of "insistence on sameness" has also been proposed as a manifestation of anxiety in children with ASD (White et al., 2009). As a result of the significant diagnostic overlap between anxiety and ASD, there are questions about what direction the relationship is, with research indicating it is a bidirectional relationship (Kreslins et al., 2015).

When trying to understand the importance of anxiety on children with ASD, it is important to also understand constructs of anxiety such as intolerance of uncertainty and alexithymia. Intolerance of uncertainty is a construct of anxiety and there has been recent interest in this construct as it relates to ASD. Intolerance of uncertainty is conceptualized as a dimensional construct that refers to a tendency to react negatively on an emotional, behavioral,

and cognitive level to uncertain events and situations (Buhr et al., 2009). Intolerance of uncertainty is a well-established predictor of anxiety and has been considered an efficacious target for CBT (Carleton, 2012).

Another construct closely related to ASD and anxiety is alexithymia. Alexithymia is defined as difficulty identifying, distinguishing, and describing emotions (Mazefsky et al., 2014) and is empirically linked to anxiety (Mueller, 2006). The typical features of alexithymia include difficulties in identifying and describing feelings, difficulties in differentiating between emotional states and physical sensations, and an externally oriented cognitive style (Rufer et al., 2010). Alexithymia has been well documented in ASD (Berthoz et al., 2005) and a study by Griffin et al., (2016) found that parent-related alexithymia correlated strongly to autistic traits.

Identifying co-occurring anxiety and its constructs has important implications for treatment and the provision of services. Clinically, the early identification of co-occurring anxiety in children and adolescents with ASD is essential, because anxiety symptoms can cause considerable distress and interfere with daily functioning (Muris et al., 1998). Additionally, anxiety in children with ASD affects the lives of their parents and other family members. Kim et al. (2000) found in a study comparing 1750 neurotypical children to 40 children with ASD aged 9-14 years old who also experienced anxiety, the children with ASD had poorer relationships with their teachers, peers, and family members, and that their parents had more limited social lives. Early identification of co-occurring anxiety may alleviate the extent to which daily functioning is affected.

Assessment of Anxiety in ASD

As a result of the aforementioned challenges, co-occurring anxiety disorders in ASD populations may frequently go unrecognized or misidentified (Tsai, 2006). A complex issue for

clinicians involves determining whether psychiatric symptoms in individuals with ASD are inextricably linked to core or secondary ASD features, or whether they represent true psychiatric symptoms (Green et al., 2000; Matson et al.,2007; Tantam, 2000, Tsai, 2006). This tendency to overlook co-occurring mental health problems in the presence of a disability is referred to as diagnostic overshadowing (Mason et al., 2004). Diagnostic overshadowing can occur in two ways: (1) attributing mental health problems to the more salient disability (Levitan et al.,1983); and (2) ignoring co-occurring mental health problems because their effects are perceived as less impactful than the effects of the primary disability (Mason et al., 2004). For example, some anxiety symptoms such as panic attacks and obsessions may be misinterpreted as challenging behavior that is directly related to the ASD diagnosis (Tsai, 2006). Determining that an individual is experiencing anxiety in addition to their diagnosis of ASD has important implications for treatment conceptualization, and unfortunately there are few assessments specific to the ASD population.

Overreliance on measures designed for neurotypical children may adversely impact the accurate measurement of treatment outcomes as previous researchers have suggested that children with ASD may manifest anxiety symptoms differently than neurotypical children (Gillott et al., 2001). Although the prevalence of co-occurring anxiety in children with ASD is high, it may also be underreported due to the design of self-report screening and diagnostic measures for anxiety. Specifically, to report on anxiety measures, children with ASD must have the expressive language skills and ability to identify and convey their internal states such as worry and fear (Lecavalier et al., 2014).

To supplement self-report measures, direct observation of behavior can contribute to clinical pictures of anxiety for children with ASD by recording observable behavioral events

across environments (Tsai, 2006). Direct observation of a child with ASD can provide useful information about their interests, intellectual development, social relationships, thoughts, and feelings (Tsai, 2006). In addition, direct observation techniques are particularly helpful for young children and for children and adolescents with complex communication needs. In addition, clinical assessment must consider behavioral changes that may reflect anxiety (e.g., appetite, energy level, or participation in social activities) because of the difficulty in distinguishing co-occurring anxiety from core-ASD symptoms.

Overview of Interventions for Anxiety in ASD

CBT and Anxiety

CBT's core premise is that changes in cognitions leads to changes in emotions and behaviors (Beck, 1970). The overall goal of CBT is to reduce symptoms and improve functioning. In order to achieve this goal, the patient becomes an active participant in a collaborative process to test and challenge the validity of maladaptive cognitions and to modify maladaptive behavioral patterns. Thus, modern CBT refers to a family of interventions that combine a variety of cognitive, behavioral, and emotion-focused techniques (Hofmann, 2011). Although these strategies greatly emphasize cognitive factors, physiological, emotional, and behavioral components are also recognized for the role that they play in the maintenance of the disorder.

Figure 1

Beck Model of Cognitive Behavioral Therapy (Beck, 1970).
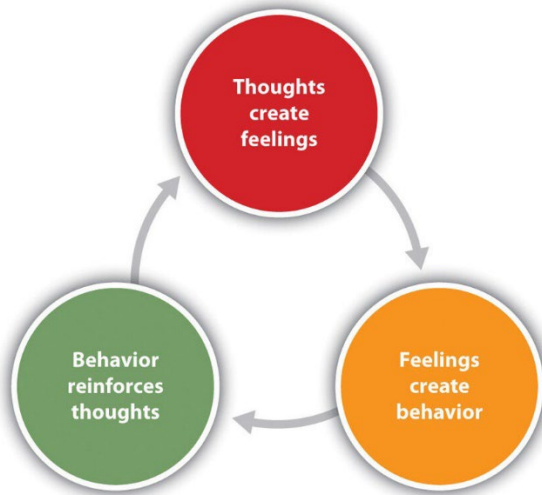
CBT is an umbrella term describing intervention packages that include various

components such as psychoeducation, cognitive restructuring, and exposure-based activities for

the treatment of anxiety. CBT models of intervention are consistently superior to control

conditions and as a result have been categorized as "well-established" treatment for anxiety in

children (Nadeau et al., 2011). In a meta-analysis of randomized controlled trials of

psychological therapies for children and adolescents with anxiety disorder, the data suggests that

CBT for children and adolescents with anxiety is effective when compared to a passive (no

treatment group) or an active control group (Reynolds et al., 2012). The study coded 55

randomized controlled trials in which children with anxiety were treated using psychological

therapy for a total of 2,434 children in the treatment group and 1,824 children in the control

group (Reynolds et al., 2012). This meta-analysis also found that individual treatment for anxiety

is associated with a larger effect size (.85) than group treatment (.58) for anxiety (Reynolds et al.,

2012). The overall effect size for all studies included in the meta-analysis was .65 (Reynolds et

al., 2012).

Despite the evidence supporting the use of CBT, there is a lack of research on the use of CBT with children with ASD. One literature review found three RCT's that investigated the use of CBT for youths with ASD and co-occurring anxiety symptoms (Nadeau et al., 2011). Furthermore, while there is little controlled clinical research on individualized interventions for ASD population to regulate emotions (a common symptom of ASD), the predominant approach is likely to be CBT since it incorporates content to address emotion regulation (Mazefsky et al., 2014). These studies found that children with ASD who received CBT significantly decreased their anxiety and used more coping strategies.

Research does indicate that psychoeducation (a component of CBT) may be especially helpful in providing mental health services to children with ASD, given the chronic and pervasive nature of ASD (Mazefsky et al., 2014). For example, in a randomized controlled trial study, Reaven et al. (2012) compared outcomes for 50 children (aged 7-14 years old) with ASD receiving CBT to children with ASD receiving treatment as usual and reported remarkedly improved outcomes for the CBT group, where 50% of children in the treatment group had clinically meaningful positive treatment response, compared to 8.7% of the treatment as usual group.

ASD and CBT

Children with ASD have difficulty in identifying emotions and cognitions both in themselves and others, otherwise known as "Theory of Mind" (Chalfant et al., 2007). An anxious ASD child might not typically be considered an appropriate candidate for a CBT program because CBT relies on the child's ability to infer their own emotional states and thoughts in order to shift their cognitive style, and, in turn, their anxious behavior (Chalfant et al., 2007). However, there is a growing body of clinical case reports suggesting that CBT

interventions for anxiety can be successful both for children and adults with ASD (Gillott et al., 2007). Information processing difficulties of both ASD and typically developing anxious children may best be addressed with structured cognitive retraining exercises, such as those in CBT (Chalfant et al., 2007). In fact, CBT interventions for children with ASD met the Council for Exceptional Children (CEC) criteria for an empirically supported treatment (Kester et al., 2018). Studies specific to CBT with ASD population found CBT resulted in significant reductions in anxiety severity (Ehreneich-May et al., 2014).

The components of CBT, such as cognitive restructuring and exposure to uncertain situations, have been demonstrated to reduce anxiety (Buhr et al., 2009; Dugas et al., 2012; Ladouceur et al., 2000). Drawing from extant research on the use of CBT to treat co-occurring problems, it is likely that CBT could address alexithymia as well as anxiety. Regardless of treatment approach, a more intensive focus on developing an individual's emotional awareness and ability to recognize and report their emotional state is often necessary for those with ASD (Mazefsky et al., 2015). As a construct of anxiety, most research regarding alexithymia occurs in adult populations, even though it is important to study in early development and could have utility for working with children. There is little research that looks at the effects of CBT on alexithymia (Rufer et al., 2010).

Several studies show that intolerance of uncertainty may be heightened in youth with ASD and is linked to both anxiety and the core features of ASD (Boulter et al., 2014). Results reported links between intolerance of uncertainty and the presence of more ASD specific features such as repetitive behaviors, insistence on sameness, and sensory over-reactivity, and suggested that intolerance of uncertainty mediated the relationship between anxiety and ASD (Boulter et

al., 2014). It follows that the assessment and potential treatment of intolerance of uncertainty should be a component of anxiety interventions.

Coping Cat

The Coping Cat program is a CBT manual-based and comprehensive treatment program for children from 7 to 13 years old. A systematic review of 30 articles using different CBT interventions resulted in 7 of those articles being methodologically sound which all used Coping Cat as the intervention, indicating that Coping Cat could now be categorized as evidence-based based on CEC 2014 specifications (Kester et al., 2018).

A randomized controlled trial with 22 children with ASD aged 8-14 years old that investigated the use of Coping Cat found that children in the CBT condition evidenced significantly larger reductions in anxiety than those on the waitlist (McNally Keehn et el., 2013). These results provide preliminary evidence that a modified version of the Coping Cat program may be feasible and effective program for reducing clinically significant levels of anxiety in children with ASD (McNally Keehn et al., 2013). Additionally, a meta-analysis of 19 RCT's yielded promising findings for the treatment effect of Coping Cat on anxiety symptoms for 1,358 child participants (Lenz, 2015).

Coping Cat places an emphasis on the use of activities to help children learn the cognitive-behavioral model, which is the interaction of thoughts, feelings, and behaviors. As opposed to teaching the child about feelings, thoughts, and behaviors didactically, the therapist and youth *discover* these concepts through play (Kendall et al., 2006). Many "flex" activities are suggested throughout the manual as ways for the therapist to pick and choose which activities might appeal to the child that they are working with, allowing for high collaboration. All of the activities include an emphasis on having fun in the therapy session to build rapport and increase

the child's engagement. For example, in the first session, the therapist and child play a "personal facts" game to see how many personal facts each can remember about the other, and the winner receives a small prize. When learning about feelings, a child and the therapist play feelings charades (i.e., act out different feelings and try to guess what the other is doing), or make a feelings dictionary/collage (i.e., look through magazines and cut out pictures of different feelings).

Progressive relaxation is an important component of Coping Cat (and CBT) and is a direct complement to learning about somatic cues for anxiety. After the children begin learning to identify somatic triggers for anxiety, they are subsequently taught how to relax their bodies. To bring these ideas to life, the therapist uses examples that resonate with children. For example, when exploring how muscles tense up when anxious, therapists use the example of "walking like a robot". When discussing deep abdominal breathing, to the therapist provides an analogy of "blowing up a balloon", smelling roses and blowing out birthday candles, or breathing in the smell of hot pizza and blowing out to cool it down to help the child learn how to fill their stomach with air (Beidas et al., 2010).

To increase the accessibility of progressive relaxation therapists use scripts that provide analogies for the different muscle groups (adapted from Koeppen, 1974). For example, instead of saying "tense up your fist," a child is told to "squeeze lemons to make lemonade." By providing these useful and more concrete analogies, children are more apt to remember what to do when they begin feeling somatic cues of anxiety (Beidas et al., 2010).

The logic model for this study is illustrated in Figure 2. It begins with the setting conditions of the study including the rationale for addressing anxiety in children with ASD. The contextual variables describe characteristics that may influence the child's ability to develop

skills to cope with anxiety, such as how much their family accommodates their anxiety, their

tolerance for uncertainty, and their levels of alexithymia. The core variables describe the

intervention components that impact the targeted dependent variables. The theory of change

incorporates a modified Coping Cat CBT program and caregiver training to decrease anxiety in

children with ASD as well as their externalizing behaviors related to their anxiety and to

Figure 2

Logic Model

Setting Conditions	Contextual Variables	Core Variables	Proximal Outcomes	Distal Outcomes
-Anxiety is prevalent in as many as 84% of children with ASD - Both anxiety and ASD are associated with poorer quality of life for the child and their families - There may be a bidirectional relationship between ASD and anxiety	- Family accommodation of anxiety - Intolerance of uncertainty -Alexithymia -Externalizing challenging behavior	1. Therapist delivered (via telehealth) modified Coping Cat CBT program 2. Caregiver training addressing accommodation of anxiety, implementation of exposure activities	-Decrease in child reported anxiety via SUDS rating - Decrease in externalizing behaviors associated with anxiety -Improved ability of child to identify feelings/reduced scores on alexithymia measures -Decreased caregiver reported distress via SUDS rating -Decreased caregiver reported accommodation of anxiety via Family Accommodation Scale	-Decreased ASD symptoms -Increased family quality of life

to decrease caregiver distress. It also includes an improvement in alexithymia. The intervention

will lead to proximal and distal outcomes. The proximal outcomes in the logic model will be

measured by SUDS ratings, behavioral observations of externalizing behaviors, and pre/post-

tests. The decreases in anxiety, decreases in externalizing behavior, and improved alexithymia are anticipated to decrease ASD symptoms due to the bi-directional relationship between anxiety and ASD. The following sections describe the intervention in more detail.

Coping Cat Modifications. Traditional CBT protocols may be too reliant on the therapist introducing abstract concepts verbally for children with ASD, who have known linguistic and social challenges. Some research has investigated the use of CBT with modifications for youth with ASD that included visual supports, written schedules, worksheets, multiple choice lists, and video modeling (Reaven et al., 2018). Adaptations (i.e., structure or content) and modifications (i.e., treatment components) are often necessary when working with special populations, such as children with ASD. One single-case study using a nonconcurrent multiple baseline design with two children found that combining techniques from CBT and behavior-analytic interventions was particularly effective in increasing coping skills and decreasing the frequency and intensity of challenging behavior (Parent et al., 2016). In this study, the use of the CBT model and exercises focused on skill-specific generalization that helped children to identify feelings, behaviors, and thoughts, as well as to understand the interconnection among these elements and gain insight into their own somatic triggers (Parent et al., 2016). Behavior-analytic techniques such as prompting, shaping, modeling, and task analysis assisted participants in acquiring and mastering new skills. Further, antecedent-based strategies and differential reinforcement were used to effectively reduce challenging behavior and increase independent coping-strategy use for each of the two participants. Overall, Parent et al. (2016) reported that the combination of CBT and behavior-analytic techniques promoted the participants' independent and effective use of coping skills across a variety of situations and settings.

Walters (2016) evaluated 12 studies that effectively employed CBT to alleviate symptoms of mental health problems of children. The results of this systematic review indicated that modified CBT led to a reduction in anxiety, obsessive-compulsive disorder (OCD) and depression. This review summarized the consistently reported modifications to the content and delivery of interventions for anxiety such as:

Longer durations of sessions to allow more time to match children's pace and repeat content to aid in learning

Use of metaphors such as the child as a scientist to encourage guided discovery

Use of acronyms to introduce problem solving and cognitive restructuring

Use of social stories for cognitive restructuring and problem solving

Use of idiosyncratic rating scales (e.g., a feelings thermometer to concretely measure change instead of asking about feelings directly)

Incorporate a relaxation strategy section into the program

Tangible reinforcement program in session which can be translated to home and school

Use of video modelling and role play to teach coping strategies

Increased use of games to convey concepts and maintain interest for younger children

Employ an additional parenting component to help parents support their child; and

Link with schools to increase school-based support and generalization of concepts (Walters et al., 2016).

It should be noted there is conflicting research as to whether to use metaphors or to make ideas more concrete (Vasa et al., 2014; Walters et al., 2016).

Exposure is the component of CBT thought to be the key catalyst to reduce anxiety (Beidel et al., 1998; Kendall et al., 2005, Benito et al., 2013). During exposure, the participant is taught to approach fear-producing stimuli while preventing avoidance (Tyron et al., 2005). Children who have completed CBT stated exposure activities were important (Kendall et al., 1996).

Exposure is undoubtedly an important part of the Coping Cat curriculum, as it is the main component of the second half of the curriculum. There is some empirical support for the effectiveness of potential mechanisms that decrease anxiety after exposure treatment (Kendall et al., 2005). Building upon the work of classical conditioning, Wolpe (1958) developed a treatment based on counterconditioning he called systematic desensitization, or an exposure treatment. According to Wolpe, fear or worry could be counter conditioned by confronting the fear producing stimulus (i.e., through exposure) while also suppressing the anxious response by engaging in a "biologically incompatible behavior" (e.g., relaxation).

Systematic desensitization begins by confronting feared situations low on a fear hierarchy while engaging in reciprocal inhibition and then moving up the hierarchy when success is achieved (Kendall et al., 2005).

Other behavioral explanations of the effectiveness of exposure tasks include extinction and habituation. Extinction occurs when the fear response is no longer preceded by the conditioned stimulus over repeated trials. During exposure tasks, operant extinction plays a role as the participant is no longer negatively reinforced through avoidance of the anxiety-provoking stimulus. Instead, the participant experiences a decrease in anxiety even while the anxiety-provoking stimulus is present. Habituation occurs when the participant stays in the presence of

the anxiety-provoking stimulus until that stimulus no longer evokes a distressing level of arousal (Kendall et al., 2005).

Children have rated their ability to cope with feared situations as much higher following exposure tasks (Kendall et al., 1997), which coincides with Bandura's (1977) theory of self-efficacy. The knowledge that coping skills are available to manage anxiety may increase self-efficacy and decrease anxiety.

For those children with social skill needs, while they may continue to struggle with the psychosocial aspects of treatment there is some suggestion that exposures can reduce anxiety symptoms independent of cognitive restructuring techniques (Bryant et al., 1999). Through participation in the exposure tasks, the therapist may guide children to alternative behavioral reactions, reinforced by participation in the exposure itself. Such learning may be beneficial even to a child with a lesser grasp of the cognitive and social components of therapy (Beidas et al., 2010).

When leading exposure activities, it is important to assess anxious situations and create a hierarchy of what prompts anxiety. This should be a collaborative effort between the therapist and the participant. After the anxiety-provoking situations are identified, the participant rates how nervous they would feel in each of those situations, often using a subjective units of distress scale (SUDS). Coping Cat suggests frequent use of the SUDS during the exposure activity (Kendall et al., 2006). These SUDS ratings are also best used before, during, and after the exposure activity. The SUDS ratings can be used as a method of providing feedback and as a guide for determining the length of an exposure task (if the task may not have a clear end).

When developing the fear hierarchy, imaginal or role-playing tasks are often used first as they are milder anxiety-provoking situations. Once success is established, in vivo exposure tasks

can take place. The exposure tasks are to be tailored to the individual participant's fears. When conducting exposure activities, it is important to address the participant's expectations, prepare the participant for negative events, help the participant problem-solve how to cope with the situation, remind the participant of strategies previously discussed and used, reward every effort regardless of success and ensure the participant is de-escalated.

Benito et al. (2013) conducted a study to determine which CBT components are most and least used during exposure activities. The most observed components included therapists discouraging child avoidance, therapists using externalizing talk, and children engaging in avoidance behavior, which occurred approximately 40% of the time during the exposure activity. Other components found included therapists addressing parental accommodation of child anxiety, and parents engaging in accommodation behavior suggesting a need for increased parent education regarding exposure activities.

It should be noted that with exposure activities, the therapist may invoke some anxiety before a reduction in anxiety is observed. In other words, anxiety may go up a bit before it comes down (Kendall& Hedtke, 2006).

Caregiver Training

Families of children with ASD often play a larger role in the lives of children with ASD when compared to their experiences with neurotypical offspring (Reaven et al., 2009). Not surprisingly, caregiver training is considered an integral component of effective treatments of individuals with ASD and other developmental disabilities, which normally occurs as a supplement to professionally delivered services (Moree et al., 2010). Reynolds et al. (2013) posited two specific reasons to involve families in CBT to address anxiety in children: 1) family accommodation to anxiety is common, and accommodation is associated with family distress and

child anxiety severity, and 2) a core component of CBT for anxiety involves exposure to feared stimuli which is anxiety provoking, and families can support their children with exposure practice and help maintain treatment gains beyond the therapeutic session and maintain gains once therapy has ended.

Three randomized controlled trials using CBT for the treatment of anxiety discuss the importance of including families/caregivers in treatment (Chalfant et al., 2007; Sofronoff et al., 2005; Wood et al., 2009). Most descriptions of caregiver involvement are brief; however, Sofronoff et al. (2005) described the caregiver's role as one where they are taught to encourage the child's use of strategies in different settings. Studies indicate that caregiver intervention alone can impact their child's anxiety (Estes et al., 2009). A non-exhaustive search of the peer-reviewed literature resulted in few studies that have involved caregivers in the exposure component of CBT, although caregiver involvement is common in CBT interventions for young children clinically and caregiver-mediated intervention could increase the likelihood of generalization of new skills across environments.

Family accommodation is ubiquitous in childhood anxiety disorders, with estimates as high as 95%-100% of parents reporting frequent accommodation of their child's symptoms (Lebowitz et al., 2016). Despite being well-intentioned, family accommodation is linked to more severe child anxiety and greater functional impairment and may predict poorer response to CBT. Though accommodation can reduce a child's distress in the short term, it contributes to the maintenance of anxiety by facilitating future avoidance (Kagan et al., 2016). These accommodations also remove opportunities for the child to learn that a perceived risk may no longer be present or that they have the ability to manage their emotions even if the risk is present (Zavrou et al., 2018). Literature suggests that caregivers do not necessarily believe

accommodation is helpful, but they are unsure how else to respond to their child's anxiety (Calvocoressi et al., 1995). It is therefore believed that addressing family accommodation during CBT will lead to even greater outcomes for both the family and child. From a theoretical perspective, family accommodation may maintain child anxiety by promoting avoidance and maintaining the child's reliance on caregivers. Family accommodation can also reduce child motivation for treatment, by providing the means to avoid otherwise anxiety-provoking situations (Lebowitz et al., 2020).

However, few studies have explored family accommodation in children with ASD and anxiety. To date, caregiver-based interventions for child anxiety have derived primarily from traditional CBT, with caregivers trained as the CBT therapist. With those interventions focusing on the child's behavior, little emphasis has been on family accommodation. A study by Storch et al. (2015) indicated that more family accommodation (defined as behaviors that family members use to avoid the child becoming anxious) was related to higher levels of anxiety symptom severity in the child, and that family accommodation decreased after CBT treatment.

Another study found that parents reported engaging in accommodation at least daily (Adams et al., 2020). This study also found that both child and caregiver anxiety contribute to family accommodation of the child's anxiety, highlighting the importance of involving caregivers in therapeutic input for children with ASD (Adams et al., 2020). Furthermore, the findings from Adams et al. suggested that different aspects of family accommodation were associated with different factors of child anxiety and ASD characteristics, resulting in a need for more research in this area. Since parental accommodation conflicts with the emphasis that exposure places on reducing avoidance, it is reasonable that addressing parental accommodation during exposure could further increase the benefits of CBT (Lebowitz et al., 2020).

Telehealth

Given a dramatic increase in the number of individuals diagnosed with ASD over the last two decades, with prevalence rates reaching 1 in 54 (Center for Disease Control and Prevention Control, 2020), there is a need for increased services for those with ASD. However, there has not been a corresponding growth rate in the availability of evidence-based services (Stahmer et al., 2001; Symon 2005). Telehealth has the potential to augment access to evidence-based practices. ASD intervention via telehealth is not only effective at providing interventions but it is also effective in improving a variety of child outcomes, such as reducing challenging behavior (Lindgren et al., 2016).

The use of telehealth technologies to provide services to families of children with ASD is a rapid growing area of research and has increased even more with the need to isolate during the recent pandemic. In a typical telehealth model, the service provider uses interactive video conferencing. Service providers implement components of behavioral skills training (BST) by describing the procedures and by delivering vocal prompts and feedback while observing the caregiver implement the procedures with the child within the camera's view. This approach has been used to successfully train parents, school personnel, and other professionals (Neely et al., 2017). Telehealth increases caregivers' access to qualified practitioners, eliminates the need for travel, more cost-effective, and allows for self-isolation for health reasons.

Current evidence suggests that services delivered via telehealth are as effective as clinic-based treatment in addressing many disorders in youth (Stewart et al., 2017). Telehealth has also been shown to be acceptable among youth and their families, with research suggesting that a positive therapeutic alliance is able to be established that closely approximates face-to-face treatment (Goldstein et al., 2016). Coaching caregivers and teachers via telehealth have grown in

popularity in part due to successful research advocating for such a platform (Ashburner et al., 2016). Telehealth allows caregivers to practice strategies and receive feedback (Machalicek et al., 2016).

Neely and colleagues (2016) investigated interventionist training via telehealth to implement behavioral interventions with preschool-aged children with ASD. Outcomes demonstrated high fidelity toward procedures after a relatively short training period (i.e., six sessions), and maintenance of these teaching procedures when assessed approximately one month later. An increase in child target behavior (i.e., requesting) was also an outcome (Neely et al., 2016). These findings are supported by other literature in the use of telehealth for coaching and training of practitioners and parents, resulting in the child's developmental gains (e.g., Machalicek et al., 2009; McDuffie et al., 2013).

Many studies about using telehealth with caregivers whose children have a diagnosis of ASD demonstrate positive child outcomes as well as parent satisfaction. Such studies have shown the technology to be user-friendly, successful in coaching caregivers to conduct in-home interventions, and led to the maintenance of parent-led interventions over time (Baharav et al., 2010; Jang et al., 2012; Nefdt et al., 2010; Vismara et al., 2012). Varying disciplines have reported successful implementation of telehealth practices with clients and families (e.g., speech-language pathologists, Ekberg et al., 2019; board-certified behavior analysts, Ferguson et al., 2019; and occupational therapists, Renda et al., 2018).

In a study comparing the effect of parent-mediated intervention delivered via telehealth for children with ASD and their caregivers, it was found that caregivers who received coaching developed a greater understanding of their child's skills and a better appreciation for the impact of their own behavior on their child's behavior (Ingersoll et al., 2016). Improvements were also

seen for parenting self-efficacy and parent stress, which is important considering that caregivers of children with ASD often experience lower self-efficacy and higher stress than other caregivers (Ingersoll et al., 2016).

In a study by McDuffie and colleagues (2016), the researchers used telehealth and in-person parent coaching on communication intervention strategies for young boys with Fragile-X syndrome. Outcomes were similar for both in-person and distance coaching, suggesting that telehealth coaching may be an equitable response to a family's limited access to professional support due to rural location. An additional finding from this study is that for some strategies, the consistency (i.e., fidelity) of parent strategy use was higher during telehealth than in-person sessions, echoing the success of this mode of service delivery. High rates of satisfaction of both in-person and distance sessions were reported by the parents, suggesting that telehealth may be a viable option for caregiver-led interventions (McDuffie et al., 2016).

Reviews (e.g., Machalicek et al., 2016; Unholz-Bowden et al., 2020) and studies (e.g., Suess et al., 2016) have found that parents can be coached via telehealth to assess and intervene on their child's challenging behavior with fruitful outcomes of decreasing the unwanted behavior. Behavioral interventions (e.g., functional communication training) have also successfully resulted in desired behavior change by parent-implemented interventions when coached by behavior analysts via telehealth (Boivert et al., 2010; Unholz-Bowden et al., 2020 Wacker et al., 2013; Wainer et al., 2015). Research shows that coaching caregivers via telehealth to implement interventions is cost-effective and assists with the inequity of service delivery (e.g., access to more professions, a broader reach, and greater scheduling flexibility; Ashburner et al., 2016; Lindgren et al., 2016).

There are challenges with telehealth, such as technical issues, participants remaining in the scope of the camera lens, disruptions in the environment, privacy and confidentiality, and logistical barriers. Nevertheless, research indicates that CBT can be successfully delivered via telehealth (Stewart et al., 2017; Cowain, 2001; Pelletier, 2003). Ethical considerations include the clinician's environment when conducting intervention sessions (e.g., sound-proof office space) and security of technology (e.g., HIPPA compliant platform and secure cloud storage; Lerman et al. 2020). Lerman and colleagues (2020) discuss the means to troubleshoot many of these obstacles. Solutions include supervision and training in distance-coaching by a more skilled clinician who reviews sessions and tracks fidelity for interventionists new to telehealth practices. Increasing privacy through the use of sound-proof offices, headphones, and secure platforms are also good practices. Access to technical assistance throughout the intervention series and initial technology checks to solve problems early are additional determinants of success (Lerman et al., 2020).

Pilot Study

An Organization for Autism Research funded pilot study was carried out during Spring and Summer of 2020 to assess whether a modified cognitive-behavioral therapy program based on the Brief Coping Cat CBT program would decrease anxiety symptoms in children with ASD (St. Joseph et al., in preparation). Independent changing-criterion designs for three child participants (each with medical diagnoses of ASD between the ages of 7 and 13 years old) were used to assess the impact of the therapist-delivered Brief Coping Cat on the child's level of anxiety and externalizing behaviors. The phases of the experiment included baseline and intervention, which consisted of four psychoeducation sessions and four exposure sessions.

Following the eight-week, telehealth intervention, the level of target externalizing behaviors associated with anxiety decreased for each participant, although only slightly.

Participant Aaron experienced crying, screaming, and withdrawal after a change in his schedule. During baseline, his average length of avoidant behavior was 75.2 minutes. At the end of intervention, the average length of avoidant behavior was 63 minutes. Aaron showed a decreasing trend in avoidant behavior. There was some overlap in the psychoeducation phase of the intervention. Some variability was also shown, especially once exposure was introduced. Tau-U was calculated and was -.557.

Participant Bill demonstrated frequent protests when being given demands. The percentage of protests during ten second intervals during baseline was 26.7 and decreased to 20 after intervention. After the first data point in intervention, there was immediacy of effect and very little overlap. Tau-U was calculated at -.889. Participant Bill had difficulty using the coping skills taught during psychoeducation, indicating that increased dosage may have been helpful.

Participant Christina had anxiety leaving the bathroom at night before bedtime, because she felt the need to repeatedly flush, wash her hands, blow her nose, etc. During baseline, the average length of time in the bathroom was 917.5 seconds. After intervention, the average length of time in the bathroom decreased to 324 seconds. The calculated Tau-U was -.318.

Visual analysis of the line graphs suggests that there was a functional relation between the intervention and a decrease in externalizing behaviors related to anxiety. There was a decreasing trend in externalizing behaviors related to anxiety symptoms from baseline to the last exposure activity. Scores on pre/post-test rating scales did not show consistent results across participants. The pre-test measures of the pilot study included the Children's Alexithymia Measure (CAM; Way et al., 2010), the Screen for Child Anxiety Related Disorders (SCARED;

Birmaher et al., 1997), and the Anxiety Scale for Children-Autism Spectrum Disorders (ASC-ASD; Rodgers et al., 2016). The average ASC-ASD (Rodgers et al., 2016) score was 81 in pre-test, and 58 in post-test indicating the intervention decreased anxiety. Scores on the CAM (Way et al., 2010) and the SCARED (Birmaher et al., 2007) indicated negligible changes, but this was hypothesized to be partly due to a need for higher dosage which will be addressed in the full Coping Cat curriculum. While the effectiveness of the pilot study is inconclusive, social validity questionnaires suggest that children and their caregivers valued and liked the intervention. Based on the findings of this pilot study, adaptations to the methods and design have been made in the present study with a focus on (a) a multiple-probe design that acknowledges the importance of exposure activities in decreasing reported anxiety while reducing time in baseline assessment for most of the participants, (b) the potential need for increased dose of intervention in the form of lengthened intervention phase pertaining to coaching and support during exposure activities, and (c) the increased involvement of caregivers in a caregiver-mediated intervention that prioritizes reduction of parental accommodation of anxiety and ability to support the child during telehealth delivered psychoeducation and exposure activities.

Research Questions

The current study will address the following research questions:

1. Is there a functional relation between adapted Coping Cat CBT program and a decreased level of anxiety as measured by behavioral observations?

2. Is there a functional relation between adapted Coping Cat CBT program and a decreased level of anxiety as measured by SUDS scores?

3. Do caregiver SUDS decrease through the use of the adapted Coping Cat CBT program as measured by SUDS scores?

4. Is a modified Coping Cat CBT program effective at decreasing anxiety as measured by the SCARED, IUS, GAD-7, and ASC-ASD?

5. Is a modified Coping Cat CBT program associated with improved alexithymia as measured by the Children's Alexithymia Measure (CAM)?

6. Will caregivers increase their use of exposure strategies after intervention?

7. Do caregivers and child participants perceive the intervention goals, procedures, and outcomes as feasible, acceptable, and effective?

CHAPTER II

METHOD

A description of the methodology used in this study is provided in this chapter. First, inclusion criteria, recruitment procedures, and response to attrition are discussed. Next, participants, settings, materials, and researcher information are described. The procedures for each experimental phase are discussed in detail including data collection procedures, assessment instruments, and implementation fidelity and interobserver agreement. Finally, results and a description of the data analysis (i.e., pre-post statistical analysis and visual analysis) used for each research question is discussed.

This study was pre-registered as study 4861 on the Registry of Efficacy and Effectiveness Studies (REES).

Inclusion Criteria, Recruitment Procedures, Attrition

Inclusion Criteria

Three children with a medical diagnosis or educational classification of ASD participated in this study, as well as one caregiver for each child. Inclusion criteria included falling in the age range of 7-13 years old, demonstrating fluent and conversational verbal vocal speech, having a medical diagnosis or educational classification of ASD, and being at-risk for anxiety based on the Screen for Child Anxiety Related Disorders (Birmaher et al., 1997) anxiety screener completed by caregivers and children (based on a cut-off score of 25 or higher indicating scores that are at-risk for anxiety).

Recruitment Procedures

Multiple recruitment methods were used across a 6-week period including recruiting through printed flyers and social media. Recruitment materials can be found in Appendix A:

Recruitment Flyer. An effort was made to recruit female and diverse participants. Since the intervention was delivered via tele-health, participants came from anywhere in the United States (i.e., Iowa and North Carolina). Families interested in the study contacted the principal investigator (PI) via email, website contact form, or phone. After initial contact from a family, the PI emailed or called the family to provide more detailed information and answer any questions.

 If the family was interested in participating, a consent meeting via videoconferencing was scheduled. During the consent meeting with the family, the PI explained the goal, procedures, possible outcomes, risk, benefits, and the time commitment of participating in the study. During this time, families were encouraged to ask questions and the PI specifically asked if the interested party had any questions or concerns about the study. Caregivers were asked to return the signed consent form if they wished to participate.

Once consent was received, caregivers were asked their specific concerns regarding their child's anxiety, such as what behavior occurred, when it occurred, how often it occurred, and how it affected the child's quality of life. If several behaviors or anxiety producing situations were mentioned, caregivers were asked to rate them in a hierarchy of which they felt was most pertinent. Then, caregivers were asked to complete a reinforcer inventory for the child, so that the PI was able to provide desired rewards to the child (See Appendix B). Also, caregivers were asked to fill out pre-intervention assessments, including the Caregiver Accommodation Checklist, ASC-ASD/P (Rodgers et al., 2016), and the CAM (Way et al., 2010).

Child assent was sought after caregiver consent was received. After child assent was obtained, the PI interviewed the child and asked about favorite interests (to be used during intervention to increase engagement) as well as other rapport establishing conversation starters.

Attrition

Five children were recruited to complete the study and all signed consent to participate. However, one participant removed themselves from the study early in the baseline phase because of their discomfort with the idea of exposure. They were replaced by a participant on the waitlist who also subsequently dropped out of the study in baseline because loss of childcare made it difficult for them to commit to attending scheduled sessions.

Participants and Settings

Participants

Three children and their mother participated in this study. One caregiver for each participant participated in all phases of the study, including pre/post-test assessments, caregiver trainings session, and psychoeducation and exposure activities throughout the intervention. Each child's participating caregiver was their mother. All participant dyads are referred to using pseudonyms. See Table 1 for participant demographics.

Table 1

Participant characteristics

Child	Parent	Age	Gender	Race	SCARED-Child	SCARED-Parent	FAS	BAP
Eddie	Kathy	8	Male	White	34	60	2	130
May	Angela	13	Female	White	19	46	14	X
Nolan	Bridget	12	Male	White	62	54	29	87

Note. SCARED = Screen for Child Related Anxiety Disorders (Birmaher et al., 2007); FAS = Family Accommodation Scale (Lebowitz et al., 2016); BAP = Broad Autism Phenotype Questionnaire (Hurley et al., 2007).

Participant Characteristics

Eddie and Kathy. According to his mother, Kathy, Eddie was diagnosed with a speech delay at 18 months of age, and subsequently diagnosed with ASD at 2.5 years. He was identified

as being Level 1 for ASD severity, indicating the lowest level of severity. Eddie had appropriate conversational skills for an eight-year-old, though he often needed wait time before responding. Historically, he received speech-language therapy and occupational therapy. He attended a charter school and was above grade level in school, thus he received special education services in an inclusion setting. Eddie loved games and his favorite movie was "Cloudy With A Chance of Meatballs". Eddie engaged in withdrawal and task refusal when taking tests that were timed or when he thought he was answering incorrectly. He would verbally protest, cry, or rip up papers when given difficult or timed tasks. He rated himself a 34 on the SCARED (Birmaher et al., 1997) screening and his mom rated him a 60, indicating he was experiencing anxiety. Eddie lived in a two-parent household in North Carolina and English was the primary spoken language in the home. The parents' highest reported education level was a high school degree.

Kathy worked as a cafeteria worker for the local school district, though not the same school that Eddie attended. Kathy reported on the FAS (Lebowitz et al., 2016) that she provided little family accommodation in relation to Eddie's anxiety. Kathy had a score on the (BAP) Hurley et al., 2007) that indicated she demonstrates behavior consistent with ASD. She noted that she does not like unexpected changes in plans and does not consider herself "flexible" about how things should be done. Kathy had two sons, but there was a large age gap between Eddie and his older brother (i.e., 11 years).

Kathy reported in her initial meeting with the PI that Eddie had not previously received psychotherapy. She reported that Eddie became anxious when being timed, getting things wrong, or not knowing how to do something. Kathy noted that Eddie's teacher had told her that he was upset when given a spelling test that was difficult for him, so he began crying and ripped the paper in half. On another occasion, Kathy reported that Eddie "smacked a teacher across the

face" as she was trying to encourage him through a timed task. She reported similar behaviors occurred a few times a week and had been occurring for about two years. These behaviors were causing him to get into trouble at school and were therefore of concern to Kathy. Eddie also told the PI in an interview that he did not like being timed.

May and Angela. According to her mother, Angela, May was diagnosed with ASD two years ago at 11 years of age and was a Level 1 of ASD severity indicating the lowest level of severity. May had not received any psychotherapy in the past. She had conversational speech and enjoyed talking about animals. May began the intervention enrolled in middle school but transitioned to all virtual school after the third session of the baseline phase. May enjoyed drawing, loved animals of all kinds, and enjoyed the cartoon "Steven Universe.". She rated herself a 60 on the SCARED (Birmaher et al., 1997) screening and her mom rated her a 46, indicating she was experiencing anxiety.

Angela did not complete the BAP (Hurley et al., 2007). On the FAS (Lebowitz et al., 2016), Angela had a score of 14 and reported having to frequently reassure her child. May lived in a two-parent household in Iowa and English was the primary language spoken in the home. The parents' highest reported education level was a doctoral degree. Angela was a veterinarian who ran her own clinic. Angela was proud that her love of animals was passed down to May. May was her only child. During the intervention, Angela was looking at moving and was often viewing houses or showing her own house to sell.

Angela reported that May became anxious about other students and by the amount of work demands at school, which is why she transitioned to virtual school. She noted that May did not like transitions, new situations, or new people. Angela also described how May would not order her own food in a restaurant, and that May would become upset if Angela broke a rule such

as parking in front of the airport even though signs stated, "No Parking." May reported she made up her own rules for things, such as making sure all doors are locked at night. May was afraid of wasps and refused to go outside if she thought wasps were out there and would scream and cry. Both Angela and May reported that May did not like wasps and was afraid she would get stung. This resulted in May refusing to go outside if she thought there were wasps out there. Angela was concerned this caused May to miss opportunities for fresh air and family time. This occurred daily during the times that wasps were present, usually in the spring and summer.

Nolan and Bridget. According to his mother, Bridget, Nolan was diagnosed with ASD at 11 years old at a Level 1 of ASD, indicating the lowest level of severity. Nolan attended a charter school and received special education services in an inclusive setting. He did receive play therapy. Nolan was able to engage in conversational speech, though it was usually about his own interests, and he often stuttered when starting sentences. Nolan loved Pokémon, his cats, making bracelets, and playing video games. He rated himself a 62 on the SCARED (Birmaher et al., 1997) and his mom rated him a 54, indicating he was experiencing anxiety.

On the FAS (Lebowitz et al., 2016) Bridget reported a score of 29, indicating that there was significant family accommodation regarding Nolan's anxiety. Bridget's score on the BAP (Hurley et al., 2007) also indicated she demonstrates behavior consistent with ASD. Nolan was adopted and lived in a two-parent household in North Carolina and English was the primary language spoken in the home. The parents' highest reported education level was a high school degree. Bridget worked as a kindergarten teacher's aide in the same school that Nolan attended. She had a biological son who was in college, and she also had adopted Nolan's younger brother. Bridget was close with her mother and encouraged the children to have a close relationship with her as well.

Bridget reported that Nolan struggled socially. Bridget noted that Nolan loved getting rewards, especially Coca Cola. She reported that Nolan could be very literal and when anxious he eloped. Bridget was concerned that Nolan loved going fishing but was afraid of touching worms in order to put them on a hook. He would cry and verbally protest and refused to touch the worm. The family had a park down the road that they often frequented to go fishing, but the occasions could be marred by Nolan's dislike of worms. Bridget reported that when asked to hook his own worm for fishing, Nolan's voice got higher, he shut down, he would hit family members, he screamed, and he would elope. This happened weekly during the summer when the family went on fishing trips.

Settings

The intervention was delivered via telehealth (i.e., synchronous, two-way audio-visual videoconference). The consent meeting, pre/post sessions and intervention were delivered in the participants' homes via telehealth. All experimental sessions, including baseline, intervention sessions (both psychoeducation and exposure phases), and generalization probes took place in the participants' homes via telehealth. All participants used equipment they already had in their home and were familiar with. Eddie and Kathy were always in a private office, while May/Angela and Nolan/Bridget were in their living room. Other family members were not present in the room but could sometimes be heard outside the room. The mothers were responsible for making sure equipment was working correctly (e.g., volume was on, PI could clearly see child, and child could clearly see PI) before each session started. If a problem occurred, the mother would send the PI a text message. This happened when audio was not working or if they were running late to the session, but only occurred six times overall across all sessions and participants. The PI was in Oregon and participated in all sessions in her office with

a locked door. The mean distance between the researcher and families was 2,451 miles (range: 1,838 - 2,758 miles).

Researcher Roles

Interventionist

The PI was the lead interventionist and met with each family during the consent, intake, and post intervention sessions to complete assessments. Specifically, the PI roles included: (a) consent meeting with each caregiver/child dyad, (b) conducting assessments for pre and post intervention sessions, (c) managing schedules, (d) designing intervention sessions to be individualized for each participant, (e) conducting all intervention sessions, (f) reviewing intervention session videos daily and graphing the data, (g) training graduate research assistants in data collection procedures and fidelity procedures, (h) coaching caregivers to use coping strategies during exposure. The PI is a white female, nationally certified school psychologist and doctoral student in the Special Education program at the University of Oregon. The PI served as a school psychologist for 13 years, and during that time spent considerable time working with students with ASD and their families. Her background in school psychology included training and experience in providing mental health and counseling services to children.

Research Assistants

Graduate student research assistants assisted with data collection procedures including coding target behavior from videos, coding procedural fidelity, and coding for reliability. Graduate research assistants were trained on how to collect behavioral data and fidelity data. Training took place before the study began via Zoom and took approximately two hours. Each research assistant needed to reach 90% agreement across three different videos for each behavior coded using practice videos from the pilot study. If agreement fell below 80% for two

consecutive sessions there was a plan for brief retraining, however this was not needed as agreement never fell below 80%.

<div align="center">**Materials**</div>

Hardware

The interventionist used a MacBook Air laptop with an internal video camera and speakers. The caregiver used their personal tablet, laptop, or smartphone equipped with an external web camera and internal speaker. Each device used encrypted communication through Zoom using wireless access. Zoom is approved by the federal Health Insurance Portability and Accountability Act of 1996 (HIPAA), Pub. L. 104-191, 42 U.S.C. §§ 1320d et seq. approved, approving this software to protect the privacy of its users. Each laptop, tablet, or cellphone were connected to local wireless networks provided by the family. Audio communication was achieved using the internal speakers of the device used at home. Training on how to use this equipment was provided at the time of issue, during the pre-intervention meeting. The parent was trained in how to set up the telehealth equipment and how to problem solve connection and other technology issues. Training included modeling how to open Zoom, join a meeting, turn on the sound and camera, and modeling some common solutions to problems with audio or cameras. The caregiver received assistance from the PI in how to set up the telehealth equipment. All recorded materials were stored on secure servers through Office365™, a cloud-based hosting website that is HIPAA compliant during storage and transfer. Recorded sessions were used to track behavior change during intervention sessions and allowed for interrater reliability of these data.

Intervention Materials

The PI used the Coping Cat cognitive-behavioral therapy curriculum with each participant. Each participant was provided a Coping Cat workbook by the publisher, delivered through the mail. The workbook served as a guide for the program and a resource, but the PI provided all adapted materials visually via telehealth and sent them in the mail after the intervention sessions. The participants will also receive an emotional thermometer based on their individual interests. For example, a child who was interested in Pokémon received a Pokémon-themed emotional thermometer for SUDS measurements. During intervention, the PI sent small prizes to be used as rewards that were identified in the initial interview between the PI and child.

Response Measurement, Inter-Observer Agreement, Fidelity of Implementation, and Social Validity

Response measurement

Anxiety probe activities occurred through baseline and intervention to observe the child and their behaviors in anxiety provoking situations to see changes in avoidant behaviors using a consistent measure throughout all phases of the study. In order to do this, the PI, caregivers, and child participant identified a fear hierarchy (Kendall & Hedtke, 2006) before the intervention began. Situations that were considered moderately-anxiety provoking were chosen to be used as the anxiety probes for all data-collection observations throughout baseline and intervention. Anxiety provoking situations for Eddie, May and Nolan were timed math drills, watching videos of wasps, and touching worms, respectively.

Anxiety-Related Avoidant Behavior of Child

The first measure of anxiety included observations of child participant behavior during their individual anxiety-provoking situations. Because this was specific to the child, operational definitions, examples, and non-examples were developed by the PI in collaboration with the caregiver and child after the children were recruited into the study. The behavior was identified

between the mother and PI after input was received from the mother and the child. While each child had several situations that caused them anxiety, the PI worked with the mother and child to identify a fear hierarchy (Kendall & Hedtke, 2006) in order to prioritize the most anxiety-provoking situation. After considering what situations could be done via telehealth, a moderate anxiety-provoking situation was chosen to be used as the anxiety probe. Each child participant had their externalizing behavior measured as a latency to avoidant behavior, which was specific to each child.

For Eddie, his avoidant behavior was preceded by being tasked to complete a math drill. The drill was addition and subtraction problems up to 1,000 and was presented by the PI using a shared screen feature. Eddie would verbally state his answer. His avoidant behavior was verbal protests such as stating he did not want to do anymore, shutting down, groaning, or leaning into his mom for comfort when asked to complete timed tasks.

May's avoidant behavior was preceded by presentation of a video of wasps presented by the PI through a shared screen. All videos were in the format of a documentary readily available on the internet. May's avoidant behavior occurred when she requested to end the activity and stating she did not want to watch anymore.

When Nolan's mother prompted Nolan to touch a live worm (so they could go fishing), his avoidant behavior was recoiling or dropping a worm when attempting to touch or hold the worm. His voice often rose to shouting and he stated his dislike for the task and his mother.

Subjective Units of Distress Scale (SUDS)

Anxiety is an internalizing behavior and is difficult to observe, as it manifests differently in each individual and is therefore a difficult variable to accurately measure. Therefore, the subjective units of distress scale (SUDS; Courtney et al., 2010) was used to measure

participants' self-reported anxiety-related symptoms before and after each Coping Cat intervention session (Wolpe et al., 1966), as well as before, during, and after each exposure session and anxiety probe. The SUDS is a quick and simple way for a therapist or researcher to measure emotional intensity in a given moment. The SUDS is frequently used because it is easy to understand, is very brief, and is useful for showing individuals how they habituate to different anxiety-provoking situations (Milosevic et al., 2015). The SUDS requires participants to estimate the severity of their anxiety by verbally giving a numerical value. SUDS ratings were also obtained before, midway, and after exposure activities.

Each participant completed SUDS each week before and after their psychoeducation session and more frequently during the exposure sessions, which measured changes in anxiety levels. Latency was measured from the highest SUDS rating taken midway during the exposure (e.g., the second SUDS rating) until a 50% drop in SUDS rating. For example, Eddie was asked for his SUDS rating before the math drill, midway through the drill (which was always the highest SUDS rating), and directly after the end of the drill. After the exposure, the PI and child would debrief, play a game, and the child would then indicate their lower SUDS rating. The SUDS was administered as a visual of a thermometer in a theme that was individualized to the child's interest. Each numerical rating also had more description and pictures, to make ratings more concrete for the participant. The SUDS is a permanent product resulting in raw scores. The terminal metric for this measure is the raw score obtained by the SUDS. See Appendix C for an example of a SUDS. The following ten-point scale was used using the following descriptors:

10. I am exploding out of control

9. I am going to lose control soon

8. I am struggling

7. I am heating up

6. I am getting uncomfortable

5. This is hard, but I am in control

4. I am okay

3. I am calm and cool

2. I am relaxed and happy

1. I am feeling great

The use of a small range (e.g., 1 - 10) with personalized anchors (e.g., "I am feeling great" for 1 and "I am exploding out of control" for 10) for children is encouraged to simplify the rating system and ease decision making.

Caregiver SUDS

Since caregiver anxiety is often related to child anxiety, caregiver distress was also measured using SUDS as they led their child through the exposure activities. Their SUDS was on a scale of 0-100, with 0 indicating no distress and 100 indicating the highest anxiety/distress they have ever felt. Caregivers were given a different scale since as adults they are more sensitive to changes in mood and required more options to accurately reflect their status. See Appendix D for an example of the caregiver SUDS.

Percentage of Caregiver Use of Exposure Management Strategies

Caregivers were measured on whether they use the required components of leading the exposure activity for their child during the second half of the Coping Cat curriculum. See Appendix G for the data collection sheet. The components included: (a) caregiver provided child

with a choice of reward for delivery immediately after the exposure activity, (b) caregiver prompted child to give SUDS rating, (c) caregiver prepared child for task by reviewing the task about to occur, (d) caregiver verbally reminded the child of their coping strategies, (e.g., "Use your positive self-talk" and "Remember to take deep breaths"), (e) the caregiver established a goal or guideline for the session (e.g., watching the video for two minutes), (f) the caregiver gained assent from the child (e.g., "Okay, so you are ready to watch the video?"), (g) the caregiver coached the child (e.g., "You are doing great so far, let me see you use one of your strategies"), (h) the caregiver provided specific praise every ten seconds (e.g., "I love how you just took a deep breath"), (i) the caregiver obtained a SUDS rating midway through the task (e.g., "Tell me where you are on your thermometer right now"), (j) the caregiver ended the task at the agreed upon guidelines (using the same guidelines or goals as stated previously), (k) the caregiver obtained a SUDS rating after the end of the task, (l) the caregiver provided the reward the child had previously chosen, (m) the caregiver debriefed with the child (e.g., "How do you think that went? How did it feel? What strategies did you use? What strategies were helpful? What else could you have done?"), (n) the caregiver provided praise and feedback regardless of success (e.g., "I love how you told yourself you could do this"), and (o) the caregiver told the child they were done and excused them from the session. A percentage of strategies used was calculated. Each step was marked as being completed or not being completed, and the total number of steps possible (i.e., 15 steps) completed by the parent was counted and multiplied by 100 to obtain a percentage. See Appendix G for the visual aids that were given to caregivers to prompt them through these strategies.

Clinician Fidelity of Implementation

Procedural integrity was measured to ensure the accuracy of implementation of the skills via videos for sessions across all participants. See Appendix E for the data collection sheet. Goals from the Coping Cat manual included: (a) the interventionist was prepared with materials, visuals, and activities, (b) the interventionist built rapport with the child (i.e., warmly greeting the child, asking about their day, commenting on their cool shirt, mentioning the Zoom background that was chosen for the child), (c) the interventionist reviewed previous session (e.g., "Last time we talked about being aware of what you are thinking and determining if that helps you or not"), (d) the interventionist reviewed the previous homework task (e.g., "You were supposed to record a video of yourself describing a situation where you felt really great. I loved how you described your trip to the roller coaster park and noticed how you were smiling when you were describing it"), (e) the interventionist introduced the new concept (e.g., "Today we are going to talk about how your body gives you clues as to how you are feeling"), (f) the interventionist normalized fear and anxiety (e.g., "I get anxious too and I don't like having to sing in front of people because I shake a lot"), (g) the interventionist constructed or reviewed the fear hierarchy (e.g., "You told me before that you are afraid of strangers breaking into the house but you are most afraid of getting stung by wasps"), (h) interventionist reviewed FEAR steps (i.e., Feeling Frightened, Expecting Bad Things to Happen, Attitudes and Actions, and Results and Rewards), (i) interventionist provided descriptive praise (e.g., "I saw you take a deep breath and that was really great!" or "You had some great answers today"), (j), the interventionist assigned the new homework task (e.g., "Your task for next time is to watch your mom and identify how you can tell how she is feeling"), and (k) the interventionist provided a preview of the next session (e.g., "Next time we are going to practice the FEAR steps in a pretend situation").

The fidelity was calculated by taking the number of appropriate clinician behaviors divided by 11 (the number of clinician goals in the Coping Cat program) and then multiplied by 100 to get a percentage. Clinician fidelity was measured by a school psychology graduate student trained in Coping Cat and cognitive-behavioral therapy. Clinician treatment fidelity was collected for 50% of the psychoeducation intervention sessions, and 50% of the exposure intervention sessions (four sessions for each participant). These data indicated an average of 98% (range: 91% - 100%) for clinician procedural integrity for the Coping Cat intervention (psychoeducation and exposure) sessions.

Interobserver Agreement (IOA)

Data was collected by a trained graduate student research assistant. Prior to the study, the research assistants were trained to reach a 90% agreement criterion on latency to avoidant behavior, and latency to reduction of SUDS. Training included directions on the dependent measures and practiced recording with the different measurement systems. Percentage of IOA was recorded during 30% of all sessions in baseline, intervention, and follow-up for each participant for each dependent variable. These data indicated a range of 79-100%. Then, Cohen's Kappa, a common method of determining inter-rater reliability between two raters (Nichols et al., 2011), was used as a more conservative measure because it considers the amount of agreement expected between raters purely by chance. These scores are presented in Table 2.

Table 2

Cohen's Kappa for the Latency to Target Behavior Across Participants and Phases

	Avoidant behavior				SUDS			
	B	I	M	T	B	I	M	T
Eddie	1.00	1.00	1.00	1.00	.474	.583	1.00	.583
May	.630	.600	1.00	.630	.583	.474	1.00	.583
Nolan	.375	.375	1.00	.375	1.00	1.00	1.00	1.00
Total	.500	.368	1.00	.759	1.00	.630	1.00	.770

Note: SUDS = Subjective units of distress scale, B= Baseline, I = Intervention, M = Maintenance, T = Total

Social Validity

Social validity was assessed through caregiver and child surveys and interviews after all intervention sessions were completed. Mothers and children were each asked to rate the acceptability, effectiveness, and feasibility of the intervention goals, procedures, and outcomes using an adapted version of the Treatment Acceptability Rating Form-Revised (TARF-R)

(Reimers et al., 1988). The TARF-R is a 20-item questionnaire typically used with caregivers in clinical settings and targets concerns about treatment procedures and understanding of treatment. See Appendix H for the caregiver social validity form and Appendix I for the child social validity form.

The TARF-R has fairly high internal consistency with a score of 0.92 (Wilczynski, 2017). The child participants had their social validity questionnaire presented via PowerPoint slides.

The PI read the questions aloud and explained the scales to the children. The open-ended questions were answered by the children were written down by the PI.

Other Assessments

Generalized Anxiety Disorder 7 item scale (GAD-7). The General Anxiety Disorder-7 (GAD-7; Spitzer, 2006) was completed by caregiver's via Qualtrics once a week to gain an additional measure of the child's overall anxiety. This measure objectively determined initial symptom severity and monitor symptom changes/effect of treatment over time (Spitzer et al., 2006). The internal consistency of the GAD-7 is excellent (Cronbach α = .92), and the test-retest reliability is also good (intraclass correlation = 0.83) in a sample of 47 youth diagnosed with generalized anxiety disorder (Mossman et al., 2017). This screening measure asked seven questions, with ratings from 0-3 for a total possible score of 0-21, with a higher score indicating greater anxiety.

Family Accommodation Scale. The amount of family accommodation given to a child with anxiety was measured using the Family Accommodation Scale-Anxiety developed by Lebowitz et al. (2016) since accommodation is often a contextual variable of child anxiety. This was administered before intervention began and consists of 13 questions that takes a total of 10 minutes to complete.

Anxiety Scale for Children- Autism Spectrum Disorder (ASC-ASD). Anxious affect was measured using the ASC-ASD (Rodgers et al., 2016) pre and post intervention. This scale of 24 questions includes anxiety related items that are particularly appropriate to the specific phenomenology of anxiety in ASD, and includes four subscales: Performance Anxiety, Intolerance of uncertainty, Anxious Arousal, and Separation Anxiety. These subscales provide more detailed information about anxiety profiles, resulting in both a total score and subscale

scores. Internal consistency of the ASC-ASD total score and subscales are good to excellent, with the full-scale parent form at Cronbach α = .94 and child version Cronbach α = .94. Reliability was excellent for the parent (r = .84) and child versions (r =.82); with intra class correlations between the total score at Time 1 and Time 2 (parent ICC = .84; child ICC = .82); and parent/ child agreement (r =.68) was high in a sample of 170 children with ASD (Rodgers et al., 2016). This scale has 24 questions and takes about 25 minutes to complete. A score of ten or higher would indicate clinically significant scores.

Children's Alexithymia Measure (CAM). The ability to recognize and express feelings was measured by the Children's Alexithymia Measure (Way et al., 2010) pre and post intervention. The measure has strong internal consistency reliability, with Cronbach α = .92; and IRT marginal reliability = .86 (Way et al., 2010) in a sample of 250 parents of children. This scale has 14 questions and takes about ten minutes to complete. While no normative range is reported, higher scores indicate higher levels of alexithymia.

Screen for Child Anxiety Related Disorders (SCARED). Children participants had their anxiety measured by this self-report measure, and caregivers completed the parent form both pre and post intervention. The SCARED (Birmaher et al., 1997) produces scores for somatic anxiety, general anxiety, separation anxiety, social phobia, and school phobia, which correspond to their DSM-V diagnostic categories. The SCARED demonstrated moderate to high internal consistency (Cronbach α = 0.43–0.89) and test–retest reliability (intraclass correlation coefficients = 0.46–0.77 over 2 weeks and 0.24–0.67 over 12 weeks), moderate parent–child correlation (*r* = 0.49–0.59) and good discriminant validity (between anxiety and non-anxiety disorders) in a sample of 50 clinically referred children (Birmaher et al., 1997). Cronbach α = >.90 (Moller & Bogels, 2016). Both the parent scales and the child interview have 41

questions and take about 25 minutes to complete. A score of 25 or higher would indicate a clinically significant score.

Intolerance of Uncertainty Scale (IUS). Child participants also completed a measure before and after intervention to ascertain their intolerance of uncertainty (Dugas et al., 1998), which is one of the four main constructs of anxiety. Items on the IUS were devised from statements that were generated to reflect different aspects of intolerance of uncertainty such as the consequences of being uncertain, how uncertainty reflects on a person, expectations about the predictability of the future, attempts to control the future, frustration around uncertainty, and 'all-or-nothing responses' to uncertainty. The internal consistency of the IUS was excellent (Cronbach $\alpha = 0.94$) and item-total correlations ranged from 0.36 to 0.77 in a sample of 277 youth (Buhr et al., 2002). This scale has 12 questions and takes about 15 minutes to complete. A score of 14 or higher would indicate clinically significant scores.

Broad Autism Phenotype Questionnaire (BAP). The BAP was administered to measure the caregiver's aloof personality, rigid personality and pragmatic language deficits: key personality and language components of the BAP (Hurley et al., 2007). These three components parallel the social deficits, stereotyped-repetitive behaviors and social language deficits that define the syndrome of ASD (American Psychiatric Association, 1994). In a sample of 86 parents of children with ASD and 64 control parents, reliability was strong (Cronbach $a = .95$). There are 36 questions, and a score of 40 or higher indicates that the caregiver demonstrates characteristics that are commonly associated with ASD.

Telehealth Usability Questionnaire (TUQ). The TUQ (Parmanto et al., 2016) was administered to measure the caregiver's feelings ease and use of telehealth. This measure was developed in response to the increased use of telehealth technology to measure the usefulness,

ease of use and learnability, interface quality, reliability, and satisfaction of telehealth technologies. Reliability ranged from "good" to "excellent" (Cronbach α = .81-. 93), and validity was strong (Cronbach α =.92) in a sample of 53 participants that included adults with and without experience utilizing telehealth technology. This scale has 15 questions and takes about 15 minutes to complete.

COVID-19 Exposure and Family Impact Survey (CEFIS). The CEFIS (Kazak et al., 2021) was administered to measure the impact of the COVID-19 pandemic on the families of the participants with the understanding that the pandemic could affect outcomes of studies, particularly in mental health. It conceptualizes exposure to potentially traumatic aspects of COVID-19 and assesses the impact of the pandemic on families. Cronbach's alpha was excellent (Cronbach $a = .80$ to .92) in a sample of 1805 caregivers from across the United States. This scale has 44 questions and takes about 30 minutes to complete.

General Procedures

This study consists of pre-baseline information collection (Phase 1), baseline condition (Phase 2), psychoeducation for the child (Phase 3), exposure-based activities based on a fear hierarchy (Phase 4), and maintenance sessions (Phase 5). Baseline and intervention sessions were conducted via telepractice and occurred twice weekly for 30-45 minutes. During all sessions, video recorded anxiety probes were coded for child avoidant behavior and latency to 50% reduction of SUDS.

Independent Variable

The independent variable for the multiple probe design is the modified Coping Cat CBT curriculum (Kendall & Hedtke, 2006). The overall goal of Coping Cat is to teach children to recognize signs of unwanted anxious arousal and let these signs serve as cues for engaging

anxiety management strategies. Identifying the cognitive processes associated with anxious arousal, training in strategies for managing anxiety, teaching behavioral relaxation, and opportunities to practice are strategically sequenced in the program to build skills. The greatest emphasis in the Coping Cat curriculum is based on the following: 1) graduated sequence of training tasks and assignments, 2) role play procedures, 3) coping modeling, 4) homework assignments, 5) affective education, 6) awareness of bodily reactions when anxious, 7) relaxation training, 8) identification and modification of anxious self-talk, 9) contingent rewards, 9) practice of newly acquired skills in increasingly anxiety-provoking situations (Kendall et al., 2013).

The 16-session Coping Cat CBT program was divided into two parts. The first eight sessions were the psychoeducation or training segment, and the second eight sessions was the exposure section, of which there were six exposure activities, and one session each dedicated to caregiver training and the final wrap-up. The Coping Cat program also included two training sessions between the PI with caregivers which were strategically scheduled at session four and session nine. One of the modifications made to this curriculum was the caregiver's participation in all intervention sessions, so they were learning the skills their child was being taught synchronously in addition to the two sessions devoted purely to the caregiver. These 16 sessions occurred twice a week over eight weeks, and lasted about 45 minutes each session.

The 16-sessions introduce concepts and skills in a sequential order from basic to more difficult. The interventionist guided the participant through each step, often providing themselves as a model first to demonstrate the skill for the child but to also demonstrate the difficulties that might be experienced and how to overcome those difficulties. The level of anxiety was gradually increased as the participant learns and successfully demonstrated new skills. Homework tasks

were also assigned to be completed outside of the sessions to help show the applicability of what had been addressed during the sessions.

Several important concepts were introduced to the participant during the psychoeducation portion of the program (e.g., The FEAR steps), beginning with the awareness of bodily reactions associated with specific emotions and developing awareness of physiological sensations that are specific to anxiety. The next concept was learning to recognize and modify the thoughts regarding expectations and fears about what will happen in the anxiety-provoking situation. The third concept was teaching the child how to modify their anxious self-talk into coping self-talk and developing and using plans for coping with anxiety more effectively. Lastly, the child self-rated their efforts and received a reward for their effort.

These four steps are summarized in a four-step plan for coping with anxiety, that the Coping Cat program calls the FEAR steps:

Feeling **F**rightened?

Expecting bad things to happen?

Attitudes and **A**ctions that can help

Results and **R**ewards

Table 3

Coping Cat Program Session Outline

Session Number	Session Title	Session Components
Psychoeducation		
Session 1	Introduction	Build rapport, Orient child to the program, Encourage/support the child's participation, Assign initial homework, Engage in fun end-of-session activity
Session 2	Recognizing Feelings	- Build rapport, - Review homework task from Session 1 - Introduce the concept that different feelings have different physical expressions - Normalize the experience of fears and anxiety - Begin to construct a hierarchy of anxiety-provoking situations Assign next homework task
Session 3	How Does My Body React?	Review homework task from Session 2 Discuss specific somatic reactions to anxiety Practice identifying somatic responses Introduce the "F" step Prepare the child for the upcoming caregiver session Assign homework task
Session 4	Caregiver Meeting	Provide additional information about treatment Provide caregivers an opportunity to discuss their concerns Learn more about the situations in which the child becomes anxious Offer specific ways the caregivers can help with program goals

Table 3, continued

	Session Title	Session Components
Session 5 cont.	Let's Relax	Practice relaxation via coping modeling and role-play Practice relaxation with the child's caregivers Assign homework task
Session 6	What am I Thinking?	Review homework from Session 5 Introduce the concept of thoughts (self-talk) Discuss self-talk in anxiety-provoking situations (anxious self-talk) Differentiate anxious self-talk from coping self-talk Introduce the "E" step Practicing coping self-talk ■ Assign homework task
Session 7	What Should I Do?	■ Review homework task from Session 6 ■ Review and discuss the first 2 steps in the FEAR plan ■ Introduce the "A" step ■ Discuss the concept of problem solving ■ Practice problem solving in anxious situations Assign homework task
Session 8	How am I Doing?	Review homework task from Session 7 Introduce the "R" step Discuss the concept of self-rating and reward Practice making self-ratings and rewarding oneself for effort Review the FEAR plan Apply the FEAR plan Review the fear hierarchy and discuss exposure tasks Acknowledge upcoming caregiver session

Table 3, continued

	Session Title	Session Components
Session 8 con't		Apply the FEAR plan Review the fear hierarchy and discuss exposure tasks

		Acknowledge upcoming caregiver session Assign homework task
Session 9	Caregiver Meeting	Provide additional information about the second half of treatment (i.e., exposure tasks) Provide caregivers an opportunity to discuss their concerns Learn more about the situations in which the child becomes anxious Offer specific ways the caregivers can help with program goals in the second half of treatment
Exposure		
Session 10	Start Practicing	Review the homework task from Session 8 Review the idea of progressing from learning new skills to practicing new skills Practice using imaginal exposure in low anxiety-provoking situations Practice in-vivo exposure task in low anxiety-provoking situations Briefly review relaxation exercises Plan an exposure task for Sessions 11 Assign homework task
Session 11	More Practice	Review homework task from Session 10 Continue practicing using in-vivo exposure in low anxiety-provoking situations Plan exposure task for Session 12 Assign homework task

Table 3, continued

	Session Title	Session Components
Session 12	More Practice	Review homework from Session 11 Practice using imaginal exposure in moderately anxiety-provoking situations Practice using in-vivo exposure in moderately anxiety-provoking situations Plan exposure task for Session 12
Session 13	It's Getting Tougher	Review homework from Session 13 Practice using imaginal exposure in high anxiety-provoking situations

		Practice using in-vivo exposure in high anxiety-provoking situations Plan exposure task for Session 15 Assign homework task
Session 14	Let's Practice Some More	Review homework from Session 13 Practice using imaginal exposure in high anxiety-provoking situations Practice using in-vivo exposure in high anxiety-provoking situations Plan exposure task for Session 15 Assign homework task
Session 15	Another Chance to Practice	Review homework from Session 14 Practice using in-vivo exposure in high anxiety-provoking situations Plan a closing exposure task for Session 16 Discuss briefly the end of treatment Assign homework task
Session 16	You Did It!	Review homework task from Session 15 Conduct a final exposure task in a high anxiety-provoking situation Have fun producing the "commercial" ▪ Review and summarize the treatment program and bring closure to the therapeutic relationship

Coping Cat is encouraged by the authors to be flexibly implemented in clinical settings (Kendall et al., 2006). They emphasize therapy being sensitive to co-occurring conditions, developmental level, familial and environmental stressors, socioeconomic status, and home and school functioning. The authors state "With knowledge of such individual differences, the following treatment program is applied flexibly, but within fidelity- modifying cognitive and/or behavioral components of the treatment to best help the particular child" (Kendall et al., 2006).

The following modifications were made in the pilot study, and were used for the current study:

1. Spending an extra 10-15 minutes on reviewing the content covered with child and caregivers.

2. Increased overall session length to allow a more accommodating pace for children with ASD.

3. Use of additional written and visual materials to accommodate different language abilities and executive functioning needs.

4. An increased use of focused concrete language.

5. Integration of the child's specific interests to build rapport, motivation, and participation.

6. Increased quantity and quality of reinforcement tailored to each child.

7. Decrease the amount of writing required by the child.

In addition, the PI scheduled the sessions to occur twice a week. This was done to maintain momentum and keep the concepts in the child's memory, because of known difficulties with executive functioning in ASD (Van Eylen et al., 2015).

Experimental Design and Analysis

A multiple probe design (MPD) across participants (Horner et al., 1978), a variation of the multiple baseline design, was used to assess the effectiveness of modified CBT on decreasing anxiety in children with ASD. Consistent with the design, the intervention was introduced to the first participant, followed by the second participant, and then the third participant once a change is noticed in the previous participants' data. A multiple probe design was selected for this particular study because the anxiety provoking situations for each child may not occur regularly, and the amount of exposure to anxiety-provoking situations as a use of data collection should be limited. Furthermore, the ability to collect data intermittently prior to introducing the intervention reduces the possibility of testing effects as a threat to internal validity.

In MPD, each participant served as their own control by collecting baseline data, repeated measured taken across all phases, and the staggering of baseline lengths across participants controlled for internal validity threats such as maturation, history, and multi-treatment interference. The proposed SCD design met WWC Reviewer Standards 4.1 for MPD in single case research (What Works Clearinghouse, 2020).

A digital randomizer was used to randomly assign participants to which tier of the MPD they would start in (i.e., case randomization). This design allowed examination of whether a functional relation existed between modified CBT and improved child outcomes by building in three opportunities across different points in time to assess whether a basic effect was demonstrated on the dependent variables when the intervention was actively manipulated.

Pretest measures were collected and the MPD implemented for all three participants. Following conclusion of the MPD (baseline, intervention, maintenance phases), posttest measures were administered. In addition, TUQ (Parmanto et al., 2016) and CEFIS (Kazak et al., 2021) were administered to obtain additional descriptive information. Behavioral assessment data was collected throughout the MPD to generate baseline and intervention data. Maintenance probes were taken after all intervention sessions occurred.

Analysis

Data was graphed on separate line graphs for visual analysis of within and between phase data. Specifically, the PI conducted a formal visual analysis as the study progressed to ascertain level, trend, variability, immediacy of effect, overlap of data points, and vertical analysis to evaluate basic effects between the dependent variables on child avoidant behavior and the intervention (Kazdin, 2011) and whether a functional relation between the intervention and dependent variable existed at the study level (Kazdin, 2011; Ledford & Gast, 2018). Convention

in single case research maintains that to confidently make an inference about a causal or functional relation between the intervention and dependent variables, a basic effect must be documented in at least three different points in time (Ledford & Gast, 2018). This design offered the opportunity to demonstrate whether a basic effect existed between implementation of the modified Coping Cat intervention and the dependent variables three times. Determination of whether a basic effect exists when comparing A (baseline phase) to B (intervention phase) is based on visual analysis as described above.

If visual analysis determined a clinically significant change, Tau-U was used to determine effect sizes. Tau-U is a nonparametric quantitative approach for single case design that analyzes nonoverlap between baseline and intervention phases while accounting for baseline trend (Parker et al., 2011). To calculate Tau-U, the Single-Case effect size online calculator (Version 0.5) was used from https://jepusto.shinyapps.io/SCD-effect-sizes/ (Pustejovsky et al., 2018). In addition, to meet What Works Clearinghouse (WWC) standards for SCD studies, a design comparable effect size was calculated using Cohen's d (Shadish et al., 2015). The d statistic was calculated to garner the overall magnitude of effect for the intervention for each case. A small effect is 0.2 or below, a medium effect is 0.5 or above, and a large effect size is 0.8 or above (Cohen, 1988). The use of a design comparable effect size can facilitate the inclusion of results in meta-analyses.

Descriptive statistics reported the changes on the ASC-ASD/P (Rodgers et al., 2016), SCARED (Birmaher et al., 1997), CAM (Way et al., 2010), and IUS (Carleton et al., 2007). This information provided results on preliminary effectiveness for the modified Coping Cat curriculum.

Study Timeline

Phase 1 (Pre-baseline)

Assessments and measures during Phase 1 were carried out by the PI. The assessments include the IUS (Carleton et al., 2007), ASC-ASD/P (Rodgers et al., 2016), the CAM (Way et al., 2010), the SCARED parent form (Birmaher et al., 1997), the SCARED child form (Birmaher et al., 1997), and caregiver accommodation checklist (Lebowitz et al., 2016). The caregiver and child were interviewed separately about what causes anxiety for the child, and what anxiety or avoidant behavior related to anxiety looked like for the child (behaviorally). Also, a reinforcer inventory was used to determine each child participants likes, dislikes, and interests. The results informed the rewards to be given to the child during the intervention sessions. The reinforcer inventory is a quick and simple checklist for the caregiver to fill out for each child (Tullis, 2011). See Appendix B.

Phase 2 (Baseline)

Baseline was collected during Phase 2 for all participants. Baseline sessions occurred bi-weekly. At the beginning of the baseline observation, the interventionist spoke to the caregiver and ensured that the video teleconferencing equipment was working correctly, then asked the caregiver to do what they normally do when the child is in their anxiety-provoking situation. The PI greeted the child and established rapport, engaging in conversation and mentioned the Zoom background that was chosen specifically for the child. The PI also presented a visual of the emotional thermometer and ask the child for their SUDS rating. Then the PI indicated to the mother to start the anxiety probe. The mother would start the task (i.e., math drill, wasp video, or presenting worms). The PI observed without interruption until the task ended and then obtained the last SUDS rating. After, the PI engaged in online play or games with the child before ending the session.

Phase 3 (Psychoeducation)

This phase began intervention, which occurred twice a week for 16 sessions (therefore over the course of eight weeks). The first half of the Coping Cat curriculum was the psychoeducation sessions (eight sessions) where the child learned about anxiety, how their body provided signals of their anxiety, what they thought when they experienced anxiety, and how to manage those thoughts and feelings. See Table 3 for more information regarding the outline of the Coping Cat sessions.

The child, their caregiver and PI met over videoconferencing. After greeting each other and establishing rapport, the PI prompted for the child's SUDS ratings and then began the sessions, as outlined in the Coping Cat manual. Modifications to the program were made as stated above. The PI presented everything to the child in a PowerPoint via a shared screen. Each presentation followed the Coping Cat workbook but was individualized to the child (e.g., when identifying parts of the body that might feel anxiety a picture of Steven Universe was used). The session lasted between 30-45 minutes. After the psychoeducation session was complete, data was collected through the anxiety probe using a moderate anxiety-provoking situation as described in the baseline phase. Afterwards the PI prompted the child for their SUDS ratings and help transition away from the anxiety probe activity by playing games with the child.

Phase 4 (Exposure activities)

The second half of the adapted Coping Cat curriculum was conducted during this phase. No new psychoeducation occurred for the child, only practice of the targeted skills occurred. The exposure sessions occurred for six sessions across three weeks. The other two sessions in this phase included one caregiver training session and final wrap-up session. The exposure activity was one in which the child directly faced a situation that invoked fear or anxiety in a controlled

setting. Exposure activities were dependent on the child's presenting needs but all started with less anxiety-provoking situations such as role play and gradually moved up to higher-provoking anxiety situations in alignment with the fear hierarchy that was previously created. The exposure activities are not to be confused with the anxiety probes that occurred during baseline. The anxiety probes were presented with no coaching to the mother or child and were conducted for measurement purposes. The exposure activities are part of the Coping Car curriculum and varied in intensity. The first two exposure sessions were role play or pretend situations, the second two were similar to the anxiety probe as they were moderately-anxiety provoking, and the last two were the highest of the fear hierarchy (e.g., instead of having to just touch a worm Nolan had to pick it up and hold it long enough to hook a fishing line).

In the exposure sessions, caregivers directed the exposure activities with their own child while the PI observed. The caregiver was in the same physical space as the child. The goal of caregivers mediating the exposure was to help the child generalize the skills to settings beyond the intervention sessions and provide the caregiver with needed opportunities to help their child through anxiety-provoking routines. The caregiver received 10-20 minutes of time with the PI prior to running the exposure to discuss what would occur and to receive coaching on what to do during the exposure. This also provided the caregiver a chance to discuss their concerns and questions and be an active participant in their child's learning. The PI gave individual suggestions for the caregivers (e.g., "Last time you did great except for giving specific praise regularly. Let's try to do more of that this time.) Once this discussion and coaching ended, the caregiver brought the child into the session and ran the exposure activity with the PI providing support, encouragement and modeling as needed for the child to participate in the exposure. The caregiver was prompted to use the exposure strategies visual to help them coach their child

through the exposure task. Every session ended in a debriefing with the child and then the child

received praise and a reward from a prize box previously mailed to the caregiver. The PI and

caregiver then debriefed and the and the caregiver was given descriptive feedback and praise.

Phase 5 (Follow-up)

During Phase 5, maintenance probes were recorded to determine generalization. The

procedures were the same as during baseline. During this phase the PI gave all post-test

questionnaires and social validity measures to the caregiver and child in the same manner that

they were given the pre-tests in Phase 1. In addition, the caregivers completed the (BAP) (Hurley

et al., 2007), TUQ (Parmanto et al., 2016), and the CEFIS (Kazak et al., 2021).

Table 4

Research Questions, Measurement, Intervention Component, and Time Points

Research Question	Area of Measurement	Intervention Component	Methodology	Time points of Measurement
1. Is there a functional relation between adapted Coping Cat CBT program and a decreased level of anxiety as measured by behavioral observations?	Observations dependent on child: could include frequency of protests, duration of meltdown, etc.	Modified Coping Cat CBT program	Visual analysis, Tau-U, design comparable effect size	Baseline, intervention, and follow up

2. Is there a functional relation between an adapted Coping Cat CBT program and a decreased level of anxiety as measured by SUDS scores?	SUDS scores	Modified Coping Cat CBT program	Visual analysis, Tau-U, design comparable effect size	Baseline, intervention, and follow up
3. Do caregiver SUDS scores decrease over the course of the intervention, as measured by SUDS scores?	Caregiver SUDS	Caregiver training	Descriptive report	Baseline, intervention, and follow up
4. Is a modified Coping Cat CBT program effective at decreasing anxiety as measured by the SCARED, IUS, GAD-7, and ASC-ASD?	SCARED, ASC-ASD, IUS, GAD-7	Modified Coping Cat CBT program	Descriptive report	Pre and post intervention

Table 4, continued

Research Question	Area of Measurement	Intervention Component	Methodology	Time points of Measurement
5. Is a modified Coping Cat CBT program associated with improved alexithymia as measured by the CAM?	Children's Alexithymia Measure	Modified Coping Cat CBT program	Descriptive report	Pre and post intervention
6. Will caregivers increase their use of exposure strategies after intervention?	Caregiver use of exposure strategies	Caregiver training during modified Coping Cat CBT program	Descriptive report	Intervention
7. Do caregivers and child participants perceive the intervention goals, procedures, and outcomes as feasible, acceptable, and effective?		Modified Coping Cat CBT program	Descriptive Report	Intervention

CHAPTER III

RESULTS

This chapter describes the results of the study and details (a) the impact of the intervention on latency to targeted avoidant behavior for the child participants, (b) the latency to a 50% reduction of SUDS, (c) the caregiver use of strategies, (d) results of the Tau-U, non-overlap index for single-subject data at the case level, (e) results of the Cohen's d design comparable effect size to determine the overall magnitude of effect for the intervention for each case, (f) descriptive analyses of pre/post assessments, and (g) social validity ratings of caregivers and child participants. The latency of avoidant behavior and latency to reduction of SUDS for each participant for MPD is presented in Figure 3. The results of the caregiver use of strategies are presented in Figure 4.

Results of Avoidant Behavior for Child Participants

Is there a function relation between an adapted CBT Coping Cat program and a decreased level of anxiety as measured by behavioral observations?

Eddie

During baseline, Eddie was engaging in avoidant behavior for timed tasks quickly. His mean of avoidant behaviors was 360 seconds with a range of 81 - 543 seconds. During the first half of the intervention, the psychoeducation phase, Eddie's level of avoidant behavior decreased to below baseline with a mean of 194 seconds with a range of 81-309 seconds. There was an increasing trend. During the second half of the intervention, the exposure phase, Eddie's avoidant decreased again but again demonstrated an increasing trend. During this phase, his

Figure 3

Multiple Probe Design for Latency of Avoidant Behavior, and Latency to 50% Reduction of SUDS
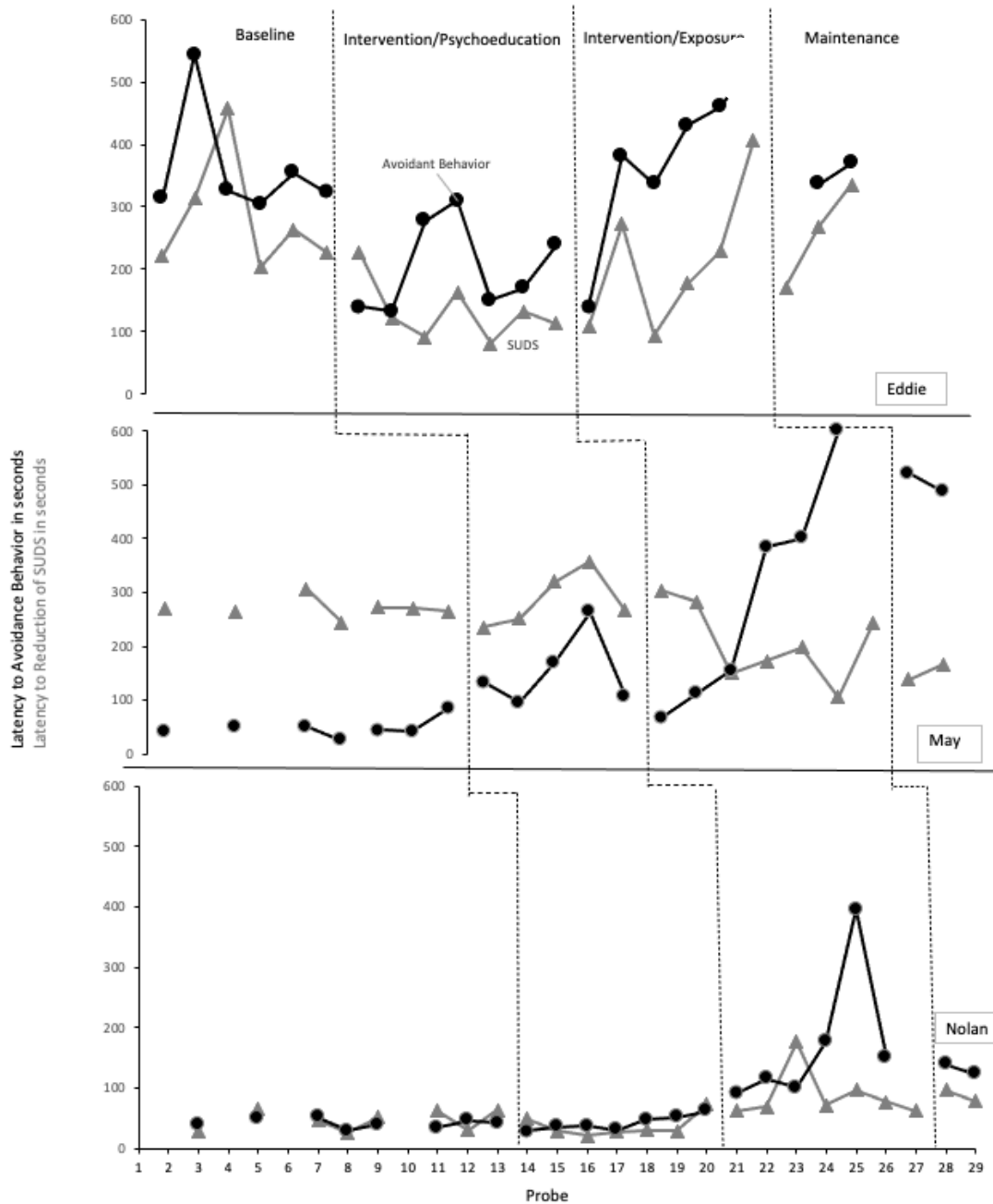
mean of avoidant behaviors was 380 seconds with a range of 140-532 seconds. His mean of avoidant behaviors increased 20 seconds from baseline to the end of intervention/exposure, and 186 seconds from the psychoeducation phase to exposure phase. During the follow-up probe, this mean was 353 seconds. Overall, visual analysis indicates while there is overlap, variability, and low consistency across phases, there is an increasing trend and an increase in level. As stated earlier, immediacy of effect was not expected due to the nature of psychotherapy where behaviors can worsen before they improve, and this held true for Eddie. Eddie maintained a similar mean of avoidant behaviors during generalization probes.

May

During baseline, May was engaging in avoidant behavior almost immediately when presented with videos of wasps. Her mean of avoidant behaviors was 43 seconds with a range of 21-51 seconds. During the first half of the intervention, the psychoeducation phase, May's mean of avoidant behavior was 128 seconds with a range of 43-263 seconds. There was an increasing trend. During the second half of the intervention, the exposure phase, May's mean of avoidant behaviors was 286 seconds with a range of 66-600 seconds. Her mean of avoidant behaviors increased 243 seconds from baseline to the end of intervention, and 158 seconds from the psychoeducation phase to exposure phase. Overall, visual analysis indicates an increase in level and trend, moderate consistency, and overlap and variability are minimal. Again, no immediacy of effect was expected though we see a small immediacy of effect when psychoeducation began. There was no immediacy of effect in the exposure phase. May maintained a similar mean of avoidant behaviors during generalization probes. During the follow-up probe, this mean was 487 seconds.

Nolan

During baseline, Nolan's mean of avoidant behavior was 42 seconds with a range of 29-52 seconds. During the first half of the intervention, the psychoeducation phase, Nolan's mean avoidant behavior was 42 seconds with a range of 29-62 seconds. The trend was stable. During the second half of the intervention, the exposure phase, Nolan's avoidant behavior demonstrated an increasing trend. During this phase, his mean of avoidant behaviors was 172 seconds with a range of 92-395 seconds. His mean of avoidant behaviors increased 130 seconds from baseline to the end of intervention/exposure, and 130 seconds from the psychoeducation phase to exposure phase. Overall, visual analysis indicates there is minimal overlap and variability, strong consistency, and an overall increasing trend though it didn't begin to increase until the exposure phase. No immediacy effect occurred when psychoeducation began as expected, though there is some when exposure began. Nolan maintained a similar mean of avoidant behaviors during generalization probes. During the follow-up probe, this mean was 131 seconds.

Overall, across all three participants, a vertical visual analysis indicates an increasing trend and levels. Consistency is moderate, there is some overlap and variability, and little immediacy of effect. It appears that a functional relation does exist between the adapted Coping Cat CBT curriculum and a decreased level of anxiety as measured by an increased latency to avoidant behaviors.

Table 5

Mean Change For Child Avoidant Behaviors

| Participant	Baseline	Intervention Psychoeducation	Intervention Exposure	Maintenance
Eddie	360	194	380	353
May	43	128	202	487
Nolan	42	42	172	131

Results of Latency to Reduction of SUDS

Is there a functional relation between an adapted Coping Cat CBT program and a decreased

level of anxiety as measured by SUDS scores?

Eddie

Eddie's mean of latency to reduction of SUDS in baseline was 281 seconds with a range

of 221-457 seconds. In intervention, his mean of latency to reduction of SUDS was 171 seconds

with a range of 81-406 seconds. Visual analysis indicates no clear trend or change in level, little

consistency, moderate variability and overlap, and no immediacy of effect.

May

May's mean of latency to reduction of SUDS in baseline was 271 seconds with a range of

244-307 seconds. In intervention, her mean of latency to reduction of SUDS was 235 seconds

with a range of 78-358 seconds. Visual analysis indicates a slight increase in trend and levels,

consistency, little overlap and variability, and no immediacy of effect.

Nolan

Nolan's mean of latency to reduction of SUDS in baseline was 47 seconds with a range

of 29-65 seconds. In intervention, his mean of latency to reduction of SUDS was 63 seconds with

a range of 21-177 seconds. Visual analysis indicates strong consistency, a slight increase in tend

and levels, little overlap and variability, and a small immediacy of effect.

Overall, the latency of suds decreased for Eddie and May but not for Nolan. See Table 6.

Visual analysis across all three participants indicates little changes in level, no clear trend, no

immediacy of effect, and considerable overlap and variability. No functional relation can be

determined.

Table 6

Mean Change For Reduction of SUDS

Participant	Baseline	Intervention	Maintenance
Eddie	281	171	302
May	271	235	153
Nolan	47	63	88

In maintenance, all participants had a small decrease in level and trend in both latency to avoidant behavior and latency to reduction of SUDS. There is strong consistency, little variability, and little overlap.

Results of Tau-U

The non-overlapping data points for adjacent A-B baseline and intervention phases were determined for each dependent variable using an online calculator (i.e., https://jepusto.shinyapps.io/SCD-effect-sizes/). Parker and Vannest (2009) suggests that Tau-U scores with ranges from 0 to .65 indicates weak effects; .66 to .92 indicates medium effects; and .93 to 1.00 indicates large effects of intervention. For Eddie's avoidant behavior, Tau-U was -.35, indicating a small effect for all phases, and there was a similar small effect for the exposure phase (Tau-U.36). There was a larger effect for the psychoeducation phase (Tau-U=.94). May had large effects for her avoidant behavior (Tau-U=1.00) for all phases. Nolan had a small effect for the psychoeducation phase (Tau-U=-.04) and all phases (Tau-U=.44). However, his Tau-U for exposure was 1.00 indicating a large effect.

Table 7

Tau-U Results

Participant	Avoidant Behavior, Phase A/B	Avoidant Behavior, Phase A/C	Avoidant Behavior, Phase A/B/C	SUDS
Eddie	-.94	.36	-.35	-.63
May	1.00	1.00	1.00	-.22
Nolan	-.04	1.00	.44	.16

Results of BC-SMD

Standardized mean difference (SMD) is a between case effect size appropriate for single case designs (Valentine et al., 2016). The between-case standardized mean difference (BC-SMD) is an effect size metric that is theoretically comparable to a standardized mean difference from a between-group design performed on the same population and with the same outcome measures. Because of its theoretical comparability, the BC-SMD effect size provides a way to describe intervention effects in terms more familiar to researchers who predominantly use group designs (Shadish et al., 2015; Shadish, 2014). BC-SMD effect size is calculated as the mean difference between outcomes from different treatment conditions, standardized by a sum of within- and between-case variance components.

BC-SMD was calculated using an online calculator (https://jepusto.shinyapps.io/scdhlm/). Cohen's d was used to interpret the findings where a small effect is 0.2 or below, a medium effect is 0.5 or above, and a large effect is 0.8 or above (Cohen, 1988). There was a small effect size for child's avoidant behavior (d =-.1863 [-.869, -.496]). Children's latency to reduction of SUDS had a small effect size (d = -.1393 [-.887, .609]).

Results of Caregiver SUDS

All three caregivers rated their SUDS during exposure activities for their children after the caregiver training session in the first half of the Coping Cat curriculum (i.e., session 4). The only noticeable pattern between the three caregivers was a slight increase in SUDS scores when exposure started at the fifth data point. See Figure 4.

Figure 4

Results of Caregiver SUDS Over Time
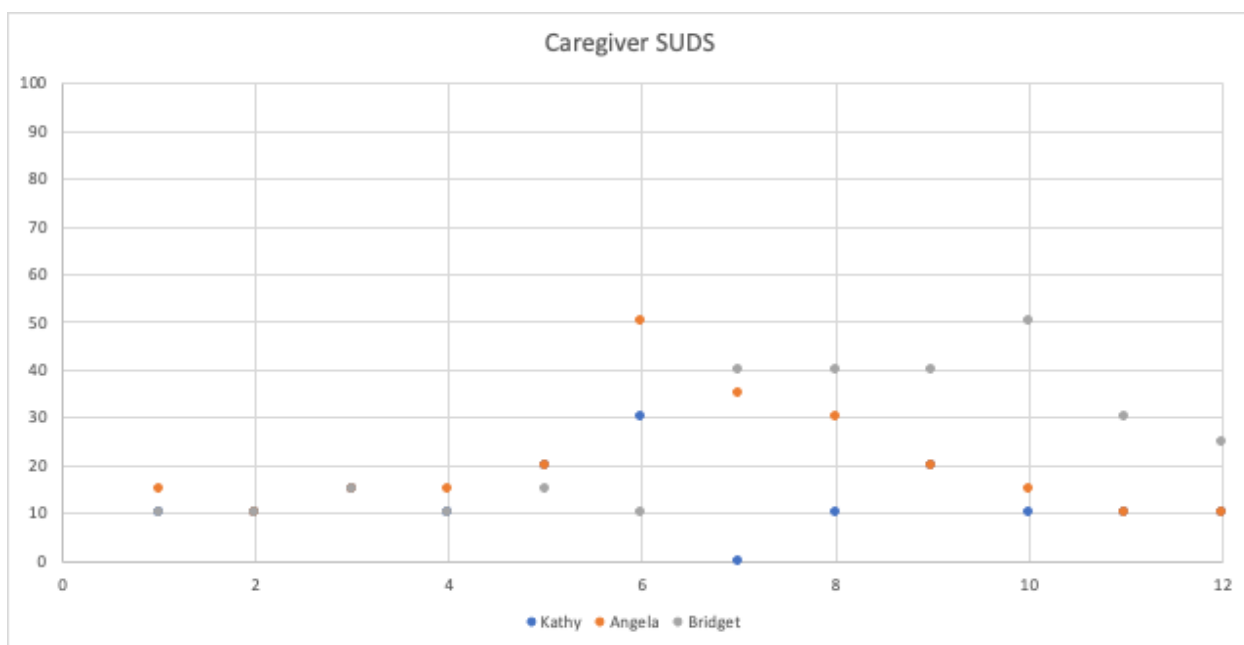
Results of Pre and Post Assessments

Is a modified Coping Cat CBT program effective at decreasing anxiety as measured by the SCARES, IUS, GAD-7, and ASC-ASD? Is a modified Coping Cat CBT program associated with improved alexithymia as measured by the CAM?

Pre and post assessments for all participants were compared. It should be noted that May's caregiver did not complete the post-test questionnaires. All child rated assessments

(SCARED-C and IUS) indicated a decreased level of anxiety after intervention. However, caregiver rated assessments indicated an increased level of anxiety after intervention. The comparisons of the pre and post assessments are presented in Table 8.

Notably, participants' scores on the CAM (Way et al., 2010) indicated an increased level of alexithymia after the intervention which indicates the intervention did not improve their alexithymia.

The GAD-7 (Spitzer, 2006) was given to caregivers to rate their child's anxiety each week during intervention. Scores varied throughout intervention, but each child had an increase in anxiety when exposure commenced in week 5. See Table 9.

Table 8

Pre/Post Intervention Assessments

Participant		Pre-assessment	Post-assessment
Eddie			
	ASC/ASD	8	12
	CAM	11	20
	SCARED-P	19	21
	SCARED-C	34	42
	IUS	34	34
May			
	ASC/ASD	29	
	CAM	14	
	SCARED-P	46	
	SCARED-C	60	46
	IUS	33	32
Nolan			
	ASC/ASD	33	64
	CAM	35	39
	SCARED-P	54	60
	SCARED-C	62	49
	IUS	55	45

Table 9

GAD-7 Scores

	Eddie	May	Nolan	Weekly Mean
Week 1	0	4	9	4.3
Week 2	1	4	5	3.3
Week 3	2	3	4	3
Week 4	0	2	0	.67
Week 5	5	3	3	3.3
Week 6	2	3	3	2.7
Week 7	1	4	3	2.7
Week 8	4	3	3	2.7

Results of Caregiver Use of Strategies During Exposure

Will caregivers increase their use of exposure strategies after intervention?

Eddie/Kathy

Eddie's mom, Kathy, was initially using 53% of the exposure strategies but increased her use to 100% by the final exposure session. Overall, Kathy had a mean of 81% of all strategies used. She demonstrated a steady increase in skills over time with only a small dip in the fifth exposure session.

May/Angela

May's mom, Angela, also demonstrated an increased use of exposure strategies. Angela was initially using 31% of the exposure strategies but increased her use to 100% by the final exposure session. Overall, Angela, had a mean of 81% of all strategies used. She demonstrated a steady increase in skills over time.

Nolan/Bridget

Nolan's mom, Bridget, was initially using 7% of the exposure strategies but increased her use to 93% by the final exposure session. Bridget's overall mean was 66% of all strategies used. She demonstrated a steady increase of skills over time. See Appendix F for the data sheet.

All caregivers increased their use of exposure strategies during the intervention. See
Table 10. The caregivers were most successful with the "Reviews task" strategy for a total mean
of 94% across caregivers. The least used strategy was "Provides specific praise every 5-10
seconds" for a total mean of 50% across caregivers. See Table 11.

Table 10

Caregiver Use of Exposure Strategies

	Eddie/Kathy	May/Angela	Nolan/Bridget
Exposure 1	53%	31%	7%
Exposure 2	56%	69%	56%
Exposure 3	75%	75%	88%
Exposure 4	93%	93%	88%
Exposure 5	87%	100%	93%
Exposure 6	100%	100%	93%

Table 11

Percentage of Exposure Strategies Used by Caregivers

Caregiver Strategies	Eddie/Kathy	May/Angela	Nolan/Bridget	TOTAL
Provides a choice for reward	100	83	66	83
Obtains initial SUDS rating	100	66	83	83
Reviews task	100	100	83	94
Reminds child of strategies	33	100	33	55
Create guidelines for task	83	50	83	72
Gains assent	83	100	83	89
Coaches and models	100	50	16	55
Specific praise every 5-10 seconds	33	66	50	50
Obtain midway SUDS	83	83	66	77
Ends task as agreed on	83	100	66	83
Obtains final SUDS rating	66	83	66	72
Provides reward	83	83	66	77
Debriefs task with child	66	83	66	72
Provides praise and feedback	100	83	83	89
Excuses child from task	100	83	83	89

Results of Social Validity

Do caregivers and child participants perceive the interventions, goals, procedures, and outcomes as feasible, acceptable, and effective?

Evaluations of social validity for this study were collected by the child participants and by caregivers at the end of the study. Overall, the ratings on effectiveness, feasibility, and likability were high for both the children and the caregivers. The evaluation form had questions from the least acceptable (rated 1) to the most acceptable (rated 5). The overall rating for the intervention from the children was 4.3 and the overall caregiver rating was 4.6. The highest rated questions from the children were "The program helped me learn how to keep my anxiety from getting too high", "This program was helpful to me". The children's comments included their dislike for the activities used in exposure (i.e., math game, wasp videos, and touching worms). See Table 12.

The highest rated questions from caregivers included "Stephanie communicated well with us", "Stephanie demonstrated good rapport with my child", and "My child enjoyed working with Stephanie". Some of the caregiver comments included "Stephanie was great with Nolan and has helped encourage him to do things he didn't want to do" and "I wouldn't change anything." See Table 13.

Table 12

Child Evaluation of Intervention

Item		Mean	Range
1	I enjoyed doing this program.	4.3	3-5
2	This program helped me learn about feelings.	4.3	4-5
3	I learned ways to cope when I feel anxious.	4.3	4-5
4	This program helped me learn how to keep my anxiety from getting too high.	4.7	4-5
5	This program was helpful to me.	4.7	4-5
6	I will use some of the strategies I learned.	3.3	2-5
7	I liked the Zoom backgrounds Stephanie used.	4.3	4-5
8	I liked the emotional thermometer Stephanie made me.	4	4

Table 12, continued

Item		Mean	Range
9	The homework activities were helpful	4.7	4-5
10	I would rather do this program in person instead of over Zoom.	4	3-5
11	I would work with Stephanie again.	4.3	4-5
12	I would do a program like this again.	4	4
13	Stephanie listened to me about my interests.	4.7	4-5
14	I was comfortable working with Stephanie.	4	3-5

Note. The self-evaluation form had questions from the least acceptable (rated 1) to the most acceptable (rated 5).

Table 13

Caregiver Evaluation of Intervention

Item		Mean	Range
1	This intervention was beneficial to my child.	4.5	4-5
2	The intervention helped my child manage their anxiety.	4.5	4-5
3	This intervention helped my child problem solve their own behavior.	4.5	4-5
4	This intervention helped my child be more aware of their thoughts, feelings, and actions.	4.5	4-5
5	My child used some of the strategies that were taught in the program.	4.5	4-5
6	This intervention addressed an important issue in our family.	4.5	4-5
7	This intervention addressed what I hoped it would.	4.5	4-5
8	Stephanie communicated well with us.	5	5
9	Stephanie individualized components of the intervention for my child.	5	5
10	Stephanie demonstrated good rapport with my child.	5	5
11	My child enjoyed working with Stephanie.	5	5
12	I would participate in this intervention again.	4.5	4-5
13	I would work with Stephanie again.	4.5	4-5
14	I would recommend this intervention to other parents.	4.5	4-5
15	This program would be better in person rather than via Zoom.	4	4

The self-evaluation form had questions from the least acceptable (rated 1) to the most acceptable (rated 5).

Telehealth Usability Questionnaire

Because the intervention occurred via Zoom, caregivers were asked to rate the usability

of telehealth for the intervention. Overall, caregivers rated the use of telehealth as high. See

Table 14.

Table 14

Telehealth Usability Questionnaire

	Mean	Range
1. Telehealth improves my access to health care services.	6	6
2. Telehealth saves me time traveling to a hospital or specialist clinic.	6	6
3. Telehealth provides for my healthcare needs.	5	4-6
4. It was simple to use the system.	6	6
5. It was easy to learn to use the system.	6.5	6-7
6. I believe I could become productive quickly using this system.	5.5	4-7
7. The way I interact with this system is pleasant.	6.5	6-7
8. I like using the system.	6.5	6-7
9. The system is simple and easy to understand.	6.5	6-7
10. This system is able to do everything I would want it to be able to do.	6.5	6-7
11. I can easily talk to the clinician using the telehealth system.	6.5	6-7
12. I can hear the clinician clearly using the telehealth system.	6.5	6-7
13. I felt I was able to express myself effectively.	6.5	6-7
14. Using the telehealth system, I can see the clinician as well as if we met in person.	6.5	6-7
15. I think the visits provided over the telehealth system are the same as in-person visits.	6	5-7
16. Whenever I made a mistake using the system, I could recover easily and quickly.	6.5	6-7
17. The system gave error messages that clearly told me how to fix problems.	5.5	4-7
18. I feel comfortable communicating with the clinician using the telehealth system.	6.5	6-7
19. Telehealth is an acceptable way to receive healthcare services.	6.5	6-7
20. I would use telehealth services again.	6.5	6-7
21. Overall, I am satisfied with this telehealth system.	6.5	6-7

Note. The self-evaluation form had questions from the least acceptable (rated 1) to the most acceptable (rated 7).

Summary of Findings by Research Question

Research Question One

Is there a functional relation between an adapted Coping Cat CBT program and decreased avoidant behavior as measured by behavioral observations? To answer this question, data were collected on the children's avoidant behavior during the anxiety probe. The latency of seconds until the avoidant behavior occurred were graphed, visually analyzed (i.e., level, trend, variability, overlap, immediacy of effect, consistency of effect, and vertical analysis), and further analyzed through non-parametric and parametric analyses. Visual analysis suggested a strong basic effect for May, and a moderate basic effect for Eddie and Nolan. Overall, there was a functional relation between the modified Coping Cat CBT curriculum and an increased latency towards avoidant behavior. Non-parametric and parametric analyses confirmed similar results to visual analysis. The omnibus Tau-U effect size for latency to avoidant behavior was .60 which indicated a moderate effect. The BC-SMD indicated a small effect ($d = -.186$).

Research Question Two

Is there a functional relation between an adapted Coping Cat CBT program and a decreased amount of latency to a 50% reduction of SUDS as measured by SUDS scores? To answer this research question, data were collected on the latency to a 50% reduction of SUDS. The data were collected, graphed, visually analyzed (i.e., level, trend, variability, overlap, immediacy of effect, consistency of effect, and vertical analysis), and also analyze through non-parametric and parametric analyses. Visual analysis indicated a moderate effect for May but weak effects for Eddie and Nolan. Overall, there was no functional relation between the modified Coping Cat CBT curriculum and a decreased latency to a reduction of SUDS. Non-parametric and parametric analyses also confirmed similar results to visual analysis. The omnibus Tau-U effect size for latency to a 50% reduction of SUDS was .34 which indicated a small effect. The BC-SMD also indicated a small effect ($d =-.14$).

Research Question Three

Is there a decrease of caregiver SUDS scores throughout the intervention as measured by caregiver SUDS scores? To answer this research question, data were collected on the caregiver's SUDS ratings during exposure activities. The data were collected and graphed on a scatterplot. The SUDS scores changed throughout intervention, but the only noticeable pattern was an increase of SUDS scores when exposure started.

Research Question Four

Is a modified Coping Cat CBT program effective at decreasing anxiety as measured by the SCARED (Birmaher et al., 1997), GAD-7 (Spitzer, 2006), and ASC-ASD (Rodgers et al., 2016)? To answer this research question, the children self-rated themselves on the SCARED (Birmaher et al., 1997) before and after the intervention, the caregivers rated their children's anxiety using the ASC-ASD (Rodgers et al., 2016) before and after intervention, and the caregivers rated their children's anxiety using the GAD-7 (Spitzer, 2006) weekly throughout intervention. The findings from these ratings were inconclusive. It should be noted that May's caregiver did not complete the post-test questionnaires. May and Nolan both rated their anxiety on the SCARED-C (Birmaher et al., 1997) as lower after the intervention (May's pre-test score was 60 and her post-test was 46; Nolan's pre-test score was 62 and his post-test was 49), but Eddie rated his anxiety as higher (his pre-test score was 34 and his post-test score was 42). Eddie and Nolan's caregiver ratings indicated higher anxiety after the intervention on the SCARED- P (Eddie's pre-test score was 19 and his post-test score was 21; and Nolan's pre-test score was 54 and his post-test score was 60). The caregiver ratings on the ASC-ASD (Rodgers et al., 2016) also indicated higher anxiety after intervention (Eddie's pre-test score was 8 and his post-test score was 12; and Nolan's pre-test score was 33 and his post-test score was 64). Caregiver

ratings of their children's anxiety on the GAD-7 (Spitzer, 2006) was variable throughout the

intervention, though the mean decreased from the first week to the final week ($M = 4.3$ to $M =$

2.7).

Research Question Five

Is a modified Coping Cat CBT program associated with improved alexithymia as

measured by the Children's Alexithymia Measure? To answer this research question, the

caregivers rated their children on the CAM (Way et al., 2010) before and after intervention. The

findings from these ratings indicated increased alexithymia, which indicates the children were

rated as having more behaviors associated with alexithymia after the intervention. The CAM

(Way et al., 2010) ratings improved for each child (Eddie's pre-test score was 11 and his post-

test score was 20; and Nolan's pre-test score was 35 and his post-test score was 39). These

increased scores indicate worsened alexithymia for all participants.

Research Question Six

Will caregivers increase their use of exposure strategies after intervention? To answer

this research question, data was collected on behavioral observations of the caregiver use of

strategies during exposure. A checklist was used to indicate whether the caregiver used the

strategy or not. Overall, findings were positive and indicated that all caregivers did increase their

use of strategies ($M = 30\%$ during the first exposure, $M = 98\%$ during the last exposure).

Research Question Seven

Do caregivers perceive the intervention, goals, procedures, and outcomes as feasible,

acceptable, and effective? To answer this research question, the caregivers rated a Likert scale

for the intervention. The findings from these ratings were overall positive in the direction of

acceptable, effective, and feasible ratings. Caregivers felt that the intervention helped their children learn about their feelings and learned coping strategies ($M = 4.5$).

CHAPTER V

DISCUSSION

In this chapter, the major findings of the current study are interpreted. The results of each research questions and findings of interest are discussed. Next, implications for practice, limitations of the current study, and recommendations for future research are addressed.

Anxiety is a significant problem for children with ASD (Davis et al., 2009) Successful treatment of anxiety for this population could improve short-term and long-term outcomes (Wood et al., 2009). Despite the obvious need for treatment targeting reduced anxiety, there is a dire shortage of interventions specific to the ASD population (Keehn et al., 2021). This single-case experimental design study examined the urgent priority of addressing anxiety and ASD symptoms for middle childhood students (ages 7 – 13 years) with an ASD diagnosis and elevated anxiety symptomatology by examining the effectiveness, feasibility, and acceptability of a manualized CBT program (i.e., Coping Cat) delivered via telehealth. The manualized Coping Cat program was adapted to address specific support needs of children with ASD such as using concrete language, using visual materials, and integrating the students' specific interests (Attwood, 2004; McNally Keehn, 2012). This project examined the preliminary feasibility and effectiveness of an ASD adapted CBT intervention on caregiver implementation of exposure activities, and subsequent decreased anxiety symptoms, decreased externalizing challenging behavior, and improved coping skills of three school aged children with ASD using a rigorous single-case experimental design (i.e., a multiple-probe across caregiver-child dyads design). The participants and their caregivers reported subjective units of distress during the exposure activities providing evidence regarding potential unintended positive and adverse effects.

In the present study, the modified Coping Cat CBT curriculum increased child participants' latency to avoidant behavior. There was a weak effect size for child's avoidant behavior (d=-.1863 [-.869, -.496]). Children's latency to reduction of SUDS had a weak effect size (d= -.1393 [-.887, .609]). Fidelity of implementation results are similar to other studies using CBT (McNally Keehn, 2013) and the results of this study align with other studies that examine CBT which supports its use and indicate positive outcomes for anxiety (Beck, 1970; Beidas et al., 2010; Ehrenreich-May et al., 2014; Reaven et al., 2018). However, all of these studies used pre/post-tests to determine effectiveness, and none used the measure of child latency to individually define avoidant behavior so direct comparison of results is not possible. While this study did find a functional relation between the adapted Coping Cat CBT curriculum and a decreased level of anxiety as measured by behavioral observations, this study did not find that anxiety decreased as measured by the SCARED (Birmaher et al., 1997), IUS (Carleton et al., 2007), or ASC/ASD (Rodgers et al., 2016). There were also no changes in the GAD-7 (Spitzer, 2006). The intervention did not decrease the latency to a 50% reduction of SUDS, it did not change caregiver SUDS, nor did it improve alexithymia as measured by the CAM (Way et al., 2010). Caregivers did increase their use of exposure strategies over time, and they perceived the intervention goals, procedures, and outcomes as feasible, acceptable, and effective.

Coping Cat

This study used the evidence-based Coping Cat as the intervention (Kendall & Hedtke, 2006; McNally Keehn, et al., 2013; Lenz, 2015). The first half of Coping Cat, the psychoeducation portion, focused on cognitive restructuring (emotional awareness and building coping skills). The participants learned how to be aware when anxiety is present, the thoughts that occur during times of anxiety, and how to cope with those thoughts and feelings. The child

participants struggled with these concepts, but all three responded well to the relaxation techniques that were taught and practiced, especially the deep breathing, practicing muscle relaxation, and mindfulness. These techniques were all mentioned in the social validity questionnaire, and anecdotally, was noted by each of the caregivers as being effectively used outside of intervention sessions (e.g., on a trip to the emergency room). Despite the high reported social validity of relaxation techniques, previous research is inconclusive on the use of relaxation techniques in CBT (Becker-Haimes et al., 2017; Whiteside et al., 2019).

Exposure was undoubtedly an important piece of the intervention as six sessions were devoted to exposure. Current research on CBT emphasizes the importance of exposure and its dosage (Peris et al., 2017; Stewart et al., 2016). More in-session exposure has been associated with larger treatment effects (Whiteside et al., 2020). However, little research has examined the use of exposure delivered via telehealth as well as the use of exposure with the ASD population. Caregivers and child participants were uncomfortable with the exposure activities, as noted by SUDS ratings and participant comments. The exposure piece of the intervention had the lowest social validity with all child participants noting it was their least favorite part. However, the largest treatment gains for all participants occurred during the exposure phase of the intervention. The exposure sessions began with low anxiety-provoking situations, such as role play, and then moving to moderate anxiety-provoking situations and high anxiety-provoking situations. The role play activities were difficult for the child participants but not because of the exposure piece. Instead, it was the "pretend" situation and lack of concrete objectives that the children struggled with. This is not surprising considering that being concrete is a common theme in ASD (De Villiers et al., 2010). Future research should examine better ways to conduct the Coping Cat

program using exposure activities with the ASD population. Considering the symptoms of ASD, it is likely that this population need more time to learn the concepts taught in psychoeducation.

Additionally, future research should examine the use of modifying Coping Cat by including more exposure sessions. Research already indicates that exposure is the main catalyst of CBT (Beidel et al., 1998). Considering that exposure is the main catalyst of CBT, knowing that the components of exposure make it especially useful for populations with cognitive and communication needs, and considering that the biggest gains in this intervention clearly occurred in the exposure phase, adding additionally exposure sessions with proper supports could be beneficial. Future research in this area is highly recommended.

Child SUDS

It was hypothesized that the intervention would decrease the latency to a 50% reduction in SUDS for the children. However, this did not occur. Instead of moving in the opposite direction of the latency to avoidant behavior, the SUDS scores followed similar patterns to the latency of avoidant behavior. The intervention did not help the children in recovering more quickly from exposure activities. It is important to note, however, that all children did indeed recover within minutes. There is little research on this particular topic, so future research is necessary to further explore this phenomenon.

Executive functioning

A possible explanation for the lack of decrease in the latency to a reduction of SUDS is the children's executive functioning. Executive functioning is high-level cognition that individuals use to control their behavior and is responsible for processing new information; attention; organizing, planning, and prioritizing; beginning tasks and staying focused on them to completion; understanding different points of view; regulating emotions; and self-monitoring

(Gilbert & Burgess, 2008). Executive functioning has been considered a central area of need in ASD (Craig et al., 2016). All of the aforementioned characteristics of executive functioning could impact the ability to recover from anxiety-provoking situations. Eddie in particular seemed to be affected by executive functioning. He was slow to answer questions, had difficulty maintaining attention, and also struggled with regulating his emotions. During exposure activities he told both his mom and the PI "I hate you". He also swatted at his mother and would close the computer screen when he became upset. Eddie was also the youngest participant and needed additional prompts to participate in sessions. Neff et al. (2017) had similar findings where the younger children in their study needed additional support in place including supplementary prompting and reinforcement. In addition, it should be noted that executive functioning , such as self-regulation, could also manifest differently (e.g., rumination, intrusive thoughts, OCD) for children with ASD. For Eddie, it could have been frustration and self-regulation that was being measured versus the distress tolerance. Based on this information, examining the role of executive functioning in anxiety is encouraged for future research.

Measuring anxiety

Because anxiety is an internalizing behavior reliant on self-report, it can be difficult to measure within a single-case research design requiring observational measures. This aligns with previous research (Lecavalier et al., 2015; White et al., 2009) and may be one reason for the limited research in this area. The research that does exist demonstrates little consistency in how anxiety was measured (Lord et al., 2005; Wolery & Garfinkle, 2002). Additionally, there is little research and few tools for anxiety specific to the ASD population. In this study, the PI had to work with the caregiver and child to not only determine what caused the child anxiety, but how that anxiety manifested itself behaviorally. Caregivers were able to report what they saw but

were more successful in doing so if it resulted in large externalizing behavioral changes, such as aggression. It took several conversations between the caregiver and PI to identify more subtle behaviors that appeared to be related to the child's anxiety and ended up agreeing on an individually operationalized avoidant behavior for each child. Both the PI and caregiver had to adjust their mindset that the behavior related to anxiety was not necessarily an externalizing behavior. The PI learned that the caregiver interview was essential to determining these behaviors and had to learn how to phrase questions that allowed both the PI and caregiver to specify a behavior that could be targeted. This is likely partly due to the caregiver's understanding of anxiety and avoidant behavior. Future research is needed to examine the best methods for identifying anxiety inducing situations for children with ASD and for creating observable and measurable definitions for dependent variables associated with and indicators self-reported internalizing behaviors such as anxiety.

Researchers have begun to examine the possible bi-directional relationship between ASD and anxiety (White et al., 2009; Hallett et al., 2013). Specifically, the "insistence on sameness" often observed in those with ASD may be a manifestation of anxiety. Adherence to routines is related to intolerance of uncertainty, a construct of anxiety (Buhr et al., 2009). However, while the participants in this study did demonstrate traits that align with insistence on sameness, none of the participants were so impacted by this that it was targeted during this study. The relationship between anxiety and ASD needs to be studied further and should include insistence on sameness and repetitive behavior as manifestations of anxiety as well as other symptoms (e.g., irritability, avoidant behavior). Additionally, future research should examine not only avoidant behaviors but also engagement behaviors with the targeted stimulus. Future research

should also measure the coping strategies that were used and the effectiveness of each strategy (e.g., deep breathing, mindfulness, muscle relaxation).

Similarly, the presentation of anxiety in children with ASD may evolve as the child ages. Studies that have examined symptoms of anxiety across children of different ages (Farrugia & Hudson, 2006) have generally found that similar to typically developing anxious youth (Ollendick et al., 2004), specific phobias may be more common in younger children with ASD, while social phobia is more common in adolescence. Social difficulties and awareness of being different from others is especially prevalent in adolescence and may lead to worsened anxiety (Chalfant et al., 2006). In this study, May and Nolan were adolescents who had exposures related to stimuli that might be classified diagnostically as phobias targeted but also demonstrated social anxiety, which was unaddressed during the study. However, both May and Nolan reported social difficulties that occurred during their participation in the study. More research is needed to understand the developmental effects of anxiety with ASD and whether targeting non-social situations during exposure sessions could result in generalized reductions in anxiety. In addition, future research should examine the cognitive ages of the participants, especially given that most interventions are designed for neurotypical populations.

Anxiety is usually categorized as being either a fear response or a distress response (Ladouceur et al., 2000). Two of the participants had a fear response (i.e., phobias for May and Nolan) and one had a distress response (i.e., Eddie being timed). It is important to consider a person-centered approach to decide which intervention approach to use. It is possible that exposure may not be the right approach for general distress, and future research should examine different intervention approaches to different anxiety responses.

COVID-19

Social difficulties became more pronounced globally during the novel coronavirus (COVID-19) pandemic. Anxiety was experienced by the population as a whole, but especially impactful for children with disabilities. Thus, addressing anxiety for children with ASD may have had increased value for families during this time period. Limited research exists in the area of behavioral interventions via telehealth. With the reduced availability of professional and educational supports because of circumstances related to the COVID-19 pandemic, delivery of services via telehealth to families of children with ASD have made interventions more accessible. The pandemic resulted in a challenging period for over 90% of families surveyed with most parents reporting increases in challenging behaviors during both free times and structured times (Colizzi et al., 2020). Additionally, only a small number of the families received formal services. A recommended pathway to maintain services is through telehealth care delivered to and mediated by caregivers or other family members (Ameis et al., 2020). Caregivers all reported on the COVID-19 Exposure and Family Impact Survey that their families were ordered to "stay at home" and that there were additional changes in accessing healthcare.

The Role of Caregivers

The role of caregivers mediating interventions might be essential to effectively address anxiety in this population, not only because of the pandemic. When children experience anxiety, not only can it hinder the quality of family relationships, but it can also have collateral effects on the caregivers' anxiety as well. Family-centered intervention approaches are considered best practice within the fields of ABA and early intervention (Antill, 2020). This includes involving parents in goal and treatment planning in addition to training and empowering parents to implement interventions (Antill, 2020).

However, the current study is novel in the approach of charging caregivers with working with their older school age children during exposure activities. Knowing that generalization is an area of need for children with ASD, training caregivers in anxiety and coping strategies was utilized in hopes of increased generalization, since the caregiver would be with the child in more situations and could serve as both a discriminative stimulus for use of coping skills and approach behavior and as a reinforcer. It is possible that this approach changed caregiver's understanding of their child and/or their anxiety. Anecdotally, Kathy noted that she didn't realize how anxious her son was and didn't realize how much she accommodated for his anxiety. However, she did report that she coached Eddie through situations outside of the intervention sessions indicating that the caregiver training was effective in other settings. Future research should measure the specific ways caregivers accommodated for their children's anxiety in baseline and measure whether these accommodations decreased after the intervention.

Feasibility

Feasibility of this study was also addressed when caregivers reported high scores about the usability of telehealth. While the delivery of the intervention via telehealth allowed for children and caregivers across the United States to participate, the virtual implementation of CBT also posed unique challenges. First, collecting reliable and accurate behavioral data for avoidant behavior was challenging as it was hard to observe all behaviors that may not be easily visualized on camera. Furthermore, it was hard to clearly hear and pick up all audio when there was background noise in the house. More sophisticated cameras and microphones will be needed to more accurately capture and code behavioral data. Brief technology checks prior to the start of the study were helpful to decrease technology glitches, set up play zones, and assist caregivers in problem solving how to operate Zoom. These findings align with literature on the use of

telehealth more broadly in relation to children with ASD (Sutherland et al., 2018). Caregivers have been able to successfully conduct functional behavioral assessments and treatments while receiving online coaching, however, connectivity issues and reducing hardware costs have been barriers to telehealth interventions (Lee et al., 2015). In order to reduce technological barriers, researchers need to have IT support available in order to provide guidance on troubleshooting video problem or audio problems as well as create task analyses for navigating different platforms (Lee et al., 2015; Lermon et al., 2020). Interventionists may need to plan ways to build rapport online with children before the implementation of intervention. Allowing children to pick out small prizes they wanted to earn and engaging their help in choosing future toy purchases were helpful strategies in building initial rapport. In this study, other rapport building strategies included changing Zoom backgrounds to child interests (e.g., animal themed or Pokémon themed), spending a few minutes playing online games or watching videos together and providing behavior specific praise. Pairing which involves imitating the child's actions, engaging in preferred activities, and delivering preferred items to the client can build therapist-child rapport (Lugo et al., 2017). Pairing has been shown to reduce challenging behavior in young children with ASD (McLaughlin & Carr, 2005).

Pre/Post Tests

Pre/post tests were administered to children and their caregivers. The children reported they did not like the length of the questionnaires and reported some of the questions as confusing. For example, a question on the SCARED asked "I am afraid of having anxiety (or panic) attacks" and the children asked what an anxiety or panic attack was. Additionally, the SCARED used terms like "frightened", "scared", "nervous", and "worry" somewhat interchangeably. On the post-test questionnaire, the children also stumbled on the question "I get

headaches when I am at school" because they said they may get headaches, but it isn't related to their anxiety. It is noted that the child's explanation indicated an increased understanding of their feelings. It should also be noted that all the children's self-ratings on the SCARED-C indicated more anxiety than the caregiver ratings on the SCARED-P. This is especially interesting considering the role that alexithymia may have played in their ability to complete these questionnaires.

Pre-post test scores indicated mixed results for Eddie and Nolan. Unfortunately, May's caregiver did not complete the post-test questionnaires. All children rated improved intolerance to uncertainty after the intervention. Additionally, May and Nolan reported improved anxiety. However, caregiver ratings did not indicate improvements after the intervention.

Surprisingly, the caregiver post-test scores indicated more anxiety than initially reported in the pre-tests. One reason for this may be that through the intervention and with the caregiver participating in the psychoeducation sessions, that the caregiver learned more about anxiety and how it manifested itself in their child. Therefore, while the scores did not indicate improvement, the scores may indicate an improvement in caregiver's learning. Furthermore, knowing the relationship between parent and child anxiety, this bi-directional relationship may have impacted the caregiver's responses to the questionnaires (Van Der Bruggen et al., 2008).

In addition, it should be noted that while the results of the CAM indicated worsened alexithymia, this intervention focused most on anxiety, fear, and worry which is only area of emotions that the CAM measures. Future research should measure specific emotions and the aligning interventions on the CAM.

Study design

As noted earlier, a pilot study was done prior to this study. The pilot study used a changing criterion design to examine whether a modified Coping Cat curriculum would decrease behaviors related to anxiety for children with ASD. The changing criterion design was unsuccessful because of the structured format of Coping Cat. Therefore, this study employed a multiple probe design. This was not without complication, as participants and their caregivers became frustrated with the amount of time they remained in baseline. Because the goal of the study was to gain skills to cope with anxiety, future research could consider the use of a repeated acquisition design, which is a single-case research design that involves repeated and rapid measurement of irreversible discrete skills or behaviors (Ledford & Gast, 2018). Unlike multiple probe (MP) and multiple baseline design (MBD) studies that extend study length to provide sufficient data in each condition, researchers can use a RAD to examine the effect of an intervention more efficiently (Kirby et al., 2021).

Variability in data

There was a moderate amount of variability in the data for avoidant behavior and latency to SUDS, especially for Eddie. The first data point in intervention was below all baseline data points. This is likely because the intervention started and Eddie, the youngest of the participants, now had to sit and talk about feelings which pre-test information indicated was difficult for him. Also, when the exposure phase began variability occurred again. As noted earlier, it is expected in psychotherapy and CBT in particular that behavior often worsens before it improves (Kendall & Hedtke, 2006).

Limitations

The current study had several limitations. The first limitation was the observed decreases during the maintenance probe of the latency to avoidant behavior and the latency to a 50%

reduction of SUDS. The maintenance probes occurred two weeks after the last Coping Cat intervention sessions and no priming, prompting, or reinforcement for using coping strategies were used for the children or the caregivers. Maintenance is encompassed by the idea of generalization and generalizing behavior change tends to be a challenge in particular, for individuals with ASD (e.g., Camargo et al. 2016; Neely et al. 2015). The decrease during the maintenance probes aligns with previous studies where the generalization of intervention outcomes remains a persistent challenge for individuals with ASD (Camargo et al. 2016).

The attrition in this study is another limitation. The first participant dropped out of the study before baseline phase due to their discomfort with the exposure piece of the program. This participant was replaced by another participant on the wait list. However, due to family circumstances and life changes (i.e., divorce, loss of respite worker) this participant was unable to schedule sessions and subsequently had to drop from the study.

This study had some low kappa scores for some phases and participants, particularly Nolan. Agreement was difficult because Nolan would reach for the worm but jerk back, and it was not always clear when he began touching the worm. Part of this is a limitation of telehealth, in which it was difficult to see everything necessary in order to start measuring the behavior. However, a clearer operational definition of his behavior may have avoided this as well.

Finally, this study addressed an important topic for children diagnosed with ASD that also have co-occurring anxiety. A modified CBT curriculum did show improvements in anxiety related avoidant behavior, though it did not reduce the time taken for SUDS scores to reduce by 50%. Caregivers increased their use of strategies to help their children through exposure activities. However, all child participants were verbally fluent and demonstrated little challenging behavior. While this study did address an important topic, it does not address the

mental health concerns for children who are not verbally fluent or who demonstrate severe challenging behavior. While it may be difficult, future research is needed to address the mental health concerns of children with ASD who have varying characteristics and needs.

CONCLUSION

The current study provides preliminary evidence that the adapted Coping Cat CBT program can improve the latency to avoidant behaviors for children diagnosed with ASD who also demonstrate anxiety. Furthermore, the intervention increased caregiver use of strategies to help their child in anxiety-provoking situations. The intervention was rates acceptable, feasible, and effective by both caregivers and child participants. However, the intervention did not reduce the latency to a 50% reduction of SUDS. Nor did it increase the scores for post-test measures, such as anxiety on the SCARED (Birmaher et al., 1997) and ASC/ASD (Rodgers et al., 2016) or alexithymia on the CAM (Way et al., 2010). The findings from this current study contribute to the body of research for children with ASD who also have anxiety.

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Do You Need Help Addressing Anxiety for Your Child With an Autism Spectrum Disorder?

This study

a diagnosis

significant

adapted C

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The study

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telehealth.

PARTICIPATION IS VOLUNTARY, AND CAN BE REVOKED AT ANYTIME.

For more information, or to express interest, contact Stephanie St. Joseph at sstjose2@uoregon.edu, or text 315-783-4338.

APPENDIX B

REINFORCEMENT INVENTORY

Name: .... Date: ………………
Completed by: ....

Items are to be marked with the appropriate code:
3 -Highly preferred   2 - Moderately preferred   1 - Non-preferred

Child 1_____

Edibles

Cookies	_____
Chips	_____
Pretzels	_____
M & Ms	_____
Popcorn	_____
Chocolate	_____
Marshmallows	_____
Any allergies?	_____

Favorite treats? _____

Toys/games

Bubbles	_____
Glitter objects	_____
Spinning objects	_____
Cars	_____
Trains	_____
Play food	_____
Blocks	_____
Numbers	_____
Dinosaurs	_____
Play animals	_____
Magna-tiles	_____
Puzzles	_____
Matching games	_____
Play dough	_____
Stacking objects	_____
Board games	_____
Balloons	_____
Painting	_____
Balls	_____

Child 2_____

Edibles

Cookies	_____
Chips	_____
Pretzels	_____
M & Ms	_____
Popcorn	_____
Chocolate	_____
Marshmallows	_____
Any allergies?	_____

Favorite treats? _____

Toys/games

Bubbles	_____
Glitter objects	_____
Spinning objects	_____
Cars	_____
Trains	_____
Play food	_____
Blocks	_____
Numbers	_____
Dinosaurs	_____
Play animals	_____
Magna-tiles	_____
Puzzles	_____
Matching games	_____
Play dough	_____
Stacking objects	_____
Board games	_____
Balloons	_____
Painting	_____
Balls	_____

APPENDIX C

CHILD SUDS

10. I am exploding out of control.	
9. I am going to lose control soon.	
8. I am struggling.	
7. I am unhappy	
6. I am getting uncomfortable	
5. This is hard, but I am in control	
4. I am okay	
3. I am cool and collected	
2. I am relaxed and happy	
1. I am feeling great	

APPENDIX D

CAREGIVER SUDS

100 — Highest anxiety/distress that you have ever felt.

90 — Extremely anxious/distressed.

80 — Very anxious/distressed; can't concentrare. Physiological signs present.

70 — Quite anxious/distressed; interfering with functioning. Physiological signs may be present.

60 — Moderate-to-strong anxiety or distress.

50 — Moderate anxiety/distress; uncomfortable, but can continue to function.

40 — Mild-to-moderate anxiety or distress.

30 — Mild anxiety/distress; no interference with functioning.

20 — Minimal anxiety/distress.

10 — Alert and awake; concentrating well.

0 — No distress; totally relaxed.

APPENDIX E

CLINICAN FIDELITY

Participant ID: E   M   N
Observer:
Session:

Intervention Technique	+	-	n/a	Notes
Interventionist is prepared (materials, visuals, etc.)				
Interventionist reviews previous session				
Interventionist reviews previous homework task				
Interventionist builds rapport				
Interventionist introduces new concept				
Interventionist normalizes fear and anxiety				
Interventionist constructs/ reviews fear hierarchy				
Interventionist reviews FEAR steps				
Interventionist provides descriptive praise				
Interventionist assigns homework task				
Interventionist provides a preview of the next session				

Fear hierarchy isn't introduced until later sessions, so just indicate n/a.

CAREGIVER USE OF STRATEGIES DATA SHEET

Participant:
Session:
Observer:

Procedure	Observed	Not Observed	N/A
Provides choices for reward Presents small array of choices, tangible or activity but ideally something for them to do together at the end of the exposure task			

Obtains SUDS rating
       Presents emotional thermometer
       Physically orients thermometer to child
       Asks child to verbally state or physically point to their current emotional state
       If child has difficulty stating how they are feeling, caregiver can offer their observation of how the child might be feeling			

Reviews task Reminds child of what exposure task was decided upon between child and interventionist previously			

Reminds child of strategies
       reminding child of what they can do during the exposure like bossing back anxiety (e.g., "*You can't tell me what to do, worry! I'm gonna squish on you!*"),
       positive self-talk (e.g., "*I got this. I can do this even though I'm scared*",
       model the exposure (i.e., the caregiver actually does the exposure themselves),
       engage the child in conversation about what the child will approach rather than avoid.
       reminds child of past successes			

Creates guidelines/goals It is best to provide two options so the child can make a choice that will still align with adult expectations. -Example: "*How long do you think you should aim for? How about we try for three or five minutes?*"			
Gains assent "*Okay, so you're ready to do_____(fill in detail about exposure)?*"			
Coaches and models may assist with the exposure, do it alongside the child, or take turns (e.g. If child is anxious about uncertainty of whether item is sufficiently clean, the caregiver might model taking art items			

out of a wastebasket with some rubbish inside and if the child asks if the item is clean enough, the caregiver models acceptance of uncertainty by saying I don't know, probably not but I really want to use this marker on my drawing. Your turn.).			

Provides specific praise every 5-10 seconds
        descriptive praise at a minimum of once every 5-10 seconds
        (e.g. "*You did a great job practicing your deep breathing*",
        Non-example: "*Everything is fine, don't worry*")			

Obtains SUDS midway through task
        Presents emotional thermometer
        Physically orients thermometer to child
        Asks child to verbally state or physically point to their current emotional state
        If child has difficulty stating how they are feeling, caregiver can offer their observation of how the child might be feeling			

Ends task at agreed upon guidelines Same guidelines as stated previously			

Obtains final SUDS rating
        Presents emotional thermometer
        Physically orients thermometer to child
        Asks child to verbally state or physically point to their current emotional state
        If child has difficulty stating how they are feeling, caregiver can offer their observation of how the child might be feeling			

Provides reward to child Gives a small reward or token			

Debriefs with child about task
        asking a) How do you think that went?
        b) How did it feel?
        c) How do you feel now?
        d) What strategies did you use?
        e) What strategies were helpful?
        f) What could have been done differently or better?			

Provides praise and feedback
        descriptive praise for effort regardless of success
        ex. "I love how you tried to touch the slime"			

Excuses child from session/task
        asks the child to either exit the room or play in the same room independently
        gives a reward that was previously agreed upon at beginning of session			

Total Fidelity= Observed/Observed + Not Observed x 100			

CAREGIVER EXPOSURE STRATEGIES VISUAL AIDE

Step 1: Getting Set Up

Show your child a small array of **reward choices**.

Ask them to select what they want to earn at the end of the session.

"What are we going to earn for our hard work today?"

Write down or set aside their choice and move to the next step. *"Great choice! Let's see how you're feeling right now."*

If your child does not select a reward, move to step two. *"Okay, let's see how you're feeling right now."*

Show **the feelings thermometer** to your child. Make sure they are facing towards and looking at the thermometer. Say, *"Show me with your finger how you feel right now. Are you in the green, yellow, orange, or red zone?"*

If your child responds, repeat what they said. *"Okay, you're feeling like you're in the yellow zone at a 7."*

If your child doesn't respond or says they don't know, **wait five seconds.** Say, *"Think about how you are feeling. Show me with your finger how you feel right now. Are you in the green, yellow, orange, or red zone?*

If your child doesn't respond, notice their body language and **suggest how they might be feeling**. *"I'm noticing that your fists are clenched, and you are frowning. That usually tells me you are in the red zone. Do you think you're about an 8 or 9?"*

Step 2: Introducing the Task

Say, *"Today we are going to _____."*
Remind your child of their **strategies.**

"Remember, you can **boss anxiety back** and say,
'You can't tell me what to do, worry!'"

"Use your **positive self-talk**, like, 'I got this. I can do this even though I'm scared!'

"If I was doing this, this is what I would do… "

If your child **agrees to start** the exposure, reaffirm their assent.
"Okay, so you're ready to _____?"

If your child is **resisting,**

Create guidelines for the task with your child, providing two options.

"How long do you think we should aim for? Should we try three, or five minutes?"

Remind your child of their past successes.
"You can do hard things! Remember when you couldn't order food at the drive through but you worked on trying even though you were scared and now you do that all of the time."

Modify the task.
"Okay, you're not feeling ready to let me go to the kitchen while you're here with Stephanie, but would you be willing to let me step just outside the room with the door open?"

If your child does not agree to start the exposure task, the therapist will provide suggestions for moving forward.

Step 3: Starting the Task

Coach and model for your child during the task.

Mirror their feelings and model how you can continue with the task anyway.

"I'm not sure if this marker is completely clean, but I need this color so I am going to use it anyway! Your turn!"

Provide specific praise every 5-10 seconds.

Instead of general reassurance, like "don't worry,"

describe what they are doing:

"You are doing a great job of using your deep breathing! Wow!"

The exposure will end based upon the agreed guidelines.

Use the feelings thermometer to ask how your child is feeling after the exposure.

Step 4: Debriefing After the Exposure

**Provide a small reward and ask
your child about the exposure task.**

"How do you think that went?" "How did it feel?" "How do you feel now?" "What strategies did you use?" "What could we do differently next time?"

Provide Praise & Selected Reward

Praise your child for things you noticed they did well or their effort with the task and give them the earned reward.

Have them exit or play independently.

Let them know you will join them when you finish talking with the therapist.

Debrief with the therapist.

APPENDIX H

CAREGIVER SOCIAL VALIDITY

This intervention was beneficial to my child.

Very strongly agree   Strongly Agree   Agree   Neither agree   Disagree   Strongly disagree   Very strongly disagree
Nor disagree

The intervention helped my child manage their anxiety.

Very strongly agree   Strongly Agree   Agree   Neither agree   Disagree   Strongly disagree   Very strongly disagree
Nor disagree

This intervention helped my child problem solve their own behavior.

Very strongly agree   Strongly Agree   Agree   Neither agree   Disagree   Strongly disagree   Very strongly disagree
Nor disagree

This intervention helped my child be more aware of their thoughts, feelings, and actions.

Very strongly agree   Strongly Agree   Agree   Neither agree   Disagree   Strongly disagree   Very strongly disagree
Nor disagree

My child uses some of the skills that were taught in the program.

Very strongly agree   Strongly Agree   Agree   Neither agree   Disagree   Strongly disagree   Very strongly disagree
Nor disagree

This intervention addressed an important issue in our family.

Very strongly agree   Strongly Agree   Agree   Neither agree   Disagree   Strongly disagree   Very strongly disagree
Nor disagree

This intervention addressed what I hoped it would.

Very strongly agree   Strongly Agree   Agree   Neither agree   Disagree   Strongly disagree   Very strongly disagree
Nor disagree

Stephanie communicated well with us.

Very strongly agree   Strongly Agree   Agree   Neither agree   Disagree   Strongly disagree   Very strongly disagree
Nor disagree

Stephanie individualized components of the intervention for my child.

Very strongly agree   Strongly Agree   Agree   Neither agree   Disagree   Strongly disagree   Very strongly disagree
Nor disagree

Stephanie demonstrated good rapport with my child.

Very strongly agree   Strongly Agree   Agree   Neither agree   Disagree   Strongly disagree   Very strongly disagree
Nor disagree

My child enjoyed working with Stephanie.

| Very strongly agree | Strongly Agree | Agree | Neither agree Nor disagree | Disagree | Strongly disagree | Very strongly disagree |

I would participate in this intervention again.

| Very strongly agree | Strongly Agree | Agree | Neither agree Nor disagree | Disagree | Strongly disagree | Very strongly disagree |

I would work with Stephanie again.

| Very strongly agree | Strongly Agree | Agree | Neither agree Nor disagree | Disagree | Strongly disagree | Very strongly disagree |

I would recommend this intervention to other parents.

| Very strongly agree | Strongly Agree | Agree | Neither agree Nor disagree | Disagree | Strongly disagree | Very strongly disagree |

This program would be better in person rather than via Zoom.

| Very strongly agree | Strongly Agree | Agree | Neither agree Nor disagree | Disagree | Strongly disagree | Very strongly disagree |

Things I would change:
Things I would keep the same:

Other notes or thoughts:

CHILD SOCIAL VALIDITY

I enjoyed doing this program with Stephanie.

Very Strongly Agree	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Very Strongly Disagree
○	○	○	○	○	○	○

Stephanie helped me learn about feelings.

Very Strongly Agree	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Very Strongly Disagree
○	○	○	○	○	○	○

I learned ways to cope when I feel anxious.

Very Strongly Agree	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Very Strongly Disagree
○	○	○	○	○	○	○

Stephanie helped me learn how to keep my anxiety from getting too high.

Very Strongly Agree	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Very Strongly Disagree
○	○	○	○	○	○	○

This program was helpful to me.

Very Strongly Agree	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Very Strongly Disagree
○	○	○	○	○	○	○

I will use some of the strategies we learned.

Very Strongly Agree	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Very Strongly Disagree
○	○	○	○	○	○	○

I liked the Zoom backgrounds Stephanie used.

Very Strongly Agree	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Very Strongly Disagree
○	○	○	○	○	○	○

I liked the thermometer Stephanie made me.

Very Strongly Agree	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Very Strongly Disagree
○	○	○	○	○	○	○

The practice activities were helpful.

Very Strongly Agree	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Very Strongly Disagree
○	○	○	○	○	○	○

The rewards from Stephanie helped motivate me.

Very Strongly Agree	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Very Strongly Disagree
○	○	○	○	○	○	○

I would rather do this program in person instead of over Zoom.

Very Strongly Agree	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Very Strongly Disagree
○	○	○	○	○	○	○

I would work with Stephanie again.

Very Strongly Agree	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Very Strongly Disagree
○	○	○	○	○	○	○

I would do a program like this again.

Very Strongly Agree	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Very Strongly Disagree
○	○	○	○	○	○	○

Stephanie listened to me about my interests.

Very Strongly Agree	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Very Strongly Disagree
○	○	○	○	○	○	○

I was comfortable working with Stephanie.

Very Strongly Agree	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Very Strongly Disagree
○	○	○	○	○	○	○

Things I would keep the same:
Things I would change:
My favorite part was:
My least favorite part was:

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