

*Limited Research Indicates Behavioral Interventions Decrease Food Selectivity and Refusal In Children Ages 2-5 Years Old*

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**CLINICAL SCENARIO:**

**Client population:**

Children ages 2-5 years old with severe food selectivity and refusal.

**Treatment Context:**

Fishbein et al. (2006), Moor, Didden, and Korzilius (2006), and Paul, Williams, Riegel, and Gibbons (2007) conducted treatment in an outpatient context. The parent or guardian of the child received training in the behavioural techniques utilized, and provided additional treatment at home. Shore, Babbitt, Williams, Coe, and Snyder (1998) treated one patient in a similar outpatient context to the other studies. Their other three participants received intervention in an inpatient setting with the trained therapists exclusively providing the treatment.

**Problem/condition:**

Severe food selectivity and refusal is characterized by a limitation of food and beverages consumed, resulting in impacted nutrition (Nationwide Children's Hospital, 2013). The cause could be non-organic, defined as "feeding difficulties resulting from psychosocial difficulties (poor environmental stimulation, dysfunctional feeder-child interaction), negative feeding behaviors shaped and maintained by internal or external reinforcement (selective food refusal, rumination), or emotionally based difficulties (phobias, conditioned emotional reactions, depression)" (Williams, Riegel, & Kerwin, 2009, p. 126). The disorder may also have an organic etiology, defined as structural or functional abnormalities that affect physiology, such as acid reflux or sensory sensitivities to texture, temperature, or taste. Food avoiding behaviors associated with an organic etiology may be maintained after physical causes are resolved if sufficiently reinforced. Therefore, some children continue to present with avoidant/restrictive feeding disorder after physiological causes are addressed (Gale, Eikseth, & Rurud, 2010).

The severe food selectivity/refusal addressed in the articles reviewed in this CAT would likely fit the *Diagnostic and Statistical Manual of Mental Disorders* criteria outlined for avoidant/restrictive feeding disorder. The *DSM-V* defines this disorder as an eating or feeding disturbance that results in the failure to meet nutritional and energy needs (American Psychiatric Association, 2013). As the criteria did not exist at the time of the studies, this diagnosis is not specified in any of the participants.

**Incidence:**

There is a 5-20% prevalence rate of children with feeding disorders, and a 40-80% prevalence rate of children with feeding disorders with disabilities. Premature infants and children with failure to thrive, sensory sensitivities, and/or autism are more likely to be diagnosed with a feeding disorder (Nationwide Children's Hospital, 2013). The most common disorders comorbid with avoidant/restrictive feeding disorder, as defined in the *DSM-V*, are anxiety disorders, obsessive-compulsive disorder, and neurodevelopmental disorders (American Psychiatric Association, 2013).

**Impact of the problem on activity/performance:**

Severe food selectivity and refusal impedes participation in eating and feeding activities of daily living (ADLs). Children with feeding disorders frequently display behaviors including crying, tantrums, maintaining a closed mouth, gagging, choking, vomiting, and/or food expulsion (Case-Smith & O'Brien, 2010). Participating in activities that emphasize eating such as meals at home, going to restaurants, or holiday celebrations may result in disruptive behaviour. Additionally, as poor nutrition impacts strength and cognition, children with feeding disorders are at an increased risk of physical and cognitive developmental delays (Nationwide Children's Hospital, 2013), which can potentially impact all occupations.

**Intervention:**

A variety of behavioral techniques were combined to form a behavioral intervention, or treatment package, that targeted severe food selectivity and refusal in each study under investigation.

Techniques utilized include:

- **Positive reinforcement:** Positive reinforcement, such as praising the child for accepting the target food, was used as a reward to increase the occurrence of the desired behavior of accepting food (Kramer & Hinojosa, 2010).
- **Escape prevention:** Children were positively reinforced for taking a bite of the targeted food being allowed to leave the table to play with toys or join parents for a short break (Paul et al., 2007).
- **Negative reinforcement:** Negative reinforcement, or ignoring disruptive mealtime behaviors (such as pushing away the spoon), was used to extinguish undesirable behaviors (Kramer & Hinojosa, 2010).
- **Contingency management:** A combination of reinforcement, including rewards and punishments, such as verbally praising children when food was accepted and saying "no" when children refused food were used to shape mealtime behavior (Moor, et al., 2006).
- **Repeated exposure:** Target foods were identified and consistently presented and offered to the children at mealtime (Paul et al., 2007).
- **Generalization:** Target foods used during intervention sessions were offered during family mealtimes by parents to generalize the behavior of accepting the food in different setting (Paul et al., 2007).
- **Shaping/food chaining:** Treatment changed with stepwise increases in the taste, texture, and/or amount of food presented (moor, et al., 2006). The chain originated with an accepted food item; foods with similar features were progressively introduced (Fishbein et al., 2006).
- **Fading:** Treatment principles were faded out until a normalized meal time situation was established (Moor, et al., 2006).
- **Appetite manipulation:** Tube feeding and/or grazing was restricted preceding treatment sessions to increase feelings of hunger for treatment (Moor et al., 2006).

The techniques used in each study are illustrated in Table 4.

**Why is this intervention appropriate for OT?:**

Behavioral feeding interventions directly address the ADLs of feeding and eating. Nutrition, which is affected by one's participation in eating, impacts the ability to participate in all occupations.

Behavioral interventions utilized in the clinic are classified as a purposeful activity, as the client is engaged in goal-directed behaviors within a therapeutic context. Interventions implemented at home are occupation based, as participation is facilitated in feeding and eating occupations in the client's natural context (American Occupational Therapy Association, 2008).

**OT theoretical basis:**

Behavioral feeding interventions are supported by the Acquisitional Frame of Reference (FOR), which views behaviors as responses to the environment (Kramer & Hinojosa, 2010). The FOR focuses on acquiring skills needed to perform optimally in the environment. Positive reinforcement strengthens a behavior, while negative reinforcement fails to support a behavior. For example, external rewards, such as play time or verbal praise, are used to strengthen the child's behavior of eating new foods. No reinforcement, or ignoring negative mealtime behaviors, is used to extinguish undesirable behaviors. Additionally, the FOR states the environment provides affordances and limitaitons, affecting elicited behavior. For example, new target foods are placed in the child's mealtime environment, and a routine is established to influence change in feeding and eating behaviors. Overall, behavioral feeding interventions fit into the Acquisitional FOR's main premise of changing the environment and the interaction between child and context to alter behavior.

**Science behind intervention:**

The theory of operant conditioning, developed by B.F. Skinner is applied in behavioral interventions to increase the child's targeted behavior (i.e. expanding food repertoire). B.F. Skinner discovered that scheduling reinforcement could change performance and create new patterns of behavior through experimental shaping. He found positive rewards elicited the targeted behavior, while negative reinforcement decreased the targeted behavior (Neel, 1977).

**FOCUSED CLINICAL QUESTION:**

What is the effectiveness of behavioral interventions compared with no intervention to increase foods accepted in children ages 2-5 years old with severe food selectivity/refusal?

**SUMMARY:**

- What is the effectiveness of behavioral interventions compared with no intervention to increase foods accepted in children ages 2-5 years old with severe food selectivity/refusal?
- Search
  - 8 databases searched.
  - 5 relevant articles located.
  - The 4 articles critiqued received a Level 4 score on the Canadian Levels of Evidence Scales.
  - One relevant article found was not critiqued, as it focused on using a specific assessment with behavioral interventions for food selectivity; thus analyzing the assessment was the focal point. All remaining articles found with similar behavioral interventions were selected for critique since only case studies were located.
- Research supports the use of behavioral interventions to decrease food selectivity and refusal in children ages 2-5, however, caution should be taken due to study limitations and lack of research.

**CLINICAL BOTTOM LINE:**

The reviewed literature supports the use of behavioral interventions to decrease food selectivity and refusal in children, however results are limited due to the methodology and rigor of the studies.

**Limitation of this CAT:**

This CAT was completed as a course assignment, and reviewed by the instructor.

## SEARCH STRATEGY:

Table 1: Search Strategy

Databases Searched	Search Terms	Limits used	Inclusion and Exclusion Criteria
<p>CINAHL Plus (EBSCOhost), Health Professions Database via EBSCOHOST, Ovid S.P.</p> <p>OT Search, Australian Journal of Occupational Therapy, AJOT</p> <p>E-Journals at Wiley Interscience</p>	<p>Feeding; food chaining; oral motor; eating; eat; food; oral motor; food chain; behavioral feeding; S.O.S. feeding; sequential oral sensory; SOS</p> <p>feeding AND child; eating AND child; oral motor AND child; food chain AND child; behavioral feeding AND child; sensory motor AND child; food avoidance AND child</p> <p>sensory motor AND children; feeding intervention AND children; food avoidance AND children; feeding difficulty AND children; eating difficulty AND children</p> <p>Behavioral feeding; feeding</p> <p>feeding AND child; eating AND child; oral motor AND child; food chain AND child; behavioral feeding AND child; sensory motor AND child; food avoidance AND child</p> <p>sensory motor AND children; feeding intervention AND children; food avoidance AND children; feeding difficulty AND children; eating difficulty AND children</p> <p>feeding AND child; eating AND child; oral motor AND child; food chain AND child; behavioral feeding AND child; sensory motor AND child; food avoidance AND child</p> <p>sensory motor AND children; feeding intervention AND children; food avoidance AND children; feeding difficulty AND children; eating difficulty AND children</p>	<p>And</p>	<p>Inclusion Criteria:</p> <ul style="list-style-type: none"> <li>-English only</li> <li>-Full text</li> <li>-Available online</li> </ul> <p>Exclusion Criteria:</p> <ul style="list-style-type: none"> <li>-Infants</li> <li>-Adults</li> <li>-Adolescents</li> <li>-Children with food selectivity/refusal of organic etiology (i.e. cerebral palsy)</li> <li>-Oral motor treatment with behavioral interventions</li> </ul>

## RESULTS OF SEARCH

Table 2: Summary of Study Designs of Articles Retrieved

Level	Study Design/ Methodology of Articles Retrieved	Total Number Located	Data Base Source	Citation (Name, Year)
Level 1a	Systematic Reviews or Metanalysis of Randomized Control Trials	0	n/a	n/a
Level 1b	Individualized Randomized Control Trials	0	n/a	n/a
Level 2a	Systematic reviews of cohort studies	0	n/a	n/a
Level 2b	Individualized cohort studies and low quality RCT's (PEDro < 6)	0	n/a	n/a
Level 3a	Systematic review of case-control studies	0	n/a	n/a
Level 3b	Case-control studies and non-randomized controlled trials	0	n/a	n/a
Level 4	Case-series and poor quality cohort and case-control studies	5	CINAHL Plus (EBSCOHOST)  ScienceDirect Complete  E-Journals at Wiley Interscience	Fishbein, et al., 2006  Gale, Eikeseth, & Rudrud, 2010.  Moor, Didden, & Korzilius, 2006  Paul, Williams, Riegel, & Gibbons, 2007  Shore, Babbit, Williams, Coe & Snyder, 1998.
Level 5	Expert Opinion	0	n/a	n/a

## STUDIES INCLUDED

Table 3: Summary of Included Studies

	<b>Study 1</b> Fishbein, et al., 2006	<b>Study 2</b> Moor, Didden, & Korzilius, 2006	<b>Study 3</b> Paul, Williams, Riegel, & Gibbons, 2007	<b>Study 3</b> Shore, Babbit, Williams, Coe & Snyder, 1998
<b>Design</b>	Retrospective chart review	Multiple baseline	ABA	Multiple baseline
<b>Level of Evidence</b>	4	4	4	4
<b>Population</b>	<p>10 subjects with severe food selectivity, ranging in age from 1-14 years. 5 subjects were ages 2-5.</p> <p><i>Subject 2:</i> 3 year old female with no additional diagnosis.</p> <p><i>Subject 3:</i> 3 year old female with no additional diagnosis.</p> <p><i>Subject 4:</i> 2 year old female with cleft palate and supplemental feedings via gastrostomy.</p> <p><i>Subject 5:</i> 5 year old male with dysphagia, bronchopulmonary dysplasia, and supplemental feedings via gastrostomy.</p> <p><i>Subject 10:</i> 2 year old female with cleft palate and supplemental feedings via gastrostomy.</p>	<p>5 subjects with severe food selectivity and a developmental disability diagnosis.</p> <p><i>Subject 1:</i> 2.5 year old boy with Triploid/Diploid syndrome. Born prematurely. History of a nasal tube; at time of treatment used a gastrostomy tube.</p> <p><i>Subject 2:</i> 2.6 year old boy with muscular dystrophy, failure to thrive, reflux, and constipation. Low oral motor tone.</p> <p><i>Subject 3:</i> 3.3 year old girl with Smith-Lemli-Opitz syndrome. History of a nasal tube; at time of treatment used a gastrostomy tube and orally accepted very small quantities of vanilla custard exclusively.</p> <p><i>Subject 4:</i> 2.7 year old boy with oculodigitoesophagoduodenal syndrome and reflux. History of nasal tube; at time of treatment used a gastrostomy tube and orally accepted very small quantities of water and custard exclusively.</p>	<p>2 subjects with severe food selectivity and an autism diagnosis.</p> <p><i>Subject 1:</i> 3.5 year old boy; consistently ate 2 foods prior to treatment.</p> <p><i>Subject 2:</i> 5 year old girl; consistently ate 0 foods prior to treatment and required a gastrostomy tube.</p>	<p>4 subjects with food selectivity or food refusal.</p> <p><i>Subject 1:</i> 3.7 year old boy admitted inpatient secondary to severe food selectivity with mild developmental delays and history of febrile seizures.</p> <p><i>Subject 2:</i> 3 year old boy admitted inpatient due to food refusal and bottle dependency with premature birth, broncho-pulmonary dysplasia, blindness and failure to thrive.</p> <p><i>Subject 3:</i> 2.8 year old girl admitted due to food refusal and gastrostomy tube dependence with severe gastroesophageal reflux, solitary kidney, renal tubular acidosis, and sensorineural hearing loss.</p> <p><i>Subject 4:</i> 5.2 year old boy in outpatient program for food selectivity</p>

		<i>Subject 5:</i> 2.5 year old female with a non-progressive muscle disorder resulting in hypotonia. She orally accepted small quantities of mashed fruit and gingerbread exclusively.		and refusal.
<b>Intervention Investigated</b>	Behavioral treatment package (See Chart A).  Treatment was conducted for 3 months, from 0.5-2 hours/week (median intervention 1.25 hours/week).	Behavioral treatment package (See Chart A).  Treatment was conducted over 4-8 months. The children participated in 45-60 minute sessions 2-3 times per week.	Behavioral treatment package (See Chart A).  <i>Subject 1:</i> 13 consecutive days of intensive treatment for all 3 meals.  <i>Subject 2:</i> 15 consecutive days of intensive treatment for all 3 meals.	Behavioral treatment package (See Chart A).  Treatment took place over 20-75 consecutive meals, depending on how quickly each child progressed to their targeted food. Sessions were up to 30 minutes long 3 times per day.
<b>Comparison Intervention</b>	None	None	None	None
<b>Dependent Variables</b>	-Foods accepted.	-Targeted foods accepted. -Frequency of vomiting/gagging.	The taste sessions and probe/generalization sessions had different dependent variables.  Taste sessions: -Length of time to consume bite. -Number of foods accepted. -Number of times food presented before accepted. -Number of inappropriate behaviors.  Probe & Generalization meals: -Percentage of novel and previously presented foods accepted.	-Percentage of four target behaviors (food acceptance, swallow,expulsion, and gag) for each bite presentation. -Grams of food consumed.
<b>Outcome Measures</b>	-10 point food acceptance scale. -Number of accepted foods.	-Acceptance of targeted food. -Height and weight gained. -Frequency of vomiting and gagging during each meal-time session.	-Number of accepted foods. -Number of food presentations before food acceptance. -Percentage of novel foods eaten during probe meals.	-Percentage of target behaviors (food acceptance, swallow,expulsion, and gag) for each bite. presentation -Grams of food consumed.

			<ul style="list-style-type: none"> <li>-Percentage of inappropriate behaviors.</li> <li>-Percentage of foods accepted during generalization meals.</li> <li>-Parent satisfaction questionnaire.</li> </ul>	
<b>Results</b>	<p><i>Subject 2:</i> -Expanded accepted food repertoire from 2 to ~40.</p> <p><i>Subject 3:</i> -Expanded food repertoire from ~5 to over ~40.</p> <p><i>Subject 4:</i> -Expanded food repertoire from ~5 to ~20 foods.</p> <p><i>Subject 5:</i> -Expanded food repertoire from water to ~10 foods.</p> <p><i>Subject 10:</i> -Expanded food repertoire from ~10 to ~20.</p>	<p><i>Subject 1:</i> -Acceptance of targeted food. -Increase in weight (1 kg) and height (4 cm). -No vomiting/gagging during treatment.</p> <p><i>Subject 2:</i> -Acceptance of targeted food. -No reported height and/or weight gains. -No vomiting/gagging during treatment.</p> <p><i>Subject 3:</i> -Acceptance of targeted food. -Increase in weight (2 kg) and height (4 cm). -No vomiting/gagging during treatment.</p> <p><i>Subject 4:</i> -Acceptance of targeted food. -Increase in height and weight, values not specified. -No vomiting/gagging during treatment.</p> <p><i>Subject 5:</i> -Acceptance of targeted food. -Stable weight, increase in height (3 cm). -Minimal vomiting and/or gagging during treatment (5 instances in 1 initial session total).</p>	<p><i>Subject 1:</i> -65 accepted foods post-treatment and 53 accepted foods at 3 mo. follow-up (Child's parents became vegetarian during 3 mo. follow-up period, so this may explain the decrease). -Number of food presentations before food acceptance was variable, but decreased -Percentage of novel foods eaten increased from 48% to 58% after week 2 and 73% during the last week. -Parents rated intervention acceptable and effective.</p> <p><i>Subject 2:</i> -49 accepted foods post-treatment and 47 accepted foods at 3 month follow-up. -Number of food presentations decreased from 10-27 to less than 5. -Percentage of novel foods eaten increased from 36% to 86% during the second week and 69% in the final week. -Parents rated intervention acceptable and effective.</p>	<p><i>Subject 1:</i> Final target texture meal behaviors: - -Acceptance: high and stable. -Swallow: high and variable. -Gags: low and stable. -Expulsions: moderate and variable. -Grams consumed at or near target volume throughout.</p> <p><i>Subject 2:</i> Final target texture meal behaviors: - -Acceptance: high and somewhat variable. -Swallows: high and stable. -Gags: low and stable. -Expulsions: low and stable. -Grams consumed high and somewhat variable with target volume achieved.</p> <p><i>Subject 3:</i> -Final target texture meal behaviors: -Acceptance: high and stable. -Swallows: high and somewhat variable. -Gags: low and stable. -Expulsions: low and stable. -Grams consumed somewhat variable</p>



				<p>throughout with target volume achieved at end.</p> <p><i>Subject 4:</i></p> <ul style="list-style-type: none"> <li>-Final target texture meal behaviors:</li> <li>-Acceptance: high and somewhat variable.</li> <li>-Swallows: high and stable.</li> <li>-Gags: low and stable.</li> <li>-Expulsions: variable (due to illness).</li> <li>-Grams consumed high and variable throughout with target volume achieved at end.</li> </ul>
Effect Size	n/a	n/a	n/a	n/a
Rigor	<ul style="list-style-type: none"> <li>-Low level of evidence (4).</li> <li>-Presents results in chart form; does not provide exact numbers of accepted foods.</li> <li>-Does not report if treatment effects are lasting.</li> <li>-Uses a paired <i>t</i>-test to determine intervention outcome.</li> <li>-The therapist who contributed to designing the individualized treatment protocol conducted the treatment. It was not specified if that person also recorded results.</li> </ul>	<ul style="list-style-type: none"> <li>-Low level of evidence (4).</li> <li>-Inconsistent follow-up reported; varies between participants.</li> <li>-Reliability checks on percentage of food acceptance were conducted in 15% of all sessions and were equally divided across phases of treatment and children. During reliability checks a secondary observer recorded results behind a one-way screen. Mean percentage of inter-rater reliability (IRR) was 99.9%.</li> <li>-Procedural integrity was assessed in 17% of all sessions by the primary therapist and a secondary observer behind a one way mirror. Each recorded if treatment procedures were implemented correctly with a mean IRR of 99.1%.</li> </ul>	<ul style="list-style-type: none"> <li>-Low level of evidence (4).</li> <li>-Reports lasting treatment effects at 3 month follow-up.</li> <li>-Therapists carried out the intervention and then trained the parents to also use intervention in home during generalization phase.</li> <li>-The therapists that designed, carried out, and reported the results of the intervention were not specified as different.</li> <li>-Reliability of observations were not reported.</li> </ul>	<ul style="list-style-type: none"> <li>Low level of evidence (4).</li> <li>-Does not report if treatment effects are lasting.</li> <li>-One OT completed the initial evaluation and 3-4 trained therapists carried out the intervention. Subject 4 also received the intervention from his mother (who was trained).</li> <li>-Data collection was completed by the experimenters with two trained observers watching the sessions through a one-way mirror for subjects 1-3, or in the home or outpatient clinic for subject 4.</li> <li>- Mean percentage of inter-rater reliability (IRR) was 97.7-</li> </ul>

		-It was not specified if the same person designed and implemented treatment.		99.6% for target behaviors and grams consumed. -It was not specified if the OT that did the initial evaluation and design of intervention was also part of implementation. It was also not specified if the therapists were the trained observers.
<b>Conclusion</b>	All subjects that participated in an individual feeding program utilizing behavioral interventions increased the number of foods they accepted.	All subjects reached the goal of their individualized treatment goals, accepting their targeted food. Four of the five children had their feeding tubes removed due to no longer needing them.	Both subjects increased the variety and number of foods they accepted. This success was still present at 3 month follow-up.  Parents were satisfied with the intervention and reported they were continuing to use the strategies at home with new foods.	All subjects consumed their targeted food by the end of treatment. There was an increase in accepting and swallowing targeted food, and negative behaviors faded. The number of meals it required to reach the targeted food goal varied, from 20-75 meals, however with repetition the goal was always obtained.

## INTERVENTIONS

Table 4: Behavioral Techniques Utilized

Behavioral Interventions	Study 1: Fishbein, et al., 2006	Study 2: Moor, Diddnen & Korzilius, 2006	Study 3: Paul, Williams, Riegel & Gibbons, 2007	Study 4: Shore, Babbit, Williams, Coe & Snyder, 1998
Positive Reinforcement	X	X	X	X
Escape Prevention			X	
Negative Reinforcement		X		X
Contingency Management		X		
Repeated Exposure	X	X	X	X
Generalization		X	X	
Shaping/Food Chaining	X	X		X
Fading			X	X
Appetite Manipulation		X	X	X
Sensory Integration*	X			

\*Sensory Integration is not a behavioural intervention, however it was included in the treatment package of one study.

## IMPLICATIONS FOR PRACTICE, EDUCATION and FUTURE RESEARCH

### Overall conclusions:

All four articles under review in this CAT were case studies (Level 4 on the Canadian Levels of Evidence Scale) with limitations regarding methodology and rigor. A total of sixteen children (8 males and 8 females) were examined ranging from 2-5 years old. All 16 participants increased the number of foods they orally accepted, which is considered successful treatment of food selectivity and refusal because it increases participation in eating and feeding.

The behavioral interventions varied among the four studies in several respects. The location in which treatment was provided varied between studies with 13 children treated in an outpatient setting and 3 children treated in inpatient. The parents of the children treated in outpatient contexts were trained to utilize treatment techniques at home, while therapists exclusively implemented the inpatient interventions. Treatment dosages varied across participants within studies, as well as between the studies.

There is some variation in how expanded food repertoire was measured. All the examined studies measured food items accepted prior to and at the conclusion of the behavioral intervention. Moor, et al. (2006) and Shore, et al. (1998) identified acceptance of a specific targeted food as the end goal of treatment; they measured the portion of the targeted food the child accepted. Fishbein, et al. (2006) and Paul, et al. (2007) did not identify acceptance of a targeted food as a goal, thus they tracked the number of foods the child accepted. All participants increased the number of foods they accepted at the end of treatment.

Changes in mealtime behavior were also reported in some studies, which is relevant to occupational performance and participation in eating and feeding. Overall, negative behaviors decreased, while positive behaviors increased in the participants of Paul, et al. (2007) and Shore, et al. (1998). The other studies did not report behaviors as part of their outcome measure.

The methodology of each study varied in the combination of behavioral techniques utilized in treatment. The extent to which each technique contributed to the treatment effect was not analyzed. Additionally, Sensory Integration treatment was incorporated into Fishbein, et al.'s (2006) provided interventions, resulting in ambiguity regarding the extent to which behavioral interventions contributed to the treatment effect. The studies were also inconsistent in reporting follow-up results after the intervention was discontinued to determine if results were maintained.

The level of rigor demonstrated by the examined studies also varied. Case studies are inherently less rigorous than other forms of research, such as randomized control trials. Strong inter-rater reliability was reported in both multiple baseline studies, Moor, et al. (2006) and Shore, et al. (1998). Both of these studies had trained observers that were not part of the intervention implementation. However, no reliability measures were reported in the retrospective chart review and ABA design, Fishbein, et al. (2006) and Paul, et al. (2007). Furthermore, these two studies did not report if the same therapists created, implemented and measured the results of the intervention.

In conclusion, the research examined supports the use of behavioral interventions to decrease food selectivity and refusal in children, however results are limited due to the poor quality of research on the topic.

### Boundaries:

- The four studies reviewed included a total of 21 participants. The results of 16 participants (those aged 2-5 years old) were analyzed in this CAT. 3 participants did not have an additional diagnosis to food selectivity/refusal, while the other participants had comorbid diagnoses.
- Inclusion Criteria:
  - Identified as having severe food selectivity/refusal.
- Exclusion Criteria:
  - Potential subjects with parents or guardians unwilling or incapable of implementing the behavioral modification program due to physical, psychological, or mental impairment were ruled out in Fishbein et al. (2006).

- Participants with a feeding disorder of medical etiology were excluded.

**Implications for practice:**

- The reviewed research supports the use of behavioral interventions to decrease food selectivity and refusal in children ages 2-5, however caution should be taken, as the quality of current research on the topic is limited. For example, there were no control groups in any of the studies therefore there are many confounding variables that may explain the results. Additionally, each of the studies had their own treatment package of behavioral interventions and did not differentiate which behavioral technique led to the successful outcome.

## REFERENCES:

### Reviewed articles:

- Fishbein, M., Cox, S., Swenny, C., Mogren, C., Walbert, L., & Fraker, C. (2006). Food Chaining: A systematic approach for the treatment of children with feeding aversion. *Nutrition in Clinical Practice*, 21, 182-184.
- Moor, J., Didden, R., & Korzilius, H. (2006). Behavioural treatment of severe food refusal in five toddlers with developmental disabilities. *Child: Care, Health, and Development*, 33 (6), 670-676.
- Paul, C., Williams, K.E., Riegel, K., & Gibbons, B. (2007). Combining repeated taste exposure and escape prevention: An intervention for the treatment of extreme food selectivity. *Appetite*, 49, 708-711.
- Shore, B.A., Babbitt, R.L., Williams, K.E., Coe, D.A., & Snyder, A. (1998). Use of texture fading in the treatment of food selectivity. *Journal of Applied Behavior Analysis*, 31, 621-633.

### Related articles:

- Gale, C.M., Eikseth, S., Rurud, E. (2010). Functional assessment and behavioural intervention for eating difficulties in children with autism: A study conducted in the natural environment using parents and aba tutors as therapist. *Journal of Autism and Developmental Disorders*, 41, 1383-1396.

### Other resources:

- American Occupational Therapy Association [AOTA]. (2008). Occupational therapy practice framework: Domain and Process. 2nd edition. *American Journal of Occupational Therapy*, 62, 625- 683.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.
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