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Treatment of Food Selectivity in Children with Autism

A Review of the Literature and Introduction to Holistic Treatment Approach

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Abstract

Food selectivity is a problem in many of the lives of children with autism. Limited food repertoires can negatively affect nutritional status and the quality of life for these children and their families. The precise cause of this food selectivity is unknown although a number of reasons have been posited. This inability to pinpoint an exact cause has led to a debate between researchers about whether behavioral or physiological issues are to blame. This paper first explores both of these options. Then, a new clinical program at WMU OT Unified Clinics is described that focuses on a holistic approach used by occupational therapists to treat food selectivity.

Introduction

Food selectivity is a common problem in children with autism. As the true etiology of this issue is unknown, general disagreement exists over whether behavioral or physiological factors are at fault. Currently, limited research is available regarding this problem. This paper explores current evidence-based treatments available for food selectivity and identifies a gap in the literature. A holistic approach used by occupational therapists to treat food selectivity is presented.

Food Selectivity in Children with Autism

Approximately 1 in 88 children in the United States are diagnosed with an autism spectrum disorder (CDC, 2012). Autism spectrum disorder (ASD) includes a wide range of conditions that are characterized by deficits in “communication, social interaction and repetitive behaviors” (Cermak, Curtin & Bandini, 2010, p.238). These traits can cause difficulty performing tasks associated with daily functioning. One of these areas is feeding, a primary occupation for children. While it is developmentally normal for children to go through stages of picky eating, many children with autism spectrum disorders self-restrict the number and variety of foods they will accept as part of their regular diet (Cermak et al., 2010). This is commonly labeled as food selectivity.

Food selectivity is the term most often used to describe feeding difficulties for those with autism spectrum disorders. As there is no standardized definition for the term, its common usage to describe multiple conditions has created confusion and made it difficult to compare the research of various authors. Despite this, literature does exist that has made it evident that autism spectrum disorders and food selectivity are interconnected. Food selectivity has been used to

describe food refusal, decreased food variety and restricted intake to only a few frequently consumed foods (Bandini, Anderson, Curtin, Cermak, Evans, Scampini, Maslin, & Must, 2010). This has also been used to describe a child's unwillingness to try new things and strong preferences about the preparation and presentation of his or her food (Williams, Gibbons & Schreck, 2005). Selectivity by sensory components or nutritional characteristics is often focused on in the literature (Bandini et al., 2010). Many children refuse to eat foods based on aspects such as color, texture, or smell. This presentation of food selectivity, along with a low food acceptance rate, is one of the most common feeding difficulties reported for children with ASD (Sharp, Jaquess, Morton & Miles, 2011). It is estimated anywhere between 46% and 89% of children with ASD have significant feeding difficulties (Sharp et al., 2011). Children with food selectivity also tend to favor foods with specific nutritional characteristics. This often includes foods high in protein or carbohydrates (Bandini et al., 2010).

While food selectivity has been used synonymously with picky eating, researchers have begun to try to define and expand upon the differences. One of the differences is the temporary nature of picky eating that is considered developmentally normal versus the long-term food refusal characteristic of food selectivity. This pattern of behavior can have negative health effects if left untreated. These effects on the life of a child with autism can include inadequate nutrition (Zimmer et al., 2012), and decreased quality of life as a result of stressful mealtime experiences for both children and their families (Rogers, Magill-Evans & Rempel, 2011). There is some research that suggests that food selectivity is not a temporary condition that a child with autism will outgrow (Suarez, Nikola & Curtis, 2012; Bandini et al., 2010). This highlights the need for intervention to ameliorate the potential negative consequences of food selectivity over a lifetime.

There is research that suggests that food selectivity has serious nutritional implications

for children with autism. One study, conducted by Zimmer et al. (2012), found that food selectivity coupled with autism resulted in calcium, zinc, vitamin D and vitamin B12 nutrient deficiencies. Another study by Schreck and Williams (2006) showed that children with autism preferred foods high in sugar such as cakes, cookies, white bread and ice cream. Finally, food selectivity that causes parents concern about their child's diet is the number one reason for referral to dietary services (Bowers, 2002). While the long-term health implications of food selectivity in children with autism are currently unknown, there is no doubt that there are nutritional deficits due to restricted variety of foods accepted.

An additional difficulty associated with food selectivity is the impact on the family mealtime experience. In general, coping with a family member with autism is difficult for the family unit. In a study by Lee, Harrington, Louie and Newschaffer (2008), parents of children with autism more frequently reported that their child had a decreased quality of life compared to children with ADHD or unaffected children. They found that the families of children with autism were less likely to be active in the community. For example, children with autism and their families were 70% less likely to attend a religious service at least once per week than children in the two comparison groups. Also, parents in this study reported difficulty retaining a job due to the increased care needs of their child and their child's difficulty functioning outside of the home. This inherent burden felt by the families of children with autism may be compounded by food selectivity due to the stress and worry food refusal causes caregivers during mealtime. A study, conducted by Rogers, Magill-Evans and Rempel (2011), explored the challenges faced by mothers during the feeding of their children with autism. The authors conducted a qualitative interview of 11 mothers. In this study, mothers described their children's limited diets, sensory aversions to food, the need for sameness in their food, food jags, behavioral problems while

eating and additional co-morbidities. These difficulties led to a confusing and frustrating process for the involved mothers. They struggled to find foods their children would consume, catered to specific eating preferences to avoid meltdowns, managed problematic behaviors, and tried to ensure their child would receive adequate nutrition. This research highlighted the stressful process mothers endured to try and determine the extent of and the reasons for their child's food selectivity.

A possible correlation between age and food selectivity in children with autism has not been well researched. No longitudinal studies have been completed to see if children naturally add foods to their diet as they increase in age. However, several authors have completed cross-sectional work to determine a possible relationship. Bandini et al. (2010), produced results contradicting their original hypothesis by using parent questionnaires to compare food selectivity in children with autism spectrum disorders and typically developing children. They found the connection between food selectivity and age was not dependent on the presence or lack of autism spectrum disorder. The authors reported that the commonly held belief that food selectivity is outgrown with age was not supported with their findings.

Food selectivity in children with autism has a negative impact on nutrition and quality of life for families. Research suggests that this is not a transitory issue that these children will outgrow. Therefore, there is a vital need for successful intervention strategies for children with autism and food selectivity to increase intake for optimal nutrition and make mealtime a better experience for families of children with autism.

Reasons for food selectivity

Eating has become one of the most problematic areas for those that fall on the spectrum,

leading many to assume comorbidity between autism spectrum disorders and feeding disorders (Schreck & Williams, 2006). As research in this area is relatively new, it is not possible to precisely explain the reason for this common link. However, several explanations have been presented throughout the literature.

One hypothesis is that feeding disorders are purely behavioral in nature. This means a child is choosing to be noncompliant during mealtime and this inappropriate behavior is maintained by environmental events (Addison et al., 2012). These environmental events can include parental responses to feeding difficulties such as negative reinforcement in the form of escape (Gale et al., 2011). This could also include the pairing of eating with aversive events such as gagging, choking or vomiting (Addison et al., 2012). A family's eating preferences could also be related to food selectivity in a child. This theory would imply that the smaller amount of food items that a set of parents may consume would decrease the variety of foods their children would eat (Schreck et al., 2004).

Further support for a behavioral explanation for food selectivity is provided by evidence that those with ASD are more at risk for behavioral eating disorders. These include conditions such as anorexia nervosa (Rastam, 2008). This may cause health care professionals to focus on behavioral interventions.

There are challenges to the idea that food selectivity in children with autism is a purely behavioral problem. Many professionals point to feeding disorders being caused by a variety of factors (Twachtman-Reilly et al., 2008). Research has demonstrated that children with a range of conditions have both physiological and behavioral causes behind their feeding disorders (Twachtman-Reilly et al., 2008). Separation of these two elements is especially difficult with ASD. Physiologically based factors, such as sensory processing impairments, are commonly

subtle and difficult to identify. Behavioral factors, defined as “willful or volitional acts of noncompliance”, are not always behavioral, but rather a part of the symptoms and characteristics of this disorder (Twachtman-Reilly et al., 2008, p.262). Behavioral difficulties are often used to explain food selectivity in children with ASD, as a physiological reasoning is not always clear. Negative behaviors generally associated with ASD include repetitive and ritualistic behavior, difficulties concerning executive function, fear and anxiety, and impairments to social and language skills (Twachtman-Reilly et al., 2008). While these are behavioral in nature, these characteristics are part of the neurologically based symptoms of ASD (Twachtman-Reilly et al., 2008). Therefore, while behavioral elements are undoubtedly involved in the feeding routines of children with ASD, it is implausible to identify them as the only reason behind feeding difficulties. An alternate explanation being explored is a link between sensory processing disorders and food selectivity.

Another possible explanation for food selectivity in children with autism is the well-documented connection between autism and sensory processing disorders. Sensory processing disorder is an umbrella term, (Miller et al., 2007), used to describe a group of disorders that involve difficulty correctly organizing and responding to sensory input. More specifically, this can include problems modulating, integrating, organizing and discriminating this sensory input (Ben-Sasson et.al, 2009). Sensory processing disorder is broken down into three subtypes: Sensory Modulation Disorder, Sensory-Based Motor Disorder and Sensory Discrimination Disorder (Miller et al., 2007). Researchers have consistently found, in basic literature, clinical literature and first hand experiences, that children with autism spectrum disorders respond differently to sensory experiences than their typically developing peers (Tomchek & Dunn, 2007). Often, sensory difficulties are discovered before a child is even diagnosed with autism.

Data from parent reports and interviews as far back as 1982 support this idea (Tomchek & Dunn, 2007). One study by Hoshino et al. found that infants with autism were unresponsive to specific sounds, were sensitive to certain food tastes and were less sensitive to pain with greater frequency than typically developing infants (Tomchek & Dunn, 2007). Other sensory discrepancies that have been reported include abnormal excitement when being tickled, not listening when spoken to, unusual eye gaze and interest in moving objects (Tomchek & Dunn, 2007). Eventually, parents may notice their child's inability to handle certain textures, smells, tastes or sounds. These are most commonly a result of sensory modulation impairments (Ben-Sasson et al., 2009).

Sensory modulation disorders (SMDs) are seen when an individual has difficulty responding appropriately to the "degree, nature or intensity of the sensory information" (Miller et al., 2007). Unpredictable responses may cause individuals to be unable to cope with the demands of a specific situation. This inability to adapt to various sensory stimuli often leads to an inflexibility that impedes activities of daily living (Miller et al., 2007). The three subtypes of SMD include sensory overresponsivity (SOR), sensory underresponsivity (SUR) and sensory seeking/craving (SS).

Children with sensory overresponsivity respond for a longer period of time, or more intensely to a sensory stimulus, than those who are typically developing. Regardless of its expression in one or more sensory systems, SOR generally leads to a defensive response. For example, a child may be unable to tolerate the various aspects of a food such as color, odor, texture, or taste. He or she may experience physical discomfort from these factors that are pleasing or unnoticed by others. This difficulty generating functional responses is particularly apparent in transition periods and new situations (Miller et al., 2007).

Children with underresponsivity demonstrate a lesser response to environmental stimuli than a situation requires. As a child with SUR is unable to notice “the possibilities for action” (Miller et al., 2007), observers may assume apathy or lethargy is at fault. Therefore, behavior of children with SUR is commonly described as being inattentive, self-absorbed, withdrawn or unmotivated. When eating, a child may not immediately react to extremely hot food or they may seem withdrawn from a group (Miller, 2006). SUR in the proprioceptive and tactile systems may also cause poor tactile discrimination and clumsiness, leading to difficulty with the feeding process.

The third type of sensory modulation disorder is known as sensory seeking. This is when a child actively seeks an unusual amount of sensory input in a highly disorganized or maladaptive manner. This insatiable desire for sensation leads to engagement in activities that ensure intense sensory experiences but not necessarily productive. In addition to craving stimuli such as spicy food, loud noises and constant motion, children may also experience difficulty interacting with their peers in an acceptable manner. They may not recognize the significance of personal boundaries. This, and labels such as “trouble maker” or “risk taker” creates a negative stereotype for children with SS (Miller et al., 2007). Characteristics of this diagnosis, especially “constant moving, carelessness, restlessness and overexpression of affection” (Miller, Anzalone, Lane, Cermak, & Osten, 2007), are often considered socially unacceptable and hazardous.

Sensory overresponsivity, sometimes referred to as sensory sensitivity or sensory defensiveness, is the sub group of sensory modulation disorder most commonly associated with food selectivity (Cermak et al., 2010). This is commonly seen in the tactile domain, in which a child overreacts and displays a negative reaction to a tactile stimulus that typically developing children would generally be unaffected by (Cermak et al., 2010, p.243). In addition to food

refusal, a child may become distressed by messiness around his or her mouth or extreme food temperatures (Twachtman-Reilly, Amaral & Zebrowski, 2008, p.263). Oral defensiveness, a suggested component of tactile defensiveness, causes children to avoid specific textures of food, thus leading to food selectivity. A study conducted by Smith et al. (2005) used the Sensory Profile to find that children with tactile defensiveness were reported to have a fair to poor appetite, were hesitant to consume unfamiliar foods, did not eat at houses other than their own and refused foods based on temperature and smell (Cermak et al., 2010, p.243).

While tactile defensiveness may be most commonly reported in the feeding routines of children with autism, hypersensitivity in all senses can be observed during mealtime (Twachtman-Reilly et al., 2008). A child may be unable to handle the culmination of sounds during a meal, leading him or her to cry, become aggressive, yell, demonstrate anxiousness, place hands over ears or become distracted. Visual oversensitivity could lead to symptoms such as squinting, shielding eyes or averting gaze. In addition, a child could become anxious, withdrawn or distracted, causing a significant reduction in his or her intake of food.

Defensiveness in the gustatory system presents difficulty handling a variety of tastes. Parents and practitioners alike may notice this by a child's refusal of food, gagging or a preference for decidedly bland flavors. Vestibular deficits could lead to hypersensitivity due to the movement or change in position of the head, resulting in poor coordination when manipulating utensils or fear in unsupported seating. Proprioceptive hypersensitivity, causing poor body awareness and grading force, may cause presentation of symptoms such as messiness or difficulty with coordination of jaw and hand to mouth movements (Twachtman-Reilly et al., 2008).

Deficits in any or all of these sensory areas can seriously impede a child's ability to eat.

Educating parents on these areas can help make mealtime a less stressful experience for the

entire family.

Current Evidence-Based Treatments

Several types of treatments are available to address food selectivity and autism. The commonly used behavioral approach focuses on treating and decreasing specific dysfunctional behaviors occurring during mealtime. Although these treatment approaches do not go beyond treating surface behaviors associated with food selectivity and have not been tested longitudinally, various behavioral interventions have proven successful in increasing food acceptance in a clinical setting (Koegel et al., 2011). These include escape extinction and differential reinforcement.

Escape extinction (EE) is a well-known model of behavioral treatment and considered an essential element of treatment for food selectivity in this behavioral model. In this method, a child's disruptive behaviors are extinguished by preventing the child from escaping completion of the designated feeding task. In a study by Sharp and colleagues (2011), three EE procedures of varying intrusiveness were utilized. Non-removal of the spoon (NRS), during which a spoon was placed at the child's lips until he or she allowed food to be deposited, was considered the least invasive. The feeder followed the child's mouth with the spoon and blocked other disruptive behaviors such as trying to hit the spoon away. If NRS proved unsuccessful, a physical spoon prompt (SP) was used. A small baby spoon was inserted with gentle pressure between the teeth until opening occurred. When a child routinely accepted bites of food but expelled the bite, representations of expels (RP) was used. The expelled bite was scooped up and then reintroduced using a NRS technique. In this treatment approach, the child was prevented from leaving the feeding situation until they complied with food acceptance. Crying, gagging, vomiting and/or

aggressive behavior was ignored.

A second behavioral technique used in this behavioral model is differential reinforcement (DRA). In this technique, the child receives a reinforcer after a target behavior has been performed. The object is to increase appropriate feeding behaviors by providing preferred stimuli based solely on performance of target behaviors (Sharp et al., 2011). Sira and Fryling (2012) combined differential reinforcement with peer modeling to treat food selectivity in a nine-year-old boy diagnosed with autism. Peer modeling was included by involving the child's typically developing sibling in the study. This approach proved successful by increasing consumption of several foods. For example, during baseline the percentage of bites consumed of spaghetti with sauce was 0%. By the two-month follow up, this number had increased to 90%. Despite this progress, the single-subject design described in this article makes the data collected implausible to generalize until more evidence is collected. In addition, Piazza, Patel, Gulotta, Sevin and Layer (2003) concluded that reinforcement alone is not adequate for increasing food intake. Combining escape extinction with reinforcement was needed to produce beneficial effects on feeding.

While behavioral approaches to treat food selectivity have been shown in small samples to increase food intake in a clinical setting, evidence of generalization of gains to real world environments has not been established (Koegel et al., 2011). Due to the invasive nature of escape extinction and the fact that behavioral interventions target only problematic behavior, rather than probing into underlying causes of food selectivity, there is reason to explore alternate treatment approaches. In developing alternative approaches to this behavioral model there is a need to consider the entire mealtime experience. Other factors, such as the environment the child is in or the family dynamic, also come into play. A family may be very involved but learning how to

treat food selectivity at home is extremely challenging. Even if changes are seen in the child initially, this does not mean that these methods are conducive to maintenance of treatment by parents over time. Mothers have described obstacles such as food jags, sensory aversions, a need for sameness, and behavioral challenges that make it more convenient for them to cater to their child's needs rather than endure a meltdown (Rogers et al., 2011). In addition, parents who are concerned about their child receiving adequate nutrition may overly stress food intake and correct mealtime behavior, negatively affecting the atmosphere and family dynamic during mealtime (Lockner et al., 2008).

Another problematic area of the behavioral approaches concerns more aggressive elements such as escape extinction, in which the child is forced to accept a spoonful of food. This kind of forced feeding could cause further feeding deficits in the future rather than decreasing them. If a child is forced to eat on a regular basis, he or she may begin to define mealtime as a negative experience. This could cause a further decrease in food intake and lead to nutritional deficits. For example, a high level of adult control over what a child eats has been connected with unhealthy extremes in a child's weight (Farrow & Blisset, 2008) as well as an increase in food avoidance (Powell, Farrow, Meyer, 2011). Sharp et al. (2011), also stated that even in behavioral treatments, dietetic, oral-motor and sensory treatment outcomes may still be critical for its effectiveness. However, selection of nutritional sufficiency, bite sizes and food textures fall outside the expertise of behavioral clinicians. This data suggests that other options are needed to treat food selectivity.

A Promising New Approach to Address Food Selectivity Holistically

While various facets of behavioral treatment may be used, a holistic approach to treat

clients is warranted. Recognizing that client-centered therapy needs to address all aspects of a person may be the key to treatment for food selectivity that is less invasive, easier for parents to extend to the home environment, and respects the sensory processing difficulties the child may be experiencing with food. This is done by “supporting health and participation in life through engagement in occupation” (AOTA, 2008, p.626). Therefore, while the behavior of a child significantly impacts his or her feeding status, it is not the only issue. Several elements may be included in this alternate approach. These elements include sensory integration treatment to address sensory modulation deficits, systematic desensitization to reduce food related anxiety, and parent education to facilitate treatment follow through at home. This combination of elements may provide children with holistic treatment that goes beyond behavior to address the entire mealtime experience.

One example of a treatment modality included in a holistic approach is occupational therapy using a sensory integration approach, or OT-SI. According to Parham and colleagues (2007), there are key elements that need to be included to qualify a treatment approach as based on SI principles. These key elements include providing sensory opportunities, providing just-right challenges, supporting optimal arousal, creating a play context, maximizing the child’s success and fostering therapeutic alliance. In addition to these factors, a sensory integration approach utilizes various modalities to incorporate tactile, proprioceptive and vestibular input into the treatment session to encourage adaptive responses (Parham et al., 2007). Each type of input serves an important purpose. Tactile input is information received through touch. Playing with food textures would be one example of tactile input. Proprioceptive input is information received from muscles and joints. Proprioceptive-based activities, sometimes called “heavy work”, might include crawling through a tunnel or riding a bike. Vestibular input is received

through the receptors in the inner ear any time the head is moving. For example, jumping on a trampoline or walking across a balance board would provide vestibular input. While proprioceptive input is generally calming to an individual, vestibular input can be both calming and alerting depending on the speed and direction of the motion. Often activities incorporate both types of input, which are used to increase attention, decrease defensiveness and moderate arousal. Use of tactile, proprioceptive and vestibular input in treatment is in keeping with sensory integration principles. OT-SI in combination with systematic desensitization and parent education form the key elements of a holistic treatment protocol for children with food selectivity. All of these elements are included in a new clinic at WMU OT Unified Clinics. Finicky Feeders seeks to reduce food selectivity using a holistic treatment approach.

Finicky Feeders at Western Michigan University Unified Clinics

The Finicky Feeders Pediatric Clinic is found within the Unified Clinics of Western Michigan University. This clinic strives to help children who struggle with food selectivity to increase their diet in a productive, fun and interactive way. Each session is conducted as a group with four main components. This includes a sensory warm-up, a tactile or cooking activity, an oral motor activity and a clinical meal. Each of these areas plays an important role in the child's treatment. By using these areas, Finicky Feeders addresses key elements of an OT-SI approach.

The sensory warm-up is used to facilitate a "just right" arousal level in all clients, meaning he or she is calm but alert. As each participating child generally has sensory modulation difficulties, this is a great way to provide adequate stimulation as well as get the group motivated to participate. Presenting this activity as a game rather than a task increases excitement to ensure completion. The activity is generally some type of obstacle course combined with a nutritional

element. Nutrition education is imperative because children with autism commonly have nutrition deficiency and poor nutrition (Zimmer et al., 2012). This way each child learns about the food groups and nutrition while simultaneously gathering sensory-motor input to achieve a just-right arousal level. In addition to the better-known senses, each part of the activity focuses on proprioceptive and/or vestibular input, as these are essential to correctly regulating the systems of children with sensory modulation disorder. The following are several examples of the activity.

- First, a pile of cards depicting various items from the grains and proteins food groups is placed at the beginning of the obstacle course. Each child picks a card and assigns it to the appropriate group. Then he or she follows the designated course for the card they picked. For example, the “grains” route may require the child to find three items in a sand bucket, jump into a pile of beanbags, jump to each hula-hoop, bounce on the trampoline for one minute, walk across a rockerboard and finally, complete the beanbag toss. The “proteins” route may require the child to pull him or herself across the floor on the scooterboard, climb up the ladder, do the limbo, throw the ball into the basketball hoop and then complete ten jumping jacks. Both of the courses offer various sensory opportunities, focusing on proprioceptive and vestibular input to achieve a just right arousal level.
- A pile of cards containing fruits and vegetables is placed at the start of the activity. Each child picks a card, decides which food group it belonged to and then places it in the appropriate pile. Then, he or she completes the same obstacle course. The child may crawl through a tunnel of material that clung to them, complete hopscotch, use a swinging trapeze-like handle to project themselves into a crash mat, crabwalk along an

outlined path, spin on the Sit N' Spin five times and jump on the trampoline while throwing beanbags to knock down artificial bricks.

- For this activity, a variety of devices are lined up for children to transport themselves around the clinic area including a scooter board, wagon, AmTryke and tricycle. Children select a device and propel themselves around a track outlined with cones. Along the track are four stations, identified by hula-hoops with various pictures of food inside each hoop. Each station consists of a different food group. Each time the child travels around the track, he or she stops at a different station to pick up a protein, grain, fruit or vegetable. Upon reaching the start of the track, they place the selected food in the correct pile and then repeat the process until they have visited each group.
- Four stations are created. Station 1 involves crawling through a tunnel, rolling over a ball to fall into beanbags and jumping on the trampoline ten times. Station 2 involves lying in the prone position on an elevated swing and swinging back and forth to reach artificial foods. The child propels him or herself to each food by utilizing his or her arms to crawl. The child decides if the food is a “sometimes” or “always” food and places it in the designated bucket. “Sometimes” meaning healthier foods that should be eaten in moderation and “always” indicating healthier options such as fruits and vegetables that should be eaten regularly for adequate nutrients. Station 3 involves walking across a balance beam and crawling to the top of a ramp. Then the child lays their stomach on a scooter board, slides down the ramp and crashes into a large beanbag. Station 4 involves the child sitting on a different swing with their legs crossed, holding on with one hand and hitting a balloon thrown by a therapist with another hand. Each child starts off at a different station and has to pick a card and decide which food group it belongs to before

completing the activity at that station. The children repeat the activity at their respective stations for one minute, and then rotate to the next one.

Variations to the above strategies were made to grade the sensory-motor activity based on the progress of the group and any unexpected behavior. This could include increasing the number of food groups to categorize, doing a relay race instead of an obstacle course or having an uncooperative child complete an activity away from the rest of the group.

While the children are engaged in the sensory-motor activity, parents are educated briefly on the various aspects of feeding. This is intended to help caregivers understand the reasoning behind therapeutic activities as well as receive suggestions from therapists to make mealtime a better experience at home. This also helps to obtain feedback from parents about each child's progress and what foods they should be trying to incorporate into their diet. Sharp et al. (2011) found that utilizing caregiver input and training caregivers not only helped to improve their children's feeding repertoire but also maintain their progress after treatment concluded. Similarly, involving parents at Finicky Feeders assists with continuing treatment techniques at home to increase the likelihood of improving their child's diet.

The oral motor activity follows next in order for the group to practice skills that are necessary for the feeding activity. Here, the focus is on strengthening as well as coordination of oral muscles and the tongue. These goals are achieved through an exercise such as blowing bubbles, using straws to blow cotton balls, chewing gum, singing songs, using whistles or imitating faces in the mirror to practice sucking and blowing abilities necessary for eating. Besides strengthening, an activity like chewing gum or sucking on candy can act as a modulating force that can help an individual focus on the task at hand.

The goal of the tactile activity is to explore textures and food in a nonthreatening and fun

atmosphere. Often, a cooking activity can be combined with tactile play to achieve this. A variety of creative methods are used to make food less threatening for the children and to decrease any discomfort they may have. Overcoming fear and discomfort associated with incorporating new foods into a diet is very difficult for children with sensory modulation deficits and this activity assists by working in small increments. This activity often involves messy play, such as finger-painting with pudding or drawing pictures with spaghetti noodles. This way, the child works to slowly overcome any oversensitivity to stimuli by becoming more familiar with various textures through the context of play.

Two times each week, a clinical meal is provided with a variety of foods to work towards each client's individual feeding goals. The children are encouraged to try new foods or reintroduce items that were previously attempted. The child works with the same therapist each week to establish necessary rapport and trust to assist the individual with the difficult process of trying new foods. Each child uses a series of steps to slowly progress towards foods they regard with uncertainty. First, a child tries having a plate with the new food in front of him or her. Then, they advance to smelling the food, then touching it and then bringing it to their lips. From here they move to touching the food with their tongue and then teeth. Finally, if they get through this sequence, they are encouraged to eat the food item. As they follow this sequence, the children place a sticker on each illustrated item as a reinforcer to help them understand each small step is a success.

This steps-to-eating approach is supported by available research on systematic desensitization. Koegel et al. (2012) used a very similar design to see if utilizing individual reinforcers and hierarchical exposure would help to increase food flexibility in children with ASD. By the end of a 22-week period, all three participants had increased the number of foods they

would accept since the initial baseline. Level seven of the utilized hierarchy was defined as accepting the food without signs of displeasure or disruptive behavior. For the 10-week period prior to intervention, the total number of foods accepted remained at zero for all three children even though they were given opportunities to add new foods to their diets. At the end of intervention, each child accepted between five and nine foods at level seven. All participants also requested new items for consumption by the end of the study. Another study by Koegel et al. (2004), examined systematic desensitization to treat hypersensitivity to auditory stimuli for children with autism. Researchers tailored a systematic desensitization hierarchy for each child, resulting in the ability to tolerate a stimulus that was once intolerable. This research suggests that the coupling of interventions (Cermak et al., 2010), such as differential reinforcement and systematic desensitization, with sensory integration can successfully increase a child's food repertoire. It also emphasizes that the treatment of food selectivity is a slow, gradual process.

This research supports a crucial part of the Finicky Feeders program. Utilizing systematic desensitization has helped to increase the number of foods in children's diets. It focuses on the success rather than the failure involved in the attempt to try a new food. For example, when using our previously discussed hierarchy, if a child spits out his or her food, they would have actually succeeded in accomplishing at least five steps, demonstrating significant progression. In addition to this less threatening approach, parents are also taught to use a passport. Parents help the therapist to determine which foods their child needs to work on and a passport is created with these foods. Sharp et al. (2011) used a similar method of parental involvement and found promising results. Parents transport the passport between home and the clinic. When at home, parents check off food when their child is exposed to it at any level on the hierarchy. Therapists keep track of the passport during the clinical meal. This method helps to increase food

repertoires as well as working towards appropriate nutrition (Cermak et al., 2010).

Conclusion

There is no doubt that the elements of behavioral treatments increase food acceptance in a clinical setting. However, there is a need to address the problem holistically, including sensory processing deficits and the mealtime experience for the family. Treatment needs to address a child's inability to process sensory information incorrectly, a trait of physiological origin rather than volitional behavior. Using this multifaceted approach in combination with information from current evidence-based research is a promising line of treatment for food selectivity.

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