A Family-Centered Positive Behavior Support Approach to Intervene Food Refusal Behavior for a Child with Autism

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Abstract

Empirical research revealed that positive behavior support technique can promote meaningful lifestyle changes across a wide spectrum of persons with disabilities and settings. The purpose of this study was to evaluate the effectiveness of a family-centered positive behavior support approach in the treatment of extreme food refusal behavior in a child with autism spectrum disorders. This single subject study used multiple measurement procedures to monitor the dependent variables and to document implementation of independent variable (i.e., intervention procedure). The researcher served as the primary interventionist throughout the study and collaborated with the family on intervention development and implementation activities. The dinner routine was selected for assessment and intervention. Four dependent variables were measured, and observation data were gathered across baseline, intervention, maintenance, and follow-up phases. The results showed improvement in aberrant behaviors, the increase of acceptance of bite consumption, and successful participation in targeted meal routine from baseline to intervention phases. Further evidence of efficacy of this support approach was found in the modest improvement in social validity, family quality of life, and parental stress. The findings of this investigation indicated that the ecological behavior intervention provided through parent-professional collaboration was acceptable and affective. Moreover, family-professional collaboration provides appropriate frameworks for planning, designing, and implementing positive behavioral support intervention, and for documenting its impact, specifically in the context of early intervention.

Key words: autism spectrum disorder, food refusal, in-home intervention, positive behavior support
Introduction

Feeding problems have become one of the most difficult challenges that the majority of parents have to face during daily life (Schreck, Williams, & Smith, 2004). The report showed that around 45% of typically-developing children experienced mealtime problems (Binnendyk & Lucyshyn, 2009). Children who exhibit problems with eating may exhibit characteristics of restricted use of various food types and textures, as well as food refusal (Ahearn, Castine, Nault, & Green, 2001). Compared to typically-developing children, a higher prevalence of children with developmental disabilities have feeding difficulties (Ledford & Cast, 2006). Among these children are those with autism spectrum disorder (ASD) (Paul, Williams, Riegel, & Gibbons, 2007; Schreck et al., 2004). Due to extreme food selectivity, these children are also more likely to exhibit challenging behaviors, such as crying, vomiting, aggression, spiting, and self-injury (Binnendyk & Lucyshyn, 2009).

Feeding problems in children with ASD could be described as selective acceptance of food or refusal to eat most foods with no medical basis. Specifically, food refusal is a feeding disorder that could last several months or years (Ahearn et al., 2001; Schwarz, 2003). Food refusal has been linked to medical conditions, such as esophageal problems, gastrointestinal disease, and genetic disorders (Roth, Williams, & Paul, 2010; Schwarz, 2003). Failure to consume adequate amounts of foods to maintain nutritional needs can pose health risks, leading to diarrhea, vomiting, and restricted caloric intake (Williams, Hendy, & Knecht, 2008). However, environmental factors, such as inadequate parenting practices, have also been shown to exacerbate and maintain the problem (Manno, Fox, Eicher, & Kerwin, 2005). Caregivers’ feeding practices can strengthen a child’s inappropriate feeding patterns, such as leaving the table contingent on problematic feeding behavior (Williams et al., 2008). Although parents reported that maladaptive feeding behaviors are more serious for children with autism than for typically-developing children, limited research has focused on addressing this aberrant feeding issue related to children with ASD within the family context (Schreck et al., 2004). While research revealed that parents might unintentionally reinforce maladaptive behaviors, evidence found that parents participating in the intervention reported a significant reduction in child behavior problems at home (e.g., Blair, Lee, Cho, & Dunlap, 2011). Specifically, family-centered practices are fundamental components of early intervention services. Because considering the needs and concerns of the entire family is essential to achieving positive outcomes for young children with disabilities (Turnbull, Brown, & Turnbull, 2006).
A Family-Centered Positive Behavior Support Approach to Intervene Food Refusal Behavior for a Child with Autism

2004), the intervention plan could be strengthen through involving families.

**Evidence-Based Interventions and Limitations**

A wide range of interventions have been utilized to address food refusal behaviors, including simultaneous and sequential presentation (e.g., Ahearn, 2003), differential reinforcement of acceptance (e.g., Anderson & McMillian, 2001), stimulus fading (e.g., Freeman & Piazza, 1998), escape extinction (e.g., Ahearn, Kerwin, Eicher, & Lukens, 2001), and appetite manipulation (e.g., Levin & Carr, 2001). Research has demonstrated the effectiveness of these intervention strategies for treating feeding acceptance and consumption problems exhibited by children with ASD. Those features of effective interventions include the use of functional assessment procedures as well as multicomponent treatment packages to address eating problems (Ledford & Gast, 2006).

Despite the effectiveness of these interventions, limitations have been identified. For example, escape extinction involves physical intervention which would require opening a child’s mouth which could cause injury (Ahearn et al., 2001). Additionally, most of these intervention trainings have been conducted within specialized clinic settings (Gentry & Luiselli, 2008). We are uncertain if effective interventions would be acceptable for parents to implement in the home. On the other hand, the effectiveness of intervention is maximized when involving families. Family-centered practices could ensure to address the unique needs of a child, and include the acceptability of goals and procedures. As for growth rate concerns due to nutritional deficits in young children, the social validation of effective treatments should be considered. Parents should be educated to implement empirical validity of treatments for food refusals in children with ASD, and research emphasized the maintenance in a socially relevant setting (e.g., home) should be conducted (Mueller et al., 2003; Ledford & Gast, 2006).

**Core Features of Positive Behavior Support Approach**

The use of parents as the interventionist in the home was defined as one of the features of an effective approach. Based on a family-centered approach, positive behavior support (PBS), an evidence-based practice, was recommended to treat food refusal behaviors in children with autism. Family-centered PBS uses individualized and systematic methods with the purposes of preventing problematic behaviors, PBS develops appropriate behaviors and achieves long-term positive outcomes for children and their families. This study of family-centered approach incorporated the six core features of PBS which was described by Binnendyk and Lucyshyn (2009) (See Figure 1).

First, utilizing a collaborative partnership, families and professionals can share
the responsibility to conduct functional assessment and design behavior support plans for treating food refusal behaviors. Contextual fit, one of the key components of PBS approach, includes “ecological validity,” which refers to the positive involvement of a variety of stakeholders over a long period time. Contextual fit also includes “social validity,” which refers to the appropriateness of the interventions and their acceptance by all stakeholders including professionals and family members (Carr et al., 2002). The intervention involved parents and was conducted within the targeted mealtime routines in the home setting that could be considered as ecological analysis for promoting maintenance of treatment outcomes.

Fourth, utilizing functional assessment uses direct and indirect observations to determine the reasons for the child’s inappropriate behavior, which could include receiving a preferred consequence or avoiding an unwanted consequence (Lucyshyn, Dunlap, & Albin, 2002; Wang, McCart, & Turnbull, 2007). The use of functional assessment is supplemental with family ecology assessment to meet the purpose of PBS plan that is contextually appropriate. Fifth, multiple measures were utilized to assess the child’s food refusal behaviors, social validity, and parents’ implementation of procedural fidelity. Finally, PBS seeks meaningful long-term improvements to the quality of life of children (Carr et al., 2002; Wang et al., 2007). PBS is a “person-centered” approach that is aimed at providing services for individual needs (Lucyshyn et al., 2002).

Based on the above theoretical framework, the study focused on evaluating evidence-based practices of family-centered PBS approach for treating food refusal behaviors of a child with autism.

![Figure 1. PBS framework.](image-url)
Method

Participant
Alex (a pseudonym) was a 6-year-olds boy who had been diagnosed with autism, attending an inclusive classroom at a public elementary school. Alex lives with his parents and older sister (8-year-olds). He was able to vocally request specific favored items (e.g., bowling and pooh), but he initiated communicative attempts inconsistently.

He was selected for this study because his food choices were highly selective (i.e., accepted less than five items of food), and his nutritional intake had little value, which posed a variety of potential health risks. Prior to the intervention, Alex received the majority of his calories from drinking soy-milk and eating goldfish crackers, pizza and chicken nuggets. In the past, he was able to feed himself and was able to use a spoon and fork. At the time of this study, he only accepted food in bottle form and often spit food out.

Because his parents were concerned about his health, they mixed multivitamin powder into soymilk to ensure Alex received sufficient nutrition. His parents also reported that Alex could consume six to eight food items when he was age four, but he gradually reduced the acceptance of food items (i.e., no longer accepted previous foods, except the four items mentioned above) and often exhibit challenging behaviors during meal time.

When his parents prompted Alex to try new foods, he displayed aggression and disruptive behaviors including crying, tantrums, and throwing food. Alex was not receiving medications or being treated for any comorbid chronic illness.

Setting
To ensure that the plan was as contextually-appropriate as possible, the researcher reviewed the family ecological information to better fit their daily routine. Alex’s parents chose the dinner routine for assessment and intervention because they wanted Alex to sit with all family members during this routine which would have the greatest impact on the family’s overall quality of life.

After discussing with Alex’s parents, initial intensive training sessions occurred in Alex’s bedroom where distracters were minimized to keep him engaged in the training. To meet the goal of dinner context (i.e., spend more time together), the remaining training sessions were conducted in the kitchen. Because Alex’s mom sometimes worked the night shift (i.e., she was a nurse), all sessions were implemented by the father to ensure consistent implementation.

The researcher trained the father during a one-on-one training session for PBS strategies in the absence of Alex, which lasted 30 to 60 minutes. Once the father mastered the procedures of PBS strategies, he imple-
mented experimental sessions with his son. The researcher was present during all sessions, physically prompting the child from behind and/or providing the father with verbal feedback, if necessary. With the permission of the parents, the researcher videotaped all experimental sessions for data coding.

Research Design

To ensure the function of food refusal and dinnertime behavioral problems, descriptive and indirect functional behavior assessments (FBA) were utilized, including direct observation of behavior and interviews to obtain information from Alex’s family to identify possible conditions or events in the natural environment that correlate with the problem behavior. The specific procedures used are described in the below sections.

To evaluate the efficacy of the PBS intervention approach for improving the child’s behaviors in dinnertime routines, this study employed a single-subject experimental design, using a multiple measurement procedure to monitor the dependent variables and to document implementation of the independent variable (Horner & Baer, 1978). Although this study involved only one participant, the external validity was controlled through replication of different conditions and different measures of the dependent variables (Horner et al., 2005). The following phases were included: (a) baseline; (b) intervention, comprising of initial training with the researcher and parent training; (c) maintenance support; and (d) follow-up.

Response Definition and Measurement

Although food refusal is a common complaint, the precise definition of food refusal has not well established (Walker, Kleinman, Sherman, Shneider, & Sanderson, 2004). In this study, food refusal defined as developmentally inappropriately intake of food due to texture, quantity, or selectivity for more than 8 weeks. It was not because medical condition rendering the child medically fragile. This behavior was measured in the assessment and all baseline and intervention phases.

Intervention sessions were scheduled with Alex during the daily dinner meal at home. The four dependent variables (DVs) of this study included: (a) percentage of bite acceptance of non-preferred foods (DV1); (b) percentage of aberrant behaviors during the targeted meal time (DV2); (c) duration of sitting at table (DV3); and (d) percentage of successful completion in routine (DV4). The definition of DV1 to DV4 was developed in collaboration with Alex’s parents.

Bite acceptance of non-preferred foods. A single bite was presented on a spoon that was placed on a plate every 30 second, and each bite presentation in each session was counted as a trial. Bite acceptance was defined as opening the mouth within 30 seconds of the simultaneous delivery of the food item with a verbal prompt
“take a bite.” If Alex opened his mouth and allowed the food item to be placed (without swallow it) after 5 seconds, the trail was not scored as an acceptance. The percentage of bite acceptance was calculated by dividing the number of acceptances by the number of presentation.

**Aberrant behaviors.** Data were also collected on two aberrant behaviors-expulsion and aggression. Expulsion was defined as spitting out foods that were visible outside the lips after acceptance. Aggression was defined as head banging, banging his arm on the table, crying, kicking, and screaming. Data on aberrant behaviors were taken for each trail of food presentation and calculated as percent occurrence per total number of trails.

**Length of sitting at table in dinner routine.** This DV was calculated as counting total minutes of appropriately staying at table with family members (i.e., did not get up or walk to and from table, being tolerant others around him, etc.) without prompts or other supports at each targeted meal. The timer stopped when he got up or showed aggressive behaviors. The goal for the Alex was to sit in his seat until he finished eating (around 20 minutes), but did not need to sit throughout family meal.

**Successful completion of dinner routine.** A criterion for terminating the routine was when Alex demonstrated an unacceptable level of aberrant behaviors (e.g., exhibited tantrum and could not continue the routine). The steps of the dinner routine were as follows: sitting at table, accepting and swallowing the food item, use of utensils, meeting the criterion level of performance (e.g., either 10 bites or empty foods on the plate, not necessarily accept all bites in the presentation), and verbally or physically asking to leave the table. The steps in the routine without the occurrence of the termination criterion could be considered as the successful completion of the step. This DV was defined as calculating the percentage of completed steps per total number of steps in the routine.

**Data Collection**

The family-centered practices were central to this study, and Family Quality of Life Survey (FQOLS) and Parental Stress Scale (PSS) were used to measure parents’ perception of the extent to which the services delivered to them would increase quality of life for Alex and his family. In addition, social validity was used to evaluate the acceptability of PBS process and outcomes while procedural integrity was utilized to measure the degree to which PBS intervention was implemented as planned.

**FQOLS.** The FQOLS was developed by the Beach Center research program of the University of Kansas (Turnbull et al., 2004). It is a 25-item assessment of five factors related to FQOL: family interaction, parenting, emotional well-being, physical/material well-being, and disability related support. Each item is scored on a Likert scale ranging
from 1 (very dissatisfied) to 5 (very satisfied). Psychometric evaluation of this instrument has shown excellent reliability as well as validity. Alex’s parents took this survey during the baseline and follow-up phases.

**PSS.** The PSS was developed to measure stress associated directly with the demands of parenting (Berry & Jones, 1995). Parents respond to each of the 18 items using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The reliability and validity have been well established. This scale was also administrated during the baseline and follow-up phases.

**Social validity.** The social validity data was from Alex’s parents. They were asked how satisfied they were with the skills their child had learned and how much change they had observed in their child’s interactions since the beginning of participation in this study. Specifically, Alex’s parents were asked to evaluate the intervention goals (one item), intervention components (i.e., procedures, strategies etc.) (three items), and intervention outcomes (e.g., effectiveness in changing a child’s behavior) (three items) using a seven-item instrument with a 5-point Likert-type scale. They completed this survey during intervention and follow-up phases.

**Procedural integrity of parent’s implementation of PBS plan.** Procedural integrity was measured as the percentage of correctly completed use of strategies by the father during intervention. The eight PBS strategies (e.g., de-escalation procedure, escape extinction, and positive contingency) were the core of this study which was also used to evaluate the fidelity of parental implementation. Twenty-five percent of treatment sessions were scored for the father’s accurate use of the support strategies. The percentage of the support strategies the father correctly implemented during a session was calculated by dividing the number of intervals of strategies correctly completed by the total number of intervals then multiplying by 100%.

Observations during the dinner time routines were videotaped using a digital video camera and then scored. Total observations would be 31 sessions across baseline, intervention, maintenance, and follow-up phases. Each observation lasted 13 minutes to one and half hour.

**Procedures**

The functional assessment approach was used to identify the Alex’s problem behaviors and design a related behavior support plan in conjunction with his family. The collaborative behavioral support model described by Binnendyk and Lucyshyn (2009) were incorporated into the implementation and planning processes. The steps of the study were described in detail as follows.

**Assessments of food refusal.**

**Indirect assessment.** Prior to the study, the researcher gathered information using interviews to identify critical antecedents or
A Family-Centered Positive Behavior Support Approach to Intervene Food Refusal Behavior for a Child with Autism

consequences maintaining the problem behaviors as well as to assess the need of an intervention for Alex’s food refusal. During the first meeting, the Behavior Feeding Assessment Parent Interview (Kedesdy & Budd, 1998) was used to assess the following core areas: developmental backgrounds, feeding history, mealtime habits, current feeding problems, feeding techniques, and treatment plans.

Additionally, the researcher conducted a family routine assessment to identify and prioritize a meal routine at home (e.g., breakfast, lunch, and dinner) that would benefit all family members, specifically taking Alex’s challenging behaviors into consideration. Parents selected dinner routine for the intervention, and the father as the interventionist collaborated with the researcher to define the content and structure of a successful meal routine (e.g., the length, the steps, the place of the routine). The descriptive information was included into the functional assessment as well as the development of intervention plan.

**Baseline.** During the baseline, DVs (DV1 to DV6) were measured before intervention procedures were initiated. DV5 and DV6 were administrated once during this phase. The daily dinner routine for Alex’s family occurred from 6:00 p.m. to 6:30 p.m. According to Alex’s parents report, the four food items (fried rice, chicken curry, beef stew, and vegetable noodle) would be offered in the dinner routine. Before the observation probes, baseline data of DV1 to DV4 were obtained over a 4-day period during the dinner routine. The observation for DV1 to DV4 lasted 90 minutes for each session.

**Functional assessment.** Functional assessments can be divided into general categories that consist of descriptive analysis and functional analysis. A behavioral analysis must look at the entire behavior equation (i.e., antecedent, behavior, and consequences) before deciding on a course of action (Kahng, Iwata, & Lewin, 2002). In this study, the descriptive analysis was conducted using anecdotal observation from the hypothesis, adapted from Cooper, Heron, and Heward (2007). The hypotheses about the function of Alex’s challenging behaviors (i.e., food refusal, self-injury, crying, aggression, kicking, etc.) emerged from the assessment including escape from the demand to eat non-preferred foods, and escape the demand to sit at the table with family.

**Family ecology assessment.** Ecological theory posited by Bronfenbrenner (1993) states that children are both directly and indirectly influenced through a number of systems (e.g., family, cultural, and societal). To design a contextually appropriate treatment, researchers (e.g., Lucyshyn et al., 2002) emphasize the usefulness of this theory as a framework for assessing feeding problems. The purpose of this assessment was to gain information that could be used to design behavior interventions to fit well
with the family meal routines. Through a couple of informal meetings and observations, key issues were discussed with the Alex’s parents, including family characteristics (e.g., strength), interaction patterns, general factors such as the family financial (e.g., resources) and emotional (e.g., stress) situation, and their goal for meeting their routine needs.

Preference assessment. The indirect and direct assessments were conducted in the study. To get a general concept of the Alex’s preferences, the author asked parents what the participants’ preference toys and foods are. According to the result of the interview, four food items (i.e., soymilk, goldfish crackers, pizza, and chicken nugget) and four toy items (i.e., car, bowling ball, music box, and ball) were identified. Specifically, parents mentioned that Alex only ate the four food items at home. Taking family’s concerns into consideration (e.g., convenient preparation and small bite that would be easy to implement), goldfish cracker was chosen to be used during the intervention. The other four toy items were used during the paired-choice presentation sessions. Each item were presented with the other three items and was randomly presented to Alex four times each. A total of 24 trials were conducted.

Positive behavior support intervention and implementation.

PBS plan strategies and implementation. The behavior intervention strategies (positive reinforcement, differential attention, or escape extinction) deemed appropriate from functional analysis were implemented. A competing behavior model (O’Neill et al., 1997) was used to guide the selection of prevention, teaching, and response strategies. Taking family-centered practices as the core of PBS, family ecology information was used to ensure the plan was contextually appropriate. The researcher and parents jointly developed plans of action and then implemented the behavior support plans (See Table1).

Training and support were provided in the dinner routine. The training sessions ended after Alex met the criterion level of performance. In addition, the session ended after 90 minutes if Alex did not accept any bites or did not meet the criteria. The food items used were the same during the baseline phase.
Table 1.  

**PBS Support Plan**

Setting Event Strategies  
1. When Alex was ill, decrease demands and non-preferred interaction.  
2. Adjust meal time to help Alex engage in the intervention.  
3. Massed trials of targeted food with interventionist.  
4. Use visual displays (i.e., positive contingency) to increase predictability and motivation with new foods.  

Preventing Procedures  
1. Offer choices among favorite food items or activities.  
2. Present preferred and non-preferred foods simultaneously.  
3. Use positive contingencies to facilitate cooperation.  
4. Use “behavioral momentum” techniques.  
5. Use visual schedule to inform routines and rules.  

Teach New Skills  
1. Teach Alex to use appropriate languages to communicate his desires.  
2. Play social games regularly with Alex to teach being compliant, cooperative, and interaction skills.  

Response Strategies  
1. Provide positive attention when Alex is positively engaged in the routines.  
2. Offer praise, preferred foods, or activities contingent on Alex’s cooperation and/or meeting the desire expectation (e.g., bite acceptance).  
3. Use escape extinction procedure when engaging in aberrant behaviors.  

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**Training with the researcher.** Training sessions began with the researcher, and occurred three or four times per week and required seven sessions ($M = 50$ minutes) across 2 weeks for a total of 6.5 hours. To reduce distraction (e.g., no family members or TV), these seven initial sessions took place in the guest room (only one bed, one table, and chair). The researcher implemented those behavior support strategies (e.g., using visual schedules and cues) developed with the parents. Once Alex’s self-injury behaviors were reduced (i.e., from 95% to 70%), the training was transferred to the natural setting (i.e., kitchen) to establish stimulus control over Alex’s eating behavior. It occurred for three sessions ($M = 42$ minutes). Before initiating training with the father, the researcher constructed meaningful role-plays, training examples, and video-observation to help the father learn the strategies.  

**Parent training.** Once a feeding plan was successfully tailored to increase bite acceptance (i.e., be willing to put a spoonful of foods in mouth), parent training was in-
Initiated to implement feeding procedures with the coaching (modeling and feedbacks). The father as the interventionist who fed the child while the researcher observed to ensure the father’s accurate use of the PBS strategies (see Table 2). Moreover, these parent and support sessions consisted of modeling systematic teaching and response procedures of cuing, prompting, time delay, reinforcement, and extinction. These sessions occurred three times per week and lasted for 30 to 47 minutes. Once the father and the child could successfully participate in the dinner routine together and data were in a stable trend, the research began to decrease the frequency of assistance to facilitate intervention maintenance. The researcher provided brief feedback before the session started, describing or modeling those strategies that the father might not accurately use. Parent training lasted 10 sessions across 4 weeks.

Table 2.

<table>
<thead>
<tr>
<th>PBS Strategies</th>
<th>Descriptions</th>
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<tr>
<td>Contingent praise</td>
<td>The father delivers praise (e.g., nice job, you finished the meal.) contingent on desirable behavior within 3 seconds.</td>
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<tr>
<td>De-escalation</td>
<td>If Alex engages in challenging behaviors, the father silently blocks aggression, ignores hitting and immediately redirects when calm.</td>
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<tr>
<td>Reinforcement</td>
<td>Once Alex consumes certain amount of food, the father delivered a favored toy or activity.</td>
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<tr>
<td>Extinction</td>
<td>When Alex engages in inappropriate behavior (e.g., pushing the food away), the father continued to hold the spoon of food up to his lips until Alex consume the food.</td>
</tr>
<tr>
<td>Positive contingency statement</td>
<td>The father tells Alex what behavior(s) he needs to do, and the positive reinforcer he will get after engaging in the behavior(s) (i.e., finish the food and then you can watch bowling movie for five minutes).</td>
</tr>
<tr>
<td>Prompting</td>
<td>Before exhibiting problem behaviors, the father used language prompts to promote Alex’s use of appropriate requests in dinner routine.</td>
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<tr>
<td>Stimulus fading</td>
<td>The father presented non-preferred food items by gradually increasing portion size of food (i.e., one-quarter spoonful to three-quarter spoonful) that is appropriate for his age.</td>
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<tr>
<td>Visual support</td>
<td>The father presents picture sequences to increase Alex’s engagement of routine steps (e.g., eat dinner and ask for leave).</td>
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Follow-up. This phase began when the father was able to (a) feed Alex the new food items (except those used in the intervention session) without the researcher’s support, and (b) implement PBS strategies in nontrained routines (e.g., breakfast). This phase used the same observation protocol as in the baseline and intervention phases. The follow-up data were obtained at 1 and 2 months postintervention (one probe every 2 weeks). Consultation was provided as needed.

Interobserver agreement. The researcher was the primary observer during the study. A doctoral student in special education and applied behavior analysis who had sufficient knowledge and experience of PBS was trained as the second coder. Interobserver agreement checks of child-related dependent variables (e.g., child problem) were completed during 25% of total sessions. Interobserver reliability was calculated by totaling the number of agreements on child-related dependent variables (i.e., both observers scored the participant’s behavior the same) divided by the number of agreements and disagreements (i.e., observers scored the participant’s behavior differently) and converting this ratio to a percentage. The average agreement were as follows: 95% for bite acceptance with the researcher, 90% for bite acceptance with parent, 100% for aberrant behaviors, 90% for duration of sitting at table, 90% for length of successful completion in routine, and 88% for parent implementation fidelity.

Results

Four DVs and other measures were used to evaluate the impact of the implementation of PBS for Alex’s food refusal behaviors. Results of these variables are summarized below.

Acceptance Rate

The implementation of PBS strategies resulted in an increase in the food acceptance rate, increasing from an average of 1.25% (range = 0–5) during baseline to 49.6% (range = 30–60) during the parent training session. The maintenance phase of acceptance rate increased to an average of 64.25% (range = 62–70). During the follow-up phase, one probe was conducted every 2 weeks, the acceptance rate increased to 75% (See Figure 2).

Aberrant Behavior

In the baseline condition, Alex engaged in aberrant behaviors an average of 90% intervals (range = 80–95). When the PBS strategies were implemented, the percent were below baseline levels and showed a decreasing trend. On average, he engaged in aberrant behaviors from 54.5% (range = 45–65) during the parent training to 38.25% (range = 32–43) during maintenance phase. During follow-up, his aberrant behaviors further improved to an average of 29% of intervals (range = 25–35) (See Figure 3).
Figure 2. Percentage of bite acceptance of non-preferred foods.

Figure 3. Percentage of aberrant behavior.

Duration of Sitting at Table

Baseline data showed that on average, Alex sat at table between 1 and 2 minutes ($M = 1.38$ minutes). During intervention, Alex could be tolerant being with others at the table. Alex could sit between 7 and 10 minutes during parent training ($M = 8.83$ minutes), and between 11 and 14 minutes...
A Family-Centered Positive Behavior Support Approach to Intervene Food Refusal Behavior for a Child with Autism

(M = 13.03 minutes) during maintenance phase. In the follow-up phase, Alex could sit longer than 14 minutes (between 14 and 15 minutes) (See Figure 4).

Completion of the Dinner Routine

In the baseline phase, Alex was not able to successfully complete all steps (0%) within the 90-minute routine. The successful completion of the routine generally became higher than 50% in the parent training (range = 40–80) and maintenance phases (range = 80–100). The mean percentage of successful completion was 93% (range = 80–100) (See Figure 5).

![Figure 4. Duration of sitting at table.](image)

![Figure 5. Percentage of completion of steps.](image)
Ratings of FQOL

Overall means of the five FQOL domains before and after the implementation of PBS strategies are represented in Table 3. The overall satisfaction scores reveal moderate improvement of quality of life (3.18 in pre-intervention and 3.68 in post-intervention). After the implementation of family-centered PBS intervention, Alex’s parents rated 5 (very satisfied) in the following items (which were under the domain of parenting and family interaction): helping the child learn to be independent, teaching the child how to get along with others, having time to take care of the individual needs of every child, enjoying spending time together, and being able to handle life’s up and down. Overall, Alex’s parents indicated positive attitudes toward the improvement of their competency in demonstrating recommended practices through parent-professional collaborative process. The possible reason for the same level of satisfaction in the area of physical/material well-being would be that Alex was in a double-income family and they did not have financial stress.

Table 3.
Ratings of FQOL

<table>
<thead>
<tr>
<th>Domains</th>
<th>Average Satisfaction Score</th>
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<tbody>
<tr>
<td></td>
<td>Baseline</td>
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<tr>
<td>Family interaction</td>
<td>2.8</td>
</tr>
<tr>
<td>Parenting</td>
<td>3.0</td>
</tr>
<tr>
<td>Emotional Well-being</td>
<td>2.5</td>
</tr>
<tr>
<td>Physical / Material Well-being</td>
<td>4.6</td>
</tr>
<tr>
<td>Disability-Related Support</td>
<td>3.0</td>
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Ratings of PSS

Since the PSS includes positive and negative statements about parental stress, and the total parental stress score is achieved by adding the scores for each of the items on the PSS, the positive statements must be scored in reverse. The data suggested the decrease in stress from baseline to intervention. Total stress scores on the PSS were 72 (M = 4.0), indicating that on average the parents expressed moderate to high levels of parental stress. Following the implementation of PBS, the scores on PSS were 60 (M = 3.3). Specifically, parents seemed to be positive about enjoying spending time with Alex (Disagree to Agree). In addition, they changed to have positive attitudes towards taking responsibilities of being a parent. Overall, the data showed that parents engaged in the PBS intervention process would empower their abilities to fulfill their roles.
Social Validity

Across all evaluations (1 = disagree; 5 = agree), the social validity of using PBS strategies for the food refusal behaviors was found to be high, the average social validity rating in two interventions was 4.25 (ranged from 4.2 to 4.8). The behavior support through parents-professional collaboration and outcomes were acceptable and effective.

Procedural Integrity

Integrity checklists provided a quantifiable measure of treatment fidelity and were useful to the researcher to evaluate. Data showed an overall average level of treatment integrity of 65% of intervals (range = 60–78). Because the father inaccurately used the de-escalation procedure (i.e., the father sometimes did not immediately provide a verbal redirection after a low-intensity aggressive behavior), analysis of the checklists revealed evidence of a moderate level of integrity. If the data did not include this strategy, the father’s overall implementation fidelity averaged 95% of intervals (range = 82–100).

Discussion

The purpose of this study was to investigate whether a family-centered approach that included six core features of PBS could remediate the participating child’s food refusal behavior. The evidence-based practices (i.e., PBS plan and strategies) were implemented through collaborative PBS process found to be effective in improving positive interactions between parents and Alex, which in turn enhance Alex’s four targeted behaviors (food acceptance, aberrant behavior, duration of sitting at table, and successful completion of dinner routine). The findings also showed that the collaborative PBS plan implemented with fidelity across phases. Social validity revealed that positive attitude toward PBS implementation and confirmed the improvement on the child’s behaviors.

This study was replicated from Binnendyk and Lucyshyn (2009), but the characteristics of the participant and dependent variables were not similar. To incorporate relevant features of the family’s ecology (goals, values, and resources) into the delineation of independent (father) and dependent variables, contextual fit of the PBS process was found to be effective in reducing Alex’s aberrant behaviors as well as enhancing target behaviors (e.g., bite consumption). Most importantly, Alex and his family members were able to sit together to enjoy dinner routines for longer periods of time, and were able to complete approximately 90% of the routines successfully. The effectiveness of the collaborative PBS process is consistent with previous findings of efficacy of modeling, coaching, and feedback for the acquisition of support procedures (Lucyshyn et al., 2007). The criterion level of performance, collaboratively determined with Alex’s parents, was a key to develop a successful indi-
vidualized intervention. The evidence of post-intervention effects also supported this ecological behavior support plan. Given the modest improvement in quality of life and parental stress, Alex’s parents viewed that the family-centered behavior support process through parent-professional collaboration and outcomes were acceptable and effective. These findings are consistent with those of other studies (e.g., Blair, 2011) and suggest that PBS is a valuable and socially valid approach.

Extending the use of functional assessment procedures into home settings with parents as the collaborator, this family-centered process was essential in designing effective interventions logically linked to the functions of aberrant behaviors. Reflecting on the previous studies (e.g., Lucyshyn et al., 2007), this function-based intervention addressed how those ecological variables could be effectively integrated into PBS procedures in the home. Additionally, multiple measures were used to provide a complete picture of outcomes of family-centered PBS process (Carr et al., 2002). Despite this process requiring more time, the benefit of this intensive process provides sufficient information to design a function-based plan that has the potential to promote meaningful and durable behavioral and lifestyle changes.

Researches (e.g., Ahearn et al., 2001; Gentry & Luiselli, 2008) have consistently demonstrated that the implementation of specific behavioral techniques provides a proven basis for facilitating change in feeding practices. A wide range of behavioral techniques including positive reinforcement, differential reinforcement, escape extinction, stimulus fading, and shaping have all showcased treatment efficacy. Specifically, this implementation of the plan resulted in collateral effects on Alex and his family, including increase of acceptance of new food, success of sitting with extended family members, and skill generalization to non-train routine. In the follow-up phase, the family was observed to be able to implement the intervention plan with skills acquired from training and implementation support received during the target routine. From lifespan perspectives, family-centered PBS is a cost-effective approach which could promote generalized long-term outcomes (Lucyshyn et al., 2007).

Finally, this study met several quality indicators of single-subject research presented by Horner et al. (2005), including detailed descriptions of participants and setting, precise definition of dependent and independent variables, established a pattern of responding during baseline, and consideration of experimental control and social validity. Moreover, treatment fidelity data indicated that the family accurately implemented family-based PBS intervention. Social validity data suggested that parents found this collaborative family-professional intervention as a valuable and suitable intervention in the home setting.
Limitation

This study yielded several limitations. First, a continuous threat to validity in single-subject design was the small sample size. In this study, that threat was exemplified by having only one family. However, Horner et al. (2005) addressed that single-subject research matches well with the needs of special education because it focuses on the “targeted analysis at the unit of individual” (p. 173). This method would allow identifying educational intervention that is appropriate for the individual student. Another potential threat to validity was the presence of the researcher and other family members (e.g., Alex’s cousins) in the training sessions. Although much attention was given to desensitizing the presence of the researcher and others, this cannot be eliminated as a possible source of interference. Secondly, this study employed a multi-component intervention which does not allow one to evaluate the most effective components of the specific behavioral techniques that promote behavioral improvements. Four different food items were rotated which might influence Alex’s performance. To meet a contextually-appropriate purpose (i.e., family’s dinner routine), we did not intentionally control this variable. Third, this study did not control threats to internal validity, including history and maturation. Although the efficacy of the PBS intervention was observed across phases, other events in Alex’s life (e.g., becoming one year older) could not be ruled out for the influence of the improvement of the target behaviors. On the other hand, internal validity of this study was controlled when the design demonstrated the effect of experimental control at three data points in time (Horner et al., 2005). These limitations were minimized by providing interobserver agreement data and a methodology section with sufficient detail to ensure the ability to replicate this study by other researchers. To strengthen external validity, future research should also consider to include families of children from diverse backgrounds (e.g., different age groups) (Horner et al., 2005).

Implications

The use of family-based PBS intervention offers an array of benefits. In the field of special education, a collaborative approach to working with families is considered as best practice, particularly with regard to early intervention, in which family empowerment is considered as the cornerstones of family-centered practice (Carr et al., 2002). Involving the parents in the process of implementation was imperative to improve the parent-child interaction (Turnbull et al., 2004). Additionally, the collaborative process emphasizes that parents and professionals come together to share common goals throughout the assessment and intervention. During this process, they arrive at a new, shared understanding of children’s needs. Reflecting on the core PBS value of building collaborative partnership between
families and professionals, early interventionist can meaningfully involve families and consequently improve their children’s behaviors and successful participation in valued family routines.

Identifying the setting events and discriminative stimuli associated with the behaviors, this study suggests that function-based PBS intervention can bring collateral effects on child’s skills. Although this study did not focus on non-trained routines, Alex’s father was able to use strategies in the other routines (e.g., weekend’s lunch time). To establish sustainable and generalized effects, the fit between behavior support plan and the family’s ecology should be defined by ensuring the interventions were congruent with the relevant elements of each family routine. Despite the fact that the process was quite time consuming, it is worthwhile to support families to implement behavioral support plans.

The ineffective parenting practices may reciprocally maintain the behaviors as well as contribute to the need of extensive support regarding parent training. Time and effort are required to promote substantial improvement (Williams et al., 2008). When early childhood professionals are working within the context of family life, they need to be mindful of the events that may interrupt the participation. To conclude, the family-centered PBS approach may have long-term effects because families are capable to implement the strategies. More evidence-based research is needed to support this cost-effective practice.

References


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家庭本位之正向行为支持方案对自闭症幼童拒食行为之介入成效

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摘要
研究上指出，自閉症幼兒經常在用餐時出現拒食或偏食行為。本研究旨在評估，藉由家庭為本位的正向行為支持以改善自閉症幼童拒食行為之成效。使用功能性評量的結果，研究人員與家長共同合作、評估、設計、以及執行居家介入方案。根據個案家庭需求，本研究選擇晚餐時間為研究情境，並採以單一受試法之實驗設計探究四個依變項之改變成效。研究結果顯示，幼童嘗試不喜愛食物的比例增高，用餐時間的行為問題也明顯降低。社會效度、家庭品質量表、以及家庭關係量表均顯示正向結果。

關鍵字：自閉症、拒食、居家介入、正向行為支持