CAREGIVER- AND BEHAVIOR TECHNICIAN-IMPLEMENTED FOOD SELECTIVITY PROCEDURES USING BEHAVIORAL SKILLS TRAINING

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ABSTRACT

By using procedures found in Behavioral Skills Training (BST), caregivers and Behavior Technicians (BTs) alike have the ability to successfully implement food selectivity training with their children and clients, thus increasing their consumption of non-preferred food items to promote healthier and more well-rounded diets. Two caregivers of children diagnosed with Autism Spectrum Disorders (ASD) and two BTs with clients who demonstrated symptoms of food selectivity administered Differential Reinforcement of Incompatible (DRI) behaviors to increase the consumption of a targeted non-preferred food item. Through a series of case studies, the use of BST procedures produced a repeated demonstration of effect in correct caregiver- and BT-implementation of DRI procedures in the home and the clinic targeting increased bite consumption of non-preferred foods in children with autism experiencing food selectivity.

Keywords: Food selectivity, ASD, differential reinforcement, BST

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INTRODUCTION

Children diagnosed with Autism Spectrum Disorder (ASD) often experience food selectivity (Seiverling et al., 2012). Food selectivity is defined as behaviors related to food refusal, limited food repertoires, and/or high-frequency single food intake (Bandini et al., 2010). Food selectivity has the potential to result in an unbalanced diets and/or nutritional deficiencies in young children. Both caregivers and providers have expressed considerable concerns about the impact of food selectivity behaviors on their children's development (Silbaugh et al., 2016).

As frequent as children with ASD experience food selectivity, there is a lack of clear definitions of food selectivity or the behaviors that food selectivity encompasses (Bandini et al., 2010). In a broad sense, food selectivity can be defined as a series of behaviors including food refusal, limited food repertoires, and/or high-frequency single food intake (Bandini et al., 2010). Some define degrees of food selectivity by the explicit number of foods or bites a child consumes from either a food group or a type of food (Clark et al., 2020). The definition of such behaviors associated with food selectivity is of extreme importance to not only identify and diagnose individuals who may be suffering from these experiences, but to also determine ideal and effective intervention.

Since a child's daily mealtimes often span across both the home and clinical settings, interventions that prioritize both the family and technicians may have the potential to be even more successful in increasing consumption of non-preferred items. However, an informal literature review of staff trainings alone that were focused on teaching employees of autism services to "develop, assess, implement, or supervise behavior mealtime interventions" found an alarmingly scarce amount of research available, and those that were available described little about the training procedures used among behavior technicians (BTs; Tereshko, 2023, p. 348-

349). This creates a pressing need for further research in training both technicians in the clinical setting and caregivers in the home.

The use of differential reinforcement is a popular technique to target food selectivity, and often chosen above many other treatment components (Silbaugh et al., 2016). Previous research has suggested that Behavioral Skills Training (BST) is a strategy that can quickly and effectively train individuals to complete both simple and complex procedures (Gianoumis et al., 2012; Kirkpatrick et al., 2019; Shayne & Miltenberger, 2013). By delivering training with both instruction and models, as well as providing trainees with the opportunity to rehearse procedures and receive constructive feedback, individuals are offered an extensive training experience to help the trainee learn to implement procedures on their own.

Reinforcement techniques have long been used in the field of Applied Behavior Analysis (ABA) to increase the occurrence of behaviors and have even shown to produce successful immediate and sustained effects on the consumption of non-preferred food items (Solberg et al., 2007). For example, Suarez and Bush (2020) conducted a pilot study examining the influence of systematic desensitization combined with escape extinction and positive reinforcement on anxiety levels and the number of foods that children would voluntarily consume, measured using a parent questionnaire. Researchers demonstrated improvements for four of the seven participants using reinforcement and escape extinction procedures, but it was noted that a more objective measurement of food acceptance could have provided greater insight to increases in food repertoires (Suarez & Bush, 2020). If provided with the training that is explicit, such as BST, implementors may better understand the objective definitions of training procedures and have better accuracy in data collection of food acceptance.

Using formal training procedures, participants can implement measures more complex than some might imagine. Bloomfield and colleagues (2019) investigated parent-implementation of a feeding intervention delivered through telehealth by using BST procedures to train treatment steps via teleconsultation to the mother. Trial-by-trial data was recorded based on the child's success in bite consumption, with reinforcement occurring on a fixed ratio schedule. Following results tentatively supported positive correlations between parental-implementation of intervention and increased consumption of non-preferred foods (Bloomfield et al., 2019). Not all researchers, though, stopped there. When there was still room for improvement on a standardized definition of food selectivity (Bandini et al., 2010), Clark and colleagues (2020) emphasized their definition of mild food selectivity as "consumption of fewer than six proteins, six starches, six fruits and six vegetables" (p. 675) when they evaluated the efficiency of BST in training mothers to implement a structured meal. Participants presented five bites of a non-preferred food and recorded the percentage of bites that were consumed during each phase and, through a series of case studies, researchers discovered that two of the three children showed substantial increases in non-preferred food consumption and mothers were able to implement steps with 94 to 95% accuracy after training (Clark et al., 2020). Taken together, these studies support the use of BST procedures in training caregivers to implement reinforcement schedules to target increased bite consumption, suggesting that the use of similar training techniques might be successful in teaching similar, and/or additional, participants.

Purpose of this Study

As mentioned, the lack of research around mealtime trainings is concerning because, without BTs trained in mealtime behavior strategies, there are even fewer resources for caregivers to access support or training to address mealtime behaviors in home. With a need for

training becoming apparent at both the home and clinical setting, and taking into consideration the positive correlations associated with Behavior Skills Training (BST) procedures and correct implementation of intervention steps from caregivers and BTs alike, as well as prior success with DRI strategies, this study aims to answer several questions: (1) To what extent does BST for caregivers and BTs lead to correct implementation of reinforcement techniques to increase food consumption of non-preferred food items in young children with autism? and (2) To what extent does DRI procedures lead to an increase in food consumption for young children with autism who demonstrate food selectivity issues?

METHOD

Settings

This study occurred in two primary settings: 1) in participants' homes; and 2) in a community-based early intervention classroom. Implementation of procedures occurring in the children's home environment took place at the family dinner table located in their kitchen. The interventionist(s) sat next to the child participant during family meals, with other members of the family seated around them. The device (e.g., laptop, phone, tablet) used for Zoom calls with the researcher was propped up on the table in front of the participants, about 1 foot away, with both the child and the caregiver clearly positioned in the screen.

Procedural implementation for BTs occurred in the classroom setting during the treatment day while other individuals were present. Both the child and the BT were seated at a 1' by 1' plastic table located in a 30' by 20' classroom, with the child seated in a 1' tall plastic chair directly across from the BT, who was using a 3' tall rolling chair. The student researcher was seated on the floor beside the device (e.g., laptop, iPad) being used to record sessions from about 1-2' in front of the child and BT.

Recruitment

Caregivers seeking BST were sought out through a recruitment list serv associated with Michigan State University (family@list.edu). Caregivers interested in participating were able to contact the student researcher via the email included in the listing. After Institutional Review Board Approval, a consent form was provided to the target participants who met the inclusion criteria. Upon receiving consent, the student researcher provided caregivers with an informal interview via MSU Qualtrics, a secure data-sharing source, to assess background information

such as the caregivers' age, level of education, experience with BST, knowledge of ABA, and any behaviors observed related to non-life-threatening food selectivity from their child.

BTs were recruited based on client-technician pairings established by the BCBA at the community-based early intervention clinic. Discussion with the BCBA led to identification of BTs fitting the inclusion criteria and whose client pairing met criteria for definition of food selectivity behaviors.

Participants

Participants were eligible for the study if they met the following inclusion criteria: 1) were between the ages of two and five years; 2) had a diagnosis of autism, either medical or educational; 3) displayed consistent rates of food selectivity, including food refusal, limited food repertoire, and/or high-frequency single food intake that is non-detrimental to their health, within the home and clinic setting (Bandini et al., 2010); and 4) expressed interest in BST. Here, we define food selectivity as "consumption of fewer than six proteins, six starches, six fruits and six vegetables" (Clark et al., 2020, p. 675). Thus, it should be noted this these inclusion criteria excludes any participants with food selectivity behaviors that warrant medical intervention.

Caregivers

The children's caregiver(s) served as the interventionists and were the study's main participants in determining the effectiveness of BST procedures in teaching food-selectivity protocols. Caregiver(s) had little to no experience in ABA, little or no training in BST, and expressed an interest in learning procedures based in such practice to target food selectivity behaviors in their children with ASD.

BTs

The children's BT(s) in their inclusive classroom where ABA services are provided were also considered to be the study's main participants in determining the effectiveness of BST procedures in teaching food-selectivity protocols. BT(s) had been employed by the early-intensive behavioral clinic for no more than three months prior to recruitment and had limited experience in both ABA and BST procedures.

Children

The study included four children diagnosed with autism, between the ages of two and five years, who consistently displayed behaviors related to food selectivity. It should be noted that these children are picky eaters that did not experience any severe nutritional deficits due to a medically concerning feeding problem. The children's caregivers had each reported that their child regularly failed to eat a variety of foods from several different food groups, including fruits, vegetables, proteins, or grains/starches.

Materials

Prior to each session, caregivers conducted a brief multiple stimulus without replacement (MSWO) preference assessment (DeLeon & Iwata, 1996) to determine a tangible item to provide contingent upon bite acceptance. iPads were used to record procedures for procedural integrity and inter-observer agreement purposes. The family participants used Zoom to meet virtually with the research and to tape the delivery of procedural skills in the home during family mealtime to be reviewed by the researcher. One type of food category was identified and selected by each caregiver(s) based on foods that frequently appear in their family's dinners. The food type was used to target the levels of food selectivity in the child participants. Bites were presented in 1" by 1" sized pieces on a plate with a fork in front of the child, while they were seated at the dinner

table across from the caregiver(s) or seated at the table with their BTs in the classroom. Caregiver(s) and BT(s) used pen and paper to record the occurrence of either bite acceptance or refusal during sessions. A timer was used to keep session durations and reinforcement periods consistent.

Design

A series of case studies, featuring four participants, was used to evaluate the extent to which implementation of BST procedures were effective in training caregivers and BTs to execute reinforcement techniques for food consumption by calculating the percentage of steps conducted correctly during caregiver performance out of the total number of applicable steps (Horner et al., 2005). Case studies were also used for four participants to assess the effects of increased bite acceptance and consumption of a non-preferred food across children using frequency count with a whole interval recording system.

Procedure

Preliminary Observation

One preliminary observation was conducted with each family/BT-client pair to identify the environmental events that contribute to, and maintain, food selectivity behaviors in each of the children. The student researcher collected descriptive data on the environmental events (antecedents, behavior, consequence) that co-occur with the food selectivity behaviors. During the preliminary observations, the student researcher also collected data on the types of foods that each child preferred and did not prefer within each food group, along with the average number of bites accepted for each of these items. Additionally, notes were taken on any tangibles that were observed as potential reinforcers.

Caregiver Interview

The student researcher conducted a brief interview with each of the caregiver(s) and BT(S) to corroborate findings on the target children's food selectivity behaviors seen during the preliminary observation periods. A food frequency questionnaire (FFQ), modified based on that used by Vepsäläinen (2018) and Korkalo (2019), was used to assess what types of food the child eats, and how frequently they are willing to consume these foods. Types of foods were categorized by primary food groups, such as dairy, fruits and vegetables, meat and eggs, cereal products (grains), drinks, and others. Categories then listed specific types of foods within that group, like whole milk, skim milk, low/high-fat cheese, yogurt, puddings, and ice cream for interviewees to choose how often their child consumes each item per week and per day.

Caregivers and BTs were also asked to complete a Meals in Our Household (MIOH) questionnaire by Anderson and colleagues (2012) regarding the typical structure of mealtimes, types of challenging behaviors experienced during these times, use of food as a reward, personal concerns around the child's diet, and any type of influence the child's food preferences have on those around them. Questions were answered to the best of individuals' abilities by rating the extent to which they agreed with each statement listed using a Likert scale system ranging from never (0) to always (4) or strongly disagree (1) to strongly agree (5). Each participant was also questioned about the types of food they would like to see the child eat, as well as potential tangible items that the child would have a high motivation for. It should be noted that BTs completed each questionnaire to the best of their ability based on their own observations of the client in the clinical setting.

Dependent Variables

Accurate implementation of DRI procedures, which was defined as the presentation of reinforcement only during bite acceptance and placing any behaviors incompatible with bite acceptance (e.g., gagging or spitting food out) on extinction, included conducting a clean mouth check, acknowledging and reinforcing behavior that was associated only with bite acceptance while placing those behaviors which are incompatible on extinction, and adhering to time intervals. These dependent variables were measured to determine the effectiveness of the BST training provided. Bite acceptance, defined as taking, chewing, and swallowing the bite of food, with a clean mouth presented ten seconds after the bite was placed in the mouth, was also measured to determine potential increase in the frequency of number of bites accepted by the child and calculated using the percentage of opportunities available.

Baseline

Prior to intervention, baseline sessions were conducted with BTs and caregivers, in which ten bites of the non-preferred food item were presented on a plate with a fork in front of their child and told them to "eat [their] food". If the child put the bite of food in their mouth, they were then asked to "say ahh" and open their mouth after ten seconds had elapsed to check for a clean mouth. If a clean mouth was presented, then a tally was recorded for each bite accepted during the ten-minute interval to determine a percentage of bite acceptance. If the child refused the bite, including instances in which the child did not present a clean mouth during the check, bite refusal was not acknowledged, and participants waited ten seconds before starting another trial. Participants were not trained to provide any reinforcement upon bite acceptance. The baseline ended after the ten-minute interval or once all ten bites were consumed, whichever came first. Data was taken on caretakers' and BTs' ability to provide reinforcement contingent upon

bite consumption by the child. During baseline, participants were not provided with any prompting or instructional discriminative stimulus to reinforce the child for consuming bites of food presented. A tally was recorded for each instance in which the participants provided any form of reinforcement (social, tangible, or edible) contingent upon the child having presented a clean mouth after eating the bite of food.

Caregiver/BT Training & Intervention

The caregiver and BT intervention involved the use of BST practices, including instructions, modeling, rehearsal, and feedback (Gianoumis et al., 2012; Shayne & Miltenberger, 2013). First, caregivers and BTs were provided with written instructions on how to conduct intervention sessions with the child by describing the preference assessments that would be used to determine tangible reinforcers, the differential reinforcement procedures that occur contingent upon bite acceptance, and how long to deliver reinforcement for bite acceptance. Instructions also explained how to perform a clean mouth check by telling the child to "say ahh" and scanning the mouth to check for any food particles.

Following the delivery of the written instructions, a model demonstrating the intervention procedures discussed in the written instructions was provided to participants and reviewed alongside the student researcher. Participants were then asked to practice/rehearse the procedures while the student researcher provided participants with feedback on their demonstration, explaining aspects of their performance that were conducted correctly, and aspects that required further description. Caregivers and BTs were asked to continue rehearsing the newly learned training procedures until they were able to demonstrate a level of accuracy that was 80% or higher for two consecutive demonstrations. Any additional feedback was provided if necessary,

and participants were given the opportunity to ask follow-up questions and/or express any concerns regarding the procedures or the intentions of the intervention.

Child Intervention

A brief MSWO was conducted at the start of each session to determine a punitive reinforcer for bite acceptance and account for momentary changes in preference across sessions. Using the preliminary observation and interviews, three tangible items with which the child enjoyed manipulating and found reinforcing were identified. The tangibles were then laid out in a random ordered array in front of the child on a flat surface. The child was told to "pick one" and following the choice of an item, the tangibles were removed, and the one chosen was set aside to be presented contingent upon bite acceptance during intervention (Paramore & Higbee, 2005).

Like baseline, participants presented ten 1" by 1" bites of the targeted non-preferred food and told the child to "eat [their] food". If the child willingly put the bite of food in their mouth, a clean mouth check was performed after ten seconds had elapsed to ensure the food had been chewed and swallowed completely. Reinforcement was then immediately provided for each instance in which bite acceptance occurred by immediately presenting social praise along with the highest preferred tangible item for 15 seconds contingent upon the child's consumption of a singular target bite and having displayed a clean mouth. After the 15 seconds of reinforcement had elapsed, the tangible item was removed and the discriminative stimulus ("eat [their] food") was re-presented, marking another opportunity for bite acceptance and reinforcement. If behaviors incompatible with bite acceptance occurred, the behaviors were not acknowledged, and caregivers waited ten seconds before starting another trial.

Also comparable to the baseline condition, a tally was recorded for each instance of bite acceptance across the 10-minute session to determine a percentage of bite acceptance for each session and was measured against baseline percentage to determine increases. Treatment fidelity was measured based on the caregiver's/BT's ability to accurately implement reinforcement and treatment procedures, including presentation of trials and delivery of reinforcement. The session ended either after ten minutes had elapsed or after all ten bites of the non-preferred food had been accepted.

Training Fidelity

Training fidelity for caregivers and BTs was assessed using Zoom's video recording feature to capture the student researcher's BST procedures provided to the caregivers. A checklist was created by the student researcher to outline the steps of the BST procedures being used. Two behavior technicians with prior knowledge in BST used these checklists to perform fidelity checks across at least 33% of sessions. Fidelity checks were calculated using a percentage of the opportunities provided to correctly perform the outlined BST procedures. Training fidelity was conducted between both behavior technicians across 100% of training sessions and showed 100% accuracy of implementation across all participants This checklist can be found in Appendix D.

Interobserver Agreement

Interobserver agreement was collected across at least 33% across each phase for each participant, calculated by dividing the number of agreements by the number of disagreements plus agreements and multiplying this figure by 100 (Kratochwill et al., 2013). In the case of this study, agreements were defined as instances in which both observers obtained the same data on a

given behavior. Disagreements were defined as instances in which one observer's data on a given behavior did not match the other observer's data for that behavior.

Agreement data for implementation delivered by Caregiver #1 averaged 100% across baseline phase, with data collected for 100% of sessions. Data collected for the training session showed 86% agreement and, taken across 33% of sessions, 100% agreement during intervention. Agreement data across baseline phase for Caregiver #2 was collected for 33% of sessions, with 86% agreement. The training session showed 100% agreement, as did the 33% of intervention sessions for which data was collected. Agreement data for BT #1 during baseline phase was collected for 67% of sessions, with an average of 100% agreement. The training session was also in 100% agreement. Additionally, intervention phase for BT #1 averaged 100% agreement across all three sessions. BT #2 had data collected for 33% of baseline sessions, of which there was 100% agreement. Data collected during the training session reported 83% agreement. The intervention phase also had data collected on 33% of sessions, with 100% agreement reported among observers.

Agreement data on bite acceptance and instances of reinforcement for Child #1 was collected across all three sessions and averaged 100% agreement across baseline phase. Intervention phase had data collected for 33% of sessions, with 100% agreement reported. Both the baseline and intervention phase for Child #2 had data collected for one of the three sessions and reported 100% agreement among observers. Data gathered for Child #3 averaged 100% agreement across 67% of baseline sessions and 100% of interventions sessions. Child #4 had agreement data recorded for 33% of baseline sessions, with 100% agreement reported among observers. The same data was reported among observers during intervention.

Procedural Fidelity

A checklist of intervention steps was used by both the student researcher and an independent observer to assess procedural fidelity of the intervention, including interviews and preliminary observations, baseline phases, BST training of DRI procedures, and generalization. The checklist included ten steps in total. Procedural fidelity data was collected across at least 33% of sessions and interobserver agreement was calculated to be 100% across all phases for Caregiver #1, 100% across all phases for Caregiver #2, 83% in baseline phase for BT #1 and 100% across training and intervention. This checklist can be found in Appendix E.

RESULTS

Caregiver/BT Procedural Implementation

Because there is an apparent need for training, both in the home and treatment room, the goal of this research was to study the effect of BST procedures on training both caregivers and BTs to implement reinforcement techniques to target food selectivity. Caregiver #1 demonstrated consistently moderate baseline trends in their ability to accurately implement procedures. Baseline data did not feature any variability, with each session earning 50% accuracy of implementation. Training procedures produced a large increase in caregiver performance, from 50% to 83%, then to 100% accuracy of implementation, and intervention sessions yielded steady responding, with low variability, at a high level of accuracy (82-86%).

Baseline trends for Caregiver #2's implementation percentages were low (33%) with some variability occurring in the third session, where accuracy of implementation declined to 17%. Training procedures improved the caregiver's implementation greatly, up to 86% of steps performed currently, but the intervention phase displayed a drop down to moderate percentages, between 60 and 50% across sessions.

BT #1's data during baseline demonstrated increasing trends of moderate to high levels of accuracy, with some variability occurring between the first and second session (50-75%). Accuracy of implementation jumped from 75% in the third baseline session to 100% after the training. Intervention sessions also showed some variability during the second intervention session, with trends dropping down and rising back up, but the overall levels of implementation accuracy remained high (75-100%).

Trends for BT #2 during baseline sessions remained fairly steady at a moderate level, with a slight increase in implementation accuracy occurring during the third baseline session (50-

60%). The training session showed a further increase in implementation, from 60 to 100% accuracy (80-100%). While the intervention phase demonstrated variability across all sessions, accuracy of implementation remained high as well, ranging from 80 to 100%. Thus, a repeated demonstration of effect was established for caregiver/BT procedural implementation of reinforcement techniques to increase food consumption of non-preferred food items in young children with autism using BST.

Child Bite Acceptance

Additionally, this research evaluated whether the DRI procedures taught to caregivers and BTs could lead to an increase in food consumption for children with autism demonstrating food selectivity. Bite acceptance from Child #1 showed some variability during baseline, with trends dropping from ten bites to three, and then back up to ten bites. Similar data was gathered on Caregiver #1's instances of reinforcement during baseline sessions where trends varied from low to moderate numbers (two to six instances of reinforcement). Intervention sessions, however, showed an increase to consistently high trends with no variability in bite acceptance or instances of reinforcement.

Data gathered on bite acceptance of Child #2 demonstrated a steady trend of low level responding throughout baseline, with zero bites accepted during all three sessions. Bite acceptance did increase between the first and second intervention session (zero to ten bites accepted) but dropped down to five bites accepted in the third intervention session. Instances of reinforcement showed identical trends, levels, and variability in data between baseline and intervention phases, with zero instances occurring in the first session, three instances occurring in the second, and one instance during the third session across both phases.

Baseline bite acceptance from the Child #3 also showed a consistently low level of bite acceptance (zero bites), with no variability. In this phase, instances of reinforcement from BT #1 showed some variability in their low level responding, which ranged from one to three instances of reinforcement per session. During the intervention phase, Child #3's bite acceptance remained low and varied some, increasing slightly from zero to two bites in the second session, but decreasing back to zero bites during the third session. BT #1's instances of reinforcement also remained low and varied alongside the child's bite acceptance, increasing from one instance of reinforcement to two in the second session, and falling back down to zero due to the lack of bite acceptance.

Data from both Child #4's bite acceptance and BT #2's instances of reinforcement during baseline sessions displayed consistently low, unvaried responding. In this case, the child accepted no bites, and the BT provided no reinforcement. Child #4's bite acceptance remained steady at zero bites up until the third intervention session, where bite acceptance increased up to all ten bites. While slightly variable, post-training intervention sessions showed an appropriate increase in instances of reinforcement as the child's bite acceptance also increased, showing proper use of differential reinforcement procedures. However, a repeated effect was not established for increasing food consumption in young children with autism using DRI procedures.

DISCUSSION

This study evaluates the implementation of BST and DRI procedures on caregiver and BT implementation to increase bite acceptance in children with autism. Overall results indicate that a repeated demonstration of effect was found for caregiver/BT implementation of differential reinforcement procedures but was not observed for bite acceptance with child participants. Given these outcomes there are several points for discussion.

First, it is important to use evidence-based instructional techniques when training caregivers and BTs to enhance the effectiveness of instruction with young children with autism and to ensure that instructional techniques being used are supported with scientific evidence. Research has shown that Behavioral Skills Training (BST) is an evidence-based procedure that advances adult skill learning for a wide variety of behavioral analytic techniques, such as naturalistic teaching skills (Gianoumis et al., 2012), functional assessments and treatment selection (Shayne & Miltenberger, 2013), and feeding interventions (Bloomfield et al., 2019; Clark et al., 2020). The use of such procedures for delivery of trainings helps to spread knowledge and understanding of behavioral techniques, often used in a variety of interventions, among populations that include staff members who are working to implement treatment, as well as caregivers looking to continue progress in the home setting.

Secondly, identifying potent reinforcers are important for enhancing young children's overall willingness to engage in bite acceptance. Consistent with current literature, studies have shown that there can be individual variation in reinforcement potency. For example, Hanratty and Hanley (2021) found that, as opposed to typical reinforcement procedures in which participants are presented with the same, implementor-chosen item across responses, some children were willing to provide more frequent and accurate responding during conditions in

which they got to make a choice between a small variety of reinforcers after each response made. It should be noted, too, that without an increase in the occurrence of similar future behavior, an item does not serve as a reinforcer. Because this was the case with some of the participants, it is possible that an appropriate reinforcer was not obtained and, therefore, might contribute to the lack of repeated effect between bite acceptance and reinforcement. It is also possible that items which were previously reinforcing for young children may lose their effectiveness after repeated or prolonged presentation (McSweeney & Murphy, 2009). Therefore, it is essential to the effectiveness of intervention procedures and to the success of the student that the identification of a variety of potent reinforcers be identified prior to implementation.

Third, it is possible that conducting a preference assessment prior to mealtime may be too large of a task demand for caregivers, given that a majority of intervention sessions conducted by both caregivers were missing implementation of the preference assessment. This may be especially true for those caregivers with other, potentially younger, children who have needs of their own. Thus, there is a need for more efficient preference assessment practices for families that are not burdensome during specific transitions and routines when there are other competing environmental variables. That is, the field of ABA needs more efficient practices for families and, drawing from the field of special education, it would be important to harness family-centered practices that are designed within the context in which families thrive. For example, Prevent-Teach-Reinforce for families is a behavioral intervention package for young children that enhances behavioral analytic principles of preventing challenging behaviors in a way that is "effective in typical family circumstances that do not include professional educators or behavior specialists" (Dunlap et al., 2017, p. 1). By designing interventions around the abilities of the individual families, while keeping in mind the goals held for the entire family, procedures may

be more feasible for families and show greater success during implementation than those that do not focus on familial implementation of procedures.

Limitations and Future Research

During this research, there was no replication of a basic effect between rates of reinforcement and increased bite acceptance, demonstrating no repeated effect among the child participants. It is possible that these results may correlate with a lack of identified reinforcement, which only exemplifies the difference that a potent reinforcer could have on, otherwise unmotivated performance. It could also be that the tangible items being used to reinforce instances of bite acceptance were not potent enough to increase future behavior. Since preference assessments were not consistently conducted prior to sessions, leaving caregivers to assume the item they're using will be reinforcing to the child, change of preferences were unable to be accounted for. In future research, further examination of reinforcer potency and assessment of changes in preferences is warranted.

A second limitation to this study was that caregivers were unable to consistently perform the prescribed preference assessment prior to feeding sessions. This may be because the training provided was not specific enough for participants to comprehend. Although, it is also possible that the procedures often found in preference assessments, even those used in brief MSWOs, are simply too complicated for caregivers to understand and/or implement in an environment with many moving environmental variables. Having preference assessment procedures that are explicitly designed with caregivers in mind might encourage use of proper reinforcement in the home, as well as the clinic. It is suggested that future researchers explore not only the efficacy of preference assessment trainings, but also the overall ease of use for implementors who do not have a behavioral or educational background.

It should also be noted that baseline and intervention phases did not obtain the optimal five sessions of data for baseline and intervention phases. Because of delays in recruiting individuals willing to participate and complications in scheduling more frequent sessions with families, researchers were only able to collect data for three sessions across each phase. Future research might consider scheduling conflicts and necessary data collection timelines prior to recruitment procedures and ensure that each baseline and intervention phase is conducted across at least five sessions to align with quality indicators for single-case design research (Kratochwill et al., 2021).

REFERENCES

Anderson, S. E., Must, A., Curtin, C., & Bandini, L. G. (2012). Meals in our household: Reliability and initial validation of a questionnaire to assess child mealtime behaviors and family mealtime environments. *Journal of the Academy of Nutrition and Dietetics, 112*(2), 276-284.

Bandini, L. G., Anderson, S. E., Curtin, C., Cermak, S., Evans, E. W., Scampini, R., Maslin, M., & Must, A. (2010). Food selectivity in children with autism spectrum disorders and typically developing children. *Journal of Pediatrics, 157*(2), 259-264.

Bandini, L.G., Curtin, C. Phillips, S., Anderson, S. E., Maslin, M., & Must, A. (2017). Changes in food selectivity in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 47*, 439-446.

Bloomfield, B. S., Fischer, A. J., Clark, R. R., & Dove, M. B. (2019). Treatment of food selectivity in a child with avoidant/restrictive food intake disorder through parent teleconsultation. *Behavior Analysis in Practice, 12*, 33-43.

Clark, R. J., Wilder, D. A., Kelley, M. E., & Ryan, V. (2020). Evaluation of instructions and video modeling to train parents to implement a structured meal procedure for food selectivity among children with autism. *Behavior Analysis in Practice, 13*, 674-678.

DeLeon, I. G., & Iwata, B. A. (1996). Evaluation of a multiple-stimulus presentation format for assessing reinforcer preferences. *Journal of Applied Behavior Analysis, 29*, 519-532. https://doi:10.1901/jaba.1996.29-519.

Dunlap, G., Fox, L., Lee, J. K., Strain, P. S., Vatland, C., & Joseph, J. D. (2017). *Prevent-teach-reinforce for families: A model of individualized positive behavior support for home and community*. Brookes Publishing.

Gianoumis, S., Seiverling, L., & Sturmey, P. (2012). The effects of behavior skills training on correct teacher implementation of natural language paradigm teaching skills and child behavior. *Behavioral Interventions, 27*(2), 57-74.

Hanratty, L. A. & Hanley, G. P. (2021). A preference analysis of reinforcer variation and choice. *Journal of Applied Behavior Analysis, 54*(3), 1062-1074.

Horner, R. H., Carr, E. G., Halle, J., McGee, G., Odom, S., & Wolery, M. (2005). The use of single-subject research to identify evidence-based practice in special education. *Council for Exceptional Children, 71*(2), 165-179.

Kirkpatrick, M., Rivera, G., & Akers, J. S. (2019). Use of behavioral skills training with teachers: A systematic review. Journal of Behavioral Education, 28, 344–361. https://doi.org/10.1007/s10864-019-09322-z.

Korkalo, L., Vepsäläinen, H., Ray, C., Skaffari, E., Lehto, R., Hauta-Alus, H. H., Nissinen, K., Meinilä, J., Roos, E., & Erkkola, M. (2019). Parents' reports of preschoolers' diets: Relative validity of a food frequency questionnaire and dietary patterns. *Nutrients, 11*(159), 1-13. https://doi:10.3390/nu11010159.

Kratochwill, T. R., Hitchcock, J. H., Horner, R. H., Levin, J. R., Odom, S. L., Rindskopf, D. M., & Shadish, W. R. (2013). Single-case intervention research design standards. *Remedial and Special Education, 34*(1), 26-38.

McSweeney, F. K. & Murphy, E. S. (2009). Sensitization and habituation regulate reinforcer effectiveness. *Neurobiology of Learning and Memory, 92*(2), 189-198.

Paramore, N. W. & Higbee, T. S. (2005). An evaluation of a brief multiple-stimulus preference assessment with adolescents with emotional-behavioral disorders in an educational setting. *Journal of Applied Behavior Analysis, 38*(3), 399-403.

Shayne, R. & Miltenberger, R. G. (2013). Evaluation of behavioral skills training for teaching functional assessment and treatment selection skills to parents. *Behavioral Interventions, 28*, 4-21.

Suarez, M. A. & Bush, E. (2020). Pilot study of the just right challenge feeding protocol for treatment of food selectivity in children. *The Open Journal of Occupational Therapy, 8*(2), 1-9.

Seiverling, L., Williams, K., Sturmey, P., & Hart, S. (2012). Effects of behavioral skills training on parental treatment of children's food selectivity. *Journal of Applied Behavioral Analysis, 45*, 197-203.

Silbaugh, B. C., Penrod, B., Whelan, C. M., Hernandez, D. A,. Wingate, H. V., Falcomata, T. S., & Lang, R. (2016). A systematic synthesis of behavioral interventions for food selectivity of children with autism spectrum disorders. *Review Journal of Autism and Developmental Disorders, 3*, 345-357.

Solberg, K. M., Hanley, G. P, Layer, S. A., & Ingvarsson, E. T. (2007). The effects of reinforcer pairing and fading on preschoolers' snack selections. *Journal of Applied Behavior Analysis, 40*(4), 633-644.

Tereshko, L. (2023). Building staff competency to create positive and effective mealtimes through training and supervision. In J.H. Cihon, L. Tereshko, K. B. Marshall, & M. J. Weiss (Eds.), *Behavior analytic approaches to promote enjoyable mealtimes for autistics/individuals diagnosed with autism and their families* (pp. 347-363). Vernon Press.

Vepsäläinen, H. (2018). *Food environment and whole-diet in children: Studies on parental role modelling and food availability*. (Doctoral Dissertation, University of Helsinki).

APPENDIX A: PRELIMINARY OBSERVATION DATASHEET

Child: _____ Participant(s): _____ Date/Time: _____

Antecedent	Behavior	Consequence
	❒ Non-preferred food ❒ Preferred Food *Tally:*	
	❒ Non-preferred food ❒ Preferred Food *Tally:*	
	❒ Non-preferred food ❒ Preferred Food *Tally:*	
	❒ Non-preferred food ❒ Preferred Food *Tally:*	
	❒ Non-preferred food ❒ Preferred Food *Tally:*	

Potential Reinforcers:

_____

_____

APPENDIX B: BASELINE/INTERVENTION DATASHEET

Child: _____ Participant (s): _____ Food: _____

Date/Time:

Bite Acceptance	
Occurrence of Reinforcement	

Total Number of Bites Accepted: _____ Total Occurrences of Reinforcement: _____

APPENDIX C: PARTICIPANT IMPLEMENTATION FIDELITY CHECKLIST

Date:	Participant(s):
Intervention sessions begin with preference assessment, conducted among 3 tangible items	
Present (10) 1"x1" pieces of non-preferred target food in front of child	
Place discriminative stimulus "Eat your food"	
Conduct clean mouth check 10 seconds after child places bite of food in mouth (S_D: "Say 'ahh'")	
Reinforce child with social praise and access to tangible item for 15 seconds (if mouth is clean)	
Bring child back to the plate of non-preferred food	
Withhold reinforcement and move on to next trial following 10 second delay (if mouth is not clean)	
Total Number of Applicable Steps:	Percentage of Accuracy:

Key:
+ = Correct Response
- = Incorrect Response
N/A = Response Not Applicable

APPENDIX D: TRAINING FIDELITY CHECKLIST

Date:	Behavior Technician:
Explain rationale for procedures/study	
Discuss written instruction on procedures involving DRI, clean mouth checks, etc.	
Provide video model of skills being demonstrated	
Allow opportunities for participant(s) to rehearse skills	
Provide feedback on performance based on accuracy of procedures	
Continue rehearsal phase until participant demonstrates 80%$^{+}$ accuracy for 2 consecutive sessions	
Provide any other necessary feedback	
Allow for opportunities to ask questions	

Percentage of Accuracy:

Key:
+ = Correct Response
- = Incorrect Response
N/A = Response Not Applicable

APPENDIX E: PROCEDURAL FIDELITY CHECKLIST

Date:	Observer:
Conduct preliminary observation to gather data on environmental events, preferred/non-preferred foods, number of bites taken, and potential reinforcers	
Conduct interviews, including modified FFQ and MIOH	
Withhold information regarding reinforcement techniques from participants during baseline conditions	
Baseline session lasts for 10 minutes, or until all 10 bites of non-preferred food are consumed	
Gather baseline data alongside participant(s) on the number of bites accepted/clean mouth presented by the child to assure accurate recording by participant(s)	
Gather baseline data on participants' ability to provide reinforcement contingent upon bite acceptance/clean mouth	
Provide written instruction describing preference assessments, differential reinforcement procedures, and clean mouth checks	
Provide video model of preference assessment, differential reinforcement, and clean mouth checks	
Allow opportunity for participant(s) to rehearse procedures	
Provide participant(s) with feedback regarding aspects of performance done correctly/incorrectly	

Continue to have participant(s) rehearse until demonstrating 80%+ for 2 consecutive sessions	
Provide any additional necessary feedback	
Allow opportunity for participant(s) to ask questions regarding training or intervention procedures	
Intervention session begins with preference assessment, including 3 tangible items	
Record data for bite acceptance/presentation of clean mouth	
Record data for participant's implementation of intervention procedures (reinforcement/withholding, clean mouth check, presentation of trials, etc.)	
End intervention session following the consumption of all 10 bites or after 10 minutes have elapsed, whichever comes first	
Conduct post-intervention follow-up to determine maintenance	
Total Number of Applicable Steps:	Percentage of Accuracy:

Key:
+ = Correct Response
- = Incorrect Response
N/A = Response Not Applicable

APPENDIX F: CAREGIVER AND BT IMPLEMENTATION DATA

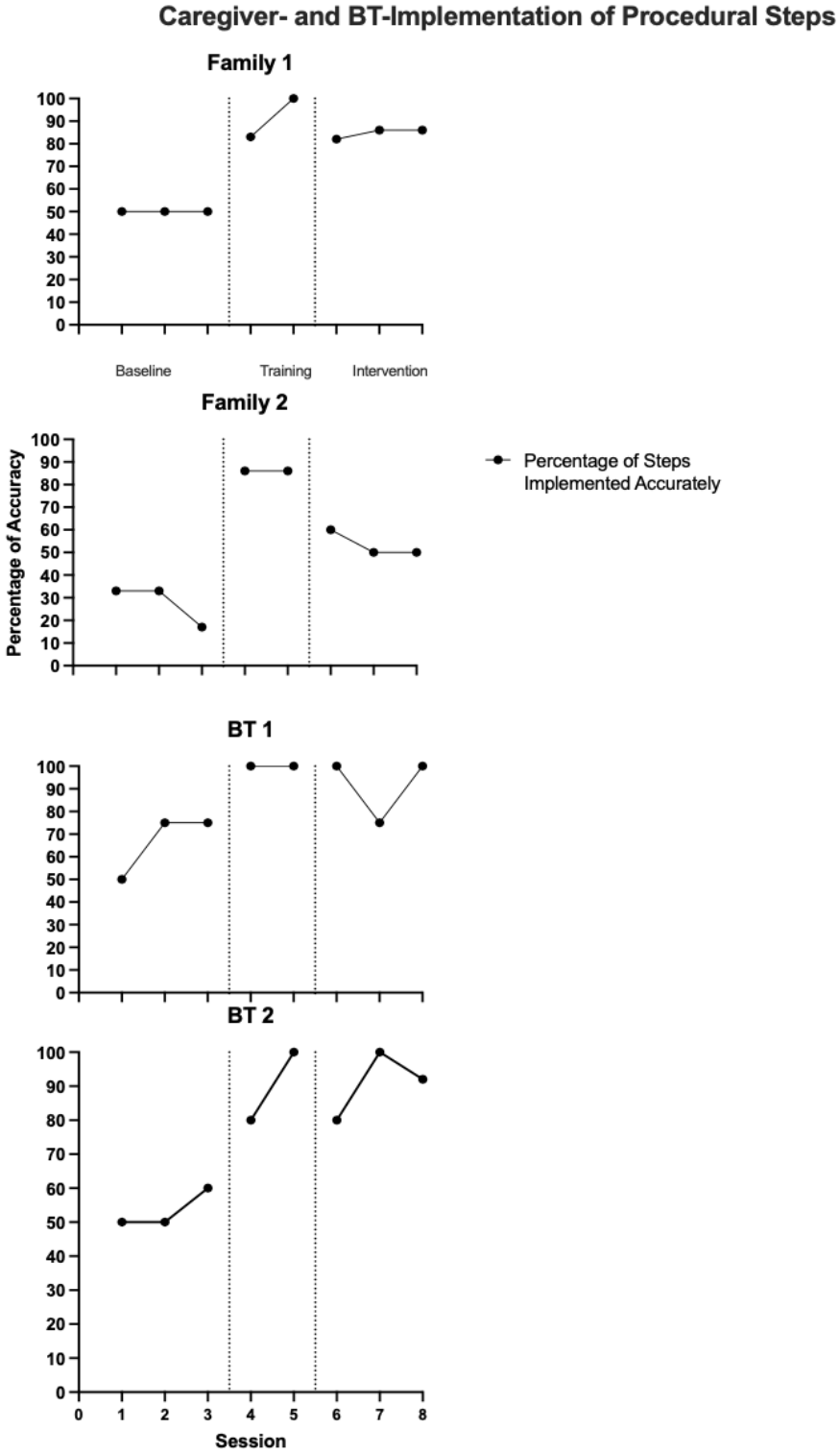

Figure 1: Caregiver and BT Implementation Data displays graphs used for visual analysis to determine caregiver and BT implementation of procedural steps across sessions.

APPENDIX G: CHILD BITE ACCEPTANCE AND REINFORCEMENT DATA

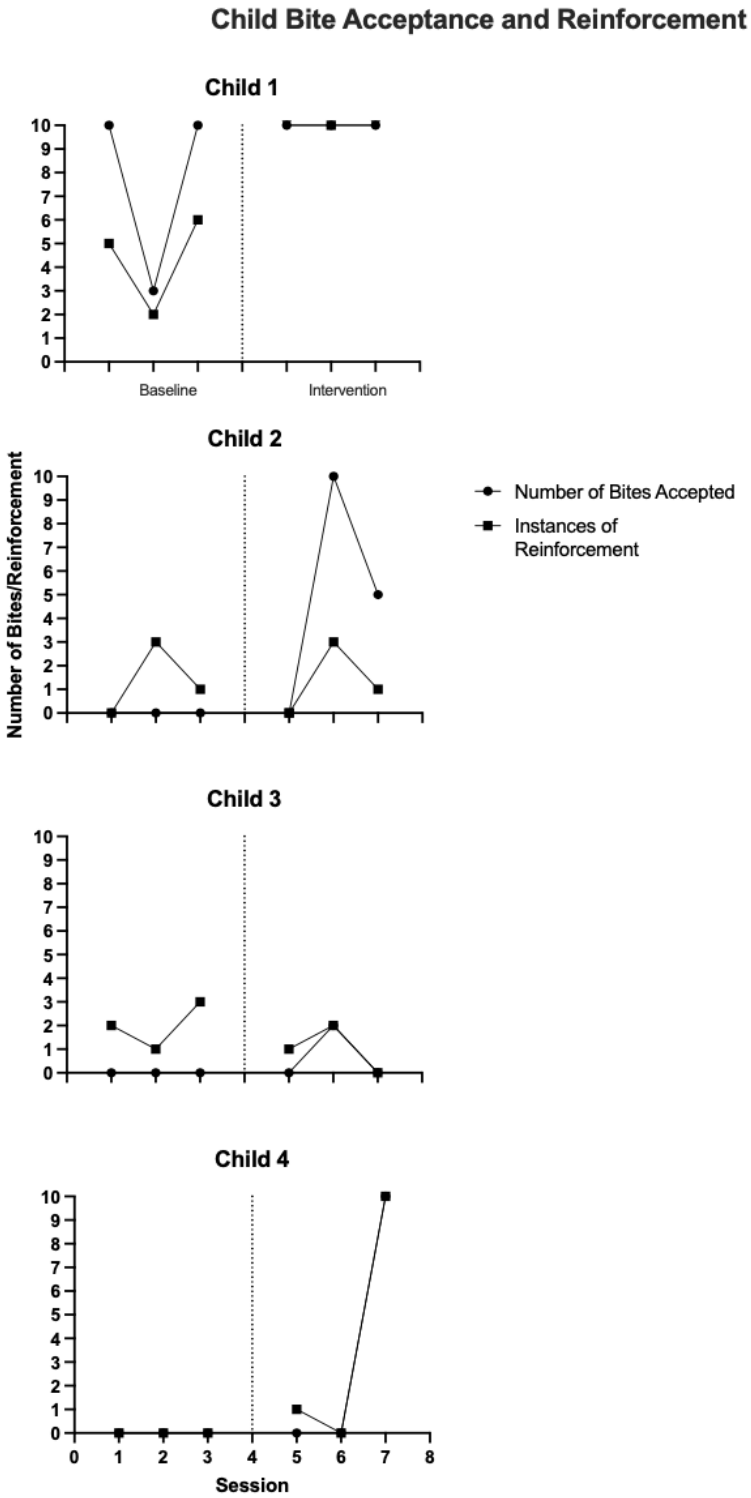

Figure 2: Child Bite Acceptance and Reinforcement Data displays graphs used for visual analysis to determine the number of occurrences of both bite acceptance and instances of reinforcement across sessions.