Caregiver Training in Pediatric Feeding Disorders

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Thanks to our partners

Thanks to my co-authors

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## Feeding Behavior

![Feeding Behavior Image](image-url)

### Typical and Disordered Feeding

<table>
<thead>
<tr>
<th>Age</th>
<th>Typical</th>
<th>Disordered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth</td>
<td>Bottle or breast milk</td>
<td>Struggle with acceptance</td>
</tr>
<tr>
<td>4-6 months</td>
<td>Pureed baby foods</td>
<td>Reject baby foods</td>
</tr>
<tr>
<td>12 months</td>
<td>Mashed table foods</td>
<td>Fail to transition</td>
</tr>
<tr>
<td>18 months</td>
<td>Picky eating</td>
<td>Refusal behavior, more restrictive</td>
</tr>
<tr>
<td>18 months +</td>
<td>Peers, numerous locations, hunger cues</td>
<td>Insensitive to peers, specific locations, lack of hunger cues</td>
</tr>
</tbody>
</table>
Feeding Behavior

• Three consecutive months of weight loss

• Diagnosed with dehydration or malnutrition that results in emergency treatment

• Nasogastric tube with no increase in oral calories for three consecutive months

Feeding Behavior

• Meal lengths over 30 minutes
Etiology

Feeding Behavior

- Medical
- Oral-motor
- Physiological
- Behavioral
Medical

• 60% of children

• Causes eating to be painful
  • Gastroesophageal reflux disease
  • Prematurity
  • Genetic disorders
  • Oncological conditions
  • Orla-motor and congenital abnormalities
  • Respiratory and heart conditions or infection

Medical: Reflux
Medical

- Causes eating to be painful

- Medical problems “masked”
  - Constipation
  - Vomiting
  - Diarrhea
  - Food allergies or intolerances

Medical: Gastroesophageal Dysfunction

- Motility
- Reflux
- Diarrhea or constipation

- Chronic vomiting
- Allergies or intolerances
Medical: Food Allergies and Intolerances

- Milk
- Eggs
- Peanuts
- Soy
- Wheat
- Tree nuts
- Fish
- Shellfish

Food Allergies

- Immune system reaction
- Affects numerous organs
- Reaction can be severe or life-threatening

Food Intolerances

- Less serious
- Limited to digestive problems
Oral Motor

• 40% of children

• Missed opportunities to practice
  • Weak suck
  • Choking and gagging
  • Tongue thrust and failure to lateralize
  • Wet vocal sounds

Oral Motor

• Arching or stiffening of the body
• Difficulty chewing, breast feeding, sucking, or coordinating the bolus inside the mouth
• Excessive drooling or food/liquid coming out of the mouth or nose
• Coughing or gagging at meals
• Difficulty coordinating breathing with eating or drinking
• Increased stiffness during meals
• Gurgly, hoarse, or breathy voice quality
• Frequent vomiting
• Recurring pneumonia or respiratory infection
Oral-Motor Skills

• Choking
• Aspiration or penetration
• Pneumonia or respiratory infection

Physiological

• Lack of hunger cues
• Tolerate lower calorie levels
Behavioral

• Inappropriate mealtime behavior
  
  • Turning the head or body
  
  • Pushing away the food, utensil, or feeder
  
  • Covering the mouth

Feeding Behavior

- Medical
- Oral-motor
- Physiological
- Behavioral
Pediatric Feeding Disorder

- Child fails to maintain nutritional status due to
  - Insufficient quantity  Food refusal
  - Insufficient variety  Food selectivity

Food Selectivity
Feeding Problems in Children

Feeding Behavior
Feeding Behavior

Feeding Problems in Children with ASD

- Up to 80% of children with ASD exhibit food selectivity
- Fewer foods from all food groups

(Schreck, Williams, & Smith, 2004)
Restrictive and Repetitive Behavior

B. Restricted, repetitive patterns of behavior, interests, or activities, as manifested by at least two of the following, currently or by history (examples are illustrative, not exhaustive; see text):

A. Stereotyped or repetitive motor movements, use of objects, or speech (e.g., simple motor stereotypes, lining up toys or flipping objects, echolalia, idiosyncratic phrases).

B. Insistence on sameness, inflexible adherence to routines, or ritualized patterns of verbal or nonverbal behavior (e.g., extreme distress at small changes, difficulties with transitions, rigid thinking patterns, greeting rituals, need to take same route or eat same food every day).

C. Highly restricted, fixated interests that are abnormal in intensity or focus (e.g., strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverative interests).

D. Hyper- or hyporeactivity to sensory input or unusual interest in sensory aspects of the environment (e.g. apparent indifference to pain/temperature, adverse response to specific sounds or textures, excessive smelling or touching of objects, visual fascination with lights or movement).

Food Selectivity as Resistance to Change

- Specific mealtime routines or conditions

- Excessive problem behavior in the presence of novel foods
Consequences of Food Selectivity

• Learning and behavior problems

• Severe health problems

Consequences of Food Selectivity

• Family stress, anxiety, and maternal depression

• Lack of self-confidence

Drewett, Blair, Emmett, & Emond (2004); Franklin & Rodger (2003); Greer, Gulotta, Masler, & Laud (2008)
Caregiver Resources

- The No-Cry Picky Eater Solution
- Food Chaining
- The Picky Eating Solution

UNIVERSITY OF NORTH CAROLINA WILMINGTON
Other Treatments

- Vitamin supplementation
- Nutritional counseling


<table>
<thead>
<tr>
<th>Nutritional Counseling</th>
<th>Behavioral Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>No decreased tube feedings</td>
<td>Decreased tube feedings</td>
</tr>
<tr>
<td>25% dropped out</td>
<td>Increased oral consumption of energy requirements at follow up</td>
</tr>
</tbody>
</table>
Other Treatments

• Vitamin supplementation

• Nutritional counseling

• “Wait and see”
  • Ineffective
  • Early intervention is critical

Peterson, Piazza, Ibanez, & Fisher (in press)

• Randomized controlled trial to compare efficacy of applied behavior analysis to a wait-list control group

• Children with ASD and food selectivity
Other Treatments

- Vitamin supplementation
- Nutritional counseling
- “Wait and see”
  - Ineffective
  - Early intervention is critical
- Other treatment approaches
Sequential Oral Sensory

Toomey (2010)

A COMPARISON OF A MODIFIED SEQUENTIAL ORAL SENSORY APPROACH TO AN APPLIED BEHAVIOR-ANALYTIC APPROACH IN THE TREATMENT OF FOOD SELECTIVITY IN CHILDREN WITH AUTISM SPECTRUM DISORDERS

Kathryn M. Peterson, Cathleen C. Piazza, and Valerie M. Volkert
University of Nebraska Medical Center's Munroe-Meyer Institute

Treatments of pediatric feeding disorder based on applied behavior analysis (ABA) have the most empirical support in the research literature (Volkert & Piazza, 2012); however, professionals often recommend, and caregivers often use, treatments that have limited empirical support. In the current investigation, we compared a modified sequential oral sensory approach (M-SOS; Benson, Parke, Gammon, & Mustoe, 2013) to an ABA approach for the treatment of the food selectivity of 6 children with autism. We randomly assigned 3 children to ABA and 3 children to M-SOS and compared the effects of treatment in a multiple baseline design across novel, healthy target foods. We used a multielement design to assess treatment generalization. Consumption of target foods increased for children who received ABA, but not for children who received M-SOS. We subsequently implemented ABA with the children for whom M-SOS was not effective and observed a potential treatment generalization effect during ABA when M-SOS preceded ABA.

Key words: applied behavior analysis, escape extinction, feeding disorders, modified sequential oral sensory, oral-motor skills, sensory integration, sequential oral sensory, sequential oral sensory training, SOS, systematic desensitization
Peterson, Piazza, & Volkert (2016)

<table>
<thead>
<tr>
<th>M-SOS</th>
<th>ABA</th>
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<tr>
<td>James</td>
<td>Greg</td>
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<tr>
<td>Jerry</td>
<td>Sam</td>
</tr>
<tr>
<td>Barry</td>
<td>Bryce</td>
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Peterson, Piazza, & Volkert (2016)

- Lack of discrimination
- Carryover effects
- Desensitization effect
Peterson, Kirkwood, Ibañez, Crowley, Ney, & Piazza (in preparation)

• Replicate and extend findings of Peterson et al. (2016)

• Assess potential generalization effects of M-SOS

Generalization Assessment
Generalization Assessment

- Pre M-SOS: Target Foods
- M-SOS: Target Foods
- Post M-SOS/Pre ABA: Target Foods
- ABA: Target Foods
- Post ABA: Target Foods

Generalization Foods

- Pre ABA: Target Foods
- ABA: Target Foods
- Post ABA: Target Foods

Generalization Foods

- Pre ABA: Target Foods
- ABA: Target Foods
- Post ABA: Target Foods

Generalization Foods
## Overall Findings

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</tr>
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<td>Brad</td>
<td>Kade</td>
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Peterson, Kirkwood, Ibañez, Crowley, Ney, & Piazza (in preparation)

## Overall Findings: Generalization

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Peterson, Kirkwood, Ibañez, Crowley, Ney, & Piazza (in preparation)
Conclusions

• No treatment generalization

• Programming for generalization

• ABA treatment necessary
Assessment: Initial Evaluation

Interdisciplinary Evaluation

- **Medicine**: Rule out physical causes of feeding problem
- **Nutrition**: Evaluate adequacy of current intake
- **Social Work**: Evaluate family stressors
- **Speech or Occupational Therapy**: Evaluate oral-motor status and safety
- **Psychology or Behavior Analysis**: Assess contribution of environmental factors
Medicine

Nutrition

<table>
<thead>
<tr>
<th>Caloric Needs</th>
<th>Nutritional Needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height, weight, and age</td>
<td>Diet macro- and micro- analysis</td>
</tr>
<tr>
<td>Activity level</td>
<td>Medical considerations</td>
</tr>
<tr>
<td>Calorie goal</td>
<td>Nutrition goals</td>
</tr>
<tr>
<td>Tube reductions</td>
<td>Food allergies and intolerances</td>
</tr>
</tbody>
</table>
Oral-Motor Skills

Psychologist or Behavior Analyst

• What is the child currently doing?

• Is this typical feeding behavior for the child’s age or development?

• Can we use our empirically supported treatments to improve the mealtime?
Psychologist or Behavior Analyst

- Medical and feeding history
- Direct observation of natural meals and structured meals
- Recommended level of service based on severity and availability or referral

8 weeks

Week 1
Week 2
Week 3
Week 4

Week 5
Week 6
Week 7
Week 8

In Clinic
In Home
6 weeks
- Home Baseline
- Standard Outcome Baseline

Assessment:
Home Baseline
**Purpose**

- Observe child and caregiver behavior
- Identify antecedents and consequences
- Inform later assessments

**Setup**

- Conditions:
  - Preferred foods and liquids
  - Nonpreferred or novel foods and liquids
- Items used in the home
- End when the family would typically end or after 10 min
Data Collection

• Checklist

• Videotape sessions

Assessment:
Standard Outcome Baseline
Purpose

• Child and caregiver behavior when we
  • Add structure to the mealtime context
  • Vary response effort associated with eating and drinking
• Assess oral-motor skills

Purpose

• Provides information for future assessments
  • Bolus size
  • Texture
  • Pace of bites or drinks
  • Test conditions of functional analysis
Benefits

• Repeatedly measure progress over time
• Compare across children
• Basis for goal development

Adding Structure

• Consistent bolus size
• Standard foods and drinks
• Fixed-time 30 s bite or drink presentation
• Mouth check
Altering Response Effort

- Feeding formats:
  - Self
  - Nonself

- Food formats:
  - Purees
  - Table textures
  - Liquids
Conducting the SOBL

• Randomize the order of the two liquid conditions

• Run the liquid conditions during the child’s scheduled liquid meals

• Finish one condition (e.g., at least three sessions) before moving on to the next

Conducting the SOBL

• Randomize the order of conditions involving food

• Run those conditions during the child’s scheduled solid meals

• Finish one condition before moving to the next
Caregiver Instructions

• Appropriate bolus size

• Single bite presentations
  • In front of the child during self sessions
  • At the child’s lips during nonself sessions

• Present a new bite every 30 s

Caregiver Instructions

• Conduct a mouth clean 30 s after acceptance

• Present next bite

• Respond to appropriate and inappropriate mealtime behavior as you would at home
6 weeks
- Home Baseline
- Standard Outcome Baseline
- Preference Assessment
- Functional Analysis

Assessment:
Preference Assessments
Types

• Free operant

• Paired stimuli

• Multiple stimuli

Free Operant

• Tells us how much time is spent with each item when given unlimited access

  • More time = higher preference
## Paired Choice

- Tells us ranking of items

- Items are presented in pairs and the client is asked to choose between each item

- All items are paired with all other items at least once

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Fisher, et al. (1992)

## Multiple Stimuli

- Three or more items presented

- With or without replacement

---

DeLeon & Iwata (1996)
Goals

- Individual
- Observable
- Measurable

**Example**: Increase total oral intake to 50% of calorie needs.
Goals

Child Behavior
• Active acceptance
• Mouth clean
• Decrease inappropriate mealtime behavior
• Self-feeding and self-drinking
• Chewing
• Increase age-appropriate portions
• Increase oral intake and variety
• Decrease tube feedings

Caregiver Behavior
• Correct protocol implementation
• Correct prompts and consequences
• Correct use of praise and attention

Example: Caregiver will implement the procedure with over 90% integrity across prompts, consequences, and utensil placement.

Mealtime Structure
Mealtime Structure

- Creates a predictable environment for the child
- Clear expectations
- Allows for systematic evaluation

Danny's Day - Treatment Schedule

9:00-9:45: Meal 1 (Breakfast)
9:45-10:30: Break
10:30-11:00: Meal 2 (Snack)
11:00-11:45: Break
11:45-12:30: Meal 3 (Lunch)
12:30-3:00: Break (nap, free feed)
3:00-3:30: Meal 4 (Snack 2)
3:30-4:00: Break
4:00-4:45: Meal 5 (Dinner)
Identify Foods

• Food type

• Food texture

• Specify foods by name, food group, brand, and recipe

• Precisely describe how you prepare the foods

<table>
<thead>
<tr>
<th>Food Name</th>
<th>Brand</th>
<th>Canned or Frozen</th>
<th>Amount (g)</th>
<th>Amount &amp; Type of Liquid (oz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cut Green Beans</td>
<td>HyVee</td>
<td>Canned</td>
<td>226</td>
<td>None</td>
</tr>
</tbody>
</table>
Identify Foods: Additives

• Consult a speech therapist for swallowing difficulties

• Consult a dietician or nutritionist for food weight gain or poor nutrition

Identify Foods: Texture
Identify Foods: Type

- Solids
- Liquids
- Oral-motor deficits

Identify Utensils
**Utensils: Solids**

- Rubber-coated baby spoons
- Small and large maroon spoons

**Utensils: Liquids**

- Flexible materials
- Prevents occlusion of child’s face
- Facilitates transition to larger bolus
Utensils: Liquids

Mealtime Structure

5-bite session

10-min session cap
Seating

- Booster Seat
- Tumble Form
- Adult Chair
- Special Tomato Chair
- Toddler Chair
- Highchair

Data Collection
Dependent Variables

- Concise, detailed definition of behavior

**Child Behavior**
- Active acceptance
- Expulsion
- Mouth clean or pack
- Cough, gag, vomit
- Inappropriate mealtime behavior
- Negative Vocalizations
- Chews

**Feeder Behavior**
- Utensil placement
- Prompts
- Praise for appropriate mealtime behavior
- Attention for inappropriate mealtime behavior
Assessment: Functional Behavior Assessments

Types

- Indirect assessment
- Descriptive assessment
- Functional analysis

Cooper, Heron & Heward (2007)
<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indirect assessment</td>
<td>Structured interviews, rating scales, checklists, or questionnaires</td>
<td>Easy to conduct and helpful for hypothesis formulation</td>
<td>Limited in accuracy</td>
</tr>
<tr>
<td>Descriptive assessment</td>
<td>Observation in the natural environment</td>
<td>Can observe in natural environment and easy to implement</td>
<td>Does not provide information on functional relations</td>
</tr>
</tbody>
</table>
Type | Description | Advantages | Disadvantages
--- | --- | --- | ---
Functional analysis | Systematically manipulate environmental events | Identify conditions under which inappropriate behavior occurs | Time, resources, and expertise to implement and interpret

Functional Analysis

vs. vs. vs.
Functional Analysis

Piazza et al. (2003)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Consequences for Inappropriate Mealtime Behavior</th>
<th>Bite Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escape</td>
<td>30 s of escape</td>
<td>Removed for 20 s</td>
</tr>
<tr>
<td>Attention</td>
<td>30 s of attention</td>
<td>Remained at midline</td>
</tr>
<tr>
<td>Tangible</td>
<td>30 s of access to tangibles</td>
<td>Remained at midline</td>
</tr>
<tr>
<td>Control</td>
<td>No differential consequences</td>
<td>Remained at midline</td>
</tr>
</tbody>
</table>
INAPPROPRIATE MEALTIME BEHAVIOR PER MINUTE

SESSIONS

Piazza et al. (2003)

INAPPROPRIATE MEALTIME BEHAVIOR PER MINUTE

SESSIONS

Piazza et al. (2003)
6 weeks
- Home Baseline
- Standard Outcome Baseline
- Preference Assessment
- Functional Analysis
- Treatment Evaluation
- Increase efficiency, volume, and variety
- Teach advanced feeding skills

Reinforcement-Based Treatment
Differential Reinforcement of Alternative Behavior

- Positive reinforcement

- A response if followed immediately by the presentation of a stimulus

- Increase in the probability of a future occurrence of that response

Differential Negative Reinforcement of Alternative Behavior

- Negative reinforcement

- Termination, reduction, or delay of a stimulus following a response

- Increase in the probability of a future occurrence of the response
Noncontingent Reinforcement

“Take a bite” → Behavior/Response → Consequence/Reinforcement

Antecedent #1

Antecedent #2

FT30

Noncontingent Reinforcement

• Stimuli with well-known reinforcing properties delivered at a set time, independent of behavior

• Reinforcers that maintain problem behavior are freely available

• Easy to implement and a more enjoyable learning environment
Using Reinforcement Effectively

• Achievable initial criterion
• Quality
• Magnitude
• Gradually shift reinforcers
• Reinforce every occurrence
• Immediacy
• Consistency

Fading-Based Treatment
Fading

- Identify what the child can currently do
- Gradually change what you expect the child to do
1. Syringe Fading

- Use when the child will swallow liquids or purees from a syringe but will not accept liquids or purees from a spoon

- Syringe-to-spoon or syringe-to-cup fading

Groff, Piazza, Volkert, & Josted (2014)
2. Spoon-to-cup Fading

- Use when the child will accept liquids from a spoon but will not accept liquids from a cup

Groff, Piazza, Zeleny, & Dempsey (2011)
3. Cup-to-spoon Fading

- Use when the child will accept liquids from a cup but will not accept solids from a spoon

4. Bite Fading

- Use when the child will accept a variety of foods but only in spoon amounts

Najdowski, Wallace, Doney, & Ghezzi (2003)
5. Blending

- Use when the child eats at least three foods reliability and has no weight concerns

- Solids or liquids
Table 1. Liquid to baby food fading.

<table>
<thead>
<tr>
<th>Fading step</th>
<th>Nectar-consistency(\text{a}) apple juice (mL)</th>
<th>Stage 2 baby food (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>59.2</td>
<td>00.0</td>
</tr>
<tr>
<td>2</td>
<td>59.2</td>
<td>02.5</td>
</tr>
<tr>
<td>3</td>
<td>59.2</td>
<td>05.0</td>
</tr>
<tr>
<td>4</td>
<td>59.2</td>
<td>07.5</td>
</tr>
<tr>
<td>5</td>
<td>59.2</td>
<td>10.0</td>
</tr>
<tr>
<td>6</td>
<td>59.2</td>
<td>12.5</td>
</tr>
<tr>
<td>7</td>
<td>59.2</td>
<td>15.0</td>
</tr>
<tr>
<td>8</td>
<td>44.4</td>
<td>17.5</td>
</tr>
<tr>
<td>9</td>
<td>29.6</td>
<td>20.0</td>
</tr>
<tr>
<td>10</td>
<td>14.8</td>
<td>22.5</td>
</tr>
<tr>
<td>11</td>
<td>00.0</td>
<td>25.0</td>
</tr>
</tbody>
</table>

\(\text{a}\)The formula for making the nectar-consistency apple juice was 59.2 mL of apple juice mixed with 6.2 cc of Thick-It. The therapist then mixed the nectar-consistency apple juice with Stage 2 baby food in the proportions indicated earlier.
6. Simultaneous Presentation

- Use when the child eats at least three foods reliability and has no weight concerns

- Present a preferred food with a nonpreferred or novel food
7. Stimulus Fading

- Use when the child is not consistently consuming a food group or enough of a food
8. Demand Fading

- Use when the child engage in high rates of problem behavior
  - Even if target behavior are in the child’s repertoire

- Begin with a step the child completes consistently and in the absence of problem behavior

7 weeks

- **Home Baseline**
- **Standard Outcome Baseline**
- **Preference Assessment**
- **Functional Analysis**
- **Treatment Evaluation**
- Increase efficiency, volume, and variety
- Teach advanced feeding skills
- Caregiver Training
1. Protocol Review
2. Meal Observation

3. Fade Caregiver
4. Caregiver Feeds with In-Vivo Feedback in Booth

5. Caregiver Feeds with In-Vivo Feedback in Room
6. Caregiver Feeds Independently

7. Food Preparation Training
8 weeks
- Home Baseline
- Standard Outcome Baseline
- Preference Assessment
- Functional Analysis
- Treatment Evaluation
- Increase efficiency, volume, and variety
- Teach advanced feeding skills
- Caregiver Training
- In-home Caregiver Training

Outpatient Follow-up
Outpatient Follow-up

End Day Treatment Admission

Assess Goals

3 mo  6 mo  9 mo  12 mo  15 mo  18 mo
<table>
<thead>
<tr>
<th>Goal Period</th>
<th>In Clinic Follow-up</th>
<th>Virtual Care Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># of kids</td>
<td>Goals met (mean)</td>
</tr>
<tr>
<td>3 months</td>
<td>36</td>
<td>93%</td>
</tr>
<tr>
<td>6 months</td>
<td>28</td>
<td>93%</td>
</tr>
<tr>
<td>9 months</td>
<td>20</td>
<td>96%</td>
</tr>
<tr>
<td>12 months</td>
<td>22</td>
<td>92%</td>
</tr>
<tr>
<td>15 months</td>
<td>13</td>
<td>92%</td>
</tr>
<tr>
<td>18 months</td>
<td>6</td>
<td>98%</td>
</tr>
</tbody>
</table>

Limitations and Future Directions

- More sensitive treatment integrity measures
- More caregiver training evaluations
Limitations and Future Directions

• More sensitive treatment integrity measures
• More caregiver training evaluations

• Component analysis of training packages

• Caregiver training through virtual-care technologies
Virtual Care Training

- Saves time and costs
- Less hassle
- Natural environment
- Easily accessible
- Protection from illness
- Technology problems
- Difficulty with observation
- Licensure
- No physical support or clinic resources
- Medical, oral-motor concerns

Limitations and Future Directions

- More sensitive treatment integrity measures
- More caregiver training evaluations
- Component analysis of training packages
- Caregiver training through virtual-care technologies
- Long-term follow-up
Future Directions

• Why does food selectivity emerge?

• Why is it so prevalent in children with ASD?

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References & Reading List


References & Reading List

Toomey, K., & Ross, E. (2010, December). The S.O.S.-sequential-oral-sensory approach to feeding. Presented at the SOS Basic Training Workshop, Sensory Processing Disorder Foundation, Aurora, CO.


