

Research Note

A Family-Centered Feeding Intervention to Promote Food Acceptance and Decrease Challenging Behaviors in Children With ASD: Report of Follow-Up Data on a Train-the-Trainer Model Using EAT-UP

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Purpose: This research note outlines the usefulness of Easing Anxiety Together with Understanding and Perseverance (EAT-UP), a train-the-trainer, family-centered feeding intervention, for promoting food acceptance of children with autism spectrum disorder (ASD). This report is a follow-up on a pilot study ($n = 4$) of the EAT-UP intervention previously completed by the same authors.

Method: Participants were 3 families of children with ASD receiving services from an outpatient department of a larger rehabilitation hospital in the northeastern United States. Three professionals working with the families were also recruited and trained by the first author, a speech-language pathologist experienced with the EAT-UP method. Initial assessment was followed by a baseline period for each participant. An individual mealtime plan was drafted for each

family. Data on acceptance of less preferred food and the presence of challenging mealtime behaviors were recorded using direct observation and pre-, mid-, and postintervention measures and questionnaires.

Results: All children demonstrated increased food acceptance and dietary diversity and decreased challenging behaviors. Caregivers reported decreases in the frequency of problem behaviors and in the number of problem mealtime behaviors. Measures of procedural fidelity increased from 50% to 100% for registered behavior technicians and parents over the course of the EAT-UP intervention period.

Conclusions: EAT-UP is an effective model for training professionals who work with families of children with ASD and challenging mealtime behavior. Implications for interprofessional practice and research are discussed.

Feeding difficulties are increasingly being recognized as part of autism spectrum disorder (ASD; e.g., Cermak, Curtin, & Bandini, 2010; Edmond, Emmett, Steer, & Golding, 2010). Marshall, Hill, Ziviani, and Dodrill (2014) reported the features of feeding difficulties for children with ASD in a review of 44 articles. They identified common issues among this otherwise heterogeneous group, including difficult mealtime behaviors, poor dietary intake, and poor weight gain. In addition, fears of food, rigid eating patterns, and texture-related food refusal were reported and appeared to contribute to the restricted diets

commonly reported in children with ASD (Marshall et al., 2014).

The work of speech-language pathologists (SLPs) in the areas of feeding, eating, and/or swallowing has typically involved evaluation, treatment, and intervention of the “anatomy, physiology, and functional aspects” of eating and swallowing (American Speech-Language-Hearing Association, 2002). Although the American Speech-Language-Hearing Association’s technical report on feeding and swallowing does not include managing difficult behavior prior to the oral preparatory phase of swallowing (i.e., difficult behavior that occurs before the food gets to the mouth), these behaviors and the consequences (e.g., rigid eating patterns, texture-related food refusal, etc.) are frequently the mealtime concerns of parents of children with ASD (Ahearn, Castine, Nault, & Green, 2001; Nadon, Ehrmann Feldman, Dunn, & Gisell, 2010). Successful therapeutic interventions often require a team of professionals working in collaboration with the parents to ameliorate the challenging behavior.

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Sharp, Jaquess, Morton, and Herzinger (2010) conducted a comprehensive synthesis of treatment outcomes in feeding interventions and reported that over 80% of the studies had professionals, rather than parents, providing the interventions. Overall, although 58.3% of the studies documented some degree of parent training, the majority of studies related to promoting behavior change at mealtimes involved a therapist (e.g., SLPs, occupational therapists [OTs], behavioral psychologists, or behavior analysts) working directly with the child (Sharp et al., 2010). Most of the studies described in that synthesis involved interventions that were supervised by interdisciplinary teams, highlighting the complex nature of mealtime interventions and the need for multiple perspectives and types of interventions. Including the parent as a contributing member of the collaborative, interdisciplinary team would increase the likelihood that the intervention would be maintained across time and settings (Moes & Frea, 2002).

The purpose of this study was to determine the feasibility of using a train-the-trainer model using EAT-UP (Easing Anxiety Together with Understanding and Perseverance; Cosbey & Muldoon, 2017). EAT-UP is a parent-implemented multicomponent mealtime intervention package designed by an SLP and an OT (first and second authors, respectively, both of whom had supervisory roles in the implementation of the EAT-UP plans herein) with a view to assisting other professionals and parents in improving their child's acceptance of less preferred food and to decrease disruptive mealtime behavior. EAT-UP is a strategy-based intervention created for each unique parent and child dyad. The foundational strategies of the EAT-UP intervention are behaviorally based, are family centered, and include therapeutic approaches from both the SLP (e.g., communication) and the OT (e.g., sensory processing difficulties). An additional rationale for EAT-UP is the evidence-based practice of parent-implemented intervention (Wong et al., 2013). Each family recruited for this study was offered combined behavior, SLP, and OT strategies in the form of an EAT-UP "menu" (see Table 1 for an example of the approaches chosen from the EAT-UP menu by one family) from which the caregiver could choose the approaches that would best fit their family's unique circumstances and for which they would become the primary interventionist.

The EAT-UP intervention specifically targets four domains: (a) communication for the mealtime dyad, (b) manipulation of food (e.g., changing textures and managing quantity and choice), (c) changes to the physical environment, and (d) changes to the social environment (Cosbey & Muldoon, 2017). These components create a menu or toolkit of options—drawn from the fields of speech-language pathology, occupational therapy, and behavior analysis—that directly target the unique needs of each family.

The preliminary results presented here are part of a larger ongoing study that is being completed by the authors ($n = 10$ children, $n = 11$ professionals) on the efficacy of EAT-UP as an intervention model for professionals (e.g., SLPs, OTs, and behavior specialists) working with families of children with ASD who are experiencing challenging

behavior at mealtimes. A quantitative group research design was used for the larger group, and these data are presented as preliminary data for a small number of families ($n = 3$) who are representative of the larger group.

Method

Participants

Three caregivers and their children with ASD and three registered behavior technicians (RBTs) were recruited from the outpatient applied behavior analysis department of a larger rehabilitation facility. The outpatient department was geographically removed from the main hospital where other therapies occurred (e.g., speech-language pathology and occupational therapy); therefore, the professionals recruited for this study were solely RBTs. The RBTs were women with 4, 8, and 16 years of experience in working with children with ASD. None had been previously trained in working with children with difficult mealtime behavior, but all expressed an interest in understanding this area of behavior management. The RBTs were trained and supervised by the first author, a dually certified SLP and a board-certified behavior analyst who has more than 20 years of experience in the field of speech-language pathology.

Three boys (Sam, Tim, and Juan) with ASD and their parents were also recruited into the study. The families, who were from diverse backgrounds, were recruited if they had expressed interest in helping their child to improve his mealtime behavior during an ongoing episode of care or following an initial referral to the outpatient department. Each boy had been diagnosed with ASD before his third birthday (prior to recruitment for the current study). Sam and Tim's caregivers expressed interest in mealtime assistance during an ongoing episode of care, whereas Juan's parents were referred to the department based on concern about his slow weight gain.

Sam was a 3-year-old boy whose parents were immigrants from India. His parents were married, and he had one older sibling. Sam had comorbid diagnoses of insomnia, expressive language disorder, and constipation. He had echolalic speech and used pictures for communication limited to a choice of one or two pictures at a time for basic requests of wants and needs (e.g., Nutella and water). He was not yet able to consistently follow one-step directions or remain at the table—he required partial or full physical prompts to do so. His family relied on a hospital financial aid program to access this intervention. The financial aid was available to families who could not access services through Medicaid and did not have private insurance.

Tim was a 5-year-old Black boy. His parents were married, and he had three older siblings, all diagnosed with ASD. Tim had additional diagnoses of mixed receptive-expressive language disorder and global developmental delay. Like Sam, he used echolalic speech and used picture communication for basic expressive communication. Tim was able to produce the first sound or an open syllable of words, typically when requesting highly preferred items.

Table 1. Mealtime plan as implemented by Tim's family.

Communication
• Teach functional communication for “all done” and other functional communication opportunities (to be identified during the intervention period) • Offer choices (e.g., do you want the apple or the carrot?) • Use command statements (e.g., “it is time to eat”) rather than questions like “do you want the apple?” • Set clear expectations around eating so that he knows what he has to do to gain access to his preferred toys/reinforcers • Pair the toys/reinforcers with specific praise so that he understands why he is getting the toy/reinforcer
Food
• Offer three of four food groups at meals and two of three at snack (include protein, fiber, and vegetable/fruit) • Select food he is likely to learn to eat • Offer the food that you want him to learn to eat (i.e., don't offer junk food unless you want him to learn to eat those) • Use preferred food as a natural motivator
Social environment
• Use a token system to increase the number of independent bites • Use visual supports to help him understand “first..., then...” and follow through using least to most prompts • Increase independence by fading physical and verbal prompts • Always finish on your direction; that is, he has to interact with the food based on the hierarchy prior to receiving his motivator • Maintain a positive tone throughout the meal/snack
Physical environment
• Use strong motivators that are available only in the kitchen and only presented upon eating/interacting with the food • Move away once you have presented the less preferred food • Remove reinforcers if he leaves the table • <i>Remove distractions (e.g., TV, iPad, toys)</i>

Note. All options are outlined. The single option rejected by the family is indicated in italics.

He was able to follow one-step directions, and he was able to answer simple yes/no questions. He accessed the feeding intervention through private insurance.

Juan was a 4-year-old White Hispanic boy whose parents were originally from Central America. His father and older sister were bilingual English/Spanish speakers, and his mother was a monolingual Spanish speaker. In addition to ASD, Juan had diagnoses of global developmental delay, feeding difficulties, expressive language disorder, and lack of weight gain. Like the other two, he had echolalic speech and used pictures to communicate his wants and needs. Juan did not consistently follow directions in either English or Spanish. He was consistent in his use of pictures for communication during clinic sessions, but he had a limited number of pictures in his repertoire. His parents reported that they did not use pictures at home. Juan's family also used the hospital's financial aid program.

The families were provided with information about the study and were given an opportunity to provide informed consent to participate. Informed consent was obtained from all individual adult participants (i.e., RBTs and parents). Because of their age and language abilities, the children were

not asked to provide assent for participation. This study was approved by the University of New Mexico Human Research Protection Office and was part of a larger study occurring simultaneously in clinics in two states.

For the duration of the study, the boys' parents (i.e., mothers for Sam and Tim and mother and father for Juan) were the primary interventionists. The first author trained the RBTs who then instructed and trained the parents using direct written and verbal feedback and measures of procedural fidelity (see Table 2). All three parents identified a goal of increasing the variety of food their son ate. In addition, Sam and Juan's parents identified a goal for their child to increase independence when eating with a spoon. Sam's mother was particularly interested in having him eat independently because to feed him, she had to restrain him by putting her arm around his neck and shoulders and bringing the spoon to his mouth from her seated position behind him. This positioning had the effect of limiting his movement away from her and limiting his ability to escape the less preferred food presented on the spoon.

Setting

All of the sessions and data collection for this study were conducted in a small hospital outpatient clinic in a rehabilitation hospital. Each session was typically 50 min in duration. Parents were advised to bring in the food that they wanted their child to eat. They also brought utensils that they used during the normal course of mealtimes at home. Intervention sessions occurred during lunch (Sam and Juan) or during snack times (Tim). All of the sessions were conducted at a child size table with the parent(s) and RBTs present. The first author was present for 48%, 57.6%, and 49.6% of the sessions for Sam, Tim, and Juan, respectively.

Procedure

This was a quantitative research design using pretest–posttest methods. This study used pre-, mid-, and post-intervention data to evaluate changes in the children's mealtime skills. In addition to the pre-, mid-, and post-intervention data collected from the parents related to the child's mealtime skills, we collected fidelity of implementation data to evaluate if the RBTs were following the EAT-UP plans (see Table 2). The RBTs have 40 hr of training in behavioral strategies and teaching methods. They are registered with the Behavior Analytic Certification Board having completed classwork and passed an exam. The RBTs who participated in this study were familiar with behavioral strategies such as prompting, modeling, direct feedback, and visual supports.

In order to develop the most relevant and appropriate intervention using EAT-UP, the children and families were asked to participate in an extensive assessment of the child's mealtime behaviors. The assessment measures completed for each child included the Brief Autism Mealtime Behavior Inventory (BAMBI; Lukens, 2005), the Behavioral Pediatrics Feeding Assessment Scale (BPFAS; Crist & Napier-Phillips,

Table 2. Example of procedural fidelity feedback, investigator to therapist.

	During today's EAT-UP session, you:	Always or strongly agree	Mostly	A little	Not really "try to do more of this"
1	helped the parent interact better with the child				
2	didn't get distracted				
3	asked them how mealtimes are going at home				
4	showed them that their input is important by asking what concerns they have and what is working well				
5	made sure that the parent was mostly the one helping the child today				
6	told the parent what strategies they are using well so they know what to keep doing				
7	helped the parent use specific strategies better (like the hierarchy, ways to talk to the child, or how to set up the food)				
8	helped the parent make sure that the session was positive and that they ended when the child was successful				
9	made suggestions that the parent can learn to do to help the child				
10	gave them specific mealtime things to work on at home between now and your next session				

Note. EAT-UP = Easing Anxiety Together with Understanding and Perseverance. EAT-UP content reprinted with permission © Springer.

2001), the Food Frequency Questionnaire (adapted from Harvard T. H. Chan School of Public Health, 2012), a 24-hr food recall (adapted from Lukens, 2005), a Family Quality of Life survey (Hoffman, Marquis, Poston, Summers, & Turnbull, 2006), and a goodness-of-fit survey (adapted from Albin, Lucyshyn, Horner, & Fannery, 1996). The BAMBI and BPFAS are Likert-scale questionnaires that parents complete to provide information on their child's mealtime behaviors. Both scales have been validated for use with children with ASD and have been used in other studies to describe the degree of mealtime challenges a child demonstrates (e.g., Badalyan & Schwartz, 2011; Binnendyk & Lucyshyn, 2008).

Following the assessment and initial interview, baseline sessions were conducted to observe the parent-child interactions during mealtimes, the child's mealtime skills, and the strategies the parent was using to promote food acceptance in order to inform the intervention phase of the study. During the baseline sessions, the parent-child mealtime interaction was observed (i.e., during snack times for Tim and lunch times for Sam and Juan). The SLP investigator and the recruited professionals observed and recorded difficult behavior (as identified by the parent during initial interview) and the number of bites of food, both preferred and less preferred, offered and/or consumed by the child. The duration of the mealtime was also recorded. No intervention techniques or strategies were offered to the parents during the baseline phase. Baseline was completed over three sessions for Tim—the maximum allowed under his private insurance coverage—and five sessions for Sam and Juan whose families had no private insurance.

Following the assessment, initial interview, and baseline sessions, a mealtime plan was designed by the SLP

and the RBT using the EAT-UP menu of options that had previously been created by the SLP and the OT. The menu of options was individualized for each family based on the concerns expressed during the interview and initial assessment. The first author and the RBT assigned to provide the intervention then met with the family to discuss the mealtime plan. The families were provided information about the different recommended intervention strategies and were supported to choose the interventions that they perceived to be most comfortable and appropriate for their family. Families were free to reject any recommendations that they felt would not suit their particular family routines or structure. For example, Tim's mother rejected the idea of removing screens (e.g., TV or iPad) at mealtimes as she thought this would be too difficult for Tim and his siblings.

The mealtime plans were based on the components of the EAT-UP model which cover four areas: (a) communication between the child and parent, (b) food (including textures, quantity, and presentation), (c) aspects of the physical environment including the type of utensils used, and (d) aspects of the social environment including praise or other motivators used by the parents. Each parent was trained on each of the menu options they chose for the plan. Table 1 provides an example of types of intervention chosen for a mealtime plan for Tim's family.

Training for each parent was completed by the RBTs using teaching strategies such as direct feedback, prompting, visual supports, and behavioral momentum (see Table 3). The RBTs modeled the strategy that was the focus of the session, and parents repeated the model during the session. Parents were provided feedback using the mealtime plan that doubled as a procedural fidelity checklist and was

Table 3. Examples of behavior strategies and descriptions used by trainers during the EAT-UP intervention period.

<i>Behavioral momentum:</i> Accomplishing an easier task before increasing the complexity of the task (e.g., using an empty spoon or plate before adding the food).
<i>Fading:</i> Removing the adult prompt as soon as possible to gauge the child's ability to complete the action independently.
<i>Negative reinforcement:</i> In combination with the visual hierarchy, positive reinforcement, and prompting, the adult and the child were instructed to interact with the food at every level. The food was not removed until the interaction was complete.
<i>Parent training:</i> Including the parents at every step of the intervention using modeling and prompting for parents as needed.
<i>Positive reinforcement:</i> Using tokens, tangibles, and preferred food after an interaction with the less preferred food to increase the likelihood that the child will interact with the food again.
<i>Prompting</i> • <i>Full physical:</i> Full hand-over-hand prompting used in combination with fading. The goal is independent performance. • <i>Partial physical:</i> Partial prompting is the use of a guide or a prompt at another location on the hand, arm, or shoulder. Parents were instructed to fade prompts to encourage independence.
<i>Redirect/reposition:</i> This is the process of redirecting the child to a more appropriate behavior using prompting or positive reinforcement.
<i>Visual hierarchy</i> for desensitization and tolerance that teaches parent and child the expectation and when to back up (e.g., move back from take a bite to touch). This involved using pictures to indicate to the expectation.

Note. EAT-UP = Easing Anxiety Together with Understanding and Perseverance. EAT-UP content reprinted with permission © Springer.

completed at the end of each session. Data were collected on every bite at every session and on the implementation of all of the EAT-UP menu options. To facilitate data collection on implementation by parents, a parent feedback form using the individualized menu of EAT-UP options was created for each parent-child dyad. For example, if Tim's goal was to use a picture to indicate "all done," then the corresponding parent goal was "You prompted Tim to say 'all done'." Parents were provided copies of the feedback forms so that they had a reminder of the EAT-UP plan and the areas of improvement they could address before the next EAT-UP session. The SLP's role was to guide the RBT in using the EAT-UP mealtime strategies during the treatment sessions through the use of direct written and verbal feedback and modeling as needed. For example, if the RBT and parent team encountered challenging behavior when prompting spoon to mouth (e.g., the child was running away, crying, etc.), the SLP modeled the use of behavioral momentum and/or positive reinforcement for the RBT and the parent. As mentioned, direct feedback was offered to the RBT by the first author using a procedural fidelity checklist (see Table 2) to increase the accuracy of the implementation of the mealtime plan by the RBT.

All of the children and their families were provided with 6 months of intervention from the date of the initial assessment. Each family was scheduled to attend twice weekly. Over the course of 6 months, Sam attended for

32 scheduled sessions, Tim attended for 36 sessions, and Juan attended for 31 sessions. Each family attended for no more than 6 months of intervention from the date of the initial assessment. For each participant, intervention started following the consultation with the family and the team (i.e., SLP, RBTs, and parent). For the children and their families, this meant that they were provided intervention immediately following the assessment and baseline sessions.

Following baseline, each parent was provided with an individualized, visual hierarchy that allowed the child and the parent to quickly see the expected interaction with the food (e.g., touch with a fork, touch with lips, and take a bite). The same visual hierarchy was a reminder for the parents to continue to expect increasing levels of interaction with the food at home. The visual hierarchy was accompanied by reinforcement (e.g., tokens, points, or preferred food) that was accessed at increasing levels of interaction with the less preferred food.

Parents were trained by the RBT in prompting their child in how to use the utensils and plates that were familiar to their child. A typical session for Sam started with a familiar spoon and plate containing less preferred food. If he refused the food, his mother was instructed to place a familiar dry spoon on the plate and then physically prompt Sam to accept the dry spoon to his mouth. Once he was comfortable with the dry spoon, she was instructed to guide or physically prompt him to once again use the spoon containing the less preferred food. The expectation for interaction with the less preferred food—an expectation presented both visually and verbally—was that the child would interact with the food independently for every bite, and if he did not, he was prompted either verbally or physically. Parents and RBTs were instructed to fade physical prompts for every interaction so that the children would not come to rely on the prompts in order to eat the less preferred food.

The families were provided with picture communication icons for use when less preferred food was presented. They were trained to use the pictures and prompts when their child did not want to interact with the food at the expected level. The most used picture icon for communication was "all done." Other functional communication responses were encouraged, including "I'm not ready" and "Can I have one more minute?"

Data Collection

All of the parents completed the assessment measures three times during the intervention: prior to intervention, at the midpoint of intervention, and immediately prior to discharge. Procedural fidelity data were gathered for both the RBT and the parent. The RBTs rated the parent's implementation of the mealtime plan, and the parent rated the RBT's training methods. These fidelity checklists were prepared for parents and RBTs based on the individual goals outlined in the EAT-UP plan. Fidelity data for the RBTs and parents were also collected by the SLP during sessions as she observed the implementation of the EAT-UP plan with the

family. In addition, during each session, data were collected by the RBT on every bite presented to the child.

Data Analysis Procedure

Data were collected and analyzed at the beginning, midpoint, and end point of the study using the assessment tools identified above. Raw scores for the BPFAS (Crist & Napier-Phillips, 2001) and BAMBI (Lukens, 2005) were recorded on an Excel spreadsheet and converted into *z*-scores for a direct comparison across the course of the study. Results for the Food Frequency Questionnaire (adapted from Harvard T. H. Chan School of Public Health, 2012), 24-hr food recall (adapted from Lukens, 2005), Family Quality of Life survey (Hoffman et al., 2006), and goodness-of-fit survey (adapted from Albin et al., 1996) were also entered into the spreadsheet for qualitative analysis and comparison with prior parental reports. Finally, during the ongoing intervention, data were analyzed and reviewed by the authors and recruited professionals using visual data analysis (i.e., line graphs were generated following each session to track the need for change and improvement). This analysis and review was completed daily by the recruited professionals and the SLP on a consultative basis by the OT.

Results

Fidelity

Parents rated the RBT fidelity of training and coaching of the plan at 100% for all three recruited RBTs. The RBTs rated fidelity of parent implementation of the mealtime plan during clinic sessions between 50% at the onset of the intervention with Sam's mother (the lowest fidelity score recorded) to 100% at the conclusion of intervention for all three parent participants. The procedural fidelity of the RBT implementation of the EAT-UP plan was rated by the SLP at 54% at the beginning of the intervention to 100% after 3 months of training.

Mealtime Behaviors/BAMBI

Z-scores were used for the analysis of the BAMBI and BPFAS data as it enabled comparison of scores from different normal distributions and different groups of data. All three children's caregivers reported a decrease in their child's challenging mealtime behaviors as measured by the BAMBI (see Figure 1). BAMBI *z*-scores decreased by 4.0 (Sam), 0.6 (Tim), and 3.4 (Juan). In addition, the number of reported behaviors perceived as problems by caregivers decreased for all of the children, falling from a range of 9–12 to a range of 0–3.

The results of the BAMBI are comparable for both Sam and Juan. Sam's mother reported meaningful differences in her ability to manage his behavior, in his ability to eat independently, and in the variety of food that he accepted at mealtimes. She was no longer observed to feed him forcibly from behind and reported that he ate independently at home and in restaurants. Juan's caregivers reported a similar

decrease in his difficult mealtime behavior. This decrease is reflected in *z*-scores for pre- and postintervention ($> + 3.0$ to $+ .3$). The real-life, meaningful differences for his parents were that he decreased his consumption of chocolate milk from approximately 48 ounces a day to less than 8 ounces per day.

While Tim's mother did not report as meaningful a difference in *z*-scores from beginning to the conclusion of intervention, there was nonetheless a difference over the course of intervention (preintervention *z*-score = $+ 1.6$, midintervention *z*-score = $+ 2.3$, postintervention *z*-score = $+ 1.0$). Tim initially met eligibility for the study based both on his BAMBI score and the number of problem areas from the parents' perspective (i.e., 9 of 18 areas identified as problem areas). The increase in scores at the midpoint of the intervention may be explained by increased caregiver awareness of typical mealtime behavior. Tim's challenging mealtime behaviors were initially absent because Tim was not offered or expected to consume less preferred food. As the intervention progressed, less preferred food was offered more frequently and was accompanied by the expectation that Tim would interact with or consume the less preferred food, thereby eliciting behaviors that had previously been absent.

Mealtime Behaviors/BPFAS

All caregivers reported a decrease in both frequency of problem behaviors and the number of problem mealtime behaviors as assessed by the BPFAS (see Figure 2).

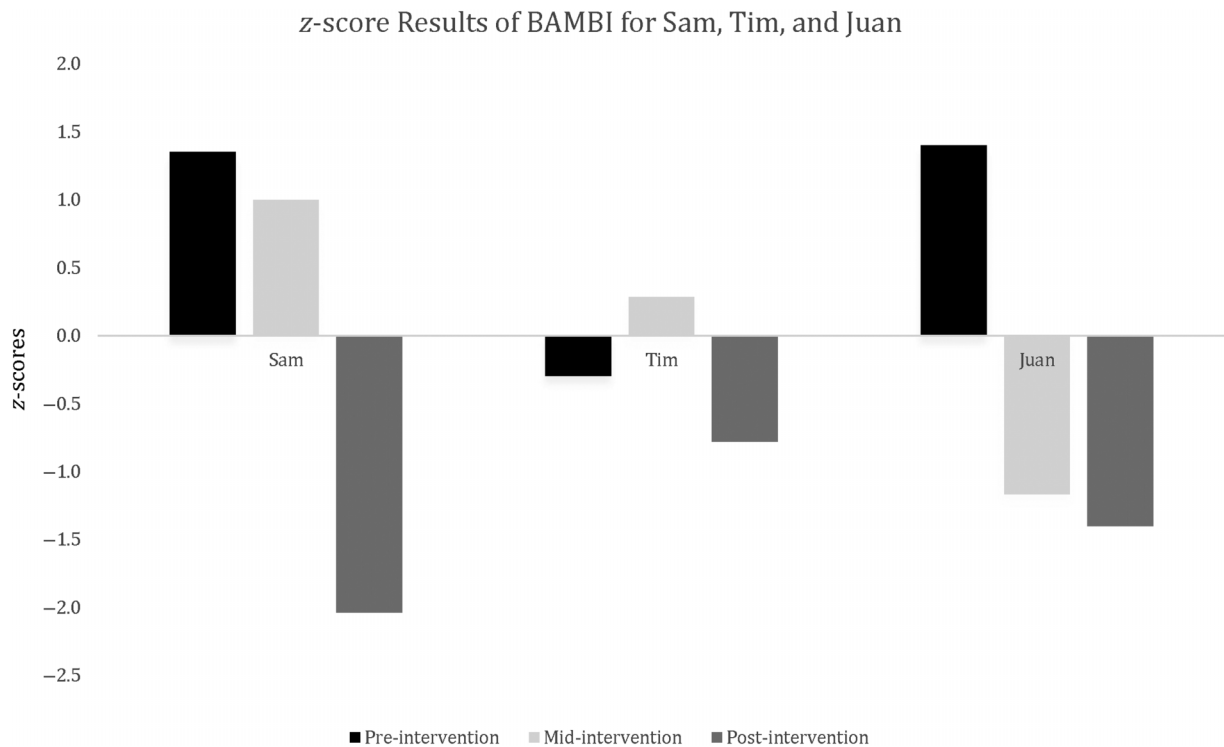
As with the scores for the BAMBI, Tim's mother reported an increase in the frequency of problem behaviors at the midpoint of intervention before then reporting a decrease after intervention. However, similar to the other parents, she reported a significant decrease in the total number of problem behaviors. This suggests that she was better able to manage difficult mealtime behaviors and that the problem behaviors that had been a concern for her before intervention were no longer problems after intervention.

Twenty-Four-Hour Food Recall

At the initiation of intervention, Sam's mother reported that in the 24 hr prior, Sam had eaten plain bread dipped in tea with hand-over-hand prompts, Cheetos, plain bread with chickpeas and rice, and "spinach bread" (i.e., bread baked with small pieces of spinach), and he drank approximately 10 ounces of soy milk. Sam had a remarkably repetitive diet, eating the same food every day. One of his parent's goals was to increase the variety of food to include more of the food that his parents ate regularly. At the conclusion of intervention, he independently ate pasta and red sauce with cheese, a chewy oatmeal bar, pizza, whole wheat homemade bread with cabbage and mango, wheat bread dipped in tea, and bread stuffed with lentils. He also drank juice (pineapple, orange, mixed carrot and apple, and apple).

Tim's mother reported during initial assessment that Tim had eaten crackers, cookies, chips, and yogurt in the

Figure 1. Pre-, mid-, and postintervention mealtime behaviors as reported by each child's mother for the Brief Autism Mealtime Behavior Inventory (BAMBI).



24 hr prior. Crackers included “half a sleeve” of dry crackers and two packs of sweet breakfast cookies. He drank water from a water bottle. After intervention, he ate Spanish rice, chicken, cookies, and yogurt. He also ate cucumber, carrots, mac and cheese, and pineapple during the final sessions in clinic. His mother succeeded in changing the type of yogurt that he was consuming (previously, he had insisted on eating only one flavor and brand of yogurt). He drank water as before.

At the initiation of intervention, Juan was reported to have consumed 48 ounces of chocolate milk from a baby bottle, two yogurt cups, and a small amount of rice mixed with water from beans that his mother cooked for him when he returned from school each day. After the EAT-UP intervention, in the previous 24 hr, he had consumed 9 ounces of chocolate milk from a cup, applesauce, yogurt, rice, beans and spaghetti, yogurt, and 8 ounces of a nutritional drink prescribed by a medical professional. His mother reported that he had gained 8 pounds, which was a significant weight gain for Juan as his parents had joined the study because he was not growing.

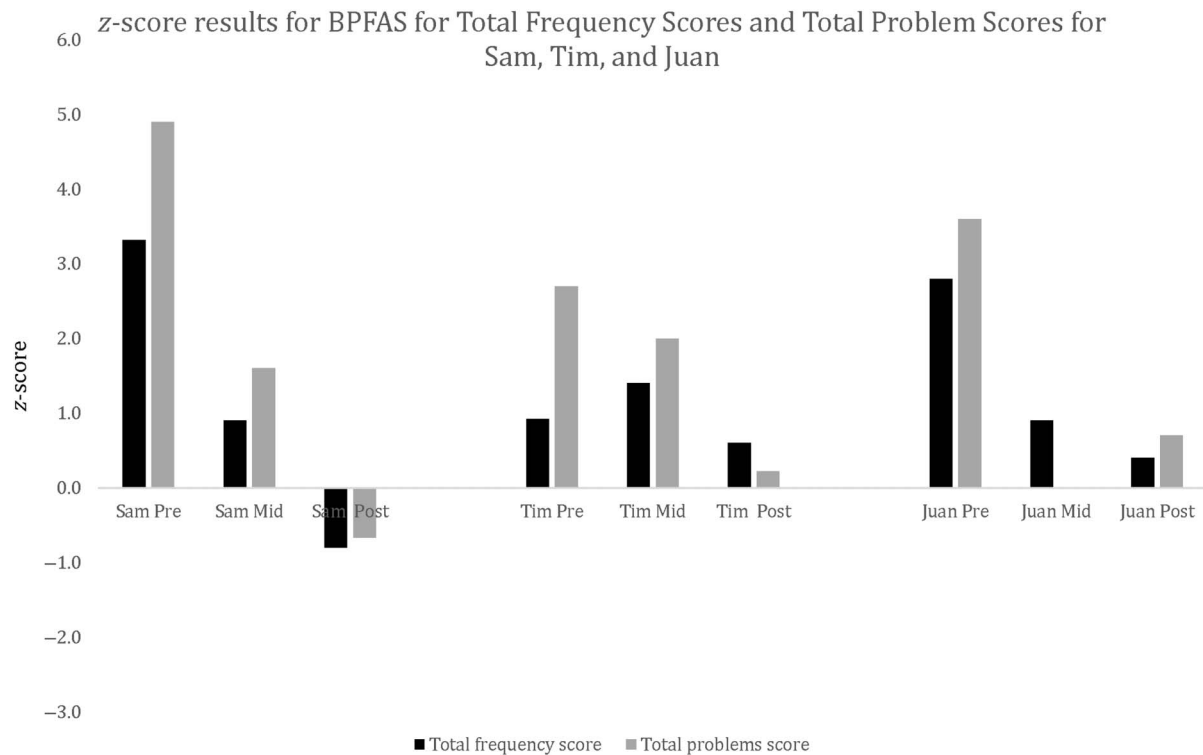
Finally, the results of the adapted goodness-of-fit survey collected before and following the intervention supported the results of the BAMBI and the BPFAS. Parents indicated that the EAT-UP plan met their child's needs. In addition, the parents also reported that the EAT-UP plans were clearly implementable at home, indicating that the intervention was family centered and socially valid.

Conclusion

EAT-UP is a family-centered, multicomponent intervention package that had been previously implemented by the authors who provided direct training to parents (Cosbey & Muldoon, 2017). This report details preliminary results from a second phase using the same EAT-UP model wherein the first author trained other professionals to implement the multicomponent intervention with three families of children with ASD. In total, this second study phase comprised a much larger group ($n = 10$ families, $n = 11$ professionals) of recruited participants of which the families and professionals presented here are a small number. The results of this study are indicative of the successful outcomes for EAT-UP that the authors are gathering across settings and participants. As with the previous work by the same authors, intervention was replicated across three individuals and their families with all of the families reporting positive outcomes. In a departure from the previous study, this work included three professionals (specifically RBTs) trained to train parents to implement EAT-UP.

Mealtime difficulties are common in children with ASD (Nadon et al., 2010). In addition, the families in this study reported decreased quality of life issues at the onset of the intervention, such as the inability to go to a restaurant, the inability of their child to eat independently, and the inability to eat together at home as a family because of their child's difficult mealtime behavior. The parents' reports of

Figure 2. Pre-, mid-, and postintervention mealtime behaviors as reported by each child's mother for the Behavioral Pediatrics Feeding Assessment Scale (BPFAS).



behavioral challenges were supported by the results of both the BAMBI and the BPFAS that detailed above average concerns about their child's eating and mealtimes at the beginning of the intervention, either in the total frequency of problems, total problem scores, or both.

Training other professionals to use the EAT-UP model, focusing on the areas of communication, manipulation of food characteristics, and manipulation of the physical and social characteristics of the environment, was an effective and successful method of decreasing challenging mealtime behaviors and increasing acceptance of less preferred food by the children. There are several explanations for this success. The first was the participation and inclusion of the professionals and parents at every step of preparation and implementation of the mealtime plan. Strategies presented to parents and professionals through training and modeling by the SLP included the use of communication and behavior techniques combined with systematic desensitization of less preferred food. The strategies were accompanied by a visual hierarchy that was appealing to both parents and professionals and was a clear reminder of the level of interaction that the child had engaged in during previous intervention sessions. For example, if the child had moved the food to his lips in a session at the beginning of the week, he was expected to meet or exceed that step later in the week. Parents reported using the visual hierarchy at home in much the same way that they used visual schedules that had been taught during traditional SLP sessions.

Second, the initial approval of the strategies by the professionals and parents appeared to increase the likelihood that the families used them between intervention sessions. Families reported using the hierarchy and the token systems at home, particularly when they were attempting to introduce new, less preferred food (i.e., food that was not presented during clinic sessions). The fact that the hierarchies and the tokens were individualized and that the distinct needs of each child were recognized resulted in the caregivers persisting with the introduction of less preferred food across settings.

Third, the visual hierarchy allowed the families and the professionals to "slide" back down the hierarchy as needed. Sliding back allowed for the avoidance of power struggles between professionals and the child or the parent and the child. Importantly, professionals and parents were trained by the first author not to reinforce the child with preferred food, tokens, toy, iPad, etc., for a lower level of interaction with the food (e.g., tolerate on plate) if they had previously achieved a higher level of interaction (e.g., take a bite). This allowed the parents and the professionals to reintroduce the food at a higher level of expectation at the next session. Each child quickly learned that the reinforcer was accessible once they met the higher level expectation. Each parent learned to proceed to the next step (up to and including take a bite and swallow) when the child was more comfortable interacting with the food at the lower level.

Implications

This study has important implications of the work of SLPs and others who work with children with ASD and their families. Estrem et al. (2016) viewed mealtime challenges as a long-term, persistent family-based journey. Chao and Chang (2016) described the problematic *parental* feeding behaviors associated with food refusal issues. Both articles stress the need for consideration of the family in the implementation of mealtime behavior change. EAT-UP provided professionals and families a mealtime plan coupled with a visual hierarchy and behavioral strategies.

Based on this work and the previous study, several conclusions can be drawn suggesting that this intervention, when used as a train-the-trainer model, may be effective for children with ASD who have limited food acceptance and challenging mealtime behaviors. First, through collaboration and consultation, the families and professionals were invested in the plan from the onset of the intervention. Second, SLPs and their colleagues engaged in interprofessional, multidisciplinary practice can affect meaningful change in the management of complex feeding difficulties. These difficulties include behaviors that are not typically in the purview of the SLP (e.g., Sam's resistance to spoon feeding independently or Juan's over-reliance on chocolate milk) but are frequently central to parent concerns when seeking assistance for their child. The interprofessional collaboration between the SLP, the OT, and the RBTs provided input from several different but important professional perspectives with the result that parents reported meaningful changes in their child's mealtime behavior. Finally, training professionals to assist families in the implementation of an individualized plan, one that contains and accommodates many necessary but disparate elements of a family's mealtime routine, supports previous research on the effectiveness of parent-implemented interventions (Wong et al., 2013).

Limitations

There are several important limitations to this report. Despite the diversity of the families in this study, the small number of participants reduces the generalizability to other families of children with ASD. While Tim made considerable progress during the study, his mother did not report outcomes as positive as Sam's and Juan's mothers. The study was limited by time (6 months), and Tim and his mother may have benefitted from more time in intervention. He made considerable progress in functional communication (e.g., "all done") during the course of the intervention. He also learned to manipulate his visual hierarchy and token system, and this contributed significantly to a decrease in disruptive behavior during mealtime. However, it also resulted in fewer bites of less preferred food, something his mother typically accepted. For example, he would trade out one token for a picture of "all done" resulting in him taking four bites of the less preferred food for rather than five. Additional training for parents and

professionals about the level of expectation coupled with additional time in intervention for some of the children may be appropriate.

Another limitation of this study was the omission of a control group. However, given the long-standing problems that these families faced in trying to manage the feeding and mealtimes of their children and the meaningful improvements that they reported over the course of the intervention, we can reasonably conclude that the EAT-UP intervention was the causal agent for the behavior changes. Future planned research includes the use of control groups using wait list controls. As mentioned, these children represent a small number of a larger group of children who participated in a study of the efficacy of the EAT-UP intervention using a train-the-trainer model, and an additional manuscript is in preparation to present results of the intervention with the larger group of families.

In addition, because of the methodology used in this study, it is impossible to draw firm conclusions regarding the impact of this intervention on the child's mealtime behaviors. It is possible that other factors, such as time (maturation), other therapies, etc., may have also contributed to their progress. However, again, given that the children's long-standing feeding difficulties improved within the time frame of the study and the fact that these outcomes are consistent with findings from our other studies (e.g., Cosbey & Muldoon, 2017), there is a growing base of evidence that supports that the EAT-UP intervention is contributing to the positive mealtime skills development of children with food selectivity.

Finally, while the parents in this study all reported a decrease in challenging behavior, they all initially expressed trepidation about implementing the mealtime plan at home. To assist in establishing and adhering to the plan, the families attended clinic sessions twice weekly. Frequent attendance may not be possible for many families based on insurance, travel time, or other family routines. Future research could explore the use of parent-to-parent support or use of telehealth technology to support families as they work at home to increase their child's intake of more varied and nutritious food.

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