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Evaluating Intensive Group Behavioral Treatment for Children with Selective Mutism

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FLORIDA INTERNATIONAL UNIVERSITY

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EVALUATING INTENSIVE GROUP BEHAVIORAL TREATMENT FOR

CHILDREN WITH SELECTIVE MUTISM

A dissertation submitted in partial fulfillment of

the requirements for the degree of

DOCTOR OF PHILOSOPHY

in

PSYCHOLOGY

by

Danielle Cornacchio

2019

To: Dean Michael R. Heithaus
       College of Arts, Sciences and Education

This dissertation, written by Danielle Cornacchio, and entitled Evaluating Intensive Group Behavioral Treatment for Children with Selective Mutism, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this dissertation and recommend that it be approved.

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Date of Defense: May 21, 2018

The dissertation of Danielle Cornacchio is approved.

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Dean Michael R. Heithaus
College of Arts, Sciences and Education

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Vice President for Research and Economic Development
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Florida International University, 2019

ABSTRACT OF THE DISSERTATION

EVALUATING INTENSIVE GROUP BEHAVIORAL TREATMENT FOR

CHILDREN WITH SELECTIVE MUTISM

by

Danielle Cornacchio

Florida International University, 2019

Miami, Florida

Professor Jonathan Comer, Major Professor

Selective mutism (SM), an anxiety disorder most commonly presenting in childhood, is characterized by a failure to speak in certain social situations. Due to its unique presentation (e.g., lack of speech) and low prevalence, expertise in the treatment of SM is scarce, leaving many affected families without access to care. Intensive Group Behavioral Treatment (IGBT) allows families to travel to a specialty clinic to receive a course of treatment in a single week. This study is the first to evaluate IGBT for SM in a randomized controlled trial. 29 children aged 5-9 with SM were randomized to immediate IGBT or to a 4-week waitlist with psychoeducational resources (WLP). Analyses demonstrated high family satisfaction with the program and low barriers to treatment participation. At Week 4, 50% of the immediate IGBT group and 0% of the WLP group were classified as "clinical responders." There was a significant Time $\times$ Group interaction effect on social anxiety severity, verbal behavior in social situations, and global functioning. Time $\times$ Group interaction effects were not observed for IE-rated SM severity, verbal behavior at home, or overall anxiety. Structured behavioral

observations revealed significant pre-to-post IGBT improvements in child verbal behavior, and parental positive attention, but not in parental provision of opportunities for child to respond to questions. Across the days of the program there were significant positive changes in most domains of observed child verbal behavior. School-year follow-up assessments (conducted 8 weeks into the following school year) revealed improvements in SM severity, social anxiety severity, global functioning, overall anxiety, and verbal behavior in home and social settings. Post-IGBT school year teachers rated less impairment and more verbal behavior relative to teachers in the pre-IGBT school year. Findings provide the first empirical support for the efficacy of IGBT for children with SM. Half of IGBT-treated youth evidence significant treatment response at Week 4, with more significant improvements unfolding into the following academic school year. Further study is needed to examine mechanisms of IGBT response, as well as other innovative treatment methods for children with SM to determine which treatment formats work best for which affected children.

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CHAPTER 1. INTRODUCTION

1.1 Selective Mutism (SM)

Although the past several decades have witnessed considerable advances in the development, evaluation, and dissemination of research-supported treatments for many child mental health problems (Weisz et al., 2017), tremendous gaps persist between treatments in experimental settings and routine services broadly available to the majority of youth in need. Traditional barriers to care—including regional professional workforce shortages in mental health care and inadequate training for a majority of frontline providers—are particularly problematic with regard to low base rate disorders and complex mental health conditions requiring specialized treatment methods (Comer & Barlow, 2014). Although such low base rate conditions requiring specialty treatments each affect a relatively low proportion of the population, they nonetheless collectively affect millions of children each year. The development and evaluation of innovative treatment formats that can overcome traditional barriers to care are critical for meaningfully addressing the needs of youth with complex and low base rate conditions and for expanding the reach of needed care for difficult-to-treat youth.

Selective mutism (SM) is one such low base rate disorder, affecting less than 2% of children, with some research indicating that prevalence estimates are rising with improved identification and awareness (Bergman et al., 2002; Carlson et al., 1994; Elizur & Perednik, 2003; Muris & Ollendick, 2015; Steinhausen & Juzi, 1996). SM is characterized by a failure to speak in certain social situations

(e.g., school) despite fluent speech in more familiar settings (e.g., home). The most recent iteration of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013) classifies SM as an anxiety disorder. Prior to its current conceptualization as an anxiety disorder, SM was classified in DSM-IV (American Psychiatric Association, 2000) as a disorder of childhood; in DSM-III (American Psychiatric Association, 1980) it was called "elective" mutism, which suggested the nature of the problem to be simply oppositional. SM's most current diagnostic classification as an anxiety disorder is well supported by a growing literature highlighting the nature of SM and its strong links with other anxiety problems.

Recent work has questioned whether SM is truly its own diagnostic entity, or whether it is simply a severe subtype or developmental variant of social anxiety disorder (Bogels et al., 2010; Martinez et al., 2015). In some ways, SM presents very similarly to social anxiety disorder, with both sets of symptoms related exclusively to social situations. For this reason, some argue that SM by nature is a problem of social anxiety (e.g., Sharp, Sherman, & Gross, 2007). Further research in support of SM as a variant, or extreme end of the spectrum, of social anxiety disorder has demonstrated familial links between SM and social anxiety disorder (Chavira, Shipon-Blum, Hitchcok, Cohan & Stein, 2007). It has also been theorized that SM is an early-onset presentation of social anxiety disorder, given its early mean age of onset, around age 5 (Bergman, Piacentini & McCracken, 2002; Martinez et al., 2015), compared to social anxiety disorder,

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which typically onsets in the teenage years (Grant et al., 2005; Kessler et al., 2005).

Other research highlights important clinical differences between social anxiety disorder and SM (e.g., Yeganeh, Beidel, Turner, Pina & Silverman, 2003). Young and colleagues (2012) examined psychophysiological factors in children with SM, social anxiety and no anxiety, and found that despite SM youth being more severe and impaired socially, youth with SM showed less psychophysiological arousal than both children with social anxiety and children with no anxiety. Such findings indicate that youth with SM may have a relatively high level of regulatory control, which may be an adaptive avoidance strategy.

What *is* agreed upon in the literature is the high co-occurrence, up to 100%, of social anxiety in youth with SM (e.g., Bergman, Keller, Piacentini & Bergman, 2008; Bergman, Gonzalez, Piacentini & Keller, 2013; Black & Uhde, 1995), indicating a need for treatment targeting SM to include components that target social anxiety as well.

The proper classification and definition of SM has faced other complex diagnostic challenges. Children with SM appear to many as being *unable* to speak, rather than reluctant, or anxious, to speak. Further, whereas children with other presentations of anxiety often appear dysregulated (e.g., fidgety, avoiding eye contact, hiding), children with SM may appear highly regulated, as documented in aforementioned literature; to untrained adults these children may appear non-anxious and quite composed. Due to this unique presentation, and the long history of misunderstanding SM and its etiology, many affected youth

have historically been misdiagnosed as having language disorders, developmental delay, intellectual disabilities and/or autism-spectrum disorder (Klein et al., 2013). Because of the high rates of misdiagnosis coupled with its relatively low prevalence, quality empirical work on SM has been limited. Research that has been conducted documents concerning trajectories and links with other forms of psychopathology. Although previous research indicates that over half of SM cases may remit over time (58% remission over 13 years), the same research documents long-term psychopathology evident in untreated SM: "the increased rates of any psychiatric disorder…point to SM being an indicator of additional and perhaps underlying psychopathology with a more protracted course than the mere SM symptoms of reluctance to speak in specific settings" (p. 755; Steinhausen et al., 2006).

Other empirical work has examined the impact that failure to speak in certain situations, especially in the school setting, has on academic and social functioning. SM often leaves children without appropriate services in the school setting; the child's failure to verbalize often leads teachers and other school personnel to underestimate affected children's academic abilities. Indeed, research shows that professionally administered tests of receptive and expressive language abilities underestimate the capabilities of children with SM (Klein et al., 2013). Moreover, SM has been found to be associated with considerable internalizing problems and deficits in social functioning (Carbone et al., 2010; Scott & Beidel, 2011).

1.2 Treating SM: A Growing Evidence Base and Unique Challenges

A very small, but growing, body of research has begun to examine how to most effectively treat SM and related impairments, with cognitive behavioral treatment (CBT) strategies showing the strongest preliminary support (see for reviews: Cohan et al., 2006; Muris & Ollendick, 2015). Prior to 2013, the majority of SM treatment-studies were case studies. To date, only a handful of controlled evaluations have been conducted. In the first randomized controlled trial of a psychosocial intervention, Bergman and colleagues (2013) demonstrated the efficacy of a 6-month weekly outpatient CBT intervention for children with SM that involved parents, children, and their teachers. Results found a 67% diagnostic remission rate and 75% treatment response rate in their CBT program. A second randomized trial of a weekly behavioral intervention for children with SM employed "defocused communication" techniques, where joint attention was used to promote verbalization, rather than direct focus on the child's speech (Oerbeck, Stein, Wentzel-Larsen, Langrud, & Kristensen, 2014). Oerbeck and colleagues' 21-session intervention was implemented in the home and school settings. This study found improvement in parent- and teacher-reported speaking behavior.

Importantly, both Bergman and colleagues' (2013) and Oerbeck and colleagues' (2014) studies found, using a 3-month waitlist control group, that SM symptoms did not remit over this amount of time. As Bergman and colleagues (2013) note, 3 months is a considerable amount of the academic school year, underscoring the need for immediate treatment. However, a weekly intervention

program that takes between a quarter and a half a year to complete may also occupy a considerable amount of the academic year during which time symptoms may still be interfering. Indeed, there may be a role for more efficient SM treatment formats that are shorter in length, and that can be completed in the summer months, when school is not in session. Furthermore, whereas Bergman and colleagues' (2013) weekly outpatient treatment program involves school coordination and assigns practices in situations related to school, children with SM may need a treatment that more intensely immerses them in a school environment, given that the majority of children with SM display greatest impairments in the school setting (Bergman et al., 2008).

As noted, SM has been increasingly linked to social anxiety disorder in recent years, with some research conceptualizing SM as a developmental variant of social anxiety disorder (Bogels et al. 2010; Martinez et al., 2015). Accordingly, treatment components for social anxiety disorder may also effectively reduce symptoms of SM. Indeed, some initial research and case studies have documented positive effects of treatments for social anxiety on SM (Carlson, Mitchell & Segool, 2008; Fisak, Oliveros & Ehrenreich, 2006; Manassis & Tannock, 2008; Suveg, Comer, Furr, & Kendall, 2006). However, features of SM pose as unique barriers to the therapy process and can limit the acceptability and effectiveness of standard social anxiety treatments. The most salient challenge is that children with SM typically do not initially speak to their therapist; one of the very reasons parents present for treatment is because they have exhausted their efforts in attempting to have their children speak to new adults. Accordingly,

specific procedures must be carefully implemented to insure that affected children become comfortable and verbalize to their therapist, and that therapists are not requiring or prompting children with SM to speak in treatment sessions before they are ready to do so. This requires a level of specialized training that therapists with expertise in treatment for other types of anxiety do not automatically have.

Further, because SM is rare, and can present uniquely (e.g., lack of speech/failure to express anxiety), many mental health care providers lack any direct experience in identifying and treating it. This leaves many families, especially those in parts of the country with limited access to specialty clinics, without effective treatment options. As is the case for many low base rate conditions requiring specialized treatment methods (see Comer & Barlow, 2014), the majority of SM specialty centers are concentrated in major metropolitan regions or academic hubs.

1.3 Intensive Group Behavioral Treatment (IGBT): A Promising, Increasingly Popular, and Unstudied Approach to Treating SM

Given problems in the acceptability and accessibility of SM treatment options—including few supported treatment approaches and limited regional expertise in SM—in recent years Intensive Group Behavioral Treatment (IGBT) formats have grown in popularity. IGBT is a 5-day, 38-hour intensive treatment program occurring in the summer months when children are not in school. IGBT was designed for school-aged children under the age of 10 and models a school setting, the very setting in which children with SM have the most impairing

symptoms. As is consistent with quality CBT for child anxiety, exposure-based activities comprise the majority of the treatment day, with added psychoeducation, cognitive components and parent training. The main goal of IGBT is to improve children's speech in school-like and social settings and provide affected children and their parents with skills to generalize treatment gains in their own environments after completing the abbreviated treatment program.

Because IGBT for SM provides a full course of intervention in a condensed period of time (e.g., 1 week), it allows families dwelling in regions lacking local SM expertise to receive expert care at a specialty clinic within a relatively shortened time frame. Destination summer intensive treatment programs have shown great success for treating a range of childhood problems (e.g., Fabiano et al., 2014; Pelham & Hoza, 1996), and intensive CBT programs, have shown particular promise for treating child anxiety disorders (e.g., Ehrenreich & Santucci, 2009; Gallo et al., 2014; Ollendick, 2014). IGBT for SM has quickly become a common clinical referral for youth with SM, has gained increasing enthusiasm and popular media attention (e.g., Petersen, 2015; Saint Louis, 2015), and has shown preliminary promise in reducing symptoms of SM (Carpenter et al., 2014). However, to date there has not been a controlled evaluation of IGBT for childhood SM. The current study is the first to empirically evaluate the potential of summer IGBT as an innovative treatment format for efficiently delivering expert care to children with SM regardless of their proximity

to an SM specialty center and regardless of their ability to sustain participation in weekly treatment.

IGBT for SM, initially developed by Steven Kurtz, Ph.D. ABPP and colleagues, has been successfully implemented in the past decade across an increasing number of SM specialty centers (e.g., NYC, Boston, Miami, Chicago). Since its inception, the program has been identified in the literature as a potentially promising intervention for SM with the ability to overcome many of the traditional barriers to quality SM care (Carpenter et al., 2014), but controlled evaluations are needed to evaluate the effectiveness of IGBT.

This waitlist-controlled pilot evaluation is the first to examine IGBT for SM in a controlled fashion, and followed treated children from baseline (Week 0) through Week 4, and then through 8 weeks into the following school year in order to examine the endurance and generalizability of gains. A multi-informant, multi-modal (i.e., parent-report, teacher-report, therapist-report, masked independent evaluator, and behavioral observation) assessment strategy was utilized.

1.4 Hypotheses

This study entailed a pilot randomized waitlist-controlled trial evaluating 5-day summer IGBT for children with SM (ages 5-9; N=29). Structured behavioral observations were collected throughout treatment. Masked independent evaluators (IEs) assessed families at Week 4, and gains were further evaluated 8 weeks into the following academic year (M = 4.01 months from baseline assessment).

1) **Feasibility and satisfaction.** It was hypothesized that the IGBT drop-out rate would be <20%, the daily attendance rate would be >85%, parents would be overall highly satisfied with IGBT and report low barriers to treatment participation. It was further hypothesized that IGBT staff would be at least 80% adherent to the treatment skills.

2) **Initial treatment response.** It was hypothesized that at Week 4, parent-rated SM symptoms and overall anxiety, as well as masked IE-rated SM severity, social anxiety severity, and global functioning, would show significantly greater improvement among IGBT-treated youth, relative to waitlist youth. Additionally, it was hypothesized that children's verbal behavior (as measured via structured behavioral observations) would show daily improvement throughout the week of IGBT.

3) **Maintenance of treatment response**. It was hypothesized that IGBT-treated children would continue to display significantly reduced SM and anxiety symptoms 8 weeks into the following school year as measured IE diagnostic assessment, by teacher-report of verbal behavior, and by parent-report of verbal behavior, anxiety, and functioning. Further, it was hypothesized that children would display improved overall functioning in the school setting, as measured by teacher-report of academic/school functioning 8 weeks into the following school year. Exploratory descriptive analyses examined the frequency with which

parents implemented the skills they learned throughout treatment between Week 4 and the school year follow-up.

4) **Mechanisms of treatment response.** It was hypothesized that parental skill usage would positively influence the trajectory of improvement in outcomes into the following school year, and improvements would be significantly weaker among parents who used less of the skills learned in treatment across the follow-up interval.

CHAPTER 2. METHOD

2.1 Participants

Participants were 29 children between the ages of 5 and 9 (M = 6.6, SD = 1.3), and their parents, seeking services for SM at the FIU Center for Children and Families. Families were typically referred to the FIU SM Program by other programs or professionals in the field, their school, or by reading about the program online or in national media coverage of the program (e.g., Saint Louis, 2015). For study eligibility, children needed to meet DSM-5 criteria for SM, and were excluded if: (a) they were identified as having any mental health condition considerably more impairing than SM; or (b) they were nonverbal with both of their parents. For generalizability, children with comorbid anxiety disorders were included. Further, children taking medication for anxiety were also included in the study as long as they were on a stable dose (i.e., no starting/stopping medication, no dose changes) for at least 6 weeks prior to the baseline assessment and the families committed to remain on this stable dose through the Week 4 assessment. All families meeting the unrestrictive inclusion criteria were included, regardless of their proximity to our clinic. Half of the sample (i.e., 51.7%) was >3 hours driving distance from the treatment clinic.

2.2 Experimental procedures

Figure 1 presents a flow of study participants through all phases of the study. Several assessments and study procedures were conducted via remote mechanisms (e.g., phone), given the high number of interested families from out of state or >3 hour travel distance to the clinic. Phone screens, consent, and

initial assessment procedures (Intake assessment) were conducted during the school year prior to the treatment program on a rolling basis. A brief phone screen for interested families was conducted by the PI and authorized volunteers to determine likelihood of research eligibility and to describe study procedures. Informed consent was obtained from potentially eligible families interested in participating in the study.

For the Intake assessment, consented parents completed a 2-hour semi-structured diagnostic interview with a therapist via telephone to determine the presence and severity of various anxiety, depressive, and behavioral disorders. Parents completed a battery of questionnaires online (via Qualtrics) and the eligible child's main teacher concurrently filled out a brief (~10 min) battery of questionnaires online (via Qualtrics) regarding academic and social functioning in the classroom. Upon completion of all forms and diagnostic assessment procedures, eligibility was determined. Eligible families were randomized to immediate IGBT (IGBT) or to a 4-week waitlist with psychoeducational materials (WLP).

Up to 3 weeks prior to the start of IGBT, all participants completed a baseline assessment (1-2 hour semi-structured diagnostic interview with a therapist via phone, and a battery of online questionnaires). On the first day of the immediate IGBT program, WLP parents were sent psychoeducational materials about SM.

Prior to the start of IGBT, participants completed a structured behavioral observation of their verbal behavior with parents and with a new adult.

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Subsequently, "lead-in" sessions were conducted to ensure children were speaking to at least 2 adult counselors before participating in the group program. These individual lead-in sessions consisted of a therapist utilizing stimulus fading, shaping, and reinforcement systems to fade a new adult (i.e., IGBT staff member) into the child's play and interactions and eventually fade the child's parent out of the interaction. Children participated in structured behavioral observations on a daily basis during IGBT as well as immediately following the treatment program.

For all families (IGBT and WLP), the Week 4 assessment (roughly 4 weeks from Baseline) consisted of a 1-2 hour semi-structured diagnostic interview conducted by an IE masked to each family's treatment condition, and a battery of questionnaires online. All parents were compensated with a $40 gift card for completion of Week 4 assessment procedures. WLP families were offered the opportunity to participate in IGBT after their Week 4 assessment. WLP families participating in IGBT after their Week 4 assessment participated in another assessment 2 weeks following completion of treatment. WLP families were compensated with a second $40 gift card for completion of this post-treatment assessment.

Participating parents were again contacted 8 weeks into the following school year (M = 3.42 months following treatment) to complete a school-year follow-up (SYF), which included a diagnostic interview via phone and a follow-up battery of questionnaires. Parents received another $40 gift card for completion of SYF assessment procedures. The child's main teacher of the second

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academic school year was also contacted 8 weeks into the school year to complete a brief (~10 min) battery of questionnaires online. Teachers received a $15 gift card upon completion of the online questionnaires.

2.3 Treatment program

IGBT entailed 5 consecutive days of 6-8-hour daily treatment: Monday through Friday child group treatment was held from 9am to 3pm, and Monday through Thursday group parent training sessions were held from 3pm to 5pm. Each IGBT classroom contained roughly 10 children of similar ages. Immediate IGBT youth (n=14) participated in the June treatment session, and WLP youth (n=15) participated in the July treatment session held 4 weeks later. The June and July treatment sessions included additional treatment participants (n=18) who were not participating in research (i.e., did not sign study consents, were not randomized to one of the two treatment sessions, and did not complete study assessments), but met the same inclusion criteria as study participants. In the June treatment session (during which immediate IGBT youth participated), nine children were placed in a classroom for children aged 6 years and below, and twelve children were placed in a classroom for children aged 6-9 years. In the July treatment session (during which WLP were offered the opportunity to receive IGBT after their Week 4 assessment) eight children were placed in a classroom for children aged 3-5 years, eight children were placed in a classroom for children aged 5-7 years, and eight children were placed in a classroom for children aged 7-9.

IGBT entailed a ratio of one counselor (i.e., trained volunteer or therapist) to one child, and at least one masters-level therapist supervised each classroom under the higher supervision of a licensed clinical psychologist. To approximate a true classroom setting, the IGBT daily structure included activities typical of an early child school setting (e.g., daily morning meeting, lunch, recess, art etc.). Throughout the week, exposure-based strategies focused on verbalizations and social situations were woven into the classroom activities in a graduated fashion, with exposure demands becoming more challenging each day. For example, Day 4 of IGBT included "show & tell," which had children bring items from home and verbally share information about those items in front of their classroom and parents. Figure 2 presents a sample IGBT schedule.

Throughout each day, consistent with CBT principles, structured exposures to various school-based verbalization situations are conducted (e.g., asking to go to the bathroom, speaking to peers at recess), utilizing the following techniques: reinforcement systems (rewarding children with tangible reinforcements for target behaviors, such as verbalizing), prompting (giving child cues to use speech in certain situations), shaping (gradually training the child to use speech by breaking down target situations into multiple steps in order of how challenging they will be for the child to conquer), stimulus fading (gradually introducing new individuals to promote child speech with new people), graduated exposure (children's anxiety gradually reduced with each repeated exposure to feared situation), social skills training (teaching children appropriate social skills with other peers and adults), cognitive strategies (providing psychoeducation

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about anxiety, teaching children how to identify maladaptive thinking patterns and more adaptive coping thoughts, relaxation training), and modeling (having other children and adults display appropriate, adaptive verbal behavior for target children to learn from).

Staff were trained to use two specific sets of skills to interact with and elicit verbal behavior from children. The first set of skills—called Child Directed Interaction (CDI) skills—were adapted from Parent-Child Interaction Therapy (PCIT; Funderburk & Eyberg, 2011) and were used to encourage building a positive relationship between adults and children and reinforce appropriate and positive behavior, including participating, interacting and incidental and/or spontaneous verbal behavior. During CDI, IGBT therapists were instructed to refrain from directly prompting children in any way to verbalize, but to provide social reinforcements (e.g., therapist praises and reflections) for all instances of incidental and/or spontaneous child verbal behavior. Specific CDI skills include labeled praises (praising child's appropriate behavior; e.g., "thank you for playing with me"), reflections (neutrally reflecting any verbalizations; e.g., if the child says "I like blue," adult says "you said you like blue"), and behavior descriptions (describing child's appropriate behaviors; e.g., "you are putting a red block on top of the tower"). Although CDI has therapists use these skills in response to all appropriate child behavior, in IGBT particular focus is given to the use of CDI skills to reinforce incidental and/or spontaneous child verbal behavior (e.g., labeled praises such as "Great job using your loud voice!" or "Thanks for using your words to tell me which candy you want!"). In addition, during CDI therapists

are to avoid questions (e.g., "how are you this morning?") and commands ("you should put the green block on next" or "please tell me what day it is") so as not to pressure the child to speak and to allow the child to lead the play however he/she chooses.

Across the week, CDI skills are interwoven throughout the staff's time interacting with the child, but these skills are used exclusively when a staff member initially meets a child, so as to build a positive relationship without placing any unnecessary pressure on the child to speak/interact at first. An in-depth description of CDI skills outside of the context of SM treatment can be found elsewhere (Funderburk & Eyberg, 2011).

The second set of skills—called Verbal Directed Interaction (VDI) skills—were developed by Kurtz and colleagues to directly prompt for and reinforce child verbalizations in ways that optimize the likelihood of eliciting a verbal response. In VDI, IGBT staff are taught to refrain from asking yes/no questions (which can be answered non-verbally with a head nod), questions that can be answered with the point of a finger or a gesture (e.g., "Which of these two toys do you want to play with?"), or open-ended questions that may confuse or overwhelm children (e.g., "What kinds of things do you like?"). When directly eliciting speech from the child, staff are trained to ask children forced-choice questions (e.g., "Do you want to play with blocks or coloring?") and/or give direct commands to respond, leaving ample opportunity for the child to respond (i.e., at least 5 seconds), and to follow through with reinforcement (e.g., labeled praise, sticker) or re-prompting if the child is non-verbal or gestures their response. Children are graduated to

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more challenging question types (e.g., open-ended) as they progress through treatment.

Parents participated in 2 hours of group parent training 4 of the 5 treatment days in which parents were taught and role-played the above-described interaction strategies for optimizing positive adult-child relationships (i.e., CDI skills) and eliciting verbal behavior from their child (i.e., VDI skills). During these group parent training sessions, parents were also coached in-vivo by a therapist in the implementation of these skills in real-life situations (e.g., ordering from a store, asking to call a parent from the school main office).

2.4 Staff Training & Fidelity Measurement

Program staff consisted of a licensed clinical psychologist, multiple doctoral or masters-level student clinicians, and undergraduate or post-baccalaureate volunteers. All staff underwent a 6 hour didactic training led by the licensed clinical psychologist, followed by a second day of training during which they observed and participated in a single-day 6 hour IGBT booster session with children with SM. Staff then participated in weekly 1.5 hour workshops for 5 weeks to further review and role play IGBT skills and strategies. Before being paired with a child and participating in the treatment program, each treatment staff member was required to demonstrate proficient CDI and VDI skill use according to a coding system developed for the program, adapted from PCIT coding criteria. Mastery criteria for CDI included using at least 5 behavior descriptions, 5 reflections, and 5 labeled praises, and 2 or less questions or commands in a 2.5 minute timeframe. Mastery criteria for VDI included using

80% effective question/prompt sequences in a 2.5 minute timeframe (i.e., using an effective prompt to speak—such as a forced-choice question or a direct command to verbalize—waiting 5 seconds for child to respond, and then reflecting/praising if child answers, or following through with additional effective prompts and opportunity to respond if child does not answer).

IGBT staff members were each video recorded (and later their skills were coded) once per treatment week for 2.5 minutes to assess adherence to IGBT treatment skills. Specifically, during this 2.5 minute period of time, staff were interacting one-on-one with a child playing a game of the child's choice. Staff verbalizations were tallied (e.g., if staff member said "great job coloring," a tally mark for "labeled praise" would be recorded). Staff were expected to have at least 80% of their verbalizations to the child in that 2.5 minute time frame to be a positive skill (labeled praise, behavior description, reflection, effective question/prompt sequence) and less than 20% of their verbalizations to be non-skill verbalizations (command to do anything other than speak; inappropriate question, such as a yes/no question; ineffective question sequence, such as asking child a forced choice question but not following verbal child response with a labeled praise or reflection) in order to meet adherence criteria.

2.5 Assessments

A multi-informant, multi-modal (i.e., parent-report, teacher-report, therapist-report, masked IE, behavioral observation) assessment strategy was utilized. Figure 3 presents an overview of all assessments and measures included in this study, and the time points at which they were administered.

2.5.1 Diagnostic information and severity. Child diagnoses were determined using the *Anxiety Disorders Interview Schedule for Children-Parent Version* (ADIS-P; Silverman & Albano, 1997), a widely used semi-structured diagnostic interview administered to parents to assess present-state DSM-based internalizing and externalizing disorders. The ADIS-P has demonstrated strong reliability, validity, and sensitivity to change (Silverman & Ollendick, 2005; Wood, Piacentini, Bergman, McCracken & Barrios, 2002). Diagnoses are assigned an IE-rated clinical severity rating (CSR) ranging from 0 (no symptoms) to 8 (extremely severe symptoms). CSRs ≥4 indicate that diagnostic criteria for a particular disorder has been met. At the intake assessment, parents were administered the full ADIS. At the baseline, Week 4, and SYF assessments, parents were re-administered the diagnostic sections that yielded baseline CSRs ≥3. Week 4 interviews were conducted by IEs masked to whether youth participated in IGBT or WLP.

2.5.2 Treatment responder status. The *Clinical Global Impression-Improvement Scale* (CGI-I; Guy & Bonato, 1970) is a widely used generic clinician-rated measure of treatment-related change. The CGI-I rates improvement of illness on a 7-point Likert scale ranging from 1 (very much improved) to 7 (very much worse), where 4 represents "no change." Consistent with the child literature (e.g., Comer et al., 2017; Walkup et al., 2008), children assigned a CGI-I score of 1 ("very much improved") or 2 ("much improved") were classified as "treatment responders." At Week 4, CGI-I scores were assigned by IEs masked to whether youth participated in IGBT or WLP.

2.5.3 Child SM symptoms and verbal behavior. SM symptoms were assessed using the *Selective Mutism Questionnaire* (SMQ; Bergman et al., 2008), a 23-item parent-report measure of SM symptoms and verbal behavior across different settings. Items are rated on a 4-point Likert-style scale ranging from 0 (never) to 3 (always). The SMQ Home and SMQ Social subscales were used for the purpose of this study; the SMQ School subscale was omitted due to parents' inability to rate verbal behavior at school during the summer months. The SMQ has demonstrated good reliability, validity, and sensitivity to treatment-related change (Bergman et al., 2008; Bergman et al., 2013; Letamendi et al., 2008). Internal consistency of the SMQ in the present sample: α = .80.

The *School Speech Questionnaire* (SSQ; Bergman et al., 2002) is a 6-item teacher-report of child verbal behavior in the school setting, adapted from the SMQ. Items are also rated on a 4-point Likert-style scale ranging from 0 (never) to 3 (always). The SSQ has demonstrated acceptable reliability and sensitivity to treatment-related change (Bergman et al., 2002; Bergman et al., 2013; Oerbeck et al., 2014). The SSQ was administered to teachers during the pre-treatment school year and at the SYF assessment. Internal consistency in the present sample: α = .81.

SM behaviors were also measured observationally pre- and post-treatment using the *Selective Mutism Interaction Coding System* (SMICS; Kurtz et al., 2007), a structured behavioral observation task. The SMICS assesses child verbal behavior (i.e., verbal response, no verbal response) in response to parent questions when parent and child are playing alone, verbal behavior in

response to parent questions when a new adult is present in the room sitting off to the side and not interacting in parent-child play, and response to questions (i.e., verbal response, no verbal response) when the new adult approaches the child and asks a forced-choice question. Further, the SMICS assesses for specific negative parent behaviors in the context of expected child speech, such as leaving insufficient opportunity for the child to respond to a question, and specific positive parent behaviors, such as labeled praises. The SMICS has demonstrated good inter-rater reliability (Kurtz et al., 2007; Carpenter et al., 2014), and good convergent validity (Cornacchio et al., in preparation).

Children's speaking behavior was also assessed using the *Verbal Output during Interactions in the Classroom Environment* Coding System (VOICE; Cornacchio et al., in preparation), a structured coding system developed specifically for IGBT to assess child verbal behavior in the classroom setting. Each child is asked 3 questions in front of the other children during the morning, and 2 questions with a new adult in a one-on-one context the afternoon. VOICE coders tally how many questions the child answers in the peer group setting and the one-on-one setting with the unfamiliar adult, the amount of prompts needed to elicit speech, and counts of spontaneous child speech in the one-on-one setting. The VOICE task was implemented each day of the treatment program. The VOICE has demonstrated good convergent validity (Cornacchio et al., in preparation).

2.5.4 Child anxiety. *The Child Behavior Checklist* (CBCL; Achenbach & Rescorla, 2001) is a standardized parent-report measure assessing behavioral

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and emotional problems in children. Parents rate each item on a 3-point Likert-style scale ranging from 0 (not true) to 2 (very true or often true). Raw scores are normed by age and sex to yield subscale T-scores reflecting a range of psychopathology domains. For the purposes of the present study, CBCL Anxiety Problems T-scores were used to measure overall child anxiety. Depending on the age of the child, parents completed the CBCL 1.5-5 (Achenbach & Rescorla, 2000; for children below the age of 6) or the CBCL 6-18 (Achenbach & Rescorla, 2001; for children ages 6 and above). The Anxiety Problems subscale of the CBCL has demonstrated strong reliability and validity in previous literature (e.g., Achenbach, Dumenci, & Rescorla, 2003; Nakamura, Ebesutani, Bernstein & Chorpita, 2009). In the present sample, internal consistency was excellent for the CBCL 1.5-5 Anxiety Problems subscale (Cronbach's α = .90) and acceptable in the CBCL 6-18 Anxiety Problems subscale (Cronbach's α = .79)

2.5.5 Global functioning. Overall functioning was measured using the *Children's Global Assessment Scale* (CGAS; Shaffer et al., 1983). The CGAS is a widely used clinician-rated measure rating global child functioning, impairment, and life disturbance on a scale of 0 to 100, with lower scores indicating greater functional impairments and higher scores indicating better functioning. The CGAS has been successfully used with child populations in this age range (e.g., Comer et al., 2012; Comer et al., 2014). CGAS scores at Week 4 were assigned by IEs masked to whether youth were in IGBT or WLP.

2.5.6 School/academic impairment. The *Impairment Rating Scale* (IRS; Fabiano et al., 2006) teacher-version was used to measure child impairment and

academic functioning as a function of their current problem (i.e., SM) in the school setting. The IRS was originally developed to measure impairment in youth with attention deficit hyperactivity disorder, however items are worded non-specifically so that teachers can report on the child's "problem" in general. Sample items include "How does this child's problems affect his or her relationship with other children?" and "How does this child's problems affect his or her academic progress?" The 8-item measure has demonstrated good concurrent, convergent, and discriminant validity. Items are rated on a 7-point Likert-style scale ranging from 0 (No Problem) to 6 (Extreme Problem). The IRS has demonstrated good reliability and validity (Fabiano et al., 2006). Internal consistency in the present sample: $\alpha = .77$.

2.5.7 Treatment satisfaction. Parent satisfaction was measured using the *Client Satisfaction Questionnaire* (CSQ; Larsen et al., 1979), a frequently used measure of satisfaction with treatment services. Sample items include "How satisfied are you with the amount of help you received?" and "Have the services you received helped you to deal more effectively with your problem?" The CSQ contains 8-items, each rated on a 4-point Likert-style scale, and has demonstrated good validity with a variety of clinical populations (Larsen, Attkisson, Hargreaves, & Nguyen, 1979; Atkisson & Zwick, 1982), including parents of children with mental health needs (Byalin, 1993). Internal consistency in the present sample: $\alpha = .69$.

2.5.8 Barriers to treatment participation. Barriers to treatment participation were measured using the *Barriers to Treatment Participation Scale*

(BTPS; Kazdin et al., 1997), a 58-item parent-report measure assessing how much various potential barriers were a problem for parents participating in treatment. Sample items include "I felt that treatment cost too much," "Treatment was in conflict with another of my activities (classes, job, friends)," and "Information in the session and handouts seemed confusing." Items are rated on a 5-point Likert-style scale ranging from 1 (never a problem) to 5 (very often a problem). Four subscales are generated from the BTPS: Stressors and obstacles that compete with treatment, Treatment demands and issues, Perceived relevance of treatment, and Relationship with the therapist. Mean subscale scores and total score range from 1 to 5. The BTPS has demonstrated good reliability and validity (Colonna-Pydyn, Giesfield, & Greeno, 2007; Kazdinet al., 1997). Internal consistency in the present sample: $\alpha = .62$.

2.5.9 Costs incurred by treated family. A brief parent-report measure designed for the purpose of this study, *Costs Incurred*, was used to assess the financial burden incurred by each family as a consequence of participation in IGBT (e.g., travel costs, lodging costs, income lost as a result of parent(s) taking time off of work to participate).

2.5.10 Service use during longer follow-up interval. A measure developed for the purpose of this study, *Recent Service Use,* asked parents at the SYF assessment about whether the child had received any mental health services since the Week 4 assessment, which services, and at what frequency.

2.5.11 Parental practice. Parental use of skills and treatment strategies were measured using a measure developed for the purpose of this study,

Parental Practice. This 5-item measure asked parents at the SYF assessment the frequency at which they were using different skills and strategies. Items are rated on a 5-point Likert-style scale (1: "Not at all"; 2: "A couple of times"; 3: "About every other day or every couple days"; 4: "Pretty often or almost every day"; 5: "Every day"). Sample items include "How often did you give your child a specific reward, prize, or reinforcement (not including praises) for speaking or interacting with others?" and "How often did you set up an exposure or practice ahead of time for your child to speak or interact with others?" (See Table 7 for all items).

2.6 Data Analysis

Preliminary analyses described the baseline demographic and clinical characteristics of the sample. T-tests and chi-square analyses tested for baseline differences across groups in order to confirm successful randomization. Means and SDs for all study variables were computed. To assess treatment *fidelity*, the percentage was computed of therapists who met mastery criteria after training, as was the percentage of the selected treatment videos during study treatment that met fidelity criteria. To assess treatment *feasibility*, the percentage of families who completed treatment was computed, as was the attendance rate. Further, parent reports on the BTPS were evaluated against the total possible scoring range, and the average travel costs incurred for each family associated with IGBT were examined. To assess treatment *satisfaction*, CSQ scores among treated families were examined relative to the range of possible scores, and individual CSQ items were examined as well.

A number of data analytic methods were used to compare changes across conditions by Week 4. To assess the *main outcome*—clinical response rates across conditions at Week 4, as determined by a masked IE—chi-square analyses evaluated group differences in response status (Week 4 "clinical response": CGI-I = 1 or 2; Week 4 "non-response": CGI-I > 2). Further chi-square analyses evaluated group differences in diagnostic status (i.e., diagnosis present or not present) for SM. The Fisher's exact test was used to determine significant difference, as recommended by Kim (2017) in the case of n's close 0 in any columns/rows. Effect sizes for response rate and diagnostic status were evaluated using the Phi statistic (ranging from 0 to 1, where higher values indicate higher magnitude of the association between the two variables). For continuous measures, two-way mixed analyses of variance (ANOVAs) examined parent-reported change in SM and anxiety symptoms, and masked IE-rated SM severity, social anxiety severity, and functioning across conditions (IGBT vs. WLP). Specifically 2 (Time, within-subjects) × 2 (Condition, between-subjects) factorial ANOVAs were conducted for each continuous outcome. The effects of Time, Condition, and Time × Condition interactions were evaluated, with significant Time × Condition interactions reflecting that symptom changes from baseline to Week 4 were not uniform across children in IGBT versus WLP. Effect sizes were evaluated for repeated measures ANOVA models using Cohen's *d* statistic, where .2 reflects a small effect, .5 reflects a medium effect, and .8 and greater reflects a large effect.

To evaluate *within-subject changes* in behaviorally observed child verbal behavior and parent skills, SMICS data were pooled from all youth who participated in IGBT (whether assigned to immediate IGBT or whether they completed IGBT following the four-week waitlist interval); paired samples t-tests compared pre- versus post-treatment SMICS codings. To examine daily changes in verbal child behavior across the 5 days of IGBT, VOICE data were pooled across all youth who participated in IGBT (whether assigned to immediate IGBT or whether they completed IGBT following the four-week waitlist interval), and hierarchical linear modeling (HLM) was applied. HLM uses maximum-likelihood estimation of parameters in order to account for missing data. The Akaike Information Criterion (AIC) value was used to determine which of three tested trajectory shapes (linear, quadratic, logarithmic) was the best-fitting trajectory type; lower AIC values indicate better fit. Linear trajectories would reflect steady continuous change in verbal behavior across the 5 days, whereas quadratic trajectories would reflect that the slope of change shifts across the course of treatment (e.g., change may be gradual in the first days of treatment, then may be more rapid in the next couple days, then may level out in the final day or two). Logarithmic trajectories would reflect a steep slope immediately, with growth continuing at a much slower rate subsequently.

To examine relatively longer lasting treatment-related *changes that extended into the following school year*, data were pooled together across conditions (as both conditions had completed IGBT by the following school year). Clinical response rates and diagnostic status rates were examined. HLM was

again used to examine changes in SM severity, social anxiety severity, anxiety symptoms, and functioning that were measured at three time points [i.e., (1) pre-treatment (for IGBT families: the baseline assessment; for WLP families: the Week 4 assessment); (2) post-treatment (for IGBT families: the Week 4 assessment; for WLP families: the post-assessment that occurred after completing post-waitlist treatment); and (3) SYF]. Group assignment was controlled for in these models, as a level 1 covariate, to account for differential timing associated with immediate IGBT in June versus post-waitlist IGBT in July. For each outcome, linear, quadratic, and logarithmic slopes were tested, with the AIC again used to determine which slope was the best fitting slope to the data. To examine teacher perspectives (which were only assessed at two time points: pre-treatment and SYF) paired samples t-tests compared differences between pre-treatment and SYF teacher reports of verbal behavior and academic/social impairment in school.

Finally, to examine *parental practice as a potential mechanism of change*, first frequency of parental practice of the key skills learned in IGBT was assessed for the interval between post-treatment and SYF. HLM analyses, with parental practice entered into the model as a level 1 predictor and controlling for condition, were then rerun to examine whether parental skill use after treatment predicted the trajectory of SM symptoms, anxiety symptoms, and functioning from pre-treatment through SYF.

CHAPTER 3. RESULTS

3.1 Descriptive Statistics

Sample characteristics at baseline are presented in Table 1. Roughly three-quarters of the sample were female, and roughly one-third were from racial/ethnic minority backgrounds. Families came from a diverse range of economic backgrounds, with 55.2% earning less than $100,000 per year, and 41.4% earning $100,000 or more per year. Participating families came from near and far to participate ($M_{distance}$ = 716 miles). 51.7% of families were from "out of town," defined as >3 hours driving distance from the FIU Center for Children and Families. There was great variability in families' locations. Roughly half of the sample (51.7%) lived more than 100 miles from the clinic, with 44.8% of the full sample living more than 500 miles from the clinic.

All participating children met DSM-5 criteria for SM. Comorbid diagnoses included social anxiety disorder (72.4%), separation anxiety disorder (27.6%), generalized anxiety disorder (24.1%), specific phobia (10.3%), obsessive compulsive disorder (6.9%), enuresis (6.9%), and attention-deficit/hyperactivity disorder (6.8%). 17.2% of parents reported that their child was taking a stable dose of medication for anxiety concerns.

3.2 Fidelity, Feasibility & Satisfaction

3.2.1 Fidelity. 100% of staff participated in the aforementioned training and met mastery criteria on all treatment skills. Staff were also each video recorded for 2.5 minutes once throughout the week of the treatment program for fidelity. 30% of videos were coded for fidelity to treatment skills. 100% of coded

staff met fidelity criteria (≥80% skill use; ≤20% non-skill use). M_{skills} = 93.11%, SD_{skills} = 7.15%; $M_{non-skills}$ = 6.87%, $SD_{non-skills}$ = 7.16%. The licensed clinical psychologist confirmed 100% of the daily agenda and treatment components were administered as planned each day.

3.2.2 IGBT Feasibility. 100% of families randomized to IGBT completed treatment, and 86.7% of WLP families participated in IGBT after the 4-week waitlist period (2 WLP families declined to participate in IGBT after the 4-week waitlist). Families across both conditions who participated in IGBT (whether before or after the waitlist) had a 100% attendance rate, with 0 no-shows or missed treatment days across participants.

Parents reported minimal barriers to IGBT participation. Specifically, IGBT-treated parents reported a mean Total barriers score of 50.54 (SD = 4.64) on the BTPS (range of possible Total BTPS scores: 47 – 220). Scores were also very low for all subdomains of potential treatment barriers: Stressors and obstacles that compete with treatment (M = 28.83, SD = 2.91; range of possible scores: 20 – 100), Treatment demands and issues (M = 11.33, SD = 1.46; range of possible scores: 10 – 50), Problems in perceived relevance of treatment (M = 9.25, SD = 1.36; range of possible scores: 8 – 40), and Problems in relationship with the therapist(s) (M = 6.13, SD = .34; range of possible scores: 6 – 30).

In terms of costs incurred (beyond those associated with the direct costs of treatment services), families varied greatly in regards to how much they spent to participate in the program. Table 2 presents a breakdown of costs incurred for

the total sample, out-of-town families (>3 hours away from the clinic), and in-town families. These costs do not include cost of treatment, which varied per family.

3.2.3 **Satisfaction with IGBT.** Parents reported very high rates of satisfaction with IGBT, with a mean post-IGBT Total CSQ-8 score of 30.46 (out of a total possible of 36). Of the parents who filled out the CSQ-8 (n = 26), 96.2% of parents rated the quality of the services they received as "excellent" and the remaining 3.8% of parents rated the quality of the services they received as "good." 100% of parents reported that they received the kind of services they wanted. When asked about the extent to which IGBT met their needs, all parents reported "most" (50%) or "almost all" (50%) of their needs had been met. One hundred percent of families reported that they would recommend IGBT if a friend were in need of similar help. Roughly three-fourths of parents (i.e., 76.9%) reported they were "very satisfied" with IGBT, and 19.2% reported they were "mostly satisfied." 100% of parents reported that they would participate again in IGBT if they needed help again.

3.3 Outcomes Through Week 4

All families were contacted to complete the Week 4 assessment which was conducted, on average, 4.84 weeks following baseline assessment. Table 3 presents baseline through Week 4 analyses.

3.3.1 **Responder status and diagnostic outcomes.** A significantly greater proportion of IGBT children than WLP children were classified as "responders" (i.e., CGI-I = 1 or 2) by an IE masked to treatment condition at Week 4. Specifically, 50% of children in the IGBT condition were classified as

"responders," whereas 0% of WLP children were classified as "responders" (Fishers exact test: $p = .006$). That said, full SM diagnostic remission by Week 4 was rare, with only 7.1% of IGBT children and 0% of WLP children classified as "SM diagnosis free" at Week 4; diagnostic remission rates did not differ between groups (Fishers exact test: $p = 1.00$).

       3.3.2 Continuous outcomes. Two-way mixed ANOVAs examined the extent to which Time (within-subjects), Condition (between-subjects), and Time $\times$ Condition (mixed) interactions predicted the continuous outcomes measured at both baseline and Week 4 (see Table 3 for details of results). In regards to masked IE-rated social anxiety severity (i.e., social anxiety disorder CSR), there was a significant effect of Time ($F(1,26) = 7.74$, $p = .01$), and a significant Time $\times$ Condition interaction effect ($F(1,26) = 5.37$, $p = .029$, Cohen's $d = -.50$), indicating that children in both conditions showed decrease in severity from Baseline to Week 4, but this decrease was significantly greater among children who participated in IGBT. Similarly, with regards to parent reports of SM symptoms in social settings (i.e., SMQ Social), there was again a significant effect of Time ($F(1,25) = 5.35$, $p = .029$), and a significant Time $\times$ Condition interaction effect ($F(1,25) = 10.80$, $p = .003$, Cohen's $d = .58$), indicating that children in both conditions showed improvements in SM symptoms and verbal behavior in social settings from Baseline to Week 4, but this improvement was significantly greater among children who participated in IGBT. In regards to masked IE-rated global functioning ratings (i.e., CGAS scores), there was a significant effect of Time ($F(1,26) = 29.52$, $p < .001$), and a significant Time $\times$ Condition interaction effect

(F(1,26) = 12.64, p = .001, Cohen's d = .73), indicating that children in both conditions showed improved functioning from Baseline to Week 4, but this improvement was significantly greater among children who participated in IGBT.

Whereas IGBT had significant effects across the four-week interval on children's responder status, social anxiety severity, SM symptoms/verbal behavior in social settings, and global functioning, IGBT did not have significant effects on several other outcomes. Specifically, in regards to SM CSR, there was a significant effect of Time (F(1,26) = 15.48, p = .001), but no significant Time × Condition interaction effect (F(1,26) = 2.31, p = .141, Cohen's d = -.50), indicating children showed uniform CSR improvements across the four week period regardless of whether they were in IGBT or WLP. In regards to parent-reported verbal behavior in home settings (e.g., extended family, speaking on the phone to family, babysitter/nanny), there was no significant effect of Time on (F(1,25) = .074, p = .788), nor a significant Time × Condition interaction effect (F(1,25) = 3.47, p = .074, Cohen's d = .36), indicating that across the four week interval children showed uniform lack of change in verbal behavior in the home setting regardless of whether they were in IGBT or WLP. Finally, similar results were found for overall anxiety symptoms: although there was an effect of Time (F(1,25) = 4.32, p = .048), there was not a significant Time × Condition interaction effect (F(1,25) = .99, p = .329, Cohen's d = -.28), indicating children's overall anxiety improved uniformly, regardless of whether they were in IGBT or WLP.

3.3.3 Behavioral observation outcomes. Paired samples t-tests examined pre- to post-treatment improvements in behaviorally observed child verbal behavior, as measured by the SMICS. Between-group comparisons were not possible, as SMICS observations were only conducted in person immediately before and immediately after the treatment week (WLP families completed these after their Week 4 assessment on the days before and after their delayed IGBT participation). The mean number of days between the pre-treatment and post-treatment SMICS was 19.65. For these analyses, SMICS scores were pooled across conditions for a total sample of 27 children who participated in IGBT (2 WLP children did not participate in IGBT after their Week 4 assessment). Table 4 presents means, standard deviations, and results of significance tests comparing pre-treatment and post-treatment SMICS scores. There was significant improvement from pre-treatment to post-treatment in all child verbalization domains observed in the SMICS, as well as in parent positive skill use. In contrast, there was no significant change in parents giving ample opportunity (i.e., 5 seconds) for child to answer after asking a question.

HLM examined daily behaviorally observed change in child verbal behavior across the 5 treatment days, as measured by the VOICE. Given that these behavioral observations were conducted on a daily basis within the treatment program, again comparisons between IGBT and WLP children were not possible. Accordingly, for these analyses VOICE scores were pooled across conditions within each of the five treatment days (n = 27, as 2 WLP families declined participation in IGBT after their Week 4 assessment). Linear, quadratic,

and logarithmic slopes were tested and compared to model the shape and rate of change in VOICE data across the five-day treatment program. AIC was examined to determine which slope pattern best fit the data, with lower AIC indicating better fit. Results of all models are presented in Table 5.

The number of questions IGBT children answered in the group setting showed significant negative quadratic change, whereas the number of questions children answered in both one-on-one and group sessions showed significant positive logarithmic change. There was no significant observed change in number of questions answered one-on-one throughout the 5 days. The AIC statistic for the quadratic and logarithmic models examining the trend in questions answered in a group setting were very close (228.56 vs. 228.78), and the logarithmic trend displayed a lower p value; it may be that a logarithmic trend is also a good fit to the data. These findings together suggest there was improvement in the number of questions children answered in a group setting, with some possible drift over time, but improvement overall in the number of questions children answered daily. Significant negative logarithmic changes were observed in number of prompts needed in a group situation, one-on-one, and in both one-on-one and group situations daily. These results indicate that the number of prompts needed to respond to a question decreased at a higher rate within the first couple days of treatment, and leveled out with more consistent improvement throughout the later treatment days. Figure 4 and Figure 5 present the trajectory of questions answered daily and prompts needed daily, respectively, over the 5 days of IGBT. There was no significant change over time

in any of the models (i.e., linear, quadratic, logarithmic) in regards to spontaneous speech, indicating that despite improvement in children's verbal behavior in response to adult prompting, there was no observed change throughout the treatment week in children's unsolicited speech.

3.4 School Year Follow-Up Results

By 8 weeks into the start of the following school year (after which children in both conditions had participated in IGBT), 45.8% of children (n = 11) who completed the SYF assessments (n = 24) were free of an SM diagnosis (improved from 7.1% of the IGBT-treated children diagnosis-free at Week 4).

3.4.1 Interim Service Use Prior to SYF. Parents reported on services they received (Recent Service Use measure) since completing their Week 4 assessment. Roughly one-third of parents (34.5%) reported they received some type of mental health service for their child's mood or behavior since completing treatment; 6.9% reported beginning or switching medications; 24.1% reported receiving "child-focused therapy"; 10.3% reported receiving "group therapy"; 3.4% reported receiving "parent-focused therapy"; and 3.4% reported receiving "speech therapy."

3.4.2 Longitudinal change in outcomes. HLMs controlling for treatment condition (immediate IGBT or IGBT post-waitlist) examined change from pre-treatment through post-treatment and into SYF in SM severity (CSR), social anxiety CSR, global functioning (CGAS), overall anxiety (CBCL Anxiety Problems), verbal behavior in "home" settings (SMQ Home), and verbal behavior in social settings (SMQ Social). Linear, quadratic, and logarithmic slopes were

tested for each outcome, with the AIC used to determine which slope was the best fitting slope to the data. Results of all models are presented in Table 6. The best-fitting models, according to AIC, showed: (a) significant linear improvement over time in SM severity (see Figure 6), with SM severity improving at a steady rate over time; (b) significant logarithmic decrease over time in social anxiety severity (see Figure 7); (c) significant logarithmic improvement over time in global functioning (see Figure 8); (d) significant logarithmic improvement over time in overall anxiety symptoms (see Figure 9); (e) a negative quadratic trend over time in verbal behavior in "home" settings (see Figure 9), with a gradual improvement seen in symptoms initially after treatment with symptoms slightly resurfacing into the following school year; (f) significant logarithmic improvement in verbal behavior in social settings (see Figure 10), with steep improvements seen initially upon treatment initiation, followed by more gradual change going into the following school year. Models were rerun controlling for interim mental health service use between Week 4 and SYF, and the interpretation of all findings remained unchanged.

3.4.3 Teacher-reported change. Paired samples t-tests were employed to examine differences between the pre-treatment teachers' reports and SYF teachers' reports of child verbal behavior in school and child academic/social impairment in school. Children's SYF teachers rated significantly higher child verbal behavior (M = 11.33, SD = 4.98) than did their pre-treatment school year teachers (M = 7.50, SD = 4.74) (t(11) = -2.67, p = .022). Additionally, children's SYF teachers reported significantly lower ratings of child academic/social

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impairment (M = 9.25, SD = 7.84) than did children's pre-treatment school year teachers (M = 18.83, SD = 5.83) (t(11) = 3.82, p = .003).

3.4.4 Parental Practice. Table 7 presents data on parents' report at SYF of how frequently they continued to practice and use the skills they learned in IGBT since completion of treatment. Overall, there was continued parental practice of IGBT-taught skills observed 8-weeks into the following school year. Specifically, at SYF the average IGBT parent was still reporting practicing CDI skills "about every other day, or every couple days" (M = 2.64, SD = 1.05), giving their child a labeled praise for speaking or interacting with others "pretty often or almost every day" (M = 3.41, SD = .91), giving their child a specific reward, prize or reinforcement (not including praises) for speaking or interacting "a couple of times" or "about every other day, or every couple days" (M = 2.82, SD = .96), setting up an exposure or practice ahead of time for their child to speak or interact "a couple of times" (M = 2.41, SD = .85), and generally using the strategies they've learned "about every other day, or every couple days" or "pretty often or almost every day" (M = 3.50, SD = .86).

3.4.5 Parent skill use as a predictor of change. HLMs examined whether continued parental practice of IGBT-taught skills predicted improvements at SYF. Results suggest continued parental practice did not significantly predict trajectories of SM severity, social anxiety severity, global functioning, overall anxiety, or verbal behavior in home or social settings (all p's > .05).

CHAPTER 4. DISCUSSION

Whereas recent years have witnessed a couple of controlled trials evaluating standard weekly treatment for childhood SM (Bergman et al., 2013; Bunnell, Mesa, & Beidel, 2018; Oerbeck et al., 2014), the present study offers the first randomized controlled trial to evaluate IGBT for children with SM. Intensive treatment formats for low base-rate and/or complex, difficult-to-treat mental health conditions are particularly needed given substantial limitations in the broad availability of quality care (Comer & Barlow, 2014). SM, in particular, has very few studies examining treatment strategies in general, and prior to this evaluation no study had examined treatment strategies delivered in a condensed period of time over the summer months in order to reach families lacking local access to quality care and/or do not want treatment to interfere with the competing academic demands of the school year.

The present waitlist-controlled trial provides promising initial support for the feasibility, acceptability, and efficacy of a 5-day IGBT for children aged 5-9. Whereas 50% of children randomized to participate in IGBT were classified four weeks later by an independent evaluator as a "responder," none of the children randomized to waitlist and self-directed psychoeducational materials were classified as such. The fact that children randomly assigned to WLP did not improve across the 4-week interval is consistent with the work of Bergman and colleagues (2013) who similarly showed that SM symptoms do not remit over time when left untreated. Moreover, findings supporting the preliminary efficacy of IGBT for the treatment of SM are consistent with a growing body of literature

supporting the very favorable role brief intensive treatment formats can play in broadening the portfolio of treatment options for a range of child anxiety and related problems (Elkins et al., 2016; Gallo et al., 2014; Ollendick, 2014; Ollendick et al., in press; Ost & Ollendick, 2017; Santucci et al., 2009; Storch et al., 2007). The further improvement in response observed into the school year is also consistent with Öst and Ollendick's recent meta-analysis which reported that remission rates for intensive treatment programs for anxiety-related problems tend to rise even higher at follow-ups relative to post-treatment assessments.

In the present study, children with SM continued to improve over time across most domains. Specifically, IE-rated SM severity significantly decreased linearly into the following school year, and IE-rated social anxiety severity and global functioning, and parent-reported overall anxiety and verbal behavior in social settings, significantly improved in a logarithmic fashion. Whereas the IE-rated SM severity significantly improved in a steady, linear fashion, the other outcomes showed the steepest improvement across the treatment period followed by continued improvements at a slower rate into the following school year. Verbal behavior at home (e.g., with family members, babysitters) improved in a negative quadratic fashion—that is, children gradually improved across treatment but then ultimately showed a slight increase in symptoms by follow-up.

Importantly, the present study did not assess families beyond 2-3 months into the following school year (i.e., M = 3.42 months post-treatment; range = 2.23 - 4.45 months post-treatment). As such it is not clear whether IGBT-related outcomes might stabilize, continue to improve, or begin to revert along with

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natural skill drift further into the school year. Regardless, continuing improvements into the early months of the following school year may be an important and unique feature of intensive treatment formats for youth with anxiety. Intensive treatment formats for childhood anxiety should place a heavy emphasis on teaching children how to generalize learned strategies to natural settings following treatment and teach parents how to promote maintenance of gains.

In addition to IE classifications and parent-reports, behavioral observations also revealed significant improvements in observed verbal behavior. In the present study, IGBT-treated children improved across all domains of observed verbal behavior when with their parent, when in front of a stranger, and when answering questions from a stranger. Further, children significantly improved on a daily basis throughout the week of IGBT in regards to the amount of questions they answered, and the amount of prompts needed to answer. Structured observations also revealed that parents significantly improved in the amount of positive attention they gave to their child for appropriate/brave behaviors (i.e., labeled praises), but there was no significant improvement in the extent to which parents afforded children ample opportunity to respond to their questions (i.e., a full 5 seconds). This indicates that IGBTs in the future might do well to incorporate a stronger emphasis on teaching and in vivo coaching of parents in this particular skill.

Despite half of the IGBT-treated sample being classified as a "responder" at Week 4 by an independent evaluator masked to treatment condition, a

relatively low percentage of children (i.e., 7.1%) was assessed to be free of SM diagnosis at Week 4. This finding, when considered against the large effect sizes in behavioral observations and measures of parent-reported SM symptoms, underscores how meaningfully symptoms can improve while a child still meets diagnostic criteria for SM. Importantly, almost half of treated children were free of an SM diagnosis by the follow-up assessment conducted 8 weeks into the following school year. This may reflect the extent to which a 4-week time period, with only 5 days of treatment, may be too brief of a time frame in which to exhibit or detect full remission of symptoms.

On the other hand, it is possible that more substantial remission in symptoms can only occur as children and parents apply treatment skills after intensive treatment in their own natural environments and school. It is important to note that the treatment program, as well as the baseline and Week 4 assessments occurred during the summer months, and thus it was not possible for parents or independent evaluators to assess until the SYF how IGBT-treated children would function in the school setting (which is typically the most impaired setting for children with SM; Sharp, Sherman, & Gross, 2007). Accordingly, the present Week 4 results, based on a summer IGBT may not reflect Week 4 results associated with IGBT implemented during the last month of summer, or during a winter or spring break. Scheduling IGBT at this time might yield even greater SM improvements by Week 4 by offering immediate opportunities for children to practice their new skills in their natural settings in which symptoms are most impairing. The present study observed improvement in social anxiety severity as

a result of participating in IGBT. At the Week 4 assessment, IGBT demonstrated an effect on social anxiety severity, as rated by a masked IE, but no effect on masked IE-rated SM severity. This finding was surprising given that IGBT is designed to directly target SM symptoms, with social anxiety symptoms improving collaterally. On the contrary, the present study witnessed an acute effect of IGBT on social anxiety severity, but not on SM severity, highlighting the potential obstinacy of SM symptomology relative to social anxiety symptomology. Inherently, social anxiety disorder is fear-centric, whereas SM symptomology is behavior-centric. Specifically, DSM-5 requires fear to be present in order for an individual to meet diagnostic criteria for social anxiety disorder, whereas diagnostic criteria for SM requires that behavior (i.e., avoidance), but not necessarily fear, be present (American Psychiatric Association, 2013). It is possible that improvements in child fear occur at a faster rate than improvements in associated child behavior. Moreover, it may be challenging for parents to report on their child's behavior over the summer when their child is not in the settings in which their behavior is most impaired (i.e., school). In the absence of school opportunities immediately following treatment, some parents may draw on pre-treatment school experiences and incorrectly assume that the child would show similar verbal reticence if the child were in school.

Teacher reports of child verbal behavior and social/academic functioning indicated significant improvements from the school year that preceded the summer IGBT to the school year that followed the IGBT. Specifically, there were significant differences from pre- to post- school year in regards to verbal child

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behavior and social/academic functioning. An important limitation of the present findings based on teacher-reports is that different teachers reported on each child in the years preceding and following IGBT. That said, many anxious children might expectedly experience more severe anxiety in the early months—relative to later months—of the school year as they become acclimated to a new environment, peers, and teachers. Accordingly, one might actually expect that, in the absence of intervention, teacher reports of child anxiety in the early months of a school year would naturally be higher than teacher reports on child anxiety completed in the later months of a school year; indeed the presently documented teacher-reported improvements in treated children's classroom verbal behavior from spring to fall may be particularly impressive.

In addition to positive symptom improvements and functional outcomes associated with IGBT, the present study also observed family satisfaction to be very high. Over 95% of parents rated the quality of the services they received as "excellent," 100% reported that they received the kind of services they wanted, 100% reported that they would recommend IGBT if a friend were in need of similar help, roughly 75% reported they were "very satisfied" with IGBT, and 100% of parents reported that they would participate in IGBT if they needed help again. These findings are consistent with the growing body of literature finding satisfaction with intensive treatment formats for a range of child mental health problems, including anxiety, to be high (e.g., Jensen et al., 2001; Ollendick et al., 2009; Santucci, Ehrenreich, Trosper, Bennett, & Pincus, 2009).

Although the present study speaks to a number of positive outcomes associated with IGBT for SM, including high family satisfaction, the present study also documented how high the costs of participation in a destination intensive treatment program (beyond the costs of services themselves) can be for families. Indeed, despite the efficacy and satisfaction associated with IGBT, the added costs associated with this unique treatment format may be prohibitive for a substantial proportion of families in need—particularly given that many IGBT-treated children still showed impairing SM symptomology into the following school year. As intensive treatment formats continue to be optimized in creative ways that might help bring down the costs associated with destination treatment (e.g., holding intensive programs on academic campuses that can offer families temporary housing in dormitory space), other innovative treatment formats should also be explored that can address geographic limitations in quality care options while also overcoming cost-related barriers.

In recent years, an increasing body of work has examined the merits of leveraging remote technologies for improving the reach quality mental health care (Comer & Barlow, 2014; Comer et al., 2017; Doss et al., 2017; Kazdin & Blase, 2011), and some recent work has begun to examine the role of technology in the specific treatment of childhood SM. For example, Bunnell and colleagues (2018) demonstrated support for the use of mobile apps to promote verbalizations in children with SM, and Ooi and colleagues (2016) showed that web-based intervention strategies, where children interact with a therapist via videoteleconferencing, can also be beneficial in reducing symptoms. As a

portfolio of alternative treatment options showing support for the treatment of SM unfold, future work should consider sequential, multiple assignment, randomized trial (SMART) designs to determine which innovative treatment strategies and formats (e.g., traditional weekly, intensive, videoteleconferencing, apps) work for which children affected by SM, and in which sequences.

The present study has several limitations that warrant comment. First, the present sample size was relatively small, prohibiting the evaluation of mediators and moderators that could help identify causal accounts of the effects of IGBT, uncover key mechanisms of IGBT-related change, and clarify for whom IGBT may be most well-suited. Second, because Week 4 assessments occurred during the summer months, it was not possible to evaluate the acute effects of IGBT on children's verbal behavior, performance, and anxiety in the school setting. Relatedly, at Week 4 it is possible that parents and children did not have an adequate amount of time to re-immerse themselves in regular social activities (e.g., school, extracurriculars, playdates) after attending the program, and thus parents may not have been able to see and accurately report on IGBT-related improvements. Future work might do well to examine IGBT during school breaks (e.g., winter break, spring break), which would allow treated children to still participate without missing any school, but would allow them to immediately apply and demonstrate their new skills in the settings most relevant and impairing for children with SM.

Third, with such a high proportion of families attending from out-of-town, it was not possible to incorporate masked behavioral observation data when

comparing the effects of IGBT relative to WLP. Future work would do well to complete masked behavioral observation data, ideally with funding to compensate out-of-town WLP families to allow them to travel to participate in assessments in-person. Lastly, children in the present study participated in treatment in different classrooms (i.e., determined by age), with each classroom having its own staff and peers. The present study was inadequately powered to accommodate multi-level modeling approaches that account for any potential nested classroom effects.

Despite these limitations, the present study offers the first controlled data supporting the promise of IGBT for the treatment of childhood SM. In the context of this initial waitlist-controlled trial, the present study found children treated with one week of IGBT showed significant improvements a month later relative to children on a four-week waitlist whose parents received psychoeducational resources. Importantly, treated families reported very high satisfaction with IGBT and very few barriers to treatment participation, and IGBT-related child outcomes continued to improve into the following school year. Research is now needed to further evaluate IGBT against increasingly rigorous comparison conditions (e.g., 1-week group summer camp programs that do not explicitly focus on promoting child verbal behavior; or weekly CBT treatment), and to incorporate additional follow-up assessments to examine longer-term maintenance of IGBT-related gains. With continued support, IGBT may prove to be a critical evidence-based strategy in the portfolio of treatment options for children with SM with the ability to

extend the availability and acceptability of quality care for affected families who may lack SM treatment expertise in their area.

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Table 1. Baseline characteristics across full sample, and by condition

	Full sample (N=29)		IGBT (n=14)		WLP (n=15)		Significance test
	N	%	N	%	N	%	
Gender							χ^2(1,N=29) = .29 , p = .591
Female	22	75.9	10	71.4	12	80.0	
Male	7	24.1	4	28.6	3	20.0	
Race/ethnicity							χ^2(1,N=29) = .02 p = .893
Non-Hispanic White	19	65.5	9	64.3	10	66.7	
Minority	10	33.5	5	35.7	5	33.3	
Annual household income							χ^2(1,N=28) = 1.20, p = .274
<$100,000	16	55.2	6	42.9	10	66.7	
≥$100,000	12	41.4	7	50.0	5	33.3	
Distance from clinic							χ^2(1,N=29) = 1.71, p = .191
"In town"	14	48.3	5	35.7	9	60.0	
"Out of town"	15	51.7	9	64.3	6	40.0	
	Mean	SD	Mean	SD	Mean	SD	
Age	6.6	1.3	6.4	1.4	6.7	1.4	t(27) = -1.07, p = .294
Annual household income, $	88,303	51,184	90,422	41,698	86,467	59,619	t(27) = .20, p = .843
SM CSR	4.9	0.7	4.86	0.8	4.87	0.6	t(27) = -.04, p = .971

IGBT: Intensive group behavioral therapy; WLP: Waitlist with psychoeducation; SM: Selective mutism; CSR: Clinical severity rating
Note: "In town" defined as <3 hours driving distance from the treatment center. "Out of town" defined as >3 hours driving distanced from the treatment center.

Table 2. Breakdown of costs incurred as a result of participation in IGBT for treatment completers

Cost Incurred Category	Total sample (n=27)		Out-of-town (n=13)		In-town (n=14)	
	M	SD	M	SD	M	SD
Money spent on travel (e.g., to and from Miami, to and from IGBT each day), $	1,057	1,694	1,933	1,986	93	151
Money spent on lodging to attend IGBT, $	473	584	893	523	10	32
Costs incurred as a result of taking time off from work to participate in IGBT, $	525	885	690	1,103	360	613
Any other expenses incurred as a result of participating in IGBT	244	285	406	248	82	229
Total costs incurred, $	2,312	2,516	3,683	2,632	529	820

Table 3. Details of IE-assigned and parent-reported outcomes at baseline and Week 4

Domain	IGBT (n=14) Baseline %	N	Week 4 %	N	WLP (n=15) Baseline %	N	Week 4 %	N	Significance test	Effect Size
Responder									Fisher's exact test: $p = .006^{**}$	Phi = -.58
Yes	0.0	0	50.0	7	0.0	0	0.0	0		
No	100.0	14	50.0	7	100.0	15	100	15		
SM diagnostic remission									Fisher's exact test: $p = 1.00$	Phi = .19
Yes	0.0	0	7.1	1	0.0	0	0	0		
No	100.0	0	92.9	13	100.0	15	100	15		

Domain	M	SD	M	SD	M	SD	M	SD	Time × Condition Interaction Effect	Effect Size
SM CSR	4.86	.77	4.21	.89	4.86	.66	4.57	.65	$F(1,26) = 2.31$	$d = -.50$
Social anxiety CSR	4.79	1.19	4.00	.78	3.64	1.60	3.57	1.51	$F(1,26) = 5.37^{*}$	$d = -.50$
SM Home	12.00	4.38	12.93	2.46	11.08	4.65	10.38	3.95	$F(1,25) = 3.47$	$d = .36$
SM Social	3.93	2.46	6.14	3.18	3.00	3.63	3.38	3.23	$F(1,25) = 10.80^{**}$	$d = .58$
Anxiety Symptoms	65.71	8.88	61.57	7.65	60.85	9.78	59.38	11.16	$F(1,25) = .99$	$d = -.28$
Global Functioning	48.86	5.53	53.64	4.63	51.50	4.72	52.50	4.94	$F(1,26) = 12.64^{**}$	$d = .73$

* $p<.05$; ** $p<.01$
Responder: Score of 1 or 2 on the CGI-I as rated by masked independent evaluator (IE)
SM diagnostic remission: Clinical Severity Rating (CSR) of 3 or below as rated by masked independent evaluator (IE)

Table 4. Behaviorally observed SMICS scores at pre-treatment and post-treatment

	Pre-Treatment		Post-Treatment		Significance Test
	M	SD	M	SD	
Stranger present					
Verbal responses	32.04	21.30	43.23	13.03	t(df=25) = -2.90**
No verbal responses	14.88	13.66	4.31	4.69	t(df=25) = 4.19***
Spontaneous speech	15.92	14.68	30.04	17.97	t(df=25) = -4.39***
Stranger questions answered	.96	.96	1.62	.75	t(df=25) = -3.05**
No stranger present					
Verbal responses	34.12	17.13	43.77	12.62	t(df=25) = -2.90**
No verbal responses	10.42	11.70	3.00	3.21	t(df=25) = 3.28**
Spontaneous speech	22.38	15.34	36.35	14.35	t(df=25) = -4.42***
Total					
Verbal responses	66.15	36.40	87	24.63	t(df=25) = -3.05**
No verbal responses	25.31	23.20	7.31	7.00	t(df=25) = 4.11***
Spontaneous speech	39.31	26.51	66.38	29.51	t(df=25) = -5.00***
Parent behaviors					
No opportunity to respond	16.65	13.39	15.38	11.32	t(df=25) = .479
Labeled praises	1.35	3.31	6.08	6.97	t(df=25) = -3.20**

**p<.01, ***p<.001

Note: SMICS observations were conducted in person on the day before and the day after the treatment week (WLP families completed these after their Week 4 assessment on the day before and after their delayed IGBT participation), and thus it is not possible to compare IGBT versus WLP scores. For these analyses pre-treatment scores were pooled across conditions and post-treatment scores were pooled across conditions for a total sample of 27 children who participated in IGBT (2 WLP children did not participate in IGBT after their Week 4 assessment).

Table 5. Models of daily verbal behavior changes, as rated by the VOICE

	AIC	Statistic
Number of questions answered in group		
Linear	233.14	$b(108) = .11, p = .001$
Quadratic	228.56	$b(108) = -.07, p = .011$
Logarithmic	228.78	$b(108) = .32, p < .001$
Number of questions answered one-on-one		
Linear	57.79	$b(108) = .03, p = .072$
Quadratic	59.79	$b(108) = .00, p = 1.00$
Logarithmic	57.74	$b(108) = .07, p = .070$
Total daily questions answered		
Linear	297.73	$b(108) = .14, p = .001$
Quadratic	295.47	$b(108) = -.07, p = .040$
Logarithmic	294.14	$b(108) = .40, p < .001$
Number of prompts needed in group		
Linear	534.52	$b(108) = -.30, p = .001$
Quadratic	534.28	$b(108) = .12, p = .136$
Logarithmic	532.21	$b(108) = -.83, p < .001$
Number of prompts needed one-on-one		
Linear	409.15	$b(108) = -.12, p = .035$
Quadratic	410.83	$b(108) = .03, p = .572$
Logarithmic	408.61	$b(108) = -.31, p = .025$
Total daily prompts needed		
Linear	626.42	$b(108) = -.42, p = .001$
Quadratic	626.60	$b(108) = .14, p = .178$
Logarithmic	624.32	$b(108) = -1.14, p < .001$
Spontaneous speech one-on-one		
Linear	354.83	$b(108) = -.02, p = .699$
Quadratic	356.72	$b(108) = .01, p = 743$
Logarithmic	354.79	$b(108) = -.05, p = .662$

Note: Shade indicates best-fitting significant model (according to AIC)

Table 6. Models of longitudinal outcomes

	AIC	Statistic
SM severity		
Linear	206.08	$b(53.63) = -.01$, $p < .001$
Quadratic	207.88	$b(54.96) = -.00002$, $p = .656$
Logarithmic	215.12	$b(53.41) = -.21$, $p < .001$
Social anxiety severity		
Linear	236.79	$b(51.93) = -.01$, $p = .002$
Quadratic	234.45	$b(52.32) = .00$, $p = .037$
Logarithmic	232.21	$b(51.55) = -.17$, $p < .001$
Global functioning		
Linear	472.60	$b(53.46) = .05$, $p < .001$
Quadratic	472.29	$b(54.94) = -.00004$, $p = 130$
Logarithmic	467.19	$b(52.73) = 1.43$, $p < .001$
Overall anxiety		
Linear	513.19	$b(48.60) = -.04$, $p = .006$
Quadratic	512.85	$b(48.88) = .0006$, $p = .126$
Logarithmic	510.97	$b(47.63) = -1.05$, $p = .002$
Verbal behavior in "home" settings		
Linear	377.56	$b(48.62) = .01$, $p = .040$
Quadratic	370.51	$b(48.26) = -.0004$, $p = .002$
Logarithmic	370.72	$b(47.72) = .40$, $p = .001$
Verbal behavior in social settings		
Linear	380.60	$b(48.66) = .02$, $p < .001$
Quadratic	372.74	$b(48.73) = -.0004$, $p = .002$
Logarithmic	371.62	$b(47.56) = .69$, $p < .001$

Note: Shade indicates best-fitting significant model (according to AIC)

Table 7. Parents' continued use of skills following completion of treatment between Week 4 and SYF

Over past 2 weeks, how often did you:	Frequency (%)				
	Not at all (1)	A couple of times (2)	About every other day, or every couple days (3)	Pretty often or almost every day (4)	Every day (5)
Practice 5 mins "special play time" (or CDI)?	13.6	31.8	36.4	13.6	4.5
Give your child a labeled praise for speaking or interacting with others?	0	18.2	31.8	40.9	9.1
Give your child a specific reward, prize, or reinforcement (not including praises) for speaking or interacting?	4.5	36.4	36.4	18.2	4.5
Set up an exposure or practice ahead of time for your child to speak or interact?	4.5	63.6	22.7	4.5	4.5
Generally use the strategies you learned in Brave Bunch to encourage your child to speak and engage?	0	13.6	31.8	31.8	9.1

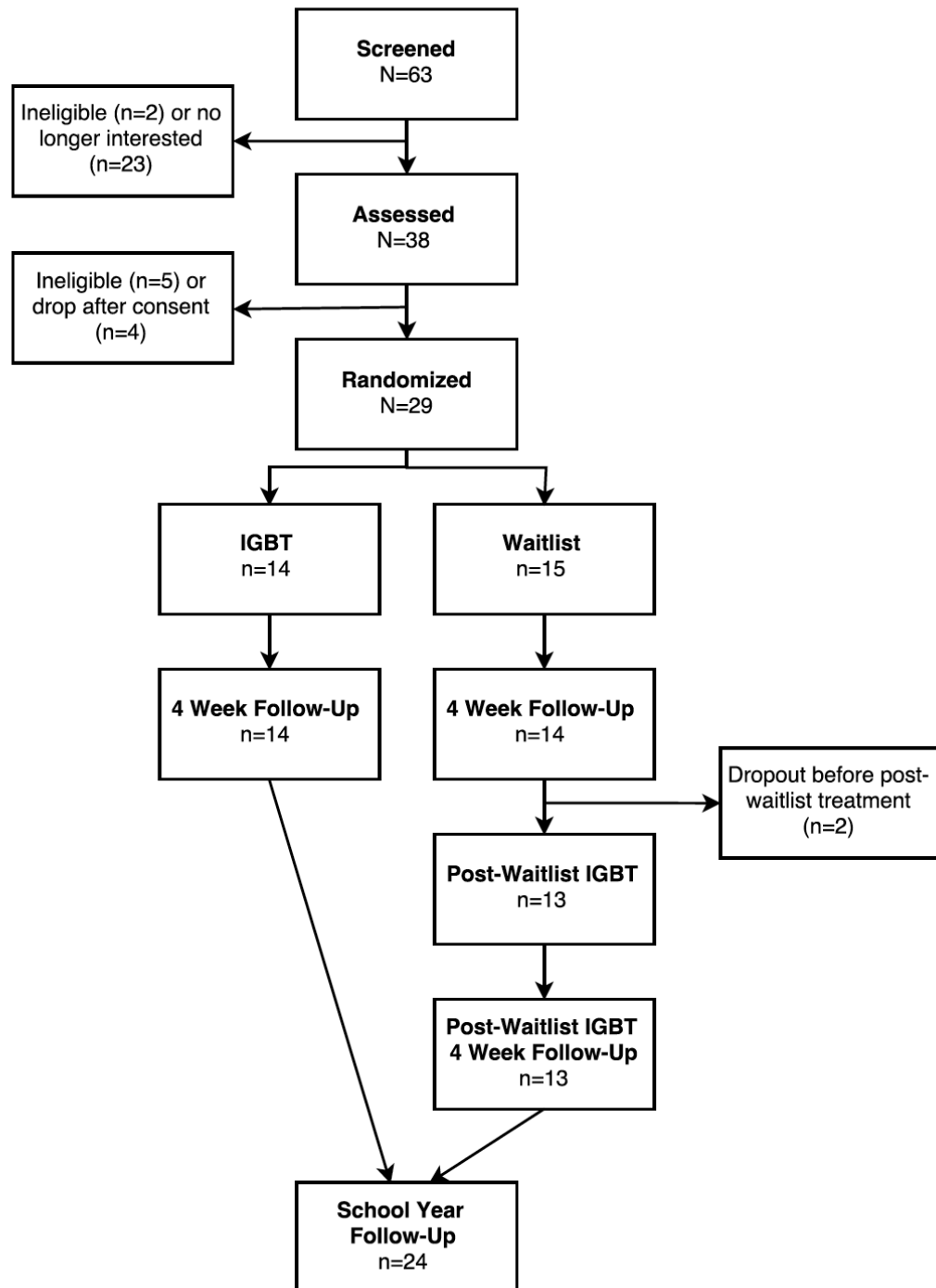**Figure 1.** Flow of participants across study phases

Screened
N=63

Ineligible (n=2) or no longer interested (n=23)

Assessed
N=38

Ineligible (n=5) or drop after consent (n=4)

Randomized
N=29

IGBT
n=14

Waitlist
n=15

4 Week Follow-Up
n=14

4 Week Follow-Up
n=14

Dropout before post-waitlist treatment (n=2)

Post-Waitlist IGBT
n=13

Post-Waitlist IGBT
4 Week Follow-Up
n=13

School Year
Follow-Up
n=24

Figure 2. Sample IGBT daily schedule

Time	MONDAY		TUESDAY		WEDNESDAY		THURSDAY		FRIDAY	
8:00AM	Day planning / supervision with master supervisor	Warm up time for separation anxious children	Day planning / supervision with master supervisor	Warm up time for separation anxious children	Day planning / supervision with master supervisor	Warm up time for separation anxious children	Day planning / supervision with master supervisor	Warm up time for separation anxious children	Day planning / supervision with master supervisor	Warm up time for separation anxious children
9:00AM	Centers		Centers		Centers		Centers		Centers	
	Counselor / Kid Introductions		Morning Meeting		Morning Meeting		Morning Meeting		Morning Meeting	
	Morning Meeting								Travel to Field Trip	
10:00AM	Create Token Bags / Snack		*I Have Who Has* game		Sports Skills Activity (with non-IGBT classroom)		Art (with non-IGBT classroom)		Field Trip Scavenger Hunt (merge with other IGBT classrooms)	
			Nurse Preparation							
	All About Me Project / Introductions		Nurse Visit		Bathroom Break / Transition		Show & Tell Practice / Snack			
11:00AM					Show & Tell Practice / Snack					
	Snack Shop Preparation		Snack Shop Preparation		Snack Shop		Scavenger Hunt (merge with other IGBT classrooms)			
	People Bingo Game		*Puppet Making* Activity (merge with other IGBT classrooms)						Order Lunch in Field Trip Food Court (merge with other IGBT classrooms)	
12:00PM					Bathroom Break / Transition					
	Bathroom Break / Transition		Bathroom Break / Transition		Lunch (with non-IGBT classroom)		Bathroom Break / Transition			
	Lunch		Lunch (merge with other IGBT classrooms)				Lunch (with non-IGBT classroom)		Travel Back to School	
					Recess				Show & Tell Practice	
1:00PM	Recess		Recess				Recess (with non-IGBT classroom)			
					Bathroom Break / Transition				Show & Tell (parents attend)	
	Bravery Lesson		Bravery Lesson		Bravery Lesson		Bravery Lesson			
2:00PM									Ice Cream Social (parents attend)	
	Brave Muscles Worksheet	Treasure Chest	Snack Shop		*Conversation Starters / Brave Muscles*	Treasure Chest	Field TripPractice / *Brave Muscles*	Treasure Chest	IGBT Certificate Ceremony (parents attend)	
			Brave Muscles	Treasure Chest						
3:00PM									Treasure Chest	
	Parent Training Didactics	Supervision with head classroom supervisors / Childcare	Parent Training Didactics	Supervision with head classroom supervisors / Childcare	Parent Training Didactics	Supervision with head classroom supervisors / Childcare	Parent Training Didactics	Supervision with head classroom supervisors / Childcare		
4:00PM			Parent Coaching / Didactics / Roleplays		Parent Coaching / Didactics / Roleplays		Parent Coaching / Didactics / Roleplays			

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Figure 3. Schedule of study assessments

DOMAIN	MEASURE	ASSESSMENT MODE	TIME POINT				
			I	B	D	W4	SYF
Selective Mutism Symptoms	SMQ	Parent-report	✓	✓		✓	✓
	SSQ	Teacher-report	✓				✓
Verbal Behavior	SMICS	Structured Observation		✓		✓	
	VOICE	Structured Observation			✓		
Other Anxiety Symptoms	CBCL-Anx	Parent-report	✓	✓		✓	✓
Functional Impairment	CGAS	IE	✓	✓		✓	✓
	IRS	Teacher-report	✓				✓
Global Severity	CGI	IE	✓	✓		✓	✓
Diagnostic Information	ADIS	IE	✓	✓		✓	✓
Feasibility/Satisfaction	CSQ	Parent-report				✓	
	BTPS	Parent-report				✓	
	Service Use	Parent-report	✓				✓
	Costs Incurred	Parent-report				✓	
Parent Use of Skills	Parental Practice	Parent-report					✓

I: Intake - when families call between January and May. **B:** Baseline - Immediately prior to IGBT/waitlist (max 3 weeks prior to start of IGBT). **D:** daily during IGBT. **W4:** Four weeks following baseline assessment (Waitlist families who participated in IGBT after the four week waitlist interval participating in an additional post assessment after their IGBT participation). **SYF:** School Year Follow-Up - 8 weeks into the following school year **IE:** Independent evaluator

Figure 4. Trajectory of logarithmic change across IGBT in daily number of questions verbally answered
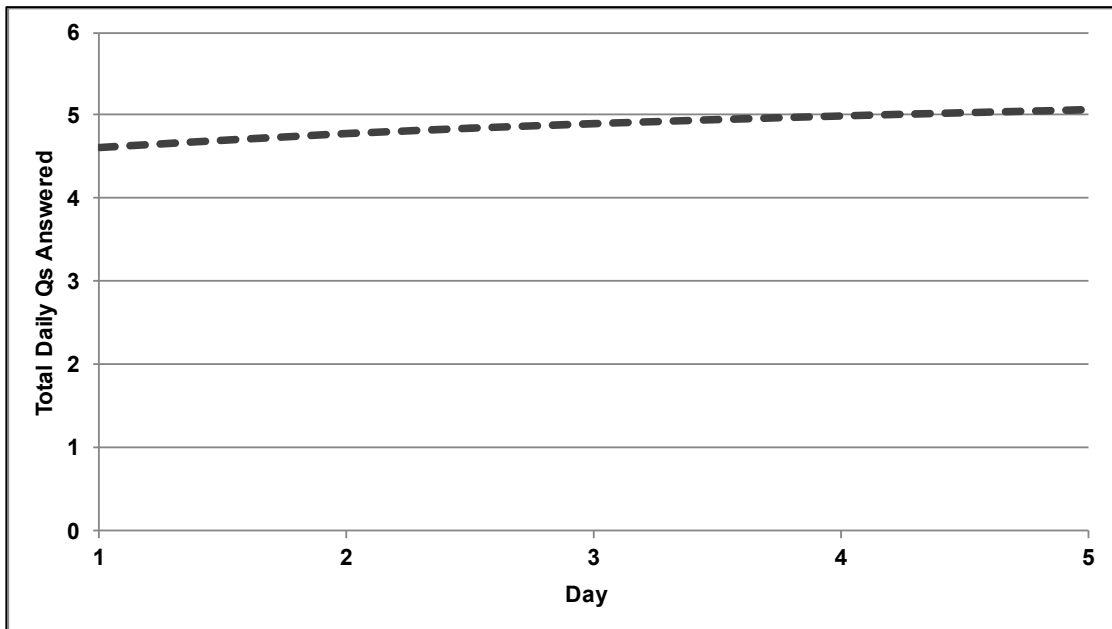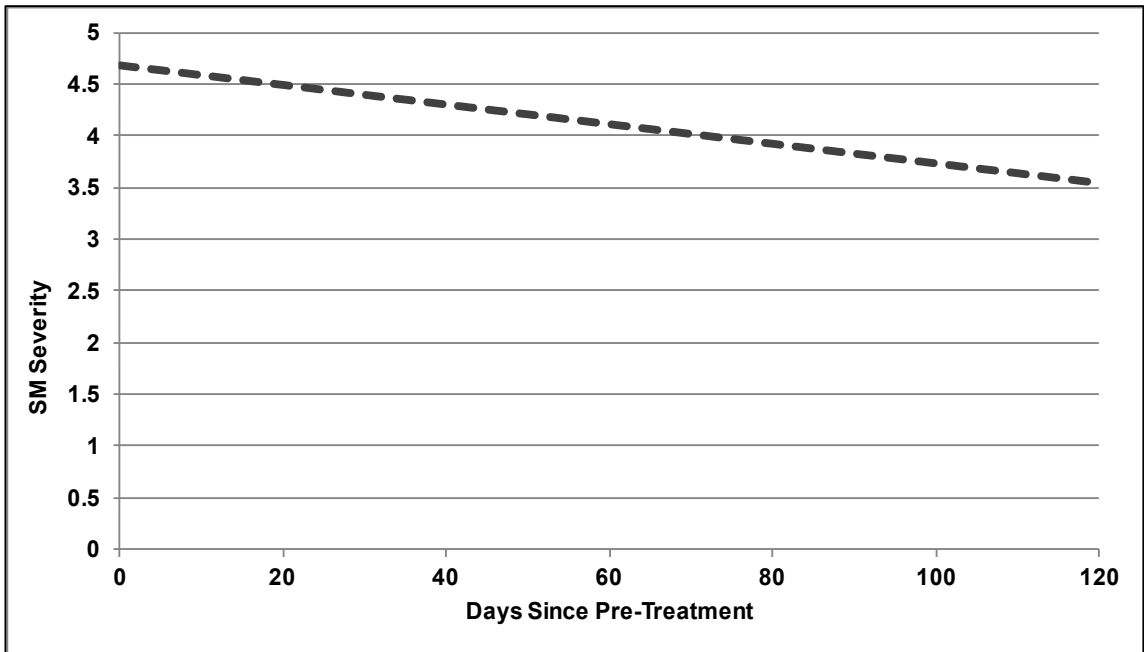

Note: Data derived from the VOICE structured behavioral observations

Figure 5. Trajectory of logarithmic change across IGBT in number of prompts needed for verbal child response
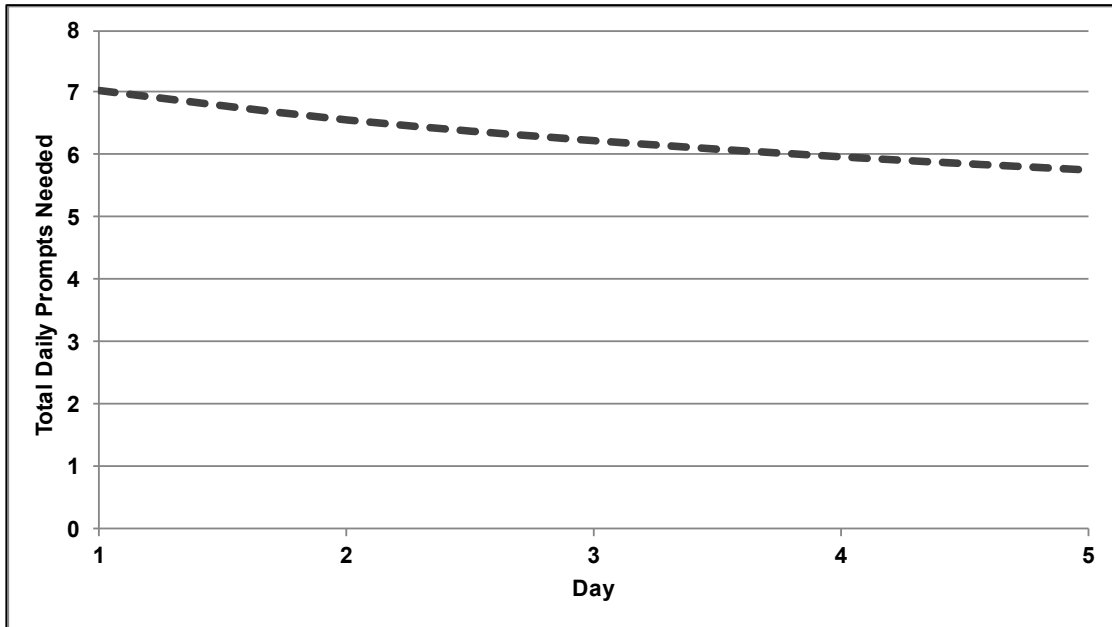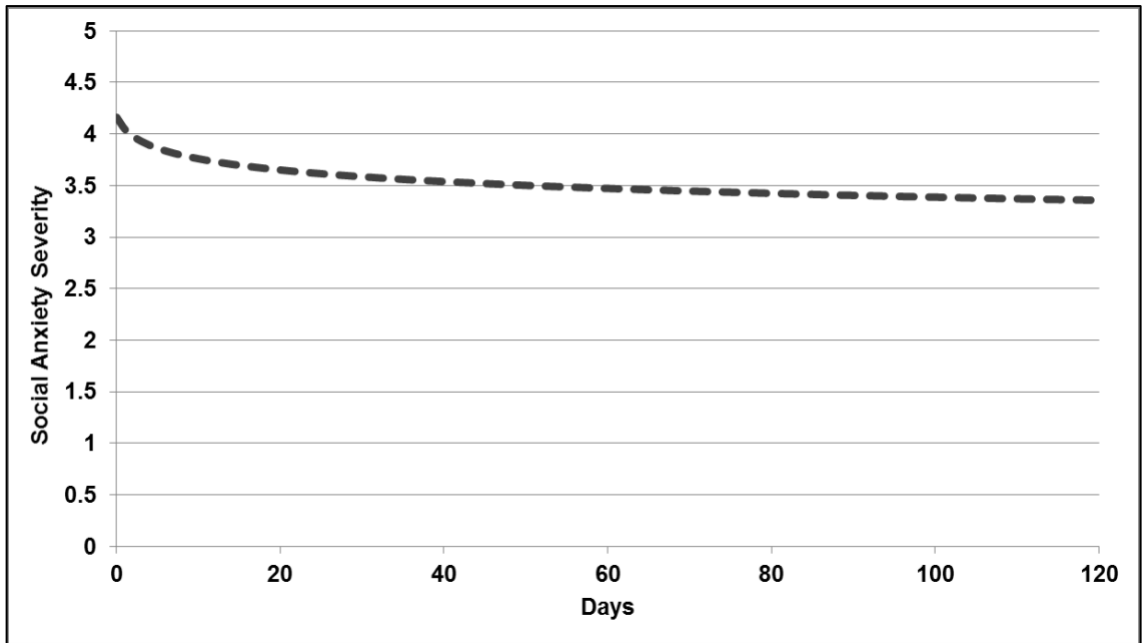

Note: Data derived from the VOICE structured behavioral observations

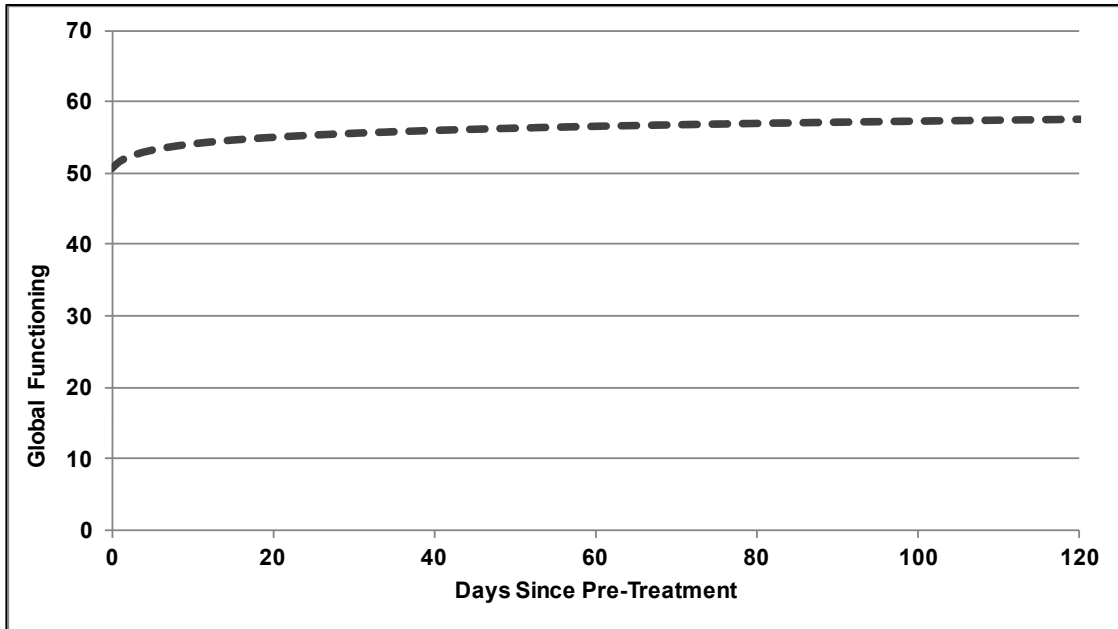**Figure 6.** Trajectory of linear change in SM severity (CSR) from pre-treatment to Week 4 to SYF

Figure 7. Trajectory of logarithmic change in social anxiety severity (CSR) from pre-treatment to Week 4 to SYF
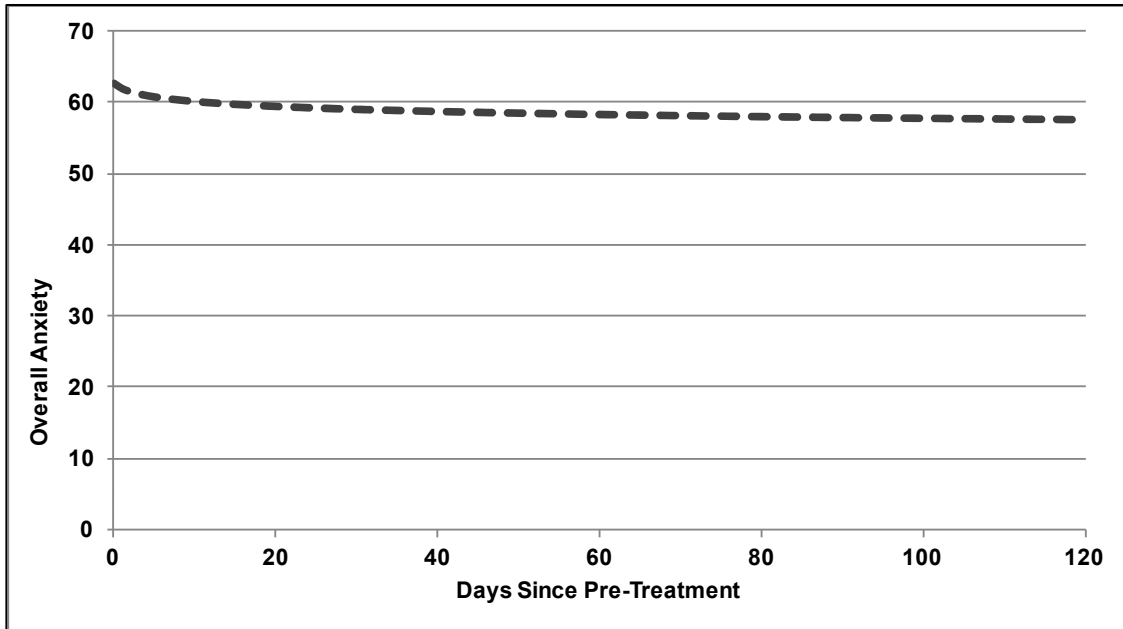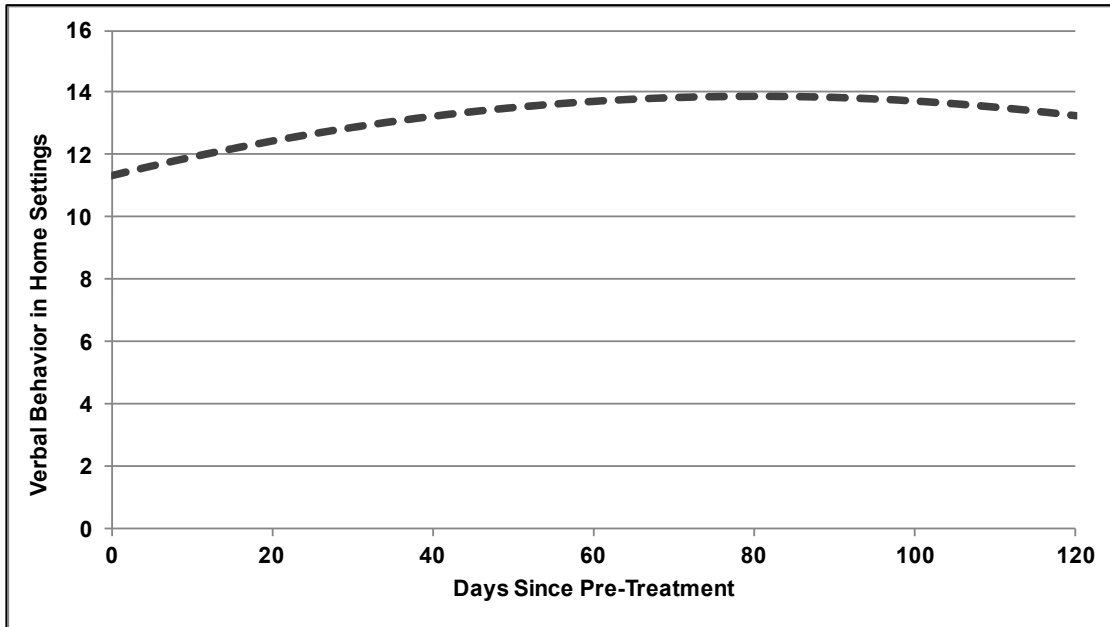
Figure 8. Trajectory of logarithmic change in global functioning (CGAS) from pre-treatment to Week 4 to SYF

Figure 9. Trajectory of logarithmic change in overall anxiety (CBCL Anxiety Problems) from pre-treatment to Week 4 to SYF

Figure 10. Trajectory of quadratic change in verbal behavior in home settings (SMQ Home) from pre-treatment to Week 4 to SYF

Figure 11. Trajectory of logarithmic change in verbal behavior in social settings (SMQ Social) from pre-treatment to Week 4 to SYF
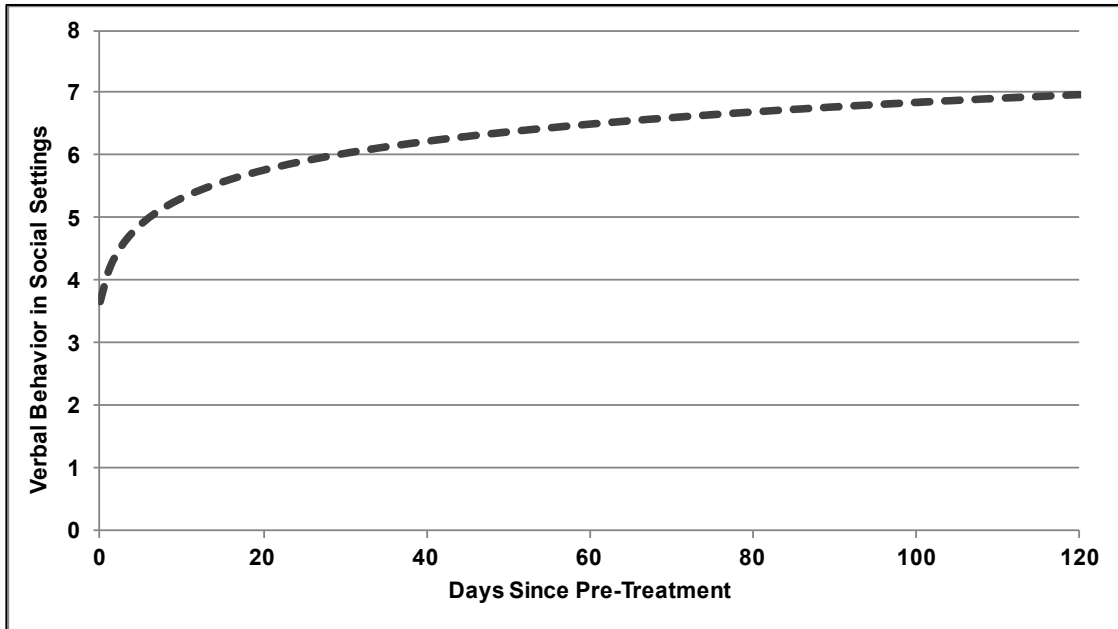
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