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BEHAVIOR SKILLS TRAINING TO IMPROVE PARENT TREATMENT FIDELITY
AND GENERALIZATION IN A FEEDING PROGRAM

A Thesis Submitted to the Graduate School
in Partial Fulfillment of the Requirements
for the Degree of
Master of Science

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BEHAVIOR SKILLS TRAINING TO IMPROVE PARENT TREATMENT FIDELITY
AND GENERALIZATION IN A FEEDING PROGRAM

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BEHAVIOR SKILLS TRAINING TO IMPROVE PARENT TREATMENT FIDELITY AND GENERALIZATION IN A FEEDING PROGRAM

An Abstract of the Thesis by
Melissa Jo Stiffler

Feeding problems are five times more likely to occur in children with autism spectrum disorder (ASD) than in typically developing peers (Sharp, et al., 2013). Though behavior analytic protocols have demonstrated efficacy, less research has investigated methods to transfer technology to non-professional caregivers. This study utilized a behavioral skills training (BST) procedure to increase generalization of treatment methods from the clinic to the home environment for three parent-child dyads. Meal observations were conducted prior to treatment to determine baseline rates of behavior, specifics of the child's food refusal, oral motor deficits, and nutritional needs. Baseline observations were used to develop an individualized treatment protocol for each child and a multiple baseline design was used to demonstrate the effects of behavioral skills training on increased treatment fidelity and generalization effects of feeding strategies. Results indicate that behavioral skills training may be used to increase treatment fidelity and generalization effects for caregivers implementing behavioral feeding strategies with their children who display severe food selectivity.

Keywords: parent training, food selectivity, feeding therapy, feeding difficulties

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CHAPTER I

Introduction

Autism Spectrum Disorder (ASD) is characterized by deficits in social/emotional reciprocity, deficits in communication, and stereotyped/repetitive patterns of behavior or interests (American Psychiatric Association, 2013). In conjunction with stereotyped/repetitive patterns of behavior, numerous studies have found a link between ASD and an increased risk of food selectivity. A study by Bandini et al. (2010) suggested that children with ASD refused 41.7% of foods presented, while typically developing peers refused 18.9% of foods presented. Sharp et al. (2013) found that food selectivity puts these children at an increased risk of nutrient deficits, specifically lower intake of calcium and protein. Long-term calcium deficiencies may increase risk of osteomalacia and osteoporosis. Osteomalacia and osteoporosis result in soft or weakened bones, increasing the risk of breaking or fracturing bones. In addition, Sharp and colleagues (2013) noted that research has demonstrated long-term food selectivity and feeding problems increase the risk of growth retardation, invasive medical procedures such as feeding tube placement, developmental delays, psychological and social deficits, and poor academic performance. General definitions of food selectivity include restriction of foods to approximately 20 or fewer foods. As noted previously, an individual's nutrition may be compromised as a result of food selectivity, and restriction may exclude entire

food groups (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2015).

Feeding difficulties often increase stress on families. Severe behaviors may be exhibited during mealtimes such as crying, aggression, gagging, or vomiting. As a result, caregivers may prepare alternative meals for the individual and/or families may avoid eating at restaurants or in other public spaces. These factors often negatively influence the quality of life for the individual and their family as well as exacerbate rigid food preferences. Evidence based treatments are warranted for these families to improve their quality of life and reduce inherent medical risks associated with selective food preferences.

Review of the Literature: Pediatric Feeding Interventions

A variety of applied behavior analytic interventions have been used to improve acceptance and tolerance of non-preferred foods in clinical settings and have been implemented by trained professionals. In order to effectively treat problem behaviors, a practitioner should first identify consequences or variables that maintain a given behavior. This allows a practitioner to identify the reasons or why a behavior occurs; often referred to as a function. By identifying the function of the behavior, interventions can then address the underlying causes opposed to how the behavior looks, often referred to as topography or symptom of a larger problem. Iwata, Dorsey, Slifer, Bauman, and Richman (1994) outlined a procedure to identify the function of problem behaviors in a method referred to as an analog functional analysis. Experimental conditions were conducted in which the participant was exposed to a variety of scenarios in which problem behavior resulted in delivery of different potential maintaining consequences. In

a controlled environment, extraneous variables are eliminated and inferences can be made about the maintaining function of problem behaviors by manipulating antecedents or stimulus cues and expected outcomes or consequences. As outlined by Iwata and colleagues, maintaining functions of behavior include escape (the task or demand is removed), attention (in the form of social disapproval), automatic reinforcement (some property of the behavior produces a pleasurable experience for the individual) and/or access to tangibles (items, edibles, preferred activities, etc.).

Piazza, Fisher, et al. (2003) demonstrated that analog functional analysis could be applied to food refusal and inappropriate mealtime behaviors to determine maintaining consequential variables most commonly associated with refusal. In this study, nine children were exposed to functional analysis conditions in which food refusal resulted in either negative reinforcement (removal of the spoon), positive reinforcement in the form of attention (statements about the food or the child's behavior), or positive reinforcement in the form of tangible items (preferred toys, foods, or drinks). Extending Iwata's (1994) methods, Piazza, Fisher, et al. (2003) identified maintaining functions in the context of food refusal by applying these consequences in a systematic and controlled manner. For these participants the function of food refusal and inappropriate mealtime behaviors as was identified as either escape (behavior resulted in negative reinforcement), attention (behavior resulted in positive reinforcement in the form of conversation about the food or the child's behavior), or tangibles (behavior resulted in access to preferred toys, foods or drinks). This experiment demonstrates that while behaviors across individuals may share topography or overt looks, the reasons or functions are idiosyncratic.

For food refusal behaviors that have been maintained by removal of the non-preferred food, escape extinction procedures may be utilized to increase food acceptance. In escape extinction procedures, the problem behavior no longer results in the termination of the aversive stimulus (Cooper, Heron, & Heward, 2007). In the case of feeding difficulties, this would include no longer removing the non-preferred food contingent on the occurrence of problem behaviors. Specific interventions that have been used to address escape extinction include non-removal of the spoon and physical guidance. In non-removal of the spoon procedures, the spoon is held at the child's mouth until the bite is accepted (Ahearn, 2002; Didden, Seys, & Schouwink, 1999; Hoch, Babbitt, Coe, Krell, & Hackert, 1994; Piazza, Patel, Gulotta, Sevin, & Layer, 2003). In physical guidance, hand over hand guidance is used to deposit the bite into the child's mouth by applying slight pressure to the lower mandible to open the mouth (Ahearn, 2002; Ahearn, Kerwin, Eicher, Shantz, & Swearingin, 1996; Piazza, Patel, et al., 2003).

Differential reinforcement procedures are often used in conjunction with escape extinction procedures, in which an alternative behavior produces reinforcement while another behavior is placed on extinction (Cooper, Heron, & Heward, 2007). In feeding interventions, differential reinforcement involves reinforcing behaviors that are conducive to mealtimes and bite acceptance, while withholding reinforcement for those behaviors that are incompatible with appropriate mealtime behaviors, such as expelling foods, batting at the spoon, leaving the table, etc. (Alaimo, Seiverling, Anderson, & Sturmey, 2018; Patel, Piazza, Martinez, Volkert, & Santana, 2002; Piazza, Patel, et al., 2003). For example, in a differential reinforcement procedure, reinforcement in the form of preferred items and attention may be provided for accepting a bite within 5 seconds of

the bite presentation and having no food in the mouth 30 seconds after the bite presentation, while withholding reinforcement if the child bats at the spoon or expels the bite.

Other strategies that have been paired with escape extinction procedures to decrease occurrence of incompatible mealtime behaviors are non-contingent reinforcement and environmental enrichment. Non-contingent reinforcement involves delivery of stimuli with known reinforcing properties at predetermined times regardless of learner behavior (Cooper, Heron, & Heward, 2007). In environmental enrichment, preferred items such as toys, food, or activities are available on a continuous basis regardless of learner behavior (Smith, 2011). In non-contingent reinforcement or environmental enrichment procedures for feeding difficulties, the child is provided with reinforcing items throughout the meal that are not contingent on bite acceptance, to increase the reinforcing properties of the meal (Allison et al., 2012; Reed et al., 2004).

In simplest terms, behavior results in getting something (positive reinforcement) or getting out of something (negative reinforcement). Both positive and negative reinforcement have been used to treat feeding difficulties. Positive reinforcement is the addition of a consequence that increases the future probability of whichever behavior immediately precedes it (Cooper, Heron, & Heward, 2007). In procedures utilizing positive reinforcement for feeding difficulties, praise or preferred items are presented, contingent on bite acceptance (Piazza, Patel, et al., 2003). Negative reinforcement is defined as the removal of an aversive stimulus that makes it more likely that a behavior will occur again in the future (Cooper, Heron, & Heward, 2007). In negative reinforcement procedures addressing food refusal, experimenters implemented a token

economy in which the child earned tokens contingent on bite acceptance and then could exchange the tokens to end the meal (Kahng, Boscoe, & Byrne, 2003). In addition, escape extinction procedures, namely, non-removal of the spoon, have been paired with other treatment methods, such as differential reinforcement to reduce food refusal in children diagnosed with autism (e.g. Patel et al., 2002; Piazza, Patel, et al., 2003; Ahearn et al., 1996).

Other strategies involve manipulating the food prior to any demands or occurrence of behavior in some way to increase the probability of acceptance, often referred to as antecedent manipulations (Cooper, Heron, & Heward, 2007). Simultaneous food presentation is an antecedent manipulation in which, a preferred condiment or food is placed on the spoon with the non-preferred food. Repeated pairings of the preferred food with the non-preferred food creates a taste preference for the non-preferred food (Ahearn, 2003). A similar procedure involves blending purees of preferred foods with purees of non-preferred foods. Mueller, Piazza, Patel, Kelley, and Pruett (2004). Mueller et al (2004) used a procedure in which a preferred food and a non-preferred food were blended together in increasing ratios to treat food refusal. Initially the ratio of non-preferred food was low and the preferred food high. The ratio was gradually increased so that the majority of the blend was the non-preferred food and the proportion of the preferred food was low. For instance, applesauce was a preferred food for one participant and chicken was a non-preferred food. Initially applesauce comprised 90% of the blend, while chicken comprised the remaining 10% of the blend. The blend ratio was gradually increased to 90% chicken and 10% applesauce in an incremental fashion (i.e., 90% applesauce/10% chicken, 80% applesauce/20% chicken, 70% applesauce, 30% chicken,

60% applesauce/40% chicken, 50% applesauce/50% chicken, 40% applesauce/60% chicken, 30% applesauce/70% chicken, 20% applesauce/80% chicken, 10% applesauce/90% chicken).

Review of the Literature: Parent Training

The procedures outlined above have been well documented in increasing food acceptance in children with ASD who display severe food selectivity and food refusal (Ahearn, 2002; Ahearn, 2003; Ahearn et al., 1996; Alaimo et al., 2018; Allison, et al., 2012; Didden et al., 1999; Hoch et al., 1994; Kahng et al., 2003; Mueller et al., 2004; Patel et al., 2002; Piazza, Patel, et al., 2003; Reed, et al., 2004). In addition to food acceptance and dietary variety being obtained during clinic based sessions, there is a need for the treatment methods to be implemented by the caregiver and generalized to the home and other settings in which the individual with ASD often eats. Because the majority of the individual's time is spent with caregivers, it is important for the caregivers to be proficient in implementing the feeding treatments outside of the clinic based setting. Previous research has examined parent implemented treatment protocols to address feeding difficulties in children. For example, Najdowski, Wallace, Doney, and Ghezzi (2003) taught parents to conduct a modified functional analysis during a meal to determine consequences maintaining food refusal. Following functional assessment, parents were taught to implement differential reinforcement and escape extinction procedures congruent with maintaining variables. Valdimarsdottir, Halldorsdottir, and Sigurdardottir (2010) provided parents with oral and written instructions, video of experimenter implementation, and performance feedback after meal sessions with their child. Results indicate gains were generalized across people; i.e. transferred from

experimenters to parents. Gains were also generalized across settings; i.e. transferred from the preschool setting to the home setting. Other studies have found similar results (Aclan & Taylor, 2017) indicating that practice with experimenter feedback may be the critical component

Behavior Skills Training: Overview

While the aforementioned research found effective strategies for training parents in implementation of specific feeding protocols, there is a need for a structured and proven methods for training parents to implement individualized treatment protocols across functions (escape, attention, etc.). Practitioners often observe a range of behaviors and needs based on an individual child's feeding difficulties. Though research has demonstrated utility in addressing feeding difficulties and generalizing to parents and home environments, no standardized training procedure that can be used by practitioners to train parents has been documented.

In traditional training approaches, verbal instructions are given, sometimes accompanied by printed instructions. This approach assumes that if an individual is able to recite instructions, he or she will be able to implement the actions instructions provide. Despite this assumption, much research has demonstrated this is not accurate (Bailey & Burch, 2010). Occasionally other components such as modeling are added. While research suggests the addition of modeling improves effectiveness, critical components such as rehearsal and feedback are absent (LaBrot, Radley, Dart, Moore, & Cavell, 2018).

Behavior Skills Training (BST) is an empirically validated approach to skill acquisition that includes 1) Instructions 2) Modeling 3) Rehearsal and 4) Feedback (Miltenberger, 2016). This method requires the trainee to demonstrate the target skill in the setting in which it is expected to be demonstrated following training. For example, in a feeding session, the child initially increases consumption of target foods with a therapist in a clinical setting. The child's behavior of eating the target food falls under the stimulus control of the clinical setting and the therapist's presentation, through the repeated pairing of consequences delivered by the therapist following acceptance of the food. Using a BST approach, the parent presents the food in the clinical setting practicing the treatment methods that have been modeled. The trainer provides in session and/or post session feedback on the parent's performance of the target skills until fluency is achieved providing an advantage of the BST model over traditional training models. All components of BST are discussed in detail below.

Instructions

Instructions are a specific description of the behavior the learner is expected to perform. Instructions may be delivered in both written and verbal formats. The rationale behind this step of BST is to give the learner a clear understanding of what is being taught, how it is going to be taught, and a detailed description of the skills to be learned (Miltenberger, 2016).

Modeling

Following instructions, the next step in BST is to model the skills that are being targeted for acquisition. In modeling the learner observes the instructor or others

proficient in the skill, act out or engage in the skill that is being learned (Gruber & Poulson, 2016; MacDonald & Ahearn, 2015). Modeling may occur in situ, that is in the natural environment that the behavior is expected to be performed in, or via video modeling in which the learner observes a video in which others perform the skill to be learned. This allows the trainee to observe essential components of the skill in a typical context in which it is to be performed in the future (Miltenberger, 2016).

Rehearsal with Feedback

Next, rehearsal sessions are conducted in which the learner has the opportunity to practice the behavior after instructions and modeling have taken place. Rehearsal is an important part of BST for several reasons. During this step of training the teacher is able to provide feedback on correct or incorrect implementation of the skill being learned. This step provides an opportunity for the teacher to reinforce the learner's correct implementation and assess if the learner is able to perform the skill overtly (Miltenberger, 2016). The trainer provides corrective feedback, in the form of a description of the skills that were performed incorrectly and those that were performed correctly. This process is repeated until the trainee is fluent and all the essential components of the trained skill are demonstrated. Through this process the trainer shapes the expected behavior by reinforcing closer and closer approximations to the target skill (Cooper, Heron, & Heward, 2007) until the learner is able to perform the skill to criterion.

Behavior Skills Training: Applications in Parent Training

Behavioral skills training has been used effectively to teach parents or caregivers to implement a range of interventions with their children. In a study by Dogan et al.,

(2017), BST was used to teach parents to be social skills trainers for their children diagnosed with ASD. In this study BST was used to teach the parents to correctly utilize the steps in BST which in turn, parents used to teach social skills to their children. First instructions included a handout that outlined the BST procedure. The investigator reviewed the material contained in the handout, specifying how to correctly use the BST steps to teach a specific social skill. Vignettes were used throughout each step to give the parents a description of the social interaction and rationale for the skill being taught. Following instructions, parents observed the investigators model the correct use of BST. This included the investigators modeling the use of BST steps to teach graduate students social skills outlined in the vignettes. A puppet was used during modeling to ensure that there were enough conversational partners to demonstrate the social skills being taught. Next, the parent engaged in the modeling process with the investigators, playing the role of the child. The investigator modeled each step of the BST procedure, providing that parent who was playing their child, appropriate feedback including descriptive praise and corrective feedback. Following modeling, the parent switched roles with the investigator and role played the learning scenario as the instructor and the investigator as their child. Parents were provided with feedback following the role play sessions and were required to rehearse the steps with feedback until a predetermined mastery criteria was met. Follow up probes were conducted, in which the parents demonstrated the maintenance of the skills taught. The results of the study indicate that BST was an effective intervention in increasing parents' correct use of BST to teach their children social skills.

Lafasakis and Sturmey (2007) demonstrated the effectiveness of BST in training parents to correctly implement discrete-trial teaching (DTT). In discrete-trial teaching, a three term contingency comprises a highly structured instructional unit, including an antecedent (i.e the instruction), a behavior or response from the learner, and a consequence (i.e social praise or a preferred item delivered for correct responding (Lovaas, Koegel, Simmons, & Long, 1973). Lafasakis and Sturmey (2007) provided instructions that included a typed list of the 10 components of discrete-trial teaching as outlined by the researchers. During baseline, the parents were instructed to conduct discrete-trial teaching to the best of their ability. Following baseline, parents were provided with a graph of their performance during baseline and the researcher discussed the parent's performance during baseline. Next, the researcher modeled three discrete trials with the child while the parent observed. The parents were then asked to perform three discrete trials previously modeled. Descriptive feedback was provided immediately following the performance and included positive comments about components performed correctly, such as "You did a nice job getting eye contact before beginning the trial". Corrective feedback was provided on components performed incorrectly and included statements such as "Next time, make sure to deliver reinforcement immediately after a correct response". Modeling and rehearsal continued with feedback for 10 minutes per session. Sessions continued until parent's demonstrated implementation of the components of discrete-trial teaching at 90% accuracy for two consecutive training sessions. Results indicate BST is an effective and efficient teaching strategy to increase parent implemented DTT.

In a study by Miles and Wilder (2009), caregivers were taught to implement a guided compliance procedure in which gradually more intrusive prompts are used contingent on non-compliance. Three caregivers participated in the study, including two parents and one nanny who provided care for six children. In this study, the researchers utilized instructions to provide a written description of each component in the guided compliance treatment. The researchers provided the parents with feedback on baseline performance and provided a graphic display of their performance as part of the feedback. Next, the researchers asked the parents to rehearse the guided compliance procedure with their child for three uninterrupted trials. The researchers provided corrective feedback on components that had been implemented incorrectly and then modeled correct implementation of the procedure with the children for four trials. Rehearsal and modeling were repeated with feedback until the caregiver was able to implement the procedure with 100% accuracy for three consecutive trials. The researchers demonstrated that BST was effective in teaching caregivers to implement a guided compliance procedure to increase child compliance with directives.

Behavior Skills Training: Parent Training in Pediatric Feeding

BST has been used in several studies to increase parent implementation of feeding protocols for their children with food selectivity. Anderson and McMillan (2001) utilized BST to teach parents to use escape extinction and differential reinforcement to treat food selectivity. The participants in this study were the parents of a 5-year-old boy diagnosed with pervasive developmental disabilities. In this study parents were provided with instructions in written format and were presented verbally to them by the researchers. The intervention involved the parents presenting a bite of food on a spoon and holding

the spoon to their child's lips until the child opened his mouth and allowed the bite to be deposited in his mouth. Parents were instructed to provide immediate praise and a sip of a preferred beverage, milk. Following the first three meals, the researchers provided feedback and coaching on a weekly basis. This study demonstrated that parents could be taught to implement a feeding procedure to increase the acceptance of non-preferred foods using a BST model.

While treatment packages have demonstrated success, it is unclear what components are responsible for the change. Mueller et al. (2003) compared the use of written instructions only to a multicomponent treatment package to train parents to implement pediatric feeding protocols. Verbal instructions plus modeling and rehearsal were compared to simplified packages consisting of verbal instructions and modeling, verbal instructions and rehearsal, and verbal instructions only. Participants were assigned to two groups; Study 1 and Study 2. Study 1 included three parents of two children who exhibited severe feeding problems. Study 2 included six parents of three children who exhibited severe feeding problems. Feeding interventions for each child were individualized but all included an escape extinction procedure, non-removal of the spoon, paired with either differential reinforcement or non-contingent reinforcement. In Study 1, the baseline data was collected on parent implementation of the protocols after receiving written instructions only. Following baseline, the parents received additional training including verbal instructions, modeling, and rehearsal. Feedback was not provided to two of the three parents. One parent received feedback following a session due to incorrect implementation of the treatment protocol.

The results of Study 1 suggest that modeling and rehearsal significantly increased correct implementation of feeding protocols by parents and that feedback was necessary for the third parent to increase correct implementation. Two parents received verbal instructions and modeling only, two parents received verbal instructions and rehearsal only, and two parents received verbal instructions only. Verbal instructions, modeling, and rehearsal components in Study 2 were identical to those in Study 1. Taken together the results of Mueller et al. (2003) indicate that while the multicomponent training package used in Study 1 was efficient to increase correct implementation of the treatment protocol, simplified training packages such as those used in Study 2, were also effective in increasing correct implementation. The authors state that the simplified training packages can be delivered in reduced amounts of time, which could provide a clinical advantage of the multicomponent treatment package due to time constraints. While correct implementation of the procedures by parents yielded high percentages across all treatment packages, there was variability in the correct implementation of the treatment package for the majority of the parents. Variability could result in the child contacting contingencies that could potentially maintain feeding difficulties for their children. In addition, only one parent in both studies received feedback. Results of that feedback increased correct performance for that parent and is likely that it could have increased correct performance to higher levels for the other participants as well.

Long term gains often hinge on a parent's ability to implement effective feeding procedures as well as generalize these skills from a tightly controlled clinic to the home environment. Najdowski et al. (2010) evaluated a home-based parent training approach using preference assessments, differential reinforcement, and demand fading to teach

parents to first conduct preference assessments to identify preferred foods. Commonly used preference assessments involve the presentation of one or more stimuli, in this case food, in a systematic manner in which structured trials are presented and selection is recorded for each trial. Results are calculated based on the number of times a stimulus was selected out of the total number of presentations (Cooper, Heron, & Heward, 2007). Next, parents were taught to implement a differential reinforcement plus escape extinction treatment or a differential reinforcement, non-removal of the spoon, plus demand fading treatment. Demand fading involves systematically increasing bite sizes based on the child's acceptance of the food, starting with a rice size bite and increasing to a full spoonful or by systematically increasing the number of bites consumed during the meal. The treatment package involved written instructions that the investigators read through while modeling them with another investigator. Following the instruction and modeling procedure, parents role-played the procedures with the investigator to allow the parents practice being the therapist. Immediately following this training, the parents conducted sessions with their child in the home setting while the investigator provided feedback as needed or when the parents asked questions. Results were positive as the number of bites for each child was increased, demonstrating the effectiveness of a BST model to train parents to implement feeding protocols in the home setting.

Other home-based training studies have shown success in treating young children ranging in age from 21 to 54 months, that had been referred to a psychology clinic for chronic selective food refusal (Werle, Murphy, & Budd, 1993). During baseline parents were instructed to "behave as they naturally would with their child during mealtime. A treatment package consisted of basic educational information on child nutrition and

strategies to introduce new foods. Instructions and handouts outlined how to implement attention contingent on their child's positive mealtime behavior as well as planned ignoring when disruptive behaviors occurred. In addition, parents were trained to use a mild corrective procedure consisting of a firm "no" paired with blocking attempts to leave the mealtime area and for two of the mothers, time out. The intervention included instruction, role play, and rehearsal with feedback. Dependent variables were mean episodes of parent behavior per minute, which included positive attention and trained vs vague prompts. Results support the use of BST in treating food selectivity and in addition provide an empirically validated approach to transfer technology to parents. Similar studies have used BST to train parents on implementation of escape extinction and differential reinforcement strategies to address food selectivity (Seiverling, Williams, Sturme, & Hart, 2012).

Purpose of the Study

Although feeding difficulties may originate due to organic or medical factors such as oral motor deficits, allergies, or texture sensitivity, parent response to feeding difficulties may increase and reinforce those behaviors. Food refusal may be generalized to foods other than those that behaviors originated with, resulting in food selectivity. Parent responses may include attention in the form of negotiations, bribery, disapproval for food refusal, or removal of non-preferred foods. In these instances problematic mealtime behaviors are likely to increase in the future through the process of negative reinforcement. Due to the complex learning history associated with feeding difficulties and food selectivity, treatment effects may be initially gained in a clinic based setting with a therapist with whom there is not a long learning history. A BST approach can be

utilized to train parents on the implementation of the feeding intervention and the treatment effects generalized to the parent and the home setting. Clinic based services offer the ability to provide a multi-disciplinary approach to address nutrition, oral motor deficits, and behavioral interventions. The current study aims to extend the work of Anderson and McMillan (2001), Mueller et al. (2003), Najdowski et al. (2010), Werle et al. (1993), and Seiverling et al. (2012), by increasing treatment fidelity using a behavioral skills training model in caregiver implementation of treatment in the clinic setting, during generalization to the home setting, as well as, provide practitioners with a technological description and access to training materials used in the training process.

CHAPTER II

Method

Participants and Settings

Three caregiver-child dyads admitted to a feeding clinic participated in the current study. Participants were selected based on their child's admittance into a feeding program for severe food selectivity and parents having little or no experience with behavioral treatment of food selectivity. A fourth participant began participation in the study, however, the caregiver withdrew due to a change in school placement.

Grace and Becky. "Grace" was the grandmother of "Becky", a 13-year-old girl diagnosed with autism, who met the criteria of feeding difficulties and had been admitted to an outpatient feeding program. Becky exhibited severe food selectivity, consuming a total of 6 foods at the time of assessment. In addition to the limited number of foods that Becky consumed, she also followed rigid rules about what foods could be eaten at certain times of the day. These rules included that she ate popcorn in the morning, waffle fries (from a specific restaurant) for lunch, and pepperoni pizza (from a specific restaurant) in the evening. Outside of these 'meals', Becky ate three other foods throughout the day including one brand of cookies, goldfish, and snack crackers.

Angie and Luke. “Angie” was the mother of “Luke”, a 5 year old boy with a diagnosis of autism, who met the criteria of feeding difficulties and had been admitted to an outpatient feeding program. Luke exhibited severe food selectivity, excluding entire food groups from his diet including most fruits and vegetables with the exception of applesauce and french fries. At the time of assessment, Luke consumed a restricted number of foods and engaged in problematic behaviors when his parents attempted to introduce new foods or foods that Luke had previously consumed, but had not recently been presented. Behaviors displayed when presented with new foods included screaming, lying on the floor while crying, throwing food items, refusing to eat preferred foods that were presented at the same time as the new food, and refusing to eat any foods including preferred foods for several hours after the meal.

Dorothy and Autumn. “Dorothy” was the mother of, “Autumn” a 6 year old girl diagnosed with autism, who met the criteria of feeding difficulties and had been admitted to an outpatient feeding program. At the time of assessment, Autumn exhibited severe food selectivity consuming mostly starchy foods and excluded entire food groups including fruits and vegetables.

Therapy goals for each child included consuming a balanced diet most days of the week, in proportions consistent with the Dietary Reference Intakes (DRI) recommendations and with the recommended United States Department of Agriculture (USDA) food patterns for children their age, sex, and physical activity level (Institute of Medicine, 2006; U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2015). Therapy goals also included increasing variety and volume of vegetables, fruits, whole grains, dairy, and lean proteins. Initially treatment goals were

obtained in the clinical setting with a highly trained feeding therapist under the supervision of a Board Certified Behavior Analyst and in collaboration with a Registered Dietician and Speech and Language Pathologist. After treatment goals were obtained with the therapist presenting the meals, treatment effects were generalized to the caregiver within the feeding clinic. Behavioral skills training was used to train parents to implement treatment components with high fidelity and ultimately to generalize the treatment goals to the home setting.

Baseline

Baseline sessions were conducted for each participant. Targeted foods for all participants were selected by their caregivers in consultation with a Registered Dietician to address nutritional inadequacies. Caregivers provided a 5 minute (minimum) recorded video of a meal in the home setting, in which each parent demonstrated current strategies used to increase food acceptance. Baseline data were collected on caregiver implementation of basic treatment components described below and added as a separate attachment in Appendix B. These components consisted of the following skills identified by the researcher as basic components to most feeding interventions implemented in the outpatient feeding program and the operational definitions were provided in writing to the participants during the initial stage of training:

- 1) Neutrality to food refusal behaviors (includes verbal statements made to the child, the care givers facial expression, and body language)
 - If your child makes a negative comment about the food (i.e “That’s yucky!!”, “Gross!!”, “I don’t want to eat that!”, “I’m going to throw up if I eat that”, etc. do

not argue or try to persuade your child to take the bite, do not attend to the comment, redirect the conversation to a non-food related topic.

- If your child, grimaces, gags, vomits, tries to push the spoon away, cries, screams, etc., remain calm, maintain a neutral expression and do not smile/frown/grimace in reaction to the behavior, do not make comments about the behavior that is occurring, and keep body posture neutral (avoid crossing arms, placing hands on hips, sighing, groaning, etc.)

2) Escape extinction (non-removal of the bite presentation until acceptance occurs)

- If your child does not accept the bite within 5 seconds of presentation, maintain the bite presentation by holding the spoon within 2 inches of your child's mouth until your child opens their mouth to accept the bite.
- If your child is self-feeding, and does not take the bite within 5 seconds of you saying "Take a bite"/placing the loaded spoon in front of them on the plate/pointing to the food, etc., maintain the bite presentation by restating the request every 15-30 seconds.

3) Environmental enrichment or non-contingent reinforcement (may include preferred items, attention for appropriate behaviors, etc.)

Environmental Enrichment:

- Toys/preferred items are present and available regardless of behavior or acceptance of food

Non-Contingent Reinforcement:

- Social praise for appropriate behaviors during the meal are delivered on a preset time schedule regardless of food acceptance or refusal. Interactions are provided throughout the meal that are not food related. i.e. “I like how you’re sitting in your chair.”, “You’re a cool kid, I like hanging out with you.”, questions or comments about the child’s day, what they are going to be doing later, things that they like, etc.

4) Positive meal time conversations

- Avoid talking about the food or making statements about what will or will not happen if your child takes a bite of the food.

5) Positive reinforcement delivered contingent on bite acceptance, (tangible or social praise)

- After your child has accepted a bite, a statement such as “Great job”, “Thank you”, “Awesome”, or a high five, a smile, etc delivered in a matter of fact tone may be delivered occasionally throughout the meal.
- If environmental enrichment is not being used and preferred items are not readily available, a toy or access to a preferred item may be made available for a brief period of time following the acceptance of the bite (20-30 seconds). At the end of the interval, prior to asking your child to take another bite, you should take control of the item by saying “My turn”, or similar phrase.

6) Prompting procedures for bite acceptance

- Present a bite of food to your child. If your child independently accepts the bite within 5 seconds, provide your child brief praise or a preferred item.

- If your child does not accept the bite within 5 seconds, provide a verbal prompt “Take a bite”. If your child accepts the bite, provide brief praise or a preferred item.
- If your child does not accept the bite within 5 seconds, provide a brief/partial physical prompt by placing your hand over their hand and beginning to move it toward but not all the way to their mouth. If your child continues to move the spoon to their mouth and places the bite in their mouth, provide brief praise or a preferred item.
- If your child does not accept the bite within 5 seconds, provide physical guidance, placing your hand over their hand and guiding the spoon to their mouth. If your child accepts the bite, provide brief praise or a preferred item.
- If your child does not accept the bite, maintain the bite presentation within 2 inches of your child’s mouth until they have accepted the bite.

7) Representation of expelled bites

- If your child spits out a bite of food, scoop the food back onto the spoon and represent the bite. If the food is expelled and falls on the floor, or is otherwise not able to be represented, present another bite of the same food.

8) Mouth clean before next bite presentation

- If your child often holds foods in their mouth or cheeks, make sure that your child has swallowed the first bite prior to presenting another bite of food. You may model saying “Ahh” and opening mouth, say “Let me see”, using a small spoon to pull the cheek back to check for pocketed bites.

- Do not present another bite if your child is actively chewing a bite. If needed you can present a drink, to get your child to swallow the bite so that the next bite can be presented.

9) Food weighed pre and post session

- Prior to beginning a meal, weigh your child's food including the tray, bowls or containers, spoons, napkins, and food. After you and your child have finished the meal, weigh the tray with the dishes and napkins and any food that was expelled or not consumed during the session. Record both of these weights on the data sheet. You will calculate the total grams of food your child consumed during the session by taking the pre meal weight and subtracting the post meal weight.

10) Parent collected data during session.

- You will be expected to collect data on bite acceptance and incompatible mealtime behaviors during the session. You will be provided training on data collection.

Percentage of components implemented correctly was calculated by dividing the number of skills implemented correctly divided by the total number of skills required during the session and multiplied by 100%. Because not all components might be needed during a session, the total number that were applicable during a meal were used as the total number of skills (i.e., if a bite of food was not expelled during a meal, the caregiver would not have the opportunity to represent an expelled bite and therefore that component was not included in the total count).

Treatment

Instructions plus Modeling. Participants were initially provided with written instructions, containing information on functions of behavior, their child's particular behaviors during mealtimes, and treatment options with rationales for each treatment. Contents of the packet were reviewed with the caregiver while a therapist conducted a therapeutic meal with their child. The caregiver was able to observe the meal through a one-way mirror while reviewing written instructions with the investigator. Caregivers observed the therapist implementing the treatment protocol with their child during therapeutic meals.

Rehearsal: Once the child had accepted full serving sizes of target foods for three consecutive meals, with incompatible mealtime behaviors occurring on 20% or fewer bite presentations, the caregiver was integrated into the therapeutic meal. Initially both the caregiver and therapist sat with the child and provided positive reinforcement in the form of verbal praise throughout the meal. Next, the caregiver presented the meal with the therapist in the feeding clinic and received feedback regarding correct/incorrect implementation of treatment components. Next, the therapist left the room and the caregiver presented the meal, while the therapist or the investigator observed through the one way mirror, while providing feedback via an earbud and microphone. Data were collected once the caregiver presented meals in the feeding clinic independently i.e. without the therapist present. Caregiver mastery criteria was set at 80% or more of the aforementioned treatment components implemented correctly across two meal sessions. Caregivers then presented meals in the home environment utilizing the treatment protocol. In home meals were recorded and reviewed with caregivers.

Feedback. All feedback was provided via recorded video of the in-home sessions. Experimenters provided corrective feedback for any component demonstrated incorrectly until mastery criteria was met. In-home mastery criteria was identical to the feeding clinic criteria.

Data Collection and Inter-observer Agreement

The dependent variable for all participants was percentage of treatment protocol components implemented correctly. Percentage correct was calculated by dividing the number of components implemented correctly divided by the total number of components in the treatment protocol and multiplied by 100%.

A second observer independently collected data on caregiver implementation of treatment protocol components for at least 30% of sessions in each phase of baseline and treatment. Inter-observer agreement was calculated by dividing the total number of agreements by the total number of agreements plus disagreements and multiplying by 100%. The mean total inter-observer agreement across all participants was 89.6%.

Experimental Design

A multiple baseline across participants was used to evaluate the effectiveness of BST in increasing accuracy of parent implementation of their child's feeding intervention. Baseline data was collected for each participant and a treatment protocol for each participant's child was determined based on baseline observations. Participants were taught to implement all treatment components using a BST approach. Data was collected on each participant's correct or incorrect implementation of the treatment protocol before and after the BST training.

CHAPTER III

Results

Interpretation of the Data

This study evaluated an evidence based training method to increase generalization effects in a feeding program by increasing correct implementation of treatment components by caregivers. Results demonstrated that behavioral skills training was an effective training method to increase correct implementation and generalization across settings of treatment components for all caregivers who completed the training protocol. In addition, results suggest that rehearsal of the target behaviors with feedback on performance were essential components in increasing the accuracy of responding for all participants. Figure 1 displays the percentage of treatment components implemented correctly during baseline meals, following instructions and modeling, with rehearsal and feedback in the clinical setting, and during generalization to the home setting. Data was collected using a procedural integrity checklist (see Appendix A) based on the treatment components that were identified as being common within the agency's feeding clinic protocols. The components assessed across participants are as follows: 1) Neutrality to food refusal behaviors (includes verbal statements made to the child, the care givers facial expression, and body language), 2) Escape extinction (non-removal of the bite presentation until acceptance occurs), 3) Environmental enrichment or non-contingent

reinforcement (may include preferred items, attention for appropriate behaviors, etc.) 4) Positive meal time conversations, 5) Positive reinforcement delivered contingent on bite acceptance, (tangible or social praise), 6) Prompting procedures for bite acceptance, 7) Representation of expelled bites, 8) Mouth clean before next bite presentation, 9) Food weighed pre and post session, and 10) Parent collected data during session. (See Appendix B for detailed definitions of each treatment component)

Three out of four caregivers completed all steps of the training sequence. Kathy, Carl's mother, withdrew from the study before implementation of the behavior skills training package due to a transition in placement for Carl. Grace (Becky's grandmother), Angie (Luke's mother), and Dorothy (Autumn's mother) completed all steps of the behavioral skills training protocol.

Grace and Becky. Baseline data indicates a mean of less than 4% of components correctly implemented, with a range in scores from 0% to 14%. The data indicate a steady and stable trend in Grace's implementation of each treatment component and it is reasonable to predict that without intervention, this trend in mealtime implementation of the treatment components would continue at the same rate and level. Following the first phase of training, data indicated that instructions plus modeling improved Grace's implementation of treatment components ($M = 22\%$, range: 0% - 33%). An immediate increase in level was observed when treatment was implemented and the data stabilized with little variability prior to the next phase of training. Treatment effect was also demonstrated as the values of the data points in each treatment phases differed from the values during the previous phase, referred to as non-overlapping data points. Non-overlapping data points are calculated by dividing the total number of data points in one

phase that fall in the same range as the previous phase and dividing by the total number of data points in the phase that is being evaluated. The percentage of non-overlapping data points from baseline to the first phase of training was 67%, indicating an initial treatment effect. After the initial phase of training, Grace implemented two of the components during one home meal, including remaining neutral when incompatible mealtime behaviors occurred and providing positive reinforcement contingent on bite acceptance in the form of social praise and providing a tangible item. However, instructions and modeling did not increase the implementation of all components to criterion level, which had been predetermined to be 80% or more of total treatment components implemented correctly throughout the entire meal. Following the next phase of training in which the caregiver presented meals and implemented treatment components while receiving feedback from the researcher, the caregiver was able to consistently implement the treatment components (see Figure 1). ($M = 86%$, range: 71% - 100%). The percent of non-overlapping data points following this phase of training increased to 100% demonstrating a functional relation between the number of BST components successfully completed and the accuracy of implementation. Figure 1. Illustrates fidelity improved from 15% to 80% across treatment phases. Mastery criterion was set at a minimum 80% treatment fidelity across at least two meals. Grace met this criteria following three rehearsal trials. During the generalization phase of training, data indicated that Grace was able to successfully generalize implementation of the treatment components to the home setting ($M = 92%$, range: 88% - 100%). In – home treatment fidelity increased slightly above feeding clinic levels further suggesting that the feeding

intervention was generalized to the home environment and indicated that Grace implemented the treatment components with a high rate of accuracy.

Angie and Luke. In the baseline condition correct implementation of treatment components was at a steady, low rate ($M = 0\%$, range: 0% - 0%). This stable, invariable data indicated that this trend in implementation was likely to occur without intervention. Following the first phase of training, data indicated that instructions plus modeling produced an increase in correct implementation of treatment components ($M = 17\%$, range: 13% - 25%) with a high rate of non-overlapping data points (100%). A change in level was also observed, increasing from 0% during baseline to 20% following the first phase of training. Angie demonstrated the ability to consistently implement an environmental enrichment procedure in which she provided Luke unrestricted access to moderately preferred toys during the meal, as well as an increase in focusing on positive mealtime behaviors. However, while some treatment effect was demonstrated, correct implementation did not reach criterion. During the next phase of training in which Angie presented meals in the clinic while receiving feedback from the researcher on implementation of treatment components, there was a rapid increase in correct implementation of treatment components, improving from 38% to 100% across three meals ($M = 72\%$, range: 38% - 100%). The percentage of non-overlapping data points during this phase was 100% with a significant increase in level from 20% to 75%. This change in level and high percent of non-overlapping data points, indicates a functional relation between the number of BST components successfully completed and the accuracy of implementation, suggesting that all components of BST are essential in increasing skill acquisition (see Figure 1). Angie met implementation criterion (80% or

above of treatment components implemented correctly across at least two meals) during the fourth clinic based meal. During the generalization phase of training, implementation of the treatment components was generalized to the home with a high rate of fidelity ($M = 97\%$, range, 88% - 100%). The percentage of non-overlapping data points decreased to 0% indicating generalization effects as correct implementation remained at an increased level from the previous phase (increasing from 75% to 90%).

Dorothy and Autumn. Data collected for Dorothy during baseline was stable and invariable at 0% correct implementation of treatment components during each meal. The low, stable, and invariable rate of implementation of treatment components during baseline suggest that without intervention, this trend in data would continue. Following the first phase of training data indicated an immediate increase in mean and level with low variability ($M = 22\%$, range: 13%-38%). The percentage of non-overlapping data points from baseline to the first phase of training was 100%, indicating some treatment effect however, the change in level was minimal (0%-30%) and Dorothy did not meet performance criterion. While performance criterion was not met following instructions and modeling, Dorothy demonstrated the ability to consistently implement environmental enrichment procedures, in which she provided Autumn unrestricted access to moderately preferred toys throughout meals. In addition Dorothy increased use of positive reinforcement in the form of social praise for desired behaviors and took pre and post meal weights. Data following rehearsal with feedback in the clinic setting indicates that there was an immediate and significant change in mean and level ($M = 84\%$, range: 63%-100%) with 100% non-overlapping data points between the phases of training. A function relationship was demonstrated between the number of BST components

completed and accuracy of implementation of treatment components, as criterion was met only after all steps of BST had been completed (see Figure 1). In the final phase of training, generalization to the home setting was demonstrated with Dorothy implementing the treatment components with a high rate of fidelity ($M = 96\%$, range: $88\% - 100\%$). The percentage of non-overlapping data points (0%) indicates that Dorothy was able to maintain the high rate of treatment fidelity demonstrated during the clinic based meals.

In summary, experimental control was demonstrated in this multiple baseline across participants design by demonstrating that changes in the dependent variable (percent of treatment components implemented correctly) occurred when and only when the intervention was applied. While the treatment was not able to be withdrawn as in a reversal design due to the inability of the researcher to withdraw what the participants had learned, results were replicated between multiple training phases for and across all participants demonstrating a treatment effect (see Figure 1).

Inter-Observer Agreement

To ensure the reliability of the measurement system used, a second independent observer collected data for each participant during 30-38% of each phase of training. Inter-observer agreement (IOA) for all participants was calculated using a point-by-point agreement ratio, as the treatment components being assessed afforded discrete opportunities for a particular skill to be assessed. To calculate the percentage of agreement between observers, the total number of treatment components that were scored the same by each observer was divided by the total number of treatment components observed during a meal and multiplied by 100. Because the goal was for the caregiver to

score a 2 to demonstrate skill acquisition (implemented the treatment component on 80-100% of bite presentations), scores were grouped so that disagreements between 0 and 1 were not calculated as disagreements. For Grace IOA during baseline was 100%, following instructions and modeling IOA was 80%, in clinic rehearsal with feedback IOA was 71%, and in home with feedback IOA was 100%. The average overall IOA percentage for Grace was 88% (range, 71-100%). For Angie average IOA during baseline was 100%, following instructions IOA was 88%, in clinic with rehearsal average IOA was 88%, and in home with rehearsal IOA was 88%. The average overall percent of agreement for Angie was 88% (range, 75-100%). IOA for Dorothy during baseline was 100%, following instructions IOA was 100%, in clinic with rehearsal IOA was 63%, and in home with rehearsal IOA was 100%. The average overall percent of agreement for Dorothy was 93% (range, 63-100%). IOA averages for each phase across participants was also calculated with the following results; baseline 100%, following instructions and modeling 92% (range, 80-100%), in clinic rehearsal with feedback 74% (range, 63-88%), and in home rehearsal with feedback 92% (range, 75-100%).

Social Validity Questionnaire

Hoch, Babbitt, Coe, Krell, and Hackbert (1994), utilized a questionnaire in their study to assess acceptability and overall satisfaction in a pediatric feeding program. The author of this study utilized the same questionnaire to assess the satisfaction and acceptability of the BST procedure. Following completion of the BST package, caregivers were asked to complete a social validity questionnaire consisting of 14 questions regarding acceptability of training procedures and overall satisfaction with the feeding program. Questions were rated on a scale from 1 – 5. A score of 1 indicated that

the caregiver strongly disagreed with the statement or was extremely dissatisfied with the care and/or procedures used. A score of 5 indicated that the caregiver completely agreed with the statement or was extremely satisfied with the service and/or training procedure. (See Appendix for questionnaire and complete rating scale) Caregivers were asked to complete and return the survey anonymously to increase the probability that they would provide honest feedback rather than answering in a way that they may have perceived as expected by the researcher. Outcomes of the survey indicated a high level of overall satisfaction, with 90% of questions across participants being rated as a 5, and the remaining 10% being rated as a 4. No questions were rated below a 4 by any participants.

CHAPTER IV

Discussion

Outcomes of the Study

This study evaluated the effects of behavior skills training (BST) on accurate caregiver implementation of feeding treatment components with generalization to the home environment. While treatment gains in the clinic setting are beneficial, generalization of treatment implementation to the home setting are socially valid and ultimate outcomes for families addressing feeding difficulties. Any treatment gains observed in the clinic must be carried over to natural environments, as this is where the child will receive the majority of their nutritional needs. Current findings demonstrate that BST was effective in the clinic and promoted generalization of parent implementation of treatment components to the home setting.

The training procedure implemented with caregivers included first providing a training packet that included descriptions of basic functions of behaviors, how those functions may apply to inappropriate mealtime behaviors, descriptions of potential interventions that may be used with their child in the clinical setting, and operational definitions of each treatment component included in the BST packet (see Appendix C). Detailed instructions outlined consistent data collection methods so that researchers, trainers, and caregivers accurately recorded results (see Appendix D). Second, caregivers

observed feeding sessions with a highly trained therapist who implemented treatment components with their child. Highly trained is defined as a Registered Behavior Technician implementing the treatment protocol under the observation of a Board Certified Assistant Behavior Analyst. Observations provided caregivers with the opportunity to ask questions regarding treatment instructions or any portion of the observation with the therapist and their child. Researchers labeled treatment components as they were modeled by the therapist. Parents moved to the next training phase after their child accepted target foods selected by parents at the onset of services. Third, the caregiver gradually participated in treatment with the child. Researchers provided instantaneous feedback on correct or incorrect implementation of the treatment components. Mastery criteria was set at 80% or more of treatment components implemented correctly, at which point parents presented a meal in the home setting. Data on implementation of treatment components was collected using a procedural integrity checklist. Each item corresponds to an operationally defined treatment component (see Appendix A and Appendix B). As indicated by the results of this study, all components of the behavior skills treatment package were required to reach acceptable treatment fidelity. The data indicate that caregivers generalized implementation of the treatment components to the home environment following behavior skills training (See Figure 1).

While many studies have demonstrated the effectiveness of interventions to increase food acceptance, dietary variety, chewing, texture fading, etc. in children with feeding difficulties, (Ahearn, 2002; Ahearn, 2003; Ahearn et al., 1996; Alaimo et al., 2018; Allison, et al., 2012; Didden et al., 1999; Hoch et al., 1994; Kahng et al., 2003; Mueller et al., 2004; Patel et al., 2002; Piazza, Patel, et al., 2003; Reed, et al., 2004) the

available research on teaching caregivers to effectively implement feeding protocols is limited. This study aimed to adhere to the seven dimensions of the field as outlined by Baer, Wolf, and Risley (1968). In this landmark article in the field of behavior analysis, the authors discussed seven core dimensions to distinguish the field as an applied field from that of laboratory research. Applied behavior analysis addresses behaviors that are socially significant to the individual (applied), those that are measurable and observable (behavioral), and utilizes visual analysis of data to guide treatment decisions (analytic). In addition, methods should be described in a technological manner that may be easily replicated by the typically trained reader. Behavioral techniques should also be conceptually systematic, effective, and generalizable. Conceptually systematic techniques have been derived from the basic research in the study of behavior and have been demonstrated to be effective. Effective behavioral techniques are those that produce results that are meaningful to the individual and/or society. In addition, behavioral techniques should be generalizable to other settings, behavior change agents, and across time. One limitation of many of the available articles on the training of caregivers to implement pediatric feeding protocols, is the lack of technologically sound descriptions of the processes, materials, and training procedures used, so that practitioners in the field might replicate the training procedures utilized in the study and found to be effective in increasing accuracy of caregiver implementation of those protocols.

Review of the literature revealed many empirical articles on BST, feeding, and parent training, lacked a thorough technological description of procedures and materials used to implement the training package. Often robust data demonstrated the effectiveness of the training methodologies, however replication of the training package

was limited due to broad descriptions of the specific procedures used in each phase of training. It was the intent of this study to extend upon the work of Anderson and McMillan (2001), Mueller et al. (2003), Najdowski et al. (2010), Werle et al. (1993), and Seiverling et al. (2012), to provide tangible guidelines for practitioners to train caregivers on implementation of feeding protocols. This study expanded upon previous investigations by outlining all treatment components in a technological manner so that a casually trained observer could replicate the results. This study also provided the training materials used with caregivers.

Limitations

One limitation of this study is that caregivers may not have had the opportunity to implement each treatment component during the various phases of the study. For example, one treatment component that was not utilized during the majority of sessions across all participants was ‘Representation of expelled bites’. If the child did not expel a bite during the meal, the caregiver would not have the opportunity to follow the protocol for representing the bite, thus they were not scored on this component. This varying number of treatment components from one meal to the next may influence the data, as meals in which there are fewer treatment components would require implementation of more treatment components than a meal in which all 10 components were required (i.e., to meet criterion a caregiver may have to implement 4 out of 5 treatment components in one meal but 8 out of 10 in another meal).

Another limitation was in the potential subjective interpretation of several treatment components. In review of IOA data collected, the treatment components which were most often disagreed upon were “Neutrality to incompatible mealtime behaviors”,

“Positive mealtime conversations”, and “Prompting procedures for bite acceptance”. These items can be operationally defined in an objective manner, however, boundary criteria or what constitutes as an occurrence non-occurrence of “neutrality”, remains somewhat of a professional judgement call. The discrepancy for these components may have been due to varying interpretations of the operational definition. Adding additional exemplars and increasing the objectivity of the definitions may resolve this discrepancy. Another potential source of discrepancy in scoring of these components may be the scoring criteria. Each treatment component was scored on a scale from 0 - 2. Criteria for scoring was as follows; 0) the component was not implemented during that meal (but should have been), 1) the treatment component was implemented on less than 80% of bite presentations (in which the component was required) 2) the treatment component was implemented on 80-100% of bite presentations. Because data was not collected on each component for each bite presented during the meal, the criteria may not have been objectively evaluated. Modifying the procedural integrity checklist to score each component on each bite presented would provide objective criteria for scoring.

Future Directions

While this study provided information on the effectiveness of behavior skills training to increase correct implementation of treatment components by caregivers, improvements in their child’s food acceptance was not represented and correlations between increases in accurate implementation of treatment components and improvements in bite acceptance and incompatible mealtime behaviors could not be evaluated. Future studies could add beneficial data to the field by evaluating the

correlation between accurate caregiver implementation of treatment protocols and the rate of bite acceptance and incompatible mealtime behaviors.

In addition, while the treatment components that were selected were identified as common components across clients receiving services in the researcher's feeding clinic, a component analysis should be conducted to evaluate which components are essential to increased acceptance of bites and reductions in incompatible mealtime behaviors.

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APPENDIX

Appendix A: Procedural Integrity Checklist

	Check Components of Client's Treatment Protocol	Was the procedure implemented correctly? (See notes at bottom of page)		
<input type="checkbox"/>	Neutral - Comments - Facial Expressions - Body Language -	0	1	2
<input type="checkbox"/>	Extinction Procedures: - Non-Removal of the Spoon - Physical Guidance	0	1	2
<input type="checkbox"/>	Non-Contingent Reinforcement: - Tangibles - Attention Or Environmental Enrichment	0	1	2
<input type="checkbox"/>	Positive mealtime conversations	0	1	2
<input type="checkbox"/>	Positive Reinforcement - Comments - Tangibles	0	1	2
<input type="checkbox"/>	Prompting procedures for bite acceptance	0	1	2
<input type="checkbox"/>	Representation of Expelled Bites	0	1	2
<input type="checkbox"/>	Mouth Clean	0	1	2
<input type="checkbox"/>	Pre and Post weights taken	0	1	2
<input type="checkbox"/>	Data collection	0	1	2
	Things You Did That were Great!! 1. 2. 3.	Things Child Did That Were Great!! 1. 2. 3.	Things To Work On 1. 2. 3.	

Appendix B: Operational Definitions of Treatment Components

MEALTIME COMPONENTS

1) Neutrality to food refusal behaviors (includes verbal statements made to the child, the care givers facial expression, and body language)

- If your child makes a negative comment about the food (i.e. “That’s yucky!!”, “Gross!!”, “I don’t want to eat that!”, “I’m going to throw up if I eat that”, etc do not argue or try to persuade your child to take the bite, do not attend to the comment, redirect the conversation to a non-food related topic.
- If your child), grimaces, gags, vomits, tries to push the spoon away, cries, screams, etc, remain calm, maintain a neutral expression and do not smile/frown/grimace in reaction to the behavior, do not make comments about the behavior that is occurring, and keep body posture neutral (avoid crossing arms, placing hands on hips, sighing, groaning, etc)

2) Escape extinction (non-removal of the bite presentation until acceptance occurs)

- If your child does not accept the bite within 5 seconds of presentation, maintain the bite presentation by holding the spoon within 2 inches of your child’s mouth until your child opens their mouth to accept the bite.
- If your child is self-feeding, and does not take the bite within 5 seconds of you saying “Take a bite”/placing the loaded spoon in front of them on the plate/pointing to the food, etc, maintain the bite presentation by restating the request every 15-30 seconds.

3) Environmental enrichment or non-contingent reinforcement (may include preferred items, attention for appropriate behaviors, etc)

Environmental Enrichment:

- Toys/preferred items are present and available regardless of behavior or acceptance of food

Non-Contingent Reinforcement

- Social praise for appropriate behaviors during the meal are delivered on a preset time schedule regardless of food acceptance or refusal. Interactions are provided throughout the meal that are not food related. i.e. “I like how you’re sitting in your chair.”, “You’re a cool kid, I like hanging out with you.”, questions or comments about the child’s day, what they are going to be doing later, things that they like, etc.

4) Positive meal time conversations

- Avoid talking about the food or making statements about what will or will not happen if your child takes a bite of the food.

5) Positive reinforcement delivered contingent on bite acceptance, (tangible or social praise)

- After your child has accepted a bite, a statement such as “Great job”, “Thank you”, “Awesome”, or a high five, a smile, etc delivered in a matter of fact tone may be delivered occasionally throughout the meal.
- If environmental enrichment is not being used and preferred items are not readily available, a toy or access to a preferred item may be made available for a brief period of time following the acceptance of the bite (20-30 seconds). At the end of the interval, prior to asking your child to take another bite, you should take control of the item by saying “My turn”, or similar phrase.

6) Prompting procedures for bite acceptance

- Present a bite of food to your child. If your child independently accepts the bite within 5 seconds, provide your child brief praise or a preferred item.
- If your child does not accept the bite within 5 seconds, provide a verbal prompt “Take a bite”. If your child accepts the bite, provide brief praise or a preferred item.
- If your child does not accept the bite within 5 seconds, provide a brief/partial physical prompt by placing your hand over their hand and beginning to move it toward but not all the way to their mouth. If your child continues to move the spoon to their mouth and places the bite in their mouth, provide brief praise or a preferred item.
- If your child does not accept the bite within 5 seconds, provide physical guidance, placing your hand over their hand and guiding the spoon to their mouth. If your child accepts the bite, provide brief praise or a preferred item.
- If your child does not accept the bite, maintain the bite presentation within 2 inches of your child’s mouth until they have accepted the bite.

7) Representation of expelled bites

- If your child spits out a bite of food, scoop the food back onto the spoon and represent the bite. If the food is expelled and falls on the floor, or is otherwise not able to be represented, present another bite of the same food.

8) Mouth clean before next bite presentation

- If your child often holds foods in their mouth or cheeks, make sure that your child has swallowed the first bite prior to presenting another bite of food. You may model saying “Ahh” and opening mouth, say “Let me see”, using a small spoon to pull the cheek back to check for pocketed bites.

- Do not present another bite if your child is actively chewing a bite. If needed you can present a drink, to get your child to swallow the bite so that the next bite can be presented.

9) Food weighed pre and post session

- Prior to beginning a meal, weigh your child's food including the tray, bowls or containers, spoons, napkins, and food. After you and your child have finished the meal, weigh the tray with the dishes and napkins and any food that was expelled or not consumed during the session. Record both of these weights on the data sheet. You will calculate the total grams of food your child consumed during the session by taking the pre meal weight and subtracting the post meal weight.

10) Parent collected data during session.

- You will be expected to collect data on bite acceptance and incompatible mealtime behaviors during the session. You will be provided training on data collection.

Appendix C: Parent Training Packet

FEEDING CLINIC

Behavior Intervention Training Packet

Consultant:

Melissa Stiffler, B.S., BCaBA, LABA

Understanding Behaviors

What do we know about problem behavior?

- Problem behaviors are learned in the same way as appropriate behaviors.
- Problem behaviors serve a function for the person.
- The behaviors interfere with learning, social interactions, and can be harmful.

Functions of Behavior

- Both appropriate and inappropriate behaviors serve a function or are supported by the environment.
- If a behavior is NOT occurring it is not being supported.
- If a behavior is occurring it is being supported.

There are 2 functions of behavior:

- To get something
 - Attention
 - Tangible
 - Self Stimulatory
- To get out of something:
 - Escape
 - Avoidance

To Get Something

- Delivered by others
 - Getting toys, preferred foods
 - Getting peer or adult attention *(good or bad)
 - Access to activities

- Within Oneself

Self-stimulatory behaviors: Sometimes what the person does is reinforcing by itself, or intrinsically reinforcing. For example, creative activities often are intrinsically motivating, that is painting a picture or playing the guitar is satisfying to the person and they do not need someone to tell them that the painting is good or that the music sounds good.

To Get out of Something

- Through others
 - Escape from an activity, task, person, sound, etc.
 - Avoidance
- Within oneself
 - Pain attenuation – taking Tylenol to get rid of a headache

Food Refusal Functions of Behavior

Attention: When a child refuses food (crying, gagging, pushing foods away, making negative statements about the food) the parent may give the child reasons why s/he should eat the food (“If you try a bite, then you will get _____”, and/or threats such as “If you don’t try a bite, you won’t get dessert” etc.) Another form of attention that a parent might provide may be statements of disappointment or other negative statements (“I’m really sad that you didn’t eat that”, “Why won’t you just eat your vegetable?!” etc.). Both types of attention may increase the food refusal behavior, in an attempt to get continued attention and interaction from the parent.

Escape: A child may engage in crying, gagging, pushing foods away, hitting, screaming, etc. because when they do, the food is removed and they are not required to taste it or eat it. In addition, they may be presented with preferred foods in its place.

Interventions That May be Used in Clinic:

Non-Contingent Reinforcement:

- We may give your child something reinforcing (i.e. tickles, toys, statements of praise for desired behaviors, etc) throughout the session on a time interval that is determined prior to the meal, as long as your child is not engaging in food refusal behaviors.

Environmental Enrichment:

- We may provide toys or attention throughout the meal regardless of behavior, to increase the appeal of the mealtime setting. This may be used during initial sessions to create a positive experience in the meal setting. As your child becomes more comfortable during the meal and has demonstrated success with foods, the amount of attention or the number of toys may be reduced to more closely resemble meals outside of the clinic.

Social Praise:

Social praise should be delivered throughout the meal, for any behaviors NOT RELATED to food. Examples include commenting on the toy that your child is engaged with, talking with your child about NON FOOD RELATED topics, or making statements about your child that are NOT RELATED to food. i.e. “You’re really good at this game!”, “Thanks for sitting at the table with me!”, “How was your day at school?”, etc.

- Following bite acceptance, a brief, neutral statement may be made such as “Thank you”, “Good job”, etc
- Try to avoid making negative statements about your child’s behavior during the session. You may be tempted to tell your child to stop pushing the food away, or not to spit out a bite, or to stop engaging in other problem behaviors.

- A method that often helps one become aware of negative statements is to wear a rubber bracelet or a silly band around his or her wrist. Each time they state something using a negative (example: no, stop, don't, not a choice, etc) the person switches the band to the other wrist. It is an awareness technique that will help one to notice how often they are making these types of statements.

Extinction Procedures for Attention:

Extinction occurs when reinforcement that has been maintaining a behavior, is no longer provided for that behavior. In other words, when the child no longer gets what they want based on engaging in that behavior. In mealtimes this may mean that crying no longer results in the food being removed. When your child engages in incompatible mealtime behaviors (refusing food, making negative comments about the food, gagging, pushing food away, crying, vomiting, turning his head away from the food, etc), the person presenting the meal will NOT comment on the behavior or engage in conversation with them about the behavior. Social praise should still be provided for behaviors not related to the incompatible mealtime behaviors. Your child may still have access to preferred toys and attention even if these behaviors are occurring (conversation and interaction should not involve the food).

Types of Extinction Procedures

- **Non-Removal of the Spoon:** If your child does not accept the bite within 30 seconds of the initial presentation, or engages in incompatible mealtime behaviors you will maintain the bite presentation. If your child is self-feeding, this means that you will keep the loaded spoon in front of them on a plate and restate "Take a bite" every 15-30 seconds until your child accepts the bite. If your child is not self-feeding, you will continue to hold the spoon 1-2 inches in front of their mouth until they open their mouth to accept the bite.

- **Physical Guidance** – If your child does not accept the bite within 5 seconds of you presenting the bite, physical guidance will be used to move the spoon towards their mouth and deposit the bite into their mouth when they open their mouth to accept the bite. To do this, you will place your hand on your child’s hand and guide the spoon to their mouth.

Redirection:

When your child engages in incompatible mealtime behaviors, the person presenting the meal may redirect your child’s attention to a preferred activity, change the conversation, or ask your child to perform a simple task (touch your nose, make your car go fast, etc).

Blending Procedure:

In this procedure a food that your child already eats that is a puree, such as applesauce or mashed potatoes, is mixed with a target food that has been pureed in the blender. For example, if your child accepts applesauce, another fruit such as peaches may be pureed and mixed with the applesauce. Initially the food that your child currently eats will be the majority of the blended food with a small amount of the target food. Based on bite acceptance, the proportion of target food will be gradually and systematically increased while the other food is decreased.

Simultaneous Presentation:

This intervention is similar to the previous one, except that the foods are not pureed and blended together. A food that your child currently eats or a condiment such as ketchup will be presented on the spoon with the target food. For example, if your child likes goldfish, a goldfish with a rice size bite of green bean would be presented. Based on your child’s acceptance, the size of the green bean would be increased gradually over time while the goldfish is gradually decreased and eliminated from the bite.

Fading:

Because introducing a new food may be overwhelming for your child if a large portion is presented, a very small amount may be initially presented. In a fading procedure a rice size bite of the food is presented until your child is consistently accepting that bite size within 5 seconds of the bite presentation, and with few to no problem behaviors. Once your child is able to do this, the bite size may be increased to a pea size bite, etc. The bite sizes that we generally use are as follows; rice, pea, 2 pea, half level, full level, full rounded. However, if needed we can adjust bite size to meet your child's needs.

Examples Positive Mealtime Conversations

Do Say:

“You worked so hard! I’m proud of you”

“That was new, huh?”

“What are we going to do later?”

“That toy is really cool”

“That was funny (watching a video)”

“I think that you are awesome!”

Do NOT Say:

“I know that doesn’t taste good”

“If you don’t do a good job eating, you will lose _____”

“If you do a good job eating, then we will have _____ later.”

“You can take a bigger bite.”

“Just try it, please.”

“You won’t throw up.”

Appendix D: Mealtime Data Sheet

Bite Number	Acceptance	Expel	Pack	Gag	Disruption	Neg. Vocalization	Other: _____	Food	Bite Number	Acceptance	Expel	Pack	Gag	Disruption	Neg. Vocalization	Other: _____	Food
1.									26.								
2.									27.								
3.									28.								
4.									29.								
5.									30.								
6.									31.								
7.									32.								
8.									33.								
9.									34.								
10.									35.								
11.									36.								
12.									37.								
13.									38.								
14.									39.								
15.									40.								
16.									41.								
17.									42.								
18.									43.								
19.									44.								
20.									45.								
21.									46.								
22.									47.								
23.									48.								
24.									49.								
25.									50.								

Acceptance: Accepts bite into mouth within 5 seconds of the bite presentation

Expel: Food larger than the size of a pea outside of the mouth after acceptance

Pack: Food larger than the size of a pea in the mouth 30 s after acceptance

Mouth Clean: No food larger than a pea inside the mouth 30 s after acceptance

Disruption: Turning head away from spoon, hitting spoon, covering mouth, touching feeder's hand (when bite is presented

Negative Vocalization: crying, whining for longer than 3 consecutive seconds during a bite presentation. Making non favorable statements about the food.

* *Data sheet adapted from Treating Eating Problems of Children with Autism Spectrum Disorders and Developmental Disabilities: Interventions for Professionals and Parents by Keith E Williams and Richard M. Foxx*

Appendix E: Social Validity Questionnaire

Discharge Parental Satisfaction Questionnaire

<p>Rate each item from 1 – 5 using the following rating scale:</p> <p>1 - (quite dissatisfied/not effective at all/totally disagree/no improvement) 2 - (dissatisfied/not effective, disagree/no) 3 - (neutral) 4 - (satisfied, effective, agree, yes, some improvement) 5 - (very satisfied, very effective, totally agree, marked improvement)</p>					
1. In an overall, general sense, how satisfied were you with the service you received?	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
2. In general, how effective were treatment recommendations for your child?	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
3. The training sessions were presented in a concise and easy to understand manner.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
4. The amount of work required by the program was at a reasonable level to be most effective.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
5. If a friend were in need of similar help, would you recommend our program to him/her?	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
6. At home, will you continue to use the treatment program?	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
7. I feel that when I do use these recommendations, they will be effective when applied consistently.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
8. I feel that the methods involved with the treatment recommendations were ethically sound.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
9. The Feeding Team:					
a. Was flexible and open to work with	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
b. Was knowledgeable and thoroughly trained	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
c. Was cooperative and easy to work with	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>

d. Was helpful in solving problems as they arose	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
e. Showed positive regard for my child	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
f. Showed positive regard for the family	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
g. Was empathic and sensitive to the child	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
10. Has the implementaiton of the treatment program helped reduce any other behavior problems or increase other skills?	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
11. At the time of dischare, were your child's problems worse (1), the same (3), or absent (5)?	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
12. If for some reason you needed to seek help again, would you come back to our program?	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
13. Have you noticed an improvement in your child's health?	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
14. To what extent has our program achieved the goals set at admission?	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>
<p>Additional Comments: Click here to enter text.</p>					

* *Questionnaire originally used by Hoch, T. A., Babbit, R. L., Coe, D. A., Krell, D. M., & Hackert, L. (1994). Combining positive reinforcement and escape extinctino procedures to treat persistent food refusal. Behavior Modification, 18, 106-128.*

Figure 1: Multiple Baseline Graph Across Participants

