

# Assessment and Treatment of Feeding Problems in Children with ASD

---

William Sharp, Ph.D.  
Director, Feeding Disorders Program  
Marcus Autism Center  
Children's Healthcare of Atlanta |  
Assistant Professor  
Department of Pediatrics  
Emory University School of Medicine



# Learning Objectives

---

- Describe food selectivity and related mealtime concerns in ASD
- Identify medical outcomes and nutrition issues associated with atypical patterns of intake
- Recognize possible contributing factors, focusing on evidence of gastrointestinal (GI) concerns in ASD
- Identify appropriate interventions for feeding disorders in ASD based on the severity of the presenting problem. This includes parent consultation/education, nutritional guidance, behavioral therapy, medical interventions, and intensive inpatient services.

# Autism Spectrum Disorder (ASD)

---

- DSM – 5:

Neurodevelopmental disorder(s) of unknown genetic origin where symptoms unfold over the first few years of life:

- *Persistent deficits in social communication and social interaction*
- *Restrictive, repetitive patterns of behavior, interests, or activities*

# Volume: Associated Factors

---

- Medical Issues:
  - Congenital or acquired respiratory, cardiac, and gastrointestinal problems, which cause difficult or painful eating experiences
- These include:
  - Gastroesophageal reflux
  - Food allergies
  - Gastroenteritis
  - Dysmotility
  - Prematurity (with intubation)
  - Bronchopulmonary dysplasia
  - Short bowel syndrome
  - Lactose intolerance
- Feeding problems occurs in 40-70% of children with chronic medical conditions (Lukens & Silverman, 2014)

# Variety: Associated Factors

---

- Autism Spectrum Disorder (ASD)

# Pediatric Feeding Disorders

---

- Chronic feeding concerns generally involve either:
  - 1) Volume - Food Refusal
  - 2) Variety - Food Selectivity

Severe problem behaviors during meals:

- Crying
- Disruptions
- Elopement
- Aggression
- Spitting
- Expulsion



# Historical Background

---



- Kanner, L. (1943). Autistic disturbances of affective contact. *The Nervous Child*, 2, 217-250.
- "Food is the earliest intrusion that is brought to the child from the outside world."

# Research Support

---

- Ledford & Gast (2006)
  - Most comprehensive summary at the time
  - 7 descriptive studies identified
  - N = 381 children with ASD
- Estimates ranged from 46% and 89% of children with ASD displaying significant feeding problems
  - Often no identifiable organic precursor



# Research Support

---

- Limitations
  - No control group and mostly descriptive studies
  - Involved biased clinical sample – e.g., feeding disorders clinic
  - Lack of uniformity definition of feeding problem

# Feeding Problems and Nutrient Intake in Children with Autism Spectrum Disorders: A Meta-analysis and Comprehensive Review of the Literature

William G. Sharp · Rashelle C. Berry · Courtney McCracken ·  
Nadrat N. Nuhu · Elizabeth Marvel · Celine A. Saulnier ·  
Ami Klin · Warren Jones · David L. Jaquess

- **Inclusion criteria:**

1. Published between 1980 and 2011
2. Focused on pediatric population (birth to 18 years)
3. Involved a comparison group
4. Evaluated feeding and/or nutrition in ASD a standardized, replicable manner
5. Presented data either descriptively (e.g., frequency, percentages) or statistically (e.g., t scores)

- **Exclusion criteria:**

1. Studies with known sampling bias (e.g., chart reviews from feeding programs)
2. Studies focusing on dietary manipulation (e.g., GFCF

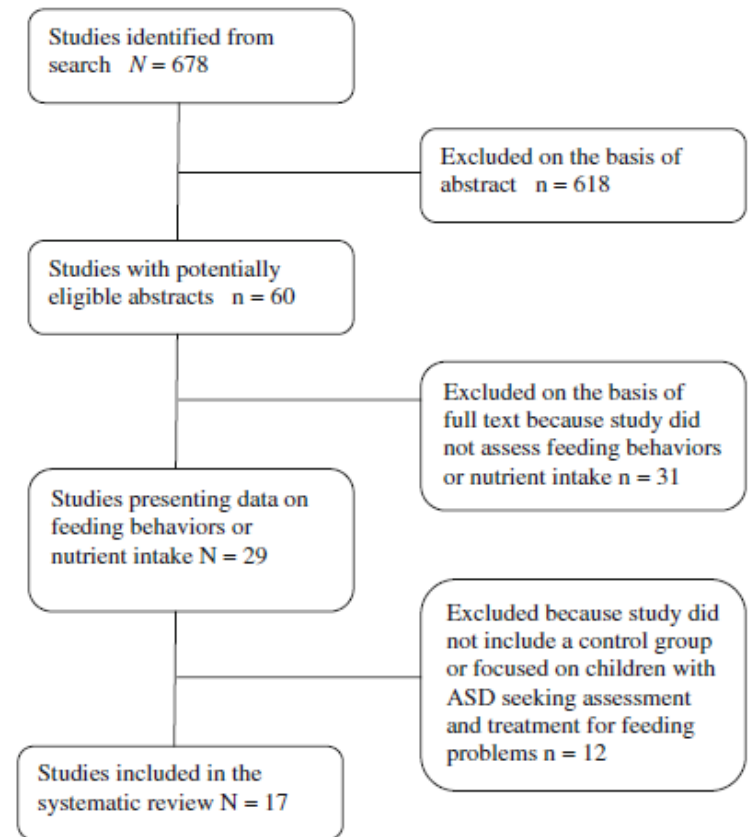


Fig. 1 Flow diagram of included and excluded studies

**Table 4** Effect sizes, 95 % confidence limits and within-group tests for heterogeneity for studies included in the meta-analysis for feeding behavior problems by comparison groups

ASD versus subgroup	Number of contributing studies	Random effects model				Within-groups		
		SMD (SE)	OR	95 % confidence limits		<i>p</i> value	$\chi^2$ test (Q)	<i>p</i> value
				LCL	UCL			
All groups	15	0.89 (0.08)	5.11	3.74	6.97	<0.001		
TD	13	0.94 (0.11)	5.49	3.77	7.98	<0.001	29.9	0.003
SB	3	0.98 (0.22)	5.89	2.73	12.71	<0.001	0.45	0.798
DD	2	0.67 (0.19)	3.36	1.69	6.67	0.001	0.012	0.913

*TD* typically developing, *DD* other developmental delay, *SB* siblings

## Fivefold increase in the odds of having a feeding problem in ASD

### Food Selectivity

Preference - carbohydrates, snacks, fats, and/or processed food

Rejection - fruits and vegetables

# Picky Eating vs. Food Selectivity

---

Food selectivity in ASD is distinct from picky eating in terms of duration and intensity

- **Duration** - Food selectivity is a chronic concern that persists overtime
  - Suarez, Nelson, and Curtis (2013) indicated no change in food selectivity in 52 children with ASD over a 20-month period.
- **Intensity** – Food selectivity more likely to involve strong refusal behaviors (e.g., crying, throwing objects, aggression)

# Food Selectivity vs. Picky Eating

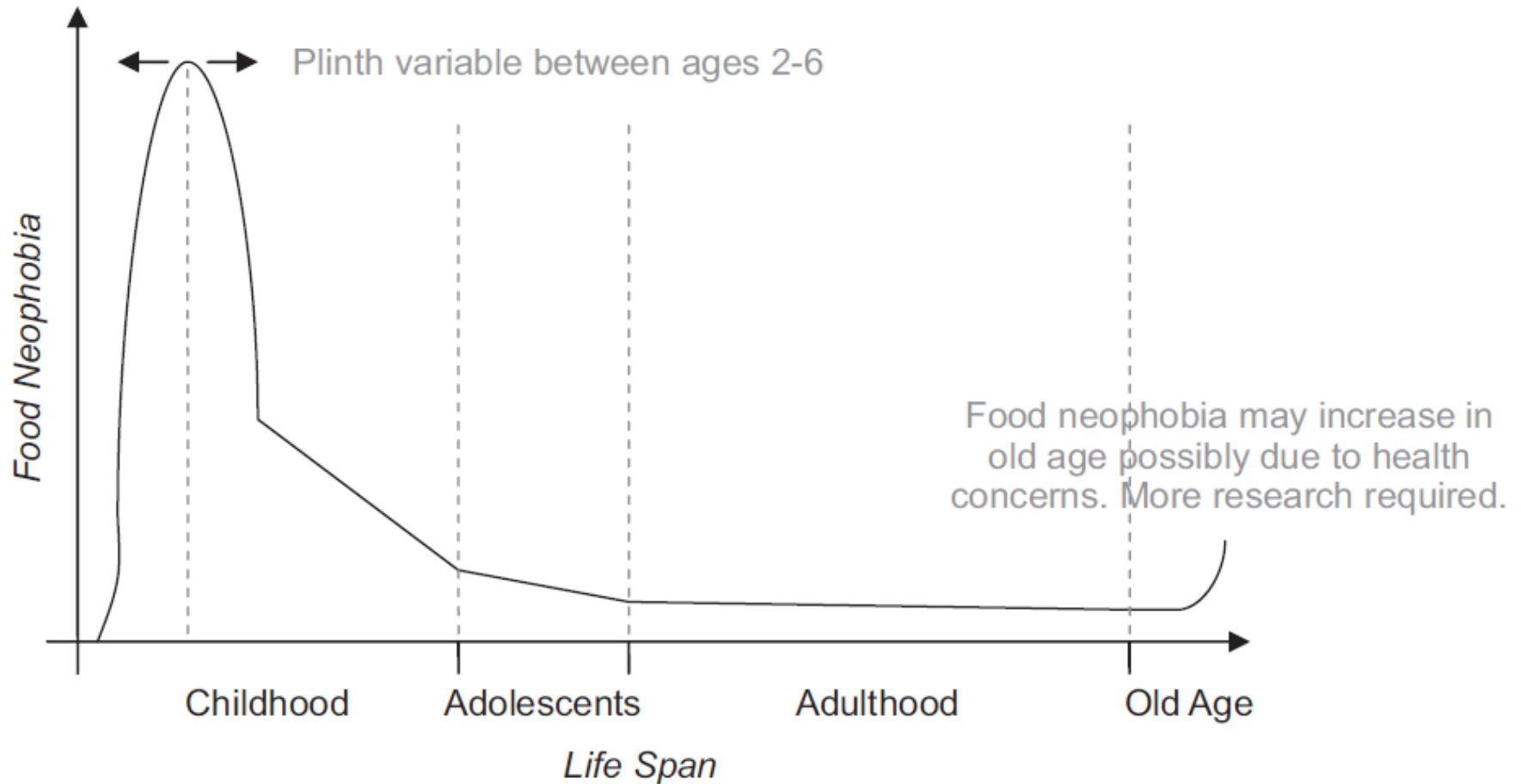


Figure 1: Life span model of food neophobia as proposed by Dovey et al. (2008)

**Table 5** Effect sizes, 95 % confidence limits and within-group tests for heterogeneity for studies included in the meta-analysis for nutritional data

Nutrient	Number of contributing studies	Random effects model				<i>p</i> value
		SMD (SE)	OR	95 % confidence limits		
				LCL	UCL	
Calcium	8	-0.65 (0.29)	0.31	0.11	0.85	0.022
Carbohydrates	7	-0.02 (0.07)	0.97	0.76	1.24	0.810
Energy	6	0 (0.06)	0.99	0.80	1.25	0.995
Fiber	6	0.09 (0.12)	1.18	0.77	1.78	0.448
Iron	7	0.17 (0.20)	1.35	0.66	2.76	0.414
Protein	7	-0.58 (0.25)	0.35	0.14	0.86	0.021
Total fat	6	0.03 (0.06)	1.05	0.84	1.30	0.690
Vitamin A	6	-0.51 (0.35)	0.39	0.11	1.37	0.143
Vitamin C	7	-0.13 (0.19)	0.98	0.52	1.87	0.507
Vitamin D	6	-0.07 (0.19)	0.88	0.45	1.71	0.703
Vitamin E	5	0.05 (0.17)	1.10	0.61	1.98	0.742
Zinc	6	-0.03 (0.09)	0.95	0.69	1.31	0.758

**Sharp et al** (2013). Feeding Problems and Nutrient Intake in Children with Autism Spectrum Disorders: A Meta-analysis and Comprehensive Review of the Literature. *Journal of Autism and Developmental Disorders*, 43(9): 2159 - 2173.

# Daily Living and Quality of Life

---

**Increased parental stress regarding health and development**

**Reduced opportunities to eat at restaurants or social occasions**

**Disrupted family meals & further limitations in social interactions**

**Required to prepare multiple menus for each meal**

J Dev Phys Disabil (2012) 24:19–33

DOI 10.1007/s10882-011-9252-2

---

ORIGINAL ARTICLE

# **Mothers' Challenges in Feeding their Children with Autism Spectrum Disorder—Managing More Than Just Picky Eating**

**Laura G. Rogers • Joyce Magill-Evans •  
Gwen R. Rempel**



# Parent Report

---

- “I’m worried about his health. How can he stay alive eating two foods and drinking water?”
- “If you ever saw those meltdowns you wouldn’t want to offer non-preferred food either.”
- “He’ll gag and almost get physically sick just watching us eat something like spaghetti and meat sauce.”
- “My younger children won’t eat the food they don’t like, but my son with autism won’t even come to the table.”

# The Parent Experience

---

- Meals described as stressful, chaotic, and energy depleting
- Mealtimes lack positive interactions
- Child's food selectivity limited other family members' food choices during meals
- Caregivers reported ceasing family meals to avoid further worry, guilt, and stress.

Marquenie, K., Rodger, S., Mangohig, K., & Cronin, A. (2011); Suarez, Atchison, & Lagerwey (2016)

# PEDIATRICS<sup>®</sup>

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

## Gastrointestinal Symptoms in Autism Spectrum Disorder: A Meta-analysis

Barbara O. McElhanon, Courtney McCracken, Saul Karpen and William G. Sharp

*Pediatrics*; originally published online April 28, 2014;

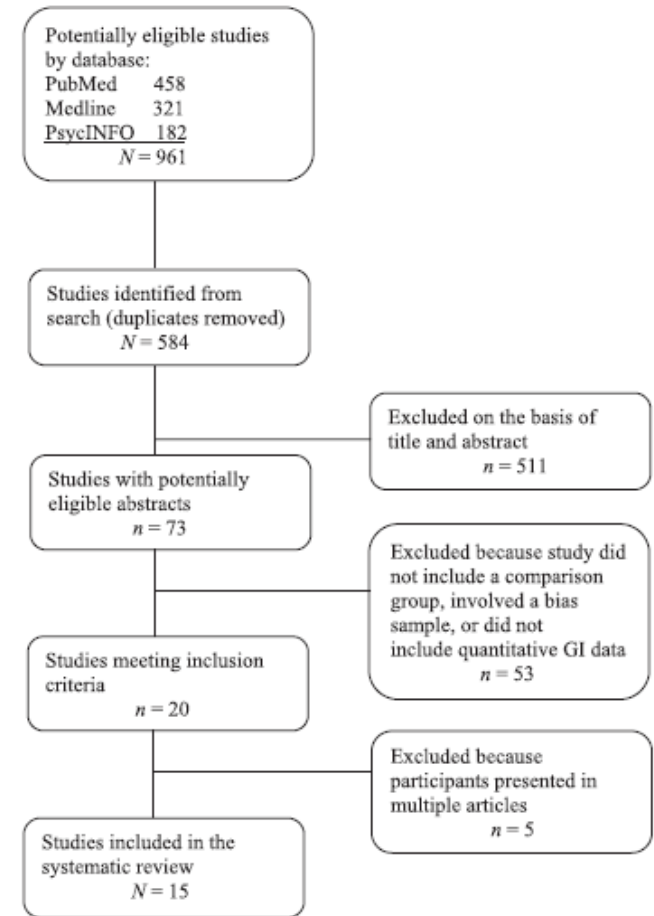
DOI: 10.1542/peds.2013-3995

### Inclusion criteria:

1. Published between 1980 and 2012
2. Focused on pediatric population (birth to 18 years)
3. Involved a comparison group
4. Evaluated GI concerns in ASD a standardized, replicable manner
5. Presented data either descriptively (e.g., frequency, percentages) or statistically (e.g., t scores)

### Exclusion criteria:

1. Studies with known sampling bias (e.g., chart reviews from GI clinics)
2. Studies using a healthy control group (i.e., screening out children with known gut issues)



**FIGURE 1**

Flow diagram of included and excluded studies.

**TABLE 1** ASD and GI Key Words Used in Database Search

---

ASD Search Terms

Asperger's  
Autism  
Autism spectrum disorder  
Autistic  
Pervasive developmental disorder  
PDD-NOS

GI Search Terms

Abdominal pain/abdomen  
Celiac  
Colitis  
Constipation  
Diarrhea  
Digestion  
Digestive disorders/system  
Disaccharidase  
Endoscopy/colonoscopy  
Esophagitis/oesophagitis  
Gastroenterology  
Gastritis  
Gastrointestinal  
Gluten(s)  
Gastroesophageal reflux  
Intestines/intestinal  
Vomiting

---

PDD-NOS, pervasive developmental disorder not otherwise specified.

**TABLE 4** ESs, 95% Confidence Limits, and Within-Group Tests for Heterogeneity for Studies Included in the Meta-analysis for GI Symptoms

GI Symptom	Number of Contributing Studies	Random Effects Model				
		SMD (SE)	Odds Ratio	95% Confidence Limits		<i>P</i>
				Lower	Upper	
General GI concerns	10	0.91 (0.23)	5.25	2.34	11.75	<.0001
Diarrhea	12	0.71 (0.19)	3.63	1.82	7.23	<.0001
Constipation	9	0.75 (0.16)	3.86	2.23	6.71	<.0001
Abdominal pain	8	0.49 (0.20)	2.45	1.19	5.07	.016

McElhanon, B.O., McCracken, C., Karpen, S., Sharp, W.G. (2014) Gastrointestinal Symptoms in Autism Spectrum Disorders: A Meta-analysis. *Pediatrics*, 133:5 872-883

# Other key findings

---

- Insufficient data to analyze data on other GI concerns, such as reflux or EOE, often link with organic pathology
- Although organic factors leading to difficult or painful eating, such as gastroesophageal reflux, gastroenteritis, and food allergies, often precipitate or play a role in the development of chronic feeding concerns in other pediatric populations, research has yet to identify a clear GI link to account for the emergence, maintenance, and topography of feeding problems associated with ASD.

# Buie et al. (2010)

---

- All of the common gastrointestinal conditions encountered by individuals with typical neurologic development are also present in individuals with ASDs.
- The communication impairments characteristic of ASDs may lead to unusual presentations of gastrointestinal disorders, including sleep disturbances and problem behaviors.
- Caregivers and health care professionals should be alert to the presentation of atypical signs of common gastrointestinal disorders in patients with ASDs.

# Clinical Implications

---

When a feeding concerns is present in ASD:

- An important first step when working with any child with a feeding disorder involves ruling out the potential contribution of organic factors (e.g., gastroesophageal reflux, food allergy) that may cause pain or discomfort along the GI tract.
- This may require adopting a lower threshold for obtaining subspecialty consultation (e.g. pediatric gastroenterologist; allergist) and increased reliance on objective testing in order to recognize pathology and facilitate a diagnosis given limitations in communication often observed in ASD (Buie et al., 2010)



# A Measurement Problem

---

- 1) No universally accepted definition
- 2) High variability in item content
- 3) No direct link with actual diet and nutritional status
- 4) Food selectivity has been viewed as a monolithic construct (e.g., total number of items accepted or rejected), without consideration to symptom severity or dietary diversity.

# Bandini et al. (2010)

---

## Three Part Definition of Food Selectivity:

- 1) Food Refusal: Percentage of foods offered that the child will not eat
- 2) Limited Food Repertoire: Number of unique foods consumed over a three-day period
- 3) High Frequency Single Food Intake (HFSFI):  
Number of single food items eaten 4 to 5 or more times daily.

# Bandini et al. (2010)

---

- 53 children with ASD vs. 58 typically developing children (ages 3-11 years).
- Children with ASD:
  - 1) Exhibited greater food refusal (rejecting 41.7% of food items versus 18.9% rejected by peers)
  - 2) Consumed a more limited dietary repertoire (consuming an average of 19 foods over a three day period vs 22.5 consumed by peers)
- HFSFI was rarely observed in both groups.

# Framework for defining food selectivity by severity

---

<u>Category</u>	<u>Criteria</u>	<u>Rationale</u>
<b>Severe Food Selectivity</b>	<ul style="list-style-type: none"> <li>• Complete rejection of one or more food groups</li> <li>• Accepts five or fewer total food items</li> </ul>	<p>Increases the risk of micro- and/or macronutrient deficiency (e.g., scurvy; iron deficiency anemia; kwashiorkor)</p> <p>Further narrowing of the diet would eliminate additional food groups</p>
<b>Moderate Food Selectivity</b>	<ul style="list-style-type: none"> <li>• Consumes two or fewer items in one or more food groups</li> <li>• Regularly (weekly) accepts at least one item across the five food groups</li> </ul>	<p>Reflects a diet that may lack diversity of nutrient-dense foods; further restriction increases likelihood of nutrient deficiency</p> <p>Decreases likelihood of being diagnosed with a nutrient deficiency; however, intake may be limited to a handful of preferred items or involve high intake of a single food group</p>
<b>Mild Food Selectivity</b>	<ul style="list-style-type: none"> <li>• Diet involves at least three or more items from each food group (15 total foods); more than half of items fall into one food group</li> <li>• Consistently (daily) accepts foods from all five food groups</li> </ul>	<p>Suggests low probability of nutrient deficiency while recognizing child may show preference for a certain food group (e.g., grains)</p> <p>Indicates the child maintains a consistent degree of dietary diversity</p>

# The Behavioral Perspective

---

- Why?
  - Symptom severity
  - Medical concern vs. quality of life issue
- How?
  - Severe -> Intensive Multidisciplinary Intervention
  - Moderate -> Outpatient/home interventions
  - Mild -> Adapt Existing Guidelines for Introducing Food (e.g., Ellen Satter)

# **The Autism MEAL Plan: A parent-training curriculum to manage eating aversions and low intake among children with autism**

Autism  
0(0) 1–11  
© The Author(s) 2013  
Reprints and permissions:  
[sagepub.co.uk/journalsPermissions.nav](http://sagepub.co.uk/journalsPermissions.nav)  
DOI: 10.1177/1362361313489190  
[aut.sagepub.com](http://aut.sagepub.com)  


**William G Sharp<sup>1,2</sup>, T Lindsey Burrell<sup>1,3</sup> and David L Jaquess<sup>1,2</sup>**

---

ORIGINAL ARTICLE

## **Behavioral Parent Training to Address Feeding Problems in Children with Autism Spectrum Disorder: A Pilot Trial**

**Cynthia R. Johnson<sup>1</sup> • Emily Foldes<sup>2</sup> •  
Alexandra DeMand<sup>2</sup> • Maria Mori Brooks<sup>3</sup>**

# Parent vs. Child Perspective

---

- Parent
  - Experienced eater
  - Flexibility with different food types and tastes
  - Eats large portions of foods
- Child
  - Non-preferred foods are aversive/noxious
  - Preferred foods can be contaminated
    - Change in presentation and contact with non-preferred foods
  - Highly motivated to avoid contact

# Involve children in the process through choice

---

- Food items to target
- Initial bite volume
- Jump in volume
- Which foods to add next



# Designing Interventions

---

- Overarching philosophy:
  - Treatment involves persisting with a reasonable demand
  - In order to establish traction for behavior change, begin with “zone of likely success”
    - Can not reinforce a behavior is low probability of occurring
  - And should consider the complete tool box of antecedent and consequence based strategies
    - If only relying on consequences, may not be able to replace/override function

# Other aspects of the meal.....

---

- Increase structure and routine:
  - Regular meal/snack schedule
  - Meals involve a table with age appropriate seating
- Differential Attention
  - Provide attention and praise for appropriate mealtime behaviors-
    - Accepting bites, swallowing, eating properly with a spoon, trying a new food, or staying seated throughout the meal
  - Ignore minor behavior problems
    - Whining, negative statements regarding food, messy eating (if age appropriate)

# General Behavioral Concepts

---

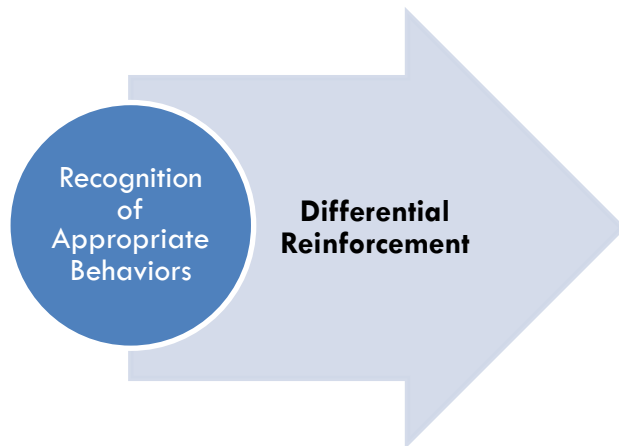
Treatment must involve:



Levels-

- Ignoring negative statements
- Non-removal of the plate/spoon

Exposure with Response Prevention



Types-

- Praise and attention
- Access to preferred activities
- Consumption of preferred food
- Escape / break

# Decision Rules

---

- Make sure behavior is stable across meals
  - After 3 meals with few problem behaviors, increase the demand
    - Add new food item
    - Increase bite number
    - Increase bite volume
    - Increase meal length
  - If problem behaviors persist across 2 meals, reduce the demand and break into smaller steps



# Power of Choice

---

- Food items to target
- Initial bite volume
- Jump in volume
- Which foods to add next

<b>Food</b>	<b>¼ pea</b>	<b>½ pea</b>	<b>Pea</b>	<b>2 pea</b>	<b>½ level</b>	<b>level</b>	<b>heaping</b>
Strawberry	□□□	□□□	□□□	□□□	□□□	□□□	□□□
Rice	□□□	□□□	□□□	□□□	□□□	□□□	□□□
Carrots	□□□	□□□	□□□	□□□	□□□	□□□	□□□
Rawberry gogurt	□□□	□□□	□□□	□□□	□□□	□□□	□□□
Waffle	□□□	□□□	□□□	□□□	□□□	□□□	□□□
String cheese	□□□	□□□	□□□	□□□	□□□	□□□	□□□
Strawberry yogurt	□□□	□□□	□□□	□□□	□□□	□□□	□□□
Wheat bread	□□□	□□□	□□□	□□□	□□□	□□□	□□□
Blueberry yogurt	□□□	□□□	□□□	□□□	□□□	□□□	□□□

## What Is Known

- 1) Food selectivity is primarily an issue of poor dietary diversity; compromised growth is less likely. Associated sequela may include vitamin and mineral deficiencies, decreased quality of life for families and increased risk for childhood obesity.
- 2) Nutritional monitoring – including serum testing of vitamin levels in cases of severe food selectivity –should be included as part of routine health screening to detect possible underlying nutritional insufficiencies
- 3) GI symptoms (e.g., constipation, diarrhea) are prevalent in children with ASD; however, the relationship between possible GI dysfunction and food selectivity remains unknown.
- 4) Degree of dietary restriction in ASD ranges from mild to severe. Children with severe food selectivity are at risk for severe malnutrition (e.g., scurvy, rickets), while mild food selectivity more closely resembles “pickiness” often observed in young children.
- 5) Behavioral intervention is the only well-established treatment for food selectivity in ASD, although optimal care should involve contributions from a multidisciplinary team to screen for possible dietary, oral-motor, and/or medical concerns.



# Questions?



# References - Feeding

- Bandini, L.G., Anderson, S.E., Curtin, C., Cermak, S., Evans, E.W., Scampini, R., Maslin, M., & Must, A. (2010). Food selectivity in children with autism spectrum disorders and typically developing children. *The Journal of Pediatrics*, 157 (2), 259 - 264.
- Buie T., Campbell, D.B., Fuchs, G.J., Furuta, G.T., Levy, J., Vandewater, J., et al. (2010). Evaluation, diagnosis, and treatment of gastrointestinal disorders in individuals with ASDs: a consensus report. *Pediatrics*, 125(suppl 1), S1-18.
- Curtin C, Anderson SE, Must A, Bandini L. The prevalence of obesity in children with autism: a secondary data analysis using nationally representative data from the National Survey of Children's Health. *BMC Pediatr*. 2010 Feb 23;10:11. doi: 10.1186/1471-2431-10-11.
- Egan AM, Dreyer ML, Odar CC, Beckwith M, Garrison CB. Obesity in young children with autism spectrum disorders: prevalence and associated factors. *Child Obes*. 2013; doi: 10.1089/chi.2012.0028. Epub 2013 Mar 13
- Emond, A., Emmett, P., Steer, C., Golding, J. (2010). Feeding symptoms, dietary patterns, and growth in young children with autism spectrum disorders. *Pediatrics*, 126 (2), 337 - 342
- Ho, Eaves, & Peabody (1997). Nutrient Intake and Obesity in Children with Autism. *Focus on Autism and Other Developmental Disabilities*, 12 (3), 187 – 192.
- Johnson, C.R., Handon, B.L., Mayer-Costa, M., & Sacco, K. (2008). Eating habits and dietary status on young children with autism. *Journal of Autism and Developmental Disorders*, 20, 437 - 448.
- Kanner, L. (1943). Autistic disturbances of affective contact. *The Nervous Child*, 2, 217–250.
- Ledford, J.R. & Gast, D.L. (2006). Feeding problems in children with autism spectrum disorders: A review. *Focus on Autism and Other Developmental Disabilities*, 21, 153-166.
- Lukens, C.T. & Linscheid (2008). Development and validation of an inventory to assess mealtime behavior problems in children with autism. *Journal of Autism and Developmental Disorders*, 38, 342 - 352.
- Lukens, C.T. & Silverman, A.H. (2014). Systematic Review of Psychological Interventions for Pediatric Feeding Problems. *Journal of Pediatric Psychology*. pp. 1–15, 2014 doi:10.1093/jpepsy/jsu040
- Manikam, R., & Perman, J. (2000). Pediatric feeding disorders. *Journal of Clinical Gastroenterology*, 30, 34-46.
- Martins, Y., Young, R.L., & Robson, D.C. (2008). Feeding and eating behaviors in children with autism and typically developing children. *Journal of Autism and Developmental Disorders*, 38, 1878 - 1887.
- Mayes, L., & Volkmar, F. (1993). Nosology of eating and growth disorders in early childhood. *Child and Adolescent Psychiatric Clinics of North America*, 2, 15-25.

# References - Feeding

- McElhanon, B.O., McCracken, C., Karpen, S., Sharp, W.G. (2014) Gastrointestinal Symptoms in Autism Spectrum Disorders: A Meta-analysis. *Pediatrics*, 133:5 872-883.
- Satter, E. (1990). The feeding relationship: Problems and interventions. *Journal of Pediatrics*, 117(2 Pt 2), S181–S189.
- Schmitt, L., Heiss, C.J., & Campbell, E.E. (2008). A comparison of nutrient intake and eating behaviors of boys with and without autism. *Topics in Clinical Nutrition*. 23(1), 23 - 31.
- Sharp, W.G., Berry, R.C., McCracken, C., Nuhu, N.N., Marvel, E., Saulnier, C.A., Klin, A., Jones, W., & Jaquess, D.L. (2013). Feeding Problems and Nutrient Intake in Children with Autism Spectrum Disorders: A Meta-analysis and Comprehensive Review of the Literature. *Journal of Autism and Developmental Disorders*, 43(9): 2159 - 2173.
- Sharp, W. G., Jaquess, D. L., Morton, J. S., & Herzinger, C. (2010). Pediatric feeding disorders: A quantitative synthesis of treatment outcomes. *Clinical Child and Family Psychology Review*, 13, 348-365.