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Individual Case Study: The SOS Approach to Feeding

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Capstone Paper:

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It is estimated that feeding problems occur in up to 25% of typically developing children and up to 35% of children with neurodevelopmental disabilities (Volkert & Vaz, 2010). Feeding problems are commonly defined as the inability or refusal to eat novel foods or a variety of foods and textures (Arts-Rodas & Benoit, 1998). Areas of difficulty typically occur around the following themes; selective eating, food textures, swallowing, decreased appetite, limited interest in feeding, and mealtime behavior (Haywood & McCann, 2009). Feeding difficulties are often the presenting symptoms for developmental delays, cognitive or emotional disorders, and/or other medical diagnoses (Davis, Bruce, Cockin, Mousa, & Hyman, 2010). Occupational therapists provide interventions for feeding difficulties in children, often focusing on enhancing occupational performance by applying techniques to improve oral motor skills and educating caregivers on how to promote feeding interactions.

Occupational therapy has a long-standing expertise in understanding and working with activities of daily living that include involvement in the feeding, eating, and swallowing performance of individuals across the life span (AOTA, 2007). Occupational therapists use a variety of approaches to feeding, including flooding, oral motor approaches, behavioral approaches, and systematic desensitization (Boyd, 2009). However this case study focuses solely on the Sequential Oral Sensory Approach developed by Dr. Kay Toomey.

The Sequential Oral Sensory Approach to Feeding, commonly referred to as the SOS Approach to Feeding, began in the mid 1980's (Toomey & Ross, 2011) in response to increasing use of gastrostomy (G) and nasogastric tubes (NG). G/NG tubes are used to promote intake in children that are unable to independently eat well enough to grow appropriately. Due to the

increase in non-oral feeding, it became apparent that a plan for tube removal was necessary. The SOS Approach to Feeding was developed to do just that; provide intervention strategies to help the child transition from tube feeding or non-oral to PO or oral feedings (Toomey & Ross, 2011). According to the SOS approach it is necessary to consider a perspective of the whole child, encompassing the areas of sensory, motor, oral motor, behavioral, medical, nutrition, and the environment as they relate to a child's ability to eat. The goal of the SOS Approach to feeding is to "increase the range and volume of foods the child will eat through a play-based intervention" (Toomey & Ross, 2011, pg. 86). Success of the program is determined through interest in trying new foods, appropriate skills for eating and drinking (level of acceptance on the SOS Food Hierarchy), consumption of sufficient calories, and improved family functioning during meal times.

Currently, there is minimal research within the literature, on the effectiveness of the Sequential Oral Sensory (SOS) Approach to Feeding in increasing the number of new foods accepted as well as the level of food acceptance on the SOS Food Hierarchy. In addition, what little research is done on the SOS Approach to Feeding primarily focuses on the purpose and goals of the approach. An individual case study would be beneficial for adding to the current research on the SOS Approach.

The purpose of the individual case study was to determine if the SOS Approach to Feeding is effective in improving the number of new foods a child accepts in his or her diet when treated within the outpatient clinic located within Virginia. Effectiveness of the individual case study was determined as noted by the number of new foods accepted as well as the level

of food acceptance on the SOS Food Hierarchy in the participant's daily diet pre and post eight-week intervention.

The results of this case study may help provide support for identifying the SOS Approach to Feeding as a primary feeding intervention used at the outpatient clinic, where the researcher is employed. Within the clinic, feeding evaluations and interventions are completed by both occupational therapists and speech therapists trained in a variety of approaches such as oral stimulation, negative reinforcement, positive reinforcement, systematic desensitization, and/or flooding. Therapists are allowed to choose their treatment approach based on training and mentoring. Within the policies and guidelines, this outpatient clinic in Virginia has not defined an approach to feeding that is used throughout the organization. By identifying a standard approach to treatment, it may help to assure treating therapists are trained in an advanced feeding intervention for improved quality of care.

Literature Review

Feeding and Eating

Eating is defined as "the ability to keep and manipulate food or fluid in the mouth and swallow it" (Toomey, p. 687, 2002). Eating is considered to be the most complex physical task that humans engage in. Eating utilizes all of the body's organs, including the brain, cranial nerves, heart, vascular system, respiratory, endocrine, and metabolic system, all muscles of the body, and the entire GI tract (Toomey, 2002).

In addition, feeding involves the coordination of all the sensory systems and the ability to manage motor coordination which begins instinctively, however this is only for the first few months of life. Feeding also provides a context for the development of relationships between

infants and their primary caregivers, which is the basis for bonding and attachment (Bahr & Johnson, 2013). Within the first few months of life, the child is dependent on his or her primary caregivers during mealtimes. Around the age of six to nine months, the child moves from dependency and begins showing interest in use of a spoon. By the age of twelve months, the child is finger feeding a variety of textures and by age of eighteen months, the child is then able to independently use a spoon with minimal spillage. Feeding then becomes an avenue for children to develop independence and mealtimes are considered to be the social time that is central to all cultures (Bahr & Johnson, 2013).

Development of Feeding and Eating

Feeding has several purposes in both infancy and childhood. First and foremost, it is a biological skill that is essential for survival. Feeding provides the foundation for development of relationships between a child and his or her primary caregiver and is the basis for bonding and attachment. When feeding goes well for a child, his or her needs for physical and emotional closeness are met and feeding then becomes an environment in which to learn and explore. In addition, when feeding is going well it becomes an avenue for children to develop autonomy, cognitive and developmental maturity, as well as independence in participation in mealtimes (Bahr & Johanson, 2013).

During infancy and childhood, feeding serves several purposes. Feeding is considered to be the most biologically based early skill and quality feeding development and nutrition is necessary and essential for a positive quality of life for children (Bahr & Johanson, 2012). Typically developing newborns are born with the ability to suck and swallow and they are able

to coordinate sucking bursts with pauses to breathe. As the infant matures past the four months of age, eating becomes more of a learned behavior. However, when the typical feeding progression is disrupted, a feeding problem may occur (Chamberlin, Henry, Roberts, Sapsford, & Courteny, 1991).

The critical learning period for feeding development is between the ages of birth to two years, as essential and crucial skills related to feeding and eating are developing during this period. By the age of two, children should demonstrate mature, adult-like oral motor skills including a rotary chew, tongue lateralization, sustained bite, and ability to move tongue tip to place and collect food for chewing and swallowing (Bahr & Johanson, 2013). Dr. Kay Toomey (2002) identified six skills that need to be established in order to achieve successful eating. These six skills include; postural stability, oral motor skills, jaw skills, sensory skills, hand to mouth skills, and parenting skills.

Toomey (2002) identified postural stability as an essential skill for successful feeding. Postural stability refers to the ability to maintain the position of the body within specific boundaries of space. In a younger child, the ability to sit upright is critical for self-feeding and ability to eat more difficult foods. Also, the lack of appropriate seating allows the child to get in and out of their chair during meals. In addition to postural stability, Toomey (2002) identified oral-motor skills as an essential skill for successful eating. As previously discussed, a child's oral motor skills should be fully developed by the age of two. The oral motor skills necessary to eat table foods are different than those needed to take from the breast or bottle. A child is typically able to develop the ability to move food from the front of the mouth to the back within a month of being introduced to solids. Between the ages of seven and nine months, the

child is then able to cup the tongue for the spoon and demonstrate appropriate lip closure around the spoon. As the child develops, he or she is able to demonstrate tongue lateralization, which is essential for moving the food to the rear molars for success eating table foods (Toomey, 2002).

The third essential skill for feeding is jaw skills, which begins around the age of nine and ten months as the child learns to break foods apart. This skill is most often referred to as munching. The child then develops a more mature jaw movement, known as a rotary chew, during the ages of twelve to fourteen months as the child is introduced to chewy texture foods (Toomey, 2002).

The fourth skill identified by Dr. Kay Toomey is sensory skills. As previously mentioned, eating requires the integration of all eight of the sensory systems; hearing, touch, seeing, tasting, smelling, balance, awareness of body in space, and information received from one's joints. In order for a child to eat table foods, he or she must be able to integrate the information from all eight of the sensory systems (Toomey, 2002).

The fifth skill is the hand to mouth skills. Self-feeding skills are typically mastered by the age of fourteen to sixteen months of age and the use of a spoon for self-feeding should be seen by the age of three. The sixth and final skill identified by Toomey (2002) is the parent's role. It is essential that the caregivers teach their children how to eat; including developmentally appropriate foods, making meal times enjoyable, and focusing on the mechanics of the task of eating (Toomey, 2002).

Parents, caregivers, and physicians should monitor the above skills to track and facilitate feeding development. This will allow the caregivers and/or professionals to know which

specific skills to encourage, when to encourage the skill, and to identify if the child needs to be referred to a feeding specialist for concerns in any of these areas (Bahr & Johnson, 2013).

Feeding and Eating Concerns

It is estimated that feeding problems occur in up to 25% of typically developing children and up to 35% of children with neurodevelopmental disabilities, including eating too much or too little, delay in the skill and mechanics of eating, limited food preferences, delay in self-feeding, and/or display of other meal time challenges (Volkert & Vaz, 2010; Howe & Wang, 2013). Schwarz (2003) found that the percentage of feeding difficulties significantly increases within the population of children with motor and/or cognitive disabilities ranging from 30-90% (Schwarz, 2003). In addition, the evidence of malnutrition has been reported in to be up to 90% of children with cerebral palsy that are non-ambulatory. Also, feeding concerns in children with autism has been reported to be as high as 90% (Volkert & Vaz, 2010).

Research suggests that parental report of feeding difficulties in early childhood is around thirty percent and areas of difficulties tend to include self-feeding, oral aversion, mealtime behaviors, selective eating, poor interest in food, poor appetite, and vomiting/gagging during meals (Haywood & McCann, 2009). Schwarz (2003) divided feeding difficulties/disorders into two main categories; functional motor disorders and aversive feeding behaviors. The first category, functional motor disorders, includes problems of oral-motor coordination, swallowing and, esophageal function. The second category includes aversive feeding behaviors typically found within children of autism. Aversive behaviors/problems include food refusal, choking, gagging, and/or spitting, as well as sensory-based feeding problems such as tactile defensiveness (Schwarz, 2003).

In addition to the above concerns, research has found that the most frequently identified concerns for feeding problems include gastroesophageal reflux disease (GERD), dysphagia, and swallowing disorders (Schwarz, 2003). Complications associated with the concerns stated above include increased hospitalizations, increased cost of care, and decreased quality of life for these children (Schwarz, 2003).

When children are diagnosed with one or more of the above stated feeding concerns in early childhood, the most serious consequences include poor growth, compromised heath and brain development, and the possibility of death in the most severe cases (Howe & Wang, 2013). A young child's brain is highly dependent on the nutritional adequacy of the diet and therefore inadequate intake of nutrition places the child at risk of neurodevelopment impairment and decreased motor, cognitive, language, and emotional development (Howe & Wang, 2013). Bahr & Johnson (2013) found that early malnutrition is directly linked to several health concerns later in life, including hypertension, cardiac disease, and obesity. In addition, these children are more likely to have a developmental delay and emotional and behavioral disorders (Bahr & Johnson, 2013).

Impact on Child and Family

Children who are diagnosed with a feeding problem often present with unique challenges as they fail to thrive despite the best efforts of the family. When children are suffering from feeding difficulties, the parents often describe feeding as a major source of stress and frustration (Howe & Wang, 2013). There is an increasing amount of research within the literature that is looking at the impact of feeding difficulties within the family structure.

Ramos-Paul et al (2014) completed a cross sectional survey study on 1,090 children to measure the effect of a child's eating habits on the family's level of stress related to meal times within the home. The results of the study found that levels of family stress related to meal times were higher in children who are picky eaters vs. healthier eaters ($p=0.007$). Higher levels of stress within the home can lead to negative behavioral consequences or change in the family dynamic, which may further exacerbate feeding disorders. In addition, the study found that picky eating behaviors may aggravate a child's relationship with his or her family and mealtimes often end in an argument (Ramos-Paul et al, 2004).

Bahr and Johnson (2013) also describe the parental distress and frustration among families that have children with a feeding difficulty. This stress can also have an effect on the parent's ability to be sensitive and respond to the child during mealtimes, which may then interfere with the child's desire for autonomy and independence.

A qualitative study by Fereday, Thomas, Forrest, and Darbyshire (2009) examined the impact of tube feeding on the lives of children and parents from the parents' perspective. The study found that tube-feeding a child at home severely impacted all areas of family life. This ranged from administering dietary formulas to their child often over 24 hours, constantly planning ahead to accommodate activities, being the child's 'case manager' and primary communicator between health professionals, curtailing social activities due to lack of respite care, and coping with the negative, prejudiced attitudes of people when going out in public with their child. The study described parents' personal experiences as they tried tirelessly to provide adequate nutrition for their child, only to find that their child failed to thrive and grow and subsequently required tube-feeding at home.

As mentioned above, when children are suffering from feeding difficulties, the parents often describe feeding as a major source of stress and frustration (Howe & Wang, 2013). Due to stress and/or concern, parents of children with feeding difficulties will then often seek guidance from their pediatrician. A pediatrician may refer the child for an occupational therapy evaluation.

Role of Occupational Therapy

Occupational therapy has a long-standing expertise in activities of daily living that includes involvement in the feeding, eating, and swallowing performance of individuals across the life span (AOTA, 2007). Occupational therapists provide interventions that are focused on facilitating an "individual's ability to participate in feeding and eating activities that are valued and meaningful to that person, such as learning to eat independently, joining friends for lunch, or feeding a child" (AOTA, 2007, p. 686). In addition, occupational therapists provide interventions for feeding related issues in children, often focusing on enhancing occupational performance by applying techniques to improve oral motor skills and educating caregivers on how to promote feeding interactions (Howe & Wang, 2013).

Occupational therapists view children and families through a holistic lens when evaluating and treating children with feeding difficulties. According to the Occupational Therapy Practice Framework, feeding and eating are considered to be activities of daily living and therefore it is within the scope of occupational therapy to promote improved participation during meal times (Bartling & Ausderau, 2013). The research shows that occupational therapists use a variety of approaches for treating children with feeding difficulties. Specific

interventions for feeding include flooding, oral motor approaches, behavioral approaches, and systematic desensitization (Boyd, 2007).

Intervention Options

Pediatric feeding disorders are complex and require specialized intervention approaches. Within the literature, there are few specific intervention strategies for infants and children with feeding disorders. Currently, the major theoretical approaches include flooding, oral motor approaches, behavioral approaches, and systematic desensitization. Despite the theoretical differences of the interventions, the most common thread within the approaches is the use of a multidisciplinary team typically comprised of a physician, nutritionist, speech and/or occupational therapist, and physiologist, (Boyd, 2007). Below is a description of the theoretical approaches to feeding intervention.

Flooding is described as an intense and rapid exposure to the feared stimulus and the treating therapist is in control of the rate and intensity of exposure to the stimulus, which is opposite of the systematic desensitization approach. With a flooding approach, the therapist places a small amount of food on the lips or inside the mouth. After five to ten seconds, another small amount of food is placed and this sequence is repeated until the meal is over, and the pace should not be interrupted (Benoit & Coolbear, 1998). Flooding is considered to be a learned-based approach of intervention and is used to help reduce anxiety and avoidance during mealtimes (Boyd, 2007).

Systematic desensitization is defined as a slow and gradual exposure to the source of fear, which is food when specifically providing intervention for feeding. The child is in control of the rate and also the exposure of the food (Benoit & Coolbear, 1998). The SOS Approach to

Feeding has established an eating hierarchy as the protocol to advance the child forwards with exposure and experiences of a variety of foods and textures (Boyd, 2007). Using this approach to intervention the food may be introduced weeks after the start of the treatment and is guided by the child's reaction to the food. Benoit and Coolbear (1998) describe an advantage of this approach is that the child rarely becomes upset during an intervention session.

There is minimal research on the description and/or effectiveness of an oral motor approach to feeding intervention within the pediatric population. Hwang et al (2010) describe an oral motor/stimulation approach to intervention as a stimulation program that provides both peri- and intraoral stimulation provided to the lips, cheeks, gums, and tongue. The Beckman Oral Motor Protocol is an example of an oral motor approach, which provides movement strategies to activate muscle contraction and movement against resistance to build strength. The focus of this specific intervention is to increase functional response to pressure and movement, range, strength, variety and control of movement for the lips, cheeks, jaw and tongue (Hwang et al, 2010).

Howe & Wang (2013) define behavioral interventions as "treatment strategies based on operant learning principles" (pg. 407). Behavioral interventions include however are not limited to the following strategies; differential attention, positive and negative reinforcement, physical guidance, discrimination and shaping (2013). The literature has found that behavioral interventions are effective for children that have a variety of diagnoses and across a variety of settings and are effective in improving a child's appetite, acceptance of food, oral intake, and mealtime behaviors (2013).

Without the proper intervention, negative and/or aversive behaviors associated with the feeding disorder will most likely increase and worsen over time. Therapists often fine it challenging to initiate a treatment with a child who is currently displaying negative or aversive behaviors without using some type of a behavioral approach to treatment. Within the literature, behavioral interventions have been found effective in the treatment of childhood feeding disorders. Examples of behavioral treatments include, positive reinforcement for the acceptance of food, ignoring inappropriate behavior, and the use of systematic desensitization which includes stimulus fading, shaping, and structured meal schedule (Clawson & Elliot, 2014).

When considering the use of evidence-based interventions for feeding difficulties, it is essential that the therapist and/or multidisciplinary team take in consideration the individual needs of the patient and family. In addition, it is necessary that they also coordinate treatment across disciplines and identify the most ideal collaborative treatment that will lead to the desired long-term outcomes (Clawson & Elliot, 2014). The SOS Approach to feeding is one example of a transdisciplinary program that is further described in the following section.

SOS Approach to Feeding

Toomey and Ross (2011) define the Sequential Oral Sensory Approach to Feeding (The SOS Approach) as "a transdisciplinary program designed to assess and address the reasons why a child is struggling to eat" (p. 82). The program is designed to assess and address the reasons why a child is having feeding difficulties and assessment occurs across seven different areas of human functions. The seven areas include organs, muscles, sensory, learning, development, nutrition, and environment. The approach is holistic as it includes the whole child perspective

including the integration of sensory, motor, oral motor, behavioral, medical, and nutrition factors during both the initial assessment and intervention.

The SOS approach was conceptualized in the mid 1980's and development continued into the early 1990's secondary to the increase in use of gastrostomy and nasogastirc tubes, which were being used to promote intake for children who were unable to eat well enough to grow (Toomey & Ross, 2011). The SOS Approach was initially developed in order to help better understand how children learn to not eat, identify why a child may need a supplemental tube feeding, and provide strategies to help a child transition off of a tube feeding. Since the initial development, the approach has developed and expanded to include a transdisciplinary approach to treatment including the ability to understand and treat a child who is not eating. Further description of the guidelines of the SOS approach and the description of a multi-disciplinary approach is provided in further detail in the following paragraphs.

In the SOS approach to feeding, difficulties are considered predominantly body based, as the child's behavior is understood as a means of communication as well as learned behavior from past feeding experiences. If the child has had positive mealtime experiences in the past, he or she has the ability to appropriately manage the food and they have learned that eating is a pleasurable experience. However, if the mealtimes have been difficult in the past, the positive reinforcement is lacking and the child often learns that eating is to be avoided. The goal of the SOS approach is to teach the child how to physically manage the eating so that he or she does not need to avoid feeding experiences (Toomey & Ross, 2011).

The SOS Approach is a transdisciplinary approach to feeding that is designed to systematically desensitize problem feeders to food. Transdisciplinary refers to a group that

works jointly using a shared conceptual framework that draws together concepts, theories, and approaches (Mitchell, 2005). The team includes a speech therapist, an occupational, therapist, a dietitian, developmental pediatrician, and pediatric psychologist. The SOS Approach to Feeding allows the child to be exposed to a wider range and variety of foods and uses strategies to teach the children how to explore through touching, smelling and eating a variety of foods in order to improve their caloric intake and increase their height/weight growth trajectory (Boyd, 2007).

The assessment portion of the SOS program addresses any physical reasons for the feeding concerns and ensures these concerns are taken care of medically and also addresses nutritional deficits of the child. Also, recommendations for intervention will be made following the initial assessment, based on the child's skills for feeding that include developmental, sensory, motor, oral-motor, and cognitive skills. The intervention approach is typically a twelve-week program that is based on the typical developmental steps involved with feeding (Benson, Parke, Gannon, & Munoz, 2013). Boyd (2007) described a typical session of the SOS approach as a set routine that exists for each of the sessions. Each session includes sensory/perceptual preparation, sitting stability, breathing and oral-motor exercise, hand washing, and a description/teaching about the food being presented that day. The therapist will then present a variety of foods of different sizes, textures, shapes, colors, and consistency in order to improve a child's oral motor skills and sensory deficits. The goal of the approach is for each child to be able to advance up the 32 Steps to Eating Hierarchy with each food that is presented (Boyd, 2007).

The 32 Steps to Eating Hierarchy is divided into five main categories; tolerates, interacts with, smells, touches, and tastes. The toleration step includes five steps beginning with tolerating the food in the room to looking at the food when directly in front of the child. The second step is the child interacting with the food through assisting with preparation through touching the food with another food. The third step is smelling the food. This step ranges from smelling the food from just the odor in the room to leaning down or picking up the food to smell. The fourth step is for the child to touch the food with just his or her fingertips to touching the food to the tip or full tongue. The fifth and final step to eating is to taste the food. This step ranges from the child licking the food to his or her lips or tongue to chewing and swallowing the food independently (Toomey, 2002).

In addition to moving through the hierarchy, the purpose and success of the SOS Approach is to teach children the skills necessary for eating and to develop an enjoyment of eating. Success according to the developer of the SOS approach, is determined through the following criteria; sustained interest in trying novel foods, appropriate skills of eating and drinking developmentally appropriate foods, consumption of appropriate caloric intake for optimal growth and development, and improved family functioning during meal times (Toomey & Ross, 2011).

Toomey and Ross (2011) identified two research studies that examine the SOS Approach. The first study by Boyd (2007) examined the progress of children in SOS A Feeding Groups after twelve-week segments of intervention. The study consisted of 37 children who were between the ages of 18 to 61 months. Twenty-one of the participants were males and sixteen were females. The purpose of the retrospective within subject design study was to

determine if the SOS Approach to Feeding within a group setting significantly increased the number of foods a child ate. Archival data was provided by Toomey and Associates, Inc between October 2004 and October 2006. In addition, the three-day diet history form, which was completed by the participant's caregivers prior to initial assessment and then at the completion of each of the twelve-week program was reviewed.

The results of Boyd's study found that children who participated in the twelve-week Group SOS Program, increased their number of foods by 41%. In addition, those that completed a second round of the program were eating an addition 17% of new foods (Boyd, 2007). As identified by Boyd (2007), the limitations of the study included the fact that the study was completed using archival data and the three-day diet histories completed by parents were very inconsistent. This led to assumptions about the actual foods and Boyd (2007) suggested that future studies have the parents list foods the child ate prior to the program and foods eaten after the program. Another limitation of the study was that the population of the study only included those who attended a twelve week, feeding group at the STAR Center and may not generalize to all children with feeding difficulties (Boyd, 2007).

A pilot study by Creech (2006) also looked at the SOS Approach to feeding with ten children between the ages of seventeen and thirty-one months. Each of the ten participants was presented with the same seven foods ten weeks apart in a pre and post assessment. The results of the study found that the children who participated in the SOS approach to feeding demonstrated an increase in positive mealtime behaviors that included smiling, positive vocalizations, and interactions with their caregivers. In addition, they had an increase in interactions with their food and a decrease in negative behaviors. The researcher also noted

decreased negative behaviors, as well as decreased aversive behaviors including gagging, vomiting, finger splicing, and head turning (Toomey & Ross, 2011).

Benson, Parke, Gannon, & Munoz completed a study in 2013 to examine the outcomes of the Sequential Oral Sensory (SOS) Approach in children with feeding dysfunction. The study was a retrospective design, with each child serving as his or her own control and there was no target behavior. The sample size was thirty-four children ages 30 to 92 months who had received the SOS Approach to Feeding intervention. The results of this study indicated there was no statistically significant difference in outcomes related to age ($p = .487$) and no significant relationship between diagnosis and the indication of a positive trend ($p = .116$). The researchers concluded that the SOS approach was beneficial for children with neurological impairment who demonstrated a consistent response to intervention as (Benson, Parke, Gannon, & Munoz, 2013).

In conclusion, the above research articles demonstrate that the SOS Approach to Feeding intervention is currently being used in many settings, including the outpatient setting, by occupational therapists as well as speech language pathologists as an intervention for feeding selectivity and refusal (Boyd, 2007, Creech, 2006, & Benson, Parke, Gannon, & Munoz, 2013). However, there is minimal research on the effectiveness of Sequential Oral Sensory (SOS) Approach to Feeding in increasing the number of new foods accepted as well as the level of food acceptance on the SOS Food Hierarchy. In addition, what little research is done on the SOS Approach to Feeding primarily focuses on the purpose and goals of the approach. The purpose of this study was to determine if the SOS Approach to Feeding was effective in

improving the number of new foods a child accepted in his or her diet when treated within the outpatient clinical setting.

Methodology

A case study is an ideal methodology when a holistic, in-depth investigation is needed (Tellis, 1997). Yin (2009) defines case study research as an "empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (p. 18). According to Yin, a case study design should be considered as a methodology when (a) the focus of the study is to answer the "how" and "why" questions; (b) the behaviors of the participants in the study cannot be manipulated; (c) the contextual conditions are being covered as they may be relevant to the phenomenon of the study; and/or (d) the boundaries between the phenomenon and the environment are not clear (Baxter & Jack, 2008). A case study was chosen based on Yin's (2009) criteria regarding answering how or why questions. Although the purpose of the study was not worded as a how or why question, it examined how the SOS Approach to Feeding might result in an increase in acceptance of foods within the child's daily diet.

The case study methodology was chosen because the researcher was examining a single child's response to a specific feeding intervention protocol. A single case study is a type of qualitative study that provides an in-depth exploration of a program, in one unique individual. The individual case was bound by both time and a specific activity or program, and the information is collected using a variety of data collection procedures over a sustained period of time (Creswell, 2009). The purpose of the case study was to determine if the Sequential Oral Sensory Approach to Feeding would result in an increase in the foods accepted by the participant as noted by the number of new foods as well as the level of food acceptance on the SOS Food Hierarchy for a child between the ages of two and six years. Once the participant had

been identified and consent had been received, the eight-week intervention began. Currently, there are no guidelines for the length of individual intervention using the SOS approach to feeding. The researcher and mentor identified and agreed on an eight-week intervention for this case study based on clinical judgment that individual sessions are more intense than a group setting which is the typical course for the SOS Approach.

Recruitment

The investigator contacted parents or guardians that were on a waitlist for a feeding and eating evaluation and intervention. The investigator had approval to view the wait list and contact the parent or guardian. The investigator then began the screening process beginning with the child who had been on the wait list the longest. Patients awaiting services for feeding concerns at the clinic are considered to be "high priority" and typically do not wait more than a week or two for an evaluation. The investigator then worked through the wait list until a child was identified as meeting all of the inclusion criteria. Inclusion criteria included that child was between the ages of two and six, was less than 80% dependent on a g-tube, and had a diagnosis of oral aversion or feeding difficulty. The information to determine whether the child met the criteria was identified on the referral/script and the child was determined by the researcher to meet or not meet the criteria prior to the investigator contacting the parents. The parent or guardian was then contacted to schedule an occupational therapy evaluation. During the evaluation, the informed consent began with the investigator explaining to the potential subject's parent or guardian what the purpose of the case study was. Once the family agreed to be a part of the case study, they were then given a parent consent form to review and sign.

If able to, the child would also be asked if he or she agrees to participate in the study via oral assent as a yes or no response. The response would then be documented on the parent consent form and witnessed by the researcher.

During the initial evaluation, the case study was explained and the parents were asked if they would be willing to participate based on the inclusion and exclusion criteria. The investigator then reviewed the purpose of the individual case study and the possible risks and benefits of being a participant. Once educated, the parents then decided on whether they would like to be the participant of the study. During the initial occupational therapy evaluation, the parents (mother and father) agreed to participate and signed the consent form. At that point, the recruitment was completed and participant was identified.

Participant

The participant was a 2-year-old male with a diagnosis of oral aversion following a complex history of a liver transplant who was referred for an occupational therapy evaluation by his primary care physician. The participant has a history of feeding difficulties since the age of three months of age and has a history of an NG tube following a liver transplant surgery. In addition, the participant has a history of developmental delay however has not received any therapeutic (occupational therapy, speech therapy, or physical therapy) services in the past. The participant lives at home with his mother and father and his maternal grandmother is considered to be a primary caregiver as well.

Instruments for Data Collection

There were two instruments used for data collection. The first instrument was the 3-Day Food Diary which is a standard form used during feeding evaluations at the outpatient clinic. The diary was completed by the parent during the initial evaluation, prior to the first session (week one) and then completed again following week eight. The second data collection instrument was the Food Tolerance Hierarchy Chart, which is a clinical tool that evaluated each step of eating through clinical observations (Toomey & Associates, Inc. 4th Revision). The investigator completed the hierarchy charts, located within the results section, during each of the eight intervention sessions.

In addition to the instruments, the parent of the participant was interviewed using three pre-determined interview questions (Appendix A). Pre-intervention questions were asked during the first week of intervention and post-intervention questions were then asked following the completion of the eight-week intervention. These questions were developed based on guidelines for occupational therapy practice in the area of feeding, eating, and swallowing (AOTA, 2007) and provided pertinent information as to the participant's feeding experience pre and post intervention. In addition, data was collected each week via the steps to food hierarchy chart, which was developed by Toomey and Associates as the data collection tool for the SOS Approach to Feeding program.

Description of Intervention

Below is an outline of the protocol for each of the eight-individual treatment sessions, as per the SOS Approach to Feeding guidelines and recommendations (Toomey & Ross, 2011). The type of SOS Approach to Feeding is dependent on the child's developmental age and individual needs. Per the SOS recommended guidelines, typically the children who are younger than 18 months are referred for individual sessions and children between the ages of 18 months and 5-6 years of age are to be enrolled in a peer-feeding group. Children older than 7 years of age are either enrolled in an individual or group following an adaptation of the SOS Feeding Program referred to as the "Food Scientist Adaptation (Boyd, 2007). Based on the recommendations of the SOS Approach, the participant would have received intervention in a peer group however the facility in which the study took place does not allow group services.

Each of the eight intervention sessions looked very similar in format; however, the foods changed per session and varied due to the participant's current daily diet, preferred foods, and foods provided by the family. Food selection for week one and eight contained the same foods for comparison of intervention. This was different than the SOS protocol and guidelines however the same foods were essential for data collection and analysis. The data collected at weeks 1 and 8 were then examined descriptively to determine changes pre and post intervention. In addition, the foods were presented in the same order, based off of chaining of the hierarchy as this is part of the SOS protocol.

"The Steps to Eating Hierarchy characterizes the necessary progressive steps to actual consumption of foods" (Boyd, p 36, 2007). The hierarchy has six main steps and then there are several smaller steps within each of the six main steps. The first step is tolerating the food and

begins with the child tolerating being in the same room as the food and moves up to tolerating the food in their personal space. The second step is interacting with the food without any direct contact of the food on the child's skin. The third step is smelling the food and the highest step within this tier is for the child to be able to bend down and directly smell the food from the table. The fourth step of the hierarchy is to touch the food, beginning with their hands and moving up their arm and towards their face and finally to their lips and teeth. The fifth step is to taste the food. This step begins with simply licking the food from their lips and then biting off a piece of the food and spitting out. The sixth and final step is for the child to eat the food. The child will successfully complete the hierarchy when they have independently chewed and swallowed the food (Toomey, 2002).

The SOS Approach to Feeding has outlined a set routine for each of the feeding therapy sessions. Each session begins with including the following; sensory/perceptual preparation, sitting stability, breathing and oral-motor exercise, hand washing, and a description of the food that is being presented. The therapist then presents the foods of different sizes, tastes, textures, shapes, colors, consistency, and temperature in order to work with the child's oral motor and sensory perceptual deficits. The children are advanced through the 32 steps of the Hierarchy with each of the food presented during the session. Therapists have been trained to interact with both the children and the food in order to assist the children in advancing through the hierarchy using positive social reinforcement (Boyd, 2007).

Each session was completed within the therapy department in a small treatment room and the participant was positioned in a highchair during each session. Each session began with a five minute warm up activity that included sensory motor activities; a structured obstacle

course for improved self-regulation and arousal needed for feeding. After transitioning from the gym and into the feeding room, the child washed their hands (from table bubbles) to help form a structured routine with feeding time. Once hands were washed, the child spent approximately four minutes engaged in oral motor strengthening activities and oral-sensory activities necessary for development of improved motor skills and decreased oral hypersensitivity. An example of an activity included making silly faces to improve strength, coordination, range of motion of the lips and tongue. A second example of an activity was blowing bubbles to strengthen muscles of the lips and improve breath control/support.

Each session consisted of six to eight foods, which were a combination of both preferred and novel foods. These foods were presented to the child one at a time. The child was then encouraged to interact with the foods and/or engage in tactile/messy play with the foods, with the optimal goal to move up the hierarchy chart. The food selections were chosen based on the needs and goals of the child and their family, in addition to the foods provided by the family. After all the foods had been presented, the session ended with the participant engaged in a clean-up routine to wrap up the day's session. Clean-up included; throwing all non-consumed foods in the trashcan, encouraging additional opportunities to interact with novel foods. In addition, by including clean-up into the session, the therapist continued to build a learned routine around feeding time.

Data Collection

Data collected in this individual case study included a Sequential Oral Sensory Approach to Feeding Food Hierarchy Chart completed for each week of intervention, a Three-Day Diet

Food Journal completed prior to beginning intervention and then completed again following the final week of intervention, and analysis of responses to open ended parent interview questions.

The quantitative data was not statistically analyzed however was examined descriptively to determine changes pre and post intervention. The data from the SOS Hierarchy chart is represented in a table in the results section of this report to demonstrate the level of acceptance for each food presented in terms of initial acceptance within each session and then final level of acceptance within each session over the course of the eight weeks.

In addition the data from the three-day diet journal is presented graphically to visually represent pre and post intervention regarding the types, amounts, and variety of foods identified in the food history. The child's level of acceptance (first and last step of the hierarchy) of foods was documented on the food hierarchy chart during each of the eight-intervention sessions. Changes in feeding behavior were analyzed and interpreted via graphic presentation to show changes pre and post intervention. The graphic representation emphasizes clinical significance rather than a statistical significance. The clinical significance shows changes that were made in the child's ability to interact or accept foods during week one compared to week eight of intervention.

The qualitative data collected from the three parent questions was analyzed using content analysis related to the parent's perceptions of his or her child's participation in the SOS Approach to feeding. The content analysis was utilized to examine text through systematic description of the meaning of text as viewed through a coding frame (Schreier, 2012). For this study, the coding frame dealt with perceptions of participation in the SOS Approach to Feeding.

The coding frame is divided into two parts; the participant's previous experience and the changes made pre and post eight-week feeding intervention.

Interview

A face-to-face interview with the participant's mother was conducted during week one of data collection and at week eight of data collection. The interviews were held within a small, private treatment room and lasted approximately 10-15 minutes. The same three interview questions were presented in both weeks one and week eight. The interview questions with the participant's mother were utilized to gain background information explaining the participant's past experience with feeding therapy, changes within the typical day of feeding, and changes within the family's emotions during meal times. Please refer to Appendix A for exact questions used to guide the interview.

Three-Day Diet History

There were two instruments used for data collection. The Three-Day Food Journal is standard of practice and is completed as part of an occupational therapy feeding evaluation at the outpatient facility in which the case study took place. The Three-Day Food Journal was completed by the parent prior to the first session (week one) and then following week eight. The Three-Day Food Journal recorded all food and drinks consumed over the course of three days and included the exact description of the item. The portion size was not completed in either the pre or post Three-Day Food Journal.

The data collected from the three-day diet journal pre and post intervention was analyzed and compared between week one and week eight of intervention. The comparison was done to assess and compare the number of total foods at week one and then at week eight. In addition, the three-day diet journal was utilized as a comparison of the number of foods within the five food categories. Please refer to Appendix B for the data analysis chart of the three-day diet journal.

Feeding Hierarchy Chart

The 32-step feeding hierarchy was developed by the founder of the SOS approach to feeding, Dr. Kay Toomey. There are six hierarchy categories; tolerate, interacts with, smells, touch, taste, and eating. Within each of these categories, there are more specific steps to describe the child's response to the food presented. Two pieces of data were collected with each food of the hierarchy. First; what did the child do within the first 3 seconds of the food being presented to them and second; what was the highest step on the hierarchy that the child achieved during the session.

Results

Caregiver Interview

During the interview conducted at week one, the child's mother reported that the child had not received direct feeding therapy services in the past. However, the child has had an NG tube placed while in the NICU post liver transplant. She also reported that the participant is fed in a highchair for three meals and two to three snacks per day. The mother, father, or grandmother all of whom are considered to be primary caregivers, typically feed the participant. The child does not typically touch the foods, and is fed approximately 75% of the time by a primary caregiver as noted above. The child continues to use a bottle for thin liquids and refuses a straw or sippy cup. In addition, the child will often gag or choke on foods that are not smooth and has occasional vomiting. The mother also reported concerns that the child is not progressing with textures and age-appropriate foods however; there are no weight concerns at this time. The family feels that the child is getting an appropriate number of calories per day. The family expressed that they are looking for ways to help the child progress with expanding the variety of foods within his daily diet and also increased independence of self-feeding skills.

The post interview completed at the end of eight weeks of occupational therapy services using the SOS Approach to Feeding. The child's mother reported that the child had a great appetite and continues to eat three meals and two to three snacks per day. In addition, all snacks and meals are completed while positioned in a highchair. The mother also reported that the child is very interested in eating and self-feeding now. The mother stated that the child has made "wonderful progress in a short period of time." The child is now showing more

interest and tolerance of exploring/touching foods and is more willing to try novel foods. In addition, the child is now self-feeding with a spoon and is no longer on the bottle. The child is now able to drink from a straw and sippy cup and the family is making less separate meals from the rest of the family during mealtimes.

3-Day Diet Journal

The three day diet journal was completed at week one and then again during week eight of intervention. The family was asked to log what the participant ate and drank for three days. Each food was then placed into one of the five food groups, which are fruit, vegetable, dairy, grain, or protein (choosemyplate.gov).

At week one, the participant ate ten different foods over the course of three days. The participant ate four different fruits however they were all pureed and not whole. The four fruits include banana, mango, blueberry, and guava. The participant also ate three vegetables; again they were pureed and not whole. The three vegetables included sweet potato, peas, and carrots. The participant ate two types of dairy including regular yogurt and Greek yogurt. The specific flavors of the yogurts were not provided within the journal. The participant also ate one grain, which was graham cracker. The family did not specify the volume of each food within the journal.

Pre-Intervention Chart

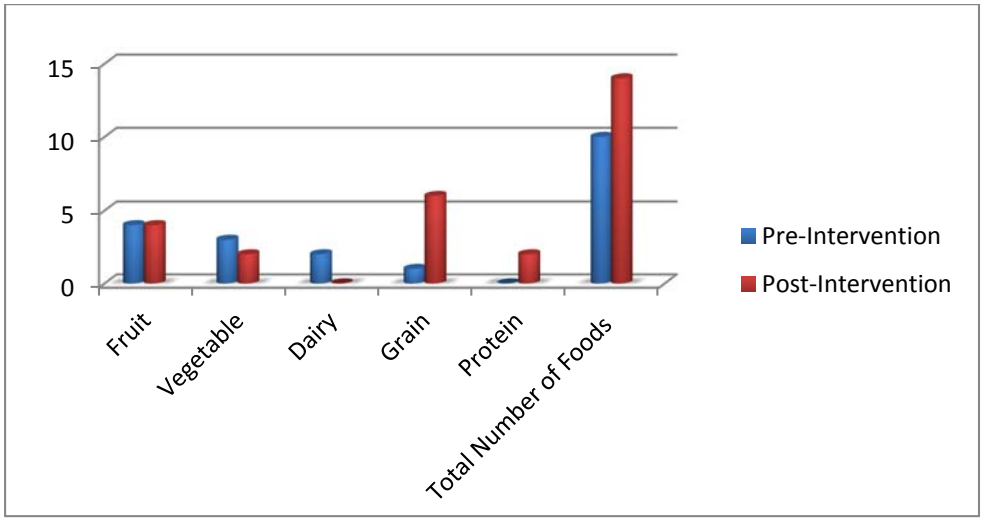
Category	Number of Foods in Category	Type of Foods in Category
Fruit	4	banana, mango, blueberry, guava
Vegetable	3	sweet potato, peas, carrot
Dairy	2	yogurt, Greek yogurt
Grain	1	graham crackers
Protein	0	

At week eight, the family completed a second three-day diet journal. The total number of foods that the participant ate was fourteen, which are four more foods within a three-day time frame when compared to week one. The participant ate four fruits, which again were in the puree form, not solids. The participant ate the following fruits; mango, raspberry, apple, and peach. He also ate two vegetables that were in the puree form; peas and carrots. The participant did not eat any dairy within the three days. The participant consumed six different grains; toast/bread, granola bar, graham crackers, cheddar bunnies, and rice. He also consumed two proteins, which were shredded chicken and peanut butter.

Post-Intervention Chart

Category	Number of Foods in Category	Type of Foods in Category
Fruit	4	mango, raspberry, apple, and peach
Vegetable	2	peas, carrots
Dairy	0	
Grain	6	toast/bread, granola bar, graham cracker, cheddar bunnies, and rice
Protein	2	chicken and peanut butter

Pre and Post 3-Day Diet Journal Chart



Feeding Hierarchy Chart

Week 1: The first food presented to the participant was a cracker. The child first tolerated the food on their plate, which is step number 9. Within a few minutes, the child then bit, chewed, and swallowed the cracker, which is step number 27; a jump of 18 steps. The second food presented was a goldfish. The participant immediately bit, chewed, and swallowed the goldfish; both beginning and ending at step number 27. The third food was a diced peach, which is a novel food/texture for the participant. The participant initially tolerated the food on their plate, which is step number 5 on the feeding hierarchy. Within a few minutes, the participant jumped to step number six, which is touching the food with a utensil. The participant advanced one step on the feeding hierarchy. The fourth food was an orange fruit snack, which the participant immediate bit, chewed, and swallowed; both beginning and ending on step number 27. The fifth food presented was a sweet potato (mashed). The participant initially tolerated it on his plate (step number 5) however was able to bite, chew, and swallow by the end of the session (step number 27). The sixth and final food presented during the

session was macaroni and cheese. The participant initially tolerated the food on his plate (step number 5) and was able to touch the food with two or more fingers (step number 9). The participant advanced four steps on the hierarchy however the following aversive behaviors were observed; immediate finger splicing, head turning, and pushing the plate away after touching the foods with two or more fingers.

Week 1

Food	Cracker	Goldfish	Diced peach	Orange fruit snack	Sweet potato	Macaroni & cheese
Start of Session	5	27	5	27	5	5
End of Session	27	27	6	27	27	9

Week Two: The first food offered was goldfish, a food that the participant has previously eaten both within the home and therapeutic setting. When the food was first presented, the participant touched the food with two or more fingers, which is step number 9. By the end of the session, the participant attempted to bite food however no pieces were created, which is step number twenty-two. The participant advanced thirteen steps within the hierarchy. The second food presented was a blueberry. When first presented, he participant touched the food with two or more fingers, which is step number 9. He did not move further on the hierarchy with this particular food. The third food presented was shredded cheddar cheese. The participant initially touched the food with two of more fingers, which is step number 9. Through modeling and play, the participant bit, chewed, and swallowed (step number 27) the shredded cheddar cheese, which is a jump of 18 on the feeding hierarchy chart. The last three foods presented during the session were graham crackers, bread strips, and

sweet potato puree. The participant bit, chewed, and swallowed (step number 27) all three foods within the first three seconds of presentation. Five foods (vs. six) were presented during week two secondary to limited foods provided by the child's caregivers.

Week 2

Food	Sweet potato	Goldfish	Cheddar cheese	Bread strips and circles	Blueberry
Start of Session	27	9	9	27	9
End of Session	27	22	27	27	9

Week 3: The first food presented during week three sessions was a diced pear, which is a non-preferred food for the participant. When first presented, the participant touched the food with one finger, which is step number seven. Through modeling and play, the participant was able to bite, chew, and swallow the diced pear, which is step number 27, without any aversive behaviors. The second food presented were veggie straws, which was a novel food for the participant. The participant immediately bit, swallowed, and chewed the food, starting and ending at step number 27. The third food presented was cheerios, again a novel food for the participant. The participant immediately bit, swallowed, and chewed the food, starting and ending with step number 27. The fourth food presented was a chick-a-pee puree. The participant immediately took the puree by mouth and swallowed several bites; beginning and ending with step number 27.

Week 3

Food	Banana yogurt	Veggie fry	Bread strip	Shredded cheese	Diced peach	Orange puree (tomato/chickpea, & beet)
Start of Session	27	9	9	27	8	27
End of Session	27	27	9	27	27	27

Week 4: The first food presented during today's session was veggie fries, a food the participant has previously eaten within the therapeutic setting. When first presented with the veggie fry, the participant touched the food with two or more fingers, which is step number 9. During the session, he was able to bite, accept, and swallow; moving from step number 9 to step number 27. The second food presented was shredded cheddar cheese. The participant immediately bit, chewed, and swallowed; both starting and ending at step number 27. The third food presented was a piece of bread cut into strips. The participant touched the food with two or more fingers, which is step number 9; however did not move past this step. The fourth and final food presented during the session was banana yogurt. The participant immediately took the puree by mouth and swallowed several bites; beginning and ending with step number 27. Four foods (vs. six) were presented during week two secondary to limited foods provided by the child's caregivers.

Week 4

Food	Veggie Fries	Shredded Cheese (cheddar)	Bread cut into strips	Banana yogurt
Start of Session	9	27	9	27
End of Session	27	27	9	27

Week 5: The first food presented during week 5 was a plain noodle. The participant initially touched the food with two or more fingers, which is step number 9. Through modeling and play, the participant then bit the food and immediately spit out. The participant then immediately had an episode resulting in a small amount of emesis. The second food presented was a pretzel stick. Immediately, the participant bit, chewed, and swallowed the food; both beginning and ending with step number 27. The third food presented was a Gerber granola bar. The participant immediately bit, chewed, and swallowed the granola bar; both beginning and ending with step number 27. The fourth food presented during the session was shredded chicken, mixed with a BBQ sauce. The participant immediately bit, chewed, and swallowed the chicken; both beginning and ending with step number 27. The fifth and final food was deli ham, a novel food. The participant initially touched the food with two or more fingers. Through modeling and play, the participant independently bit, chewed, and swallowed the deli style ham without any aversive behaviors. Five foods (vs. six) were presented during week two secondary to limited foods provided by the child's caregivers.

Week 5

Food	Plain Noodle	Pretzel	Granola Bar	Shredded Chicken	Deli Ham
Start of Session	9	27	27	27	9
End of Session	25	27	27	27	27

Week 6: The participant missed week six secondary to having the flu. The family was unable to reschedule secondary to illness and inclement weather.

Week 7: The first food presented was shredded chicken in a BBQ sauce, which is now a preferred food for the participant. The participant began and ended on step number 27; bites food, chews it, and swallows it. The second food presented was plain toast. The participant immediately bit, chewed, and swallowed the toast without any aversive behaviors. He began and ended on step number 27 with dry toast. The third food was toast with butter. Again the participant immediately bit, chewed, and swallowed the toast with butter without any aversive behaviors. He began and ended on step number 27. The fourth food was toast with grape jelly. Jelly was a novel food for the participant. The participant initially touched the toast with jelly, which another food (a piece of dry toast), which is step number 7. With modeling and play, the participant then advanced to step number 27 as he bit, chewed, and swallowed the toast with grape jelly. The fifth and final food presented was diced peaches. The participant began and ended on step number 7; he did not advance with this particular food during the session. When he touched the diced peach with another food, he immediately demonstrated aversive behaviors such as head turning and finger splicing. Five foods (vs. six) were presented during week two secondary to limited foods provided by the child's caregivers.

Week 7

Food	Shredded Chicken	Plain Toast	Toast with butter	Toast with Jelly	Diced Peach
Start of Session	27	27	27	7	7
End of Session	27	27	27	27	7

Week 8: The first food presented during week eight was a plain Ritz cracker. The participant immediately bit, chewed, and swallowed the cracker; both beginning and ending with step number 27. The second food presented was a goldfish, which is considered to be an inconsistently preferred food for the participant. The participant immediately bit, chewed, and swallowed the goldfish; both beginning and ending with step number 27. The third food presented was a diced peach. The participant began with step number 10 as he immediately picked up the food with his whole hand. He then advanced to step number 24, which is bit the food however immediately spit out. Brief gagging was then observed. The fourth food presented was fruit snacks, which is a food the participant has eaten both within the therapeutic and home context. The participant immediately bit, chewed, and swallowed the fruit snack; both beginning and ending with step number 27. The fifth food presented was a mashed sweet potato, which the participant immediately bit, chewed, and swallowed the cracker; both beginning and ending with step number 27. The sixth and final food was macaroni and cheese, which is considered to be a non-preferred food and texture. The participant was observed to initially touch the food with two or more fingers; step number nine. He then advanced to step number 16 as he brought the food to his lips. No aversive behaviors were noted with the food and final step of the feeding hierarchy.

Week 8

Food	Plain Cracker	Goldfish	Diced Peach	Fruit Snack	Sweet Potato Puree	Mac & Cheese
Start of Session	27	27	10	27	27	9
End of Session	27	27	24	27	27	16

Discussion

Quality feeding development and nutrition is necessary and essential for a positive quality of life for children (Bahr & Johanson, 2012). The critical learning period for feeding development is between the ages of birth to two years of age, as the essential and crucial skills are developed during this period. By the age of two, children should demonstrate mature, adult-like oral motor skills, which are important in facilitating age appropriate participation in mealtimes (Bahr & Johanson, 2013).

The purpose of this individual case study was to determine if the SOS Approach to Feeding would be effective in increasing the variety of foods and textures that a child accepted when treated within the outpatient clinical setting. Effectiveness of the individual case study was determined as noted by the number of new foods accepted as well as the level of food acceptance on the Food Hierarchy within the participant's daily diet pre and post eight-week intervention. The results of this case study may also help in the justification of identifying the SOS Approach to Feeding as the primary feeding intervention used at the pediatric, outpatient facility.

The participant for the case study demonstrated limited variety of foods and textures within his daily diet and showed signs of decreased oral motor strength, decreased oral motor skills, and moderate signs of tactile defensiveness; impacting his success within the occupational of feeding. The participant relied on puree textures, liquid intake, and minimal meltable textured foods to meet his daily caloric intake, necessary for growth and development. The goal of the feeding intervention using the SOS Approach to Feeding was to

make positive changes to the participant's feeding experiences, specifically increasing the variety of foods and textures within his daily diet.

After receiving eight weeks of feeding intervention using the SOS Approach to Feeding, the mother reported that the participant is much more interested in eating and self-feeding now, with minimal to no gagging or vomiting episodes during mealtimes. Prior to intervention, the participant was gagging on stage 3 baby foods and pushing away novel foods. In addition, at the end of the intervention, the participant was showing less signs of tactile defensiveness as he is exploring and touching foods and is more will to try new foods. The participant is now demonstrating improved performance and enjoyment in the occupational of feeding.

At the start of the case study, the participant was eating just ten foods; however nine out of the ten foods were in a puree form. Based on the results of the Three Day Diet Journal post intervention, the participant ate fourteen foods over the course of three days, with only six out of the fourteen foods being in a puree form. The food recorded in the Three-Day Diet Journal was not a complete or comprehensive list of the participant's preferred foods; just the foods consumed over three days. The data collected in this case study did not reflect or indicate a difference in the number of foods listed within the pre and post food journal, which differs from Boyd's findings in 2007. Boyd (2007) found that the 37 children who met the criteria for inclusion in the study had a significant increase in the number of foods they would eat after attending one, 12 week SOS group. Boyd (2009) did suggest that future research should include having the parents list all of the foods their child will eat before and after intervention as a more precise way of counting the number of foods vs. relying solely on the three-day diet history.

Despite the total number of foods only increasing by four, the variety of measures (caregiver interview, Three Day Diet Journal, and weekly hierarchy charts) did show improvements during meal times that went beyond the number of foods eaten in a three day period. These findings are different than the findings of the dissertation titled "*A comparison of the Situational-Oral-Sensory Approach to an Applied Behavioral Analytic Approach in the treatment of pediatric feeding disorders* (Peterson, 2014). Peterson (2014) found no changes across any measure after implementation of the SOS Approach. Peterson's (2014) study included six participants and intervention was completed in an individual session as opposed to a peer group session, which is typically recommended in the guidelines of the SOS Approach. Individual sessions were chosen in order to evaluate response to treatment, isolate the individual variable, equate procedures to ABA, and provide individual attention (Peterson, 2014). Peterson (2014) also recommended that future research should include comparison of group with individual intervention in order to determine whether the absence of peer and social role modeling impacts the success of the SOS Approach. In contrast, the results of this case study demonstrated improvement in the number of foods and texture the child accepted within their 3 day diet.

In addition to adding textures and foods, the child also became more independent in self-feeding skills. Prior to receiving occupational therapy services using the SOS Approach, the child relied on his caregivers to feed him as opposed to self-feeding with a utensil. The child was not participating in self-feeding with utensils or finger feeding. After only eight weeks, the participant was finger feeding and used a spoon with fair accuracy. Also, he was able to drink all liquids from a straw or sippy cup despite being dependent on a bottle for all liquid in-take

prior to intervention. These gains are considered to be clinically significant in a short period of time. The previous research that examined the effectiveness of the SOS approach to feeding does not include description or discussion of improvements in self-feeding with utensils or cup use.

For the purpose of the case study, the intervention was completed for eight weeks and in an individual session vs. peer group. Per the guidelines of the SOS Approach, a two year old would receive intervention in a peer group for social modeling however this was not an option at the outpatient facility in which the study took place. Per policy of the facility, patients of the outpatient facility must receive individual treatment session. In addition, the eight weeks is shorter than the recommended twelve weeks, which have been identified as a timeline for intervention for a group therapy setting using the SOS Approach to Feeding (Boyd, 2007). Even though data collection for the case study was completed, the participant continued to receive outpatient occupational therapy services one time per week at the outpatient facility. The participant continued to receive feeding intervention in order to continue to add age appropriate textures and foods and to continue to improve his oral motor skills. In addition, the participant also received outpatient physical and speech therapy to evaluate and treat for developmental delays.

In conclusion, feeding problems are commonly defined as the inability or refusal to eat novel or a variety of foods and textures (Arts-Rodas & Benoit, 1998) and are often the presenting symptoms for developmental delays, cognitive or emotional disorders, and/or other medical diagnoses (Davis, Bruce, Cockin, Mousa, & Hyman, 2010). The SOS Approach to Feeding uses a systematic desensitization to help children achieve the oral motor skills and

sensory tolerance necessary to eat a wider variety of foods (Toomey, 2001). The results of the case study found that after following the guidelines of the SOS Approach, the participant increased their variety of foods and textures, improved oral motor skills, and demonstrated increased independence in self-feeding.

Limitations

There are several limitations that may have impacted the results of the study. The first limitation was the food available to build the hierarchy for each session. The parents were responsible for bringing the appropriate and assigned foods to each session however that did not always occur. The investigator was then limited to the foods that were brought by the family and the very limited foods available at the facility. The hierarchy is designed to utilize foods based on the properties of the food; texture, color, shape, and size and not all food hierarchies presented over the eight weeks were able to follow the requirements of hierarchy design.

The second limitation of the study was completing the case study during an individual session vs. the recommended peer-feeding group. Based on the policies of the facility, group sessions are not allowed. The SOS Approach recommends children between the ages of eighteen months and five to six years of age receive treatment in a group setting for social and peer modeling (Boyd, 2009). The SOS Approach bases the group therapy approach to feeding on Bandura's social learning theory as well as the work of Rizzolatti concerning mirror neurons (Rizzolatti, Fogassi, & Gallese, 2006). The children within the group can identify with each other and begin to imitate each other (Boyd, 2009). More literature is needed to use this approach in

individual sessions to determine effectiveness of use of the intervention in individual sessions.

The third limitation of the case study was the shortened time frame in which data was collected. The data was collected over an eight week period however the SOS approach is typically a twelve-week program that is based on the typical developmental steps involved with feeding (Benson, Parke, Gannon, & Munoz, 2013). In addition to a shorten time frame of data collection, the patient missed x1 week due to illness and was unable to make up that week's therapy session.

The fourth and final limitation was the inconsistency of caregivers. The child split time between mother, father, and paternal grandparents, all whom had different approaches to feeding and intervention. As mentioned above, the caregivers were inconsistent on follow through of the specific foods and number of foods to bring to each therapy session, therefore potentially impacting the success of building a proper food hierarchy.

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Appendix A: Caregiver Interview Questions

Pre-Intervention Questions

Question 1: Has your child received services (speech or occupational therapy) to address feeding in the past?

Question #2: What does a typical day look like in terms of meal times?

Question #3: How would you describe yours and your family's emotions during meal times?

Post Intervention Questions

Question 1: Has your child received services (speech or occupational therapy) to address feeding in the past?

Question #2: What does a typical day look like in terms of meal times?

Question #3: How would you describe yours and your family's emotions during meal times?