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# BEHAVIORAL FEEDING INTERVENTION IN CHILDREN

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BEHAVIORAL FEEDING INTERVENTION IN CHILDREN

by

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A Research Paper

Submitted in Partial Fulfillment of the Requirements for the  
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Department of Communication Disorders and Sciences  
Southern Illinois University Carbondale  
May 2013

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## Introduction

The act of feeding is essential for the survival of all living things. Nutrition is a necessity for life and the easiest way to obtain it is through eating (Sharp, Jaquess, Morton, & Herzinger, 2010). The risks of malnutrition, which is an outcome of poor eating, include: growth retardation, dehydration, and vulnerability to infectious diseases (de Moor, Didden, & Korzilius, 2007). Despite this, Bryant-Waugh, Markham, Kreipe, and Walsh (2010) state that “approximately 25-45% of normally developing children and up to 80% of developmentally delayed children are reported to experience some type of feeding problem” (p. 99). While those who are developmentally delayed are statistically more likely to have feeding disorders, individuals with autism are the most at risk as reports by parents indicate 90% of these children have had problems during mealtimes (Ahearn, 2001). Challenging feeding behavior can be caused by a multitude of sources. Gastrointestinal distress and pain caused by food allergies or gastrointestinal reflux disease are one such source while another can include the environment, for example poor feeding structure during meals (de Moor et al., 2007). Often, even if factors such as those involved with medical conditions are addressed, feeding behaviors may be learned and still prevail after the fact (Bryant-Waugh et al., 2010). Due to the frequency and severity of behavioral feeding disorders it is important to determine which intervention technique or techniques are most efficient for treatment.

## Definition

In order to determine the most effective intervention method it is important to understand what behavioral feeding problems are. Behavioral feeding problems as a broad category can include a spectrum of issues from picky eating to full food refusal. The *Diagnostic*

*and Statistical Manual of Mental Disorders* (DSM-IV) establishes the criteria for feeding disorder of infancy and childhood as a:

feeding disturbance as manifested by persistent failure to eat adequately with significant failure to gain weight or significant low of weight over at least one month... the disturbance is not due to an associated gastrointestinal or other general medical condition (meaning that a medical condition cannot be the reason behind the weight issues but can be the reason behind a learned behavior which may cause weight issues)... the disturbance is not better accounted for by another mental disorder... the onset is before age 6 years (as cited in Bryant-Waugh et al., 2010, p. 99-100). Despite this criterion, many researchers have difficulty following this interpretation resulting in multiple variations on the criteria for what constitutes as a feeding disorder.

Traditionally, feeding problems have been viewed in two separate categories: organic and inorganic feeding disorders. Organic feeding disorders were synonymous with “failure to thrive” which is defined as:

“Either not maintaining expected rate of weight gain over time, with weight less than the fifth percentile for age and sex on National Center for Health Statistics growth charts for two or more points of time, or downward deviation in weight of two major percentiles for at least on month duration” (Kerwin, 2003, p. 163).

Failure to thrive is seen as an organic feeding problem due to the definition of organic etiologies, “structural/functional abnormalities affecting physiology or bodily organs” (Bryant-Waugh et al., 2010, p. 99).

Organic etiologies can include: conditions which result in metabolic abnormalities or defects in absorption (cystic fibrosis, mitochondrial disease, short bowel syndrome, or lactose intolerance), ongoing vomiting and/or diarrhea associated with gastrointestinal issues (gastroesophageal reflux (GER), gastroenteritis, dysmotility), structural or anatomical defects (bronchopulmonary dysplasia, malrotated intestine, micrognathia), oral motor deficits (dysphagia), and hypersensitivity to food (tastes, textures, smells) (Bryant-Waugh et al., 2010).

Non-organic feeding conditions were described as emotional issues caused by difficulties between the parent-child relationship (Kerwin, 2003), but now have been theorized as being derived from psychological issues such as: restricted interests, behavioral rigidity, perseveration, disruptive family functioning, and maladaptive patterns of reinforcement (Sharp et al., 2010). Other etiologies include problematic feeding practices (unrestrained access to food, irregular mealtimes), exposure to developmentally inappropriate textures, parental modeling of inappropriate eating habits, learned behavior often originating from preexisting conditions, and inadvertent shaping of behavior (Sharp et al., 2010). Unfortunately, feeding disorders are usually not mutually exclusive and consist of many factors both organic and inorganic. For instance, many children with organic feeding problems such as oral motor deficits from cleft palate may still have feeding problems after surgical repair, as the feeding behavior becomes a learned behavior as the child still associates food with unpleasantness.

As a result of underlying complexity of feeding problems many researchers have established different classification models to aid in assessment of different disorders. These classification models are important for intervention because they can be used as a baseline to

determine severity and type of feeding problem. The primary models consist of viewing outcome, relationship, or patterns of behavior.

The outcome-based model is based on whether or not failure to thrive has occurred with the child in which case feeding problems have occurred (Ahearn, 2001). This model is based on the organic definition of feeding disorders and does not incorporate inorganic factors. This model should be used when inorganic factors are not suspected as contributing to the feeding problem as they are not considered in this model.

The second model, viewing relationship “conceptualiz[es] feeding disorders as “shared” disorders between caregiver and child” (Bryant-Waugh et al., 2010, p. 100). This model views feeding disorders as relational disorders between the caregiver and child. This model should be used when organic components are not believed to contribute to the feeding problem as it fails to incorporate organic factors in its reasoning.

The third definition follows the idea of patterns of behavior, is designed into a subgrouping classification system, and is the most commonly used (Bryant-Waugh et al., 2010) as it encompasses the behavior, which is easier to translate into treatment techniques. An example of a classification system that follows the pattern of behavior is a technique based on food refusal behavior and consists of 5 categories: learning dependent food refusal, medical complications related food refusal, selective food refusal, fear based food refusal, appetite awareness and autonomy based food refusal (Bryant-Waugh et al., 2010, p. 102). Learning dependent food refusal is the result of behaviors being positively or negatively reinforced (Sharp et al., 2010). Medical complications related food refusal is based on organic issues such as oral motor deficits (Bryant-Waugh et al., 2010). Selective food refusal is the refusal of select

items, textures, smells, tastes and temperatures (Ahern, 2001). Fear based food refusal is based on a specific fear that food will cause gagging, choking, or vomiting resulting in a refusal of swallowing food (Bryant-Waugh et al., 2010). Appetite awareness and autonomy based food refusal is the result of the child attempting to gain independence by refusing to eat. Initially this type of refusal involves the satiation of emotional needs versus physiological needs. Eventually the two needs can become synonymous leading to a feeling of being physically feeling full when emotionally content.

Ahearn's (2001) classification system is another example of a technique based on a broader pattern of behavior. This system allows for a more thorough breakdown of what behaviors are being seen and does not consider the consequences of the behavior which the above systems follow. There are three categories for criteria of feeding disorders using this method, insufficient food intake, skill deficits, and disruptive behavior. Insufficient food intake can lead to malnutrition and is determined by behaviors of refusal to accept food, selectivity for type and/or texture; and inadequate caloric intake. Skill deficits encompass oral-motor and fine-motor delays and are determined by the appropriateness of chewing, sucking, swallowing, and self-feeding for the child's age. Disruptive behavior includes behaviors like crying, pushing away food, knocking food off the table, getting out of the seat, aggression and self-injury. These behaviors do not directly relate to eating but negatively impact mealtimes (Ahearn, 2001).

There are many more different categorizations associated with the patterns of behavior model, each attempts to accomplish the same goal but differ in their approach. Due to the multitude of classification schemes choosing one can be difficult and often leads to the creation of a customized classification scheme (Bryant-Waugh et al., 2010). An understanding of the criteria

each classification scheme presents can help determine which intervention technique to use. It does this through helping to identify behaviors, consequences of behaviors and the severity of the feeding disorder.

### **Intervention Techniques**

Feeding intervention can be a long and difficult process depending on the varied nature and severity of feeding problems themselves. Due to this fact many techniques and packages have been developed in order to safely and efficiently treat the problems at hand. Some intervention techniques examined included: positive reinforcement, timing and structure of feeding sessions; antecedent manipulations, consequence procedures, treatment packages, peer modeling, and parent implemented intervention.

#### **Reinforcement**

The most commonly used treatment technique is positive reinforcement. Positive reinforcement of appropriate behaviors involves delivering a preferred item or event contingent on the child accepting food immediately after target behavior is achieved. Reinforcers used are unique to each child and can range from toys to preferred food items. Positive reinforcement is often paired with other techniques and is rarely used by itself in regards to feeding disorder intervention (Ahern, 2001).

#### **Timing and Structure of Feeding Session**

Often overlooked or implied, timing and structure are an important factor in feeding intervention. Feeding sessions are defined as structured times where acquiring and developing new feeding behaviors is the prime focus (Kerwin, 2004). This is an important distinction between meals, which focus on ingestion of proper nutrition and not the feeding behaviors.

This can be relevant in situations where failure to thrive is an issue and a distinction should be made in order to avoid poor associations with feeding sessions, meaning separate feeding sessions and meal times should take place (Kerwin, 2004).

Feeding contains many steps and conditions in order to be successful. Like many behavioral based interventions the environment is very important to elicit desired behaviors. While the overall goal is to provide a pleasurable experience, when starting, environments should provide little or no distractions so the full focus of the child can be on feeding (Kerwin, 2004). In regards to the timing, feeding sessions should be a routine and meals should be spaced out by several hours to ensure that the child is hungry. Hunger during feeding is used as a natural motivator, so by spacing meal times out, optimum conditions for feeding can be met (Ahearn, 2001). With this in mind, intermittent snacking between meals should not occur unless the child is not gaining weight in which case any feeding occurrence should be promoted (Linscheid, 2005). Meals should go no longer than 30 minutes in order to avoid imbedding negative attitudes with feeding sessions.

The most important aspect of the structure of a feeding session is food presentation (Kerwin, 2003). This involves whether or not the child feeds him/herself, the type of cues used, the presentation order of liquids and solids, how food is placed, and any mechanics, which are done inside and outside of the mouth to aid oral-motor function. It is important not to mix food presentation with simultaneous and sequential presentation, which will be discussed later in further detail (Kerwin, 2004). This can involve physically positioning the bolus as well as physically prompting proper oral mechanics. An example of this can be seen with a child with poor lip closure, physically closing the lips or reminding the child to close their lips can be used

to help create a lip seal (Kerwin, 2004). In regards to the order of food and drink, the idea is to allow for a break to occur using the non-target item especially in children with oral motor difficulties providing a reinforcer (Kerwin, 2004). Cues can be very helpful when used during intervention. If reinforcers are used, cues can aid a child in realizing possible consequences for not following the cue such as not receiving a preferred item as a result of not completing a bite of the target food. These cues should be specific for feeding only to ensure their meaning is not degraded (Kerwin, 2004).

Timing and structure of the session are important tools by themselves but are most often found combined in various treatment packages, due to the natural reinforcers they provide such as satiation of hunger and breaks.

### **Antecedent Manipulations**

Antecedent manipulations involve the modification of the target stimulus (food or drink) presented to the child while maintaining similar results (Kerwin, 2003). The most common use of antecedent manipulations is stimulus fading, which can include chaining (forwards and backwards), simultaneous presentation of preferred food and non-preferred food, and sequential presentation of preferred and non-preferred food (Kerwin, 2004).

Stimulus fading involves the gradual change of the stimulus, being food and/or utensils, eventually shaping readily accepted behaviors into the desired target behavior (Kerwin, 2004). An example of this can be seen when trying to spoon feed a child who refuses. The first step is to introduce the spoon to the child, and once he or she can put the utensil fully into his or her mouth to then dip the spoon and again, try to have the child put it in his or her mouth. If this is successful, more and more food is added until a full spoonful can be tolerated (Kerwin, 2004).

A different study, this one performed by Najdowski (2012), looked at the effectiveness of stimulus fading in regards to treatment of feeding problems. The study involved Kaleb, a three-year-old boy diagnosed with autism, who, at the time of the study, was on a diet consisting of pureed foods due to his texture issues. Through the use of stimulus fading Kaleb was given trials of mixed textures composed of 75% of the highest texture associated with high mouth clean (no residue after bite detected) with 25% of the next highest texture (i.e., 75% puree and 25% wet ground). The percent of the next highest texture increased slowly as acceptance for the food increased (i.e., if trials with the previously mentioned mixture were successful the mix would increase to 50% puree and 50% wet ground advancing until all textures are tolerable) and this continued until the desired consistency was met. During trials Kaleb was given praise after each successful bite with mouth clean. He was able to advance his diet to chopped fine (final texture of the study) with 100% mouth clean (Najdowski, 2012). This study demonstrated that stimulus fading with reinforcement increased ingestion for some foods in a young boy presenting with food selectivity via texture.

Chaining is the reinforcement of elements in a behavior chain and can be considered an antecedent manipulation as it works by modifying behaviors or events to fit in a target sequence (Hagopian, Farrell, & Amari, 1996). Chaining can be done either forwards or backwards in which case individual steps are modified, backward chaining involves learning each step individually and putting them all together but starting from the last step to the first (Kerwin, 2004), as opposed to forward chaining which starts at the first step.

An example of this can be seen in the study by Hagopian et al. (1996). This study involved Josh, a 12 year old boy with autism, mental retardation, and a history of

gastrointestinal problems. At the time of the study Josh had full food refusal resulting in a required central line to receive parenteral nutrition. The study looked at the use of backward chaining and its effects on feeding problems in hopes of improving food acceptance for Josh. Due to the fact that he had appeared to have an intact swallow initially, this was determined to be the starting point to create a chain response. The treatment was broken into steps and consisted of: successfully dry swallowing, dry swallowing when an empty syringe was depressed in his mouth, accepting and swallowing water when placed in his mouth via syringe, increasing the amount of water accepted and swallowed, bringing a cup of water to his mouth, accept, and swallow, and lastly to increase the amount of water accepted and swallowed via cup. After the treatment was completed it was found that Josh was able to consume 90 cc of water and juice compared to his original baseline of 0% consumption of 10cc of water (Hagopian et al., 1996). Chaining in certain situations has been shown to be an effective intervention tool when used for severe feeding problems.

Simultaneous and sequential presentation are associated with the structure of the feeding session but differ in the fact that they are related to the way in which food is presented during the trials (Kerwin, 2004). Simultaneous presentation involves the pairing of a preferred item and un-preferred item at the same time for consumption. The idea behind this is that children will associate the pleasure gained from ingesting the preferred food with the non-preferred food causing them to accept the non-preferred food (Kerwin, 2004). Sequential presentation involves the use of a preferred item as a consequence for acceptance while still fading the non-preferred stimuli into the target stimuli (VanDalen & Penrod, 2010).

VanDalen and Penrod (2010) looked at a comparison of simultaneous presentation and sequential presentation to determine the outcomes of these two interventions with and without escape extinction. Two children with food selectivity participated in the study: Emilio, a five year old with autism and Kevin, a four year old with autism. Both participants received each treatment of simultaneous and sequential presentation with and without escape extinction. During the study, both subjects began eating foods in the sequential method while in trials of the simultaneous condition meaning that they both chose to eat the target food followed by the preferred food instead of the two foods at the same time. Emilio, at baseline accepted no non-preferred foods (NPF) but soon began to accept and consume bites of NPF in the sequential condition (VanDalen & Penrod, 2010). Kevin's baseline was similar to Emilio but did not improve during both simultaneous and sequential methods without escape extinction. When escape extinction was added in the form of non-removal of spoon to the sequential condition (as simultaneous was replaced with an additional sequential method due to the subject's preferences) improvements were better generalized. Emilio was able to maintain 100% consumption without expulsion and when implemented at home maintained a high generalization of 90% consumption without expulsion. Kevin was able to reach 100% consumption without expulsion as well and had a generalization of 55% consumption without expulsion of different foods (VanDalen & Penrod, 2010). Sequential presentation as seen with Emilio is somewhat effective on its own but appears to be more promising when used with escape extinction procedures.

## Consequence Procedures

Consequences procedures are behavioral feeding intervention techniques, which operate on the principle idea that consequences can have a direct impact on a target behavior, either increasing or decreasing the probability of occurrence. With this in mind consequence manipulations are used in many behavioral interventions and in the case of feeding problems, the target behavior sought after is food acceptance. In regards to intervention there are primarily two techniques used, escape extinction and differential reinforcement (Kerwin, 2004).

Escape extinction is often used in situations of full food refusal and is used to provide a consequence by not allowing the child to refuse the target food (Kerwin, 2004). In regards to feeding problems, there are two methods, which appear to be the most frequently used in research findings. These are non-removal of spoon (NRS) and physical guidance (PG). In NRS, target food is presented to the child either physically (food on the spoon is put to the child's mouth) or through verbal prompting. Next, the spoon with food is kept at the child's lips until it is eaten if no bite is taken within a predetermined time. Finally, the child is forced to accept the spoon and food (Kerwin, 2003).

Physical guidance on the other hand involves the child's mouth to be guided open with gentle pressure on the jaw, which is contingent on refusal to accept food (Ahearn, Kerwin, Eicher, & Shantz, 1996). These techniques should only be used by trained professionals, as risk for aspiration is significantly greater than other techniques (Kerwin, 2004). The idea behind the escape extinction procedure is that the clinician is providing a route in which the child can take to avoid the unwanted stimuli. Both techniques are considered extinction because they terminate the unwanted behavior of food refusal (Kerwin, 2004). Of these two methods NRS is

the preferred method when utilizing escape extinctions as PG can “be conceptualized as a punishment procedure. As a result, its use should be considered carefully... if used at all, [it] is typically used as a last resort and is usually used in combination with antecedent manipulations” (Kerwin, 2003, p. 168).

Non-removal of spoon also has drawbacks noted as extinction bursts. Extinction bursts are defined as an increase of inappropriate behavior when escape extinction is implemented (Piazza, Patel, Gulotta, Sevin, & Layer, 2003). These bursts eventually subside but are a detriment to progress in the short term. A study by Ahearn et al. (1996) looked into the effectiveness of both NRS and PG. In the study, three children with a history of food refusal and documented gastrointestinal problems for which they were receiving care for were treated using both of the above listed escape extinction techniques. The end of the study showed that both NRS and PG were effective in raising both the mean percentage of food accepted and ingested (no expulsion of food) in all children and above 80% for both categories for two of the kids (Ahearn et al., 1996). Escape extinction is often used in conjunction with other treatments as a package but remains the most necessary tool for maintenance as seen in a study conducted by Cooper, Wacker, McComas, and Brown, (1995) which sought to identify active variables in treatment packages. The study consisted of four children ranging from ages one to six and all with either a nasogastric or gastrostomy tube as a result of medical conditions leading to feeding problems. Each child was given a different treatment package in which different components were phased out and re-established to determine its effectiveness in the package. Results indicated value of escape extinction in three participants resulting in increasing and maintaining of bites accepted and amount consumed. One child (Jack), a 1-year,

9-month-old male, was given a treatment package consisting of contingent reinforcement (praise and preferred food items contingent on acceptance) and escape extinction. Jack had a baseline of an average of 23 bites was able to increase his bites to an average of 50. When escape extinction was removed the number dropped to 38 but upon reinstatement jumped back to an average of 55 bites. Similar results occurred in the other children. Andy, a 2-year, 11-month-old male, at baseline had an average of 18 acceptances (bites) of liquids with no measurable amounts of solids/liquids. This number of acceptances of liquids/solids improved to 57 as well as 33 cc consumed when a treatment package consisting of non-contingent access (toys and social interactions throughout the meal as distractors), contingent reinforcement (praise and a sip of liquid contingent on acceptances that remained in the mouth), and escape extinction was used. When escape extinctions were removed an average of 23 acceptances and 4 cc were reported, when escape extinction was reinstated the mean acceptances improved to 65 and 58 cc consumed. Lastly, Karen, a 1-year, 8-month-old female, at baseline had a decreasing trend in the number of bites with consumption and less than 10 cc consumed. With a treatment package consisting of presentation of two foods given as a choice, contingent reinforcement (praise contingent on acceptance), and escape extinction; Karen's number of bites improved to an average of 40 bites and 20 cc consumed. Choice among items did not appear to significantly promote consumption resulting in its removal from the treatment package. When escape extinction was removed the average number of bites declined to 12 with a consumption of 6 cc and upon reinstatement the average of bites accepted improved to 56 and 81 cc consumed. In each case escape extinction was necessary to not only improve the

frequency and amount of the target behavior (food acceptance and consumption) but also to maintain it (Cooper et al., 1995).

Differential reinforcement involves positive stimuli and events to be presented for a specified period of time and is contingent on if the child accepts an entire spoonful of food. If the child refuses or fails to accept the entire spoonful of food neutral events for inappropriate behavior will occur such as waiting for a period of time before beginning a new trial (Kerwin, 2004). Piazza et al. (2003) conducted a study looking at differential reinforcement and its effectiveness with and without escape extinction. In this study four boys, ranging from ages 23 months to 4 years, all with significant medical conditions resulting in failure to thrive. The study looked at the outcomes of using differential reinforcement, escape extinction, and a combination of the two together. The results indicated that while differential reinforcement alone was more effective than the baseline, results were low. However, escape extinction (in either NRS or PG) and differential reinforcement with escape extinction were effective in improving acceptance and increasing mouth clean (no residue after swallowing bolus). It was noted that differential reinforcement in combination with escape extinction procedures resulted in an immediate decrease in inappropriate behavior (extinction burst) compared with escape extinction alone (Piazza et al., 2003). The participants in the study all had similar results. Of two children dependent on bottle feeds one was able to consume 100% of his needs from solids and liquids from a cup while the other received the majority of nutrients by solids and liquids by cup but required supplemental bottle feeds. The other two boys who were previously on tube feeds were allowed to be taken off the tube feeding and receive 100% of nutrients by mouth (Piazza et al., 2003). While differential reinforcement may function to improve feeding

problems on its own, it is better effective when used with escape extinction allowing for a decrease in extinction bursts and improving treatment outcomes.

### **Treatment Packages**

While the individual treatment methods discussed, such as escape extinction and stimulus fading, are indeed effective, in practice they are often used in various combinations or treatment packages to achieve maximum efficiency. In the case of this paper a treatment package consists of at least three therapy techniques used simultaneously for intervention purposes. Freeman and Piazza (1998) conducted a study which looked into the effectiveness of combining stimulus fading, reinforcement, and extinction in treating food refusal. Rene was the only participant, a 6-year-old girl diagnosed with autism, mild mental retardation, and a multitude of medical issues including cerebellar atrophy and mild right hemiplegia. During meal times Rene was prompted to take a bite. If no bite was taken after a 5 second wait a partial physical prompt was given. If this failed a full physical prompt was used. Praise was given after each successful bite consumed. Meals lasted until either 100% of the meal was completed or 45 minutes had passed. The amount of required food per meal was slowly increased throughout treatment. At the end of treatment, which consisted of 12 weeks, Rene was consuming 50% of age appropriate portions of all four food groups, an increase from her original baseline of 0% (Freeman and Piazza, 1998).

In another study involving two participants, Buddy, a 2-year-old male with trisomy 21 and a multitude of medical issues resulting in being nasogastric tube dependent, and Vickie an eight year old female also diagnosed with Down syndrome among other issues were treated for feeding problems. Babbitt, Shore, Smith, Williams, and Coe (2001) looked at the effectiveness

of stimulus fading, escape extinction, and reinforcement in the treatment of adipsia, a condition where an individual experiences a prolonged abstinence of liquids, which both participants were diagnosed as having. Treatment consisted of verbal prompting to “take a drink”. A spoon or cup was placed to the child’s lips until he/she opened his/her mouth for the liquid to be deposited. Escape extinction was used in situations where refusal occurred. Once consumption occurred, a 15 second praise was given to the participant. Meals lasted until 120 grams were consumed or 15 minutes had expired. A fading procedure was used to transition the children from spoon to cup. This procedure consisted of five steps, cup attached at the end of the spoon handle, cup attached halfway up the spoon handle, cup attached ¼ inch from the spoon bowl, spoon edge level with the cup edge, target cup with thickened liquid (Babbitt, Shore, Smith, Williams, and Coe, 2001). At baseline using thickened liquids in cups, Buddy had an average of 20% consumed. With thickened liquids and spoons he had a baseline of 78.9% liquids consumed. He consumed an average of 3.8 grams and in both conditions expulsion was low. When the treatment package was administered to Buddy, acceptance of thickened liquids remained high throughout the fading procedure at a mean of 96.5% liquid consumed with low expulsions averaging at 5.9% and consumed an average of 149 grams. At the end of the study, tube feedings were terminated as he was consuming an adequate amount of liquids on his own. Vickie at baseline consumed no liquids from either spoon or cup. When the treatment package and an alteration with liquid consistency were implemented, Vickie had an average acceptance of 80% and an average of 106.5 grams consumed (Babbitt et al., 2001). These studies demonstrate that a treatment package approach to therapy may offer an effective route to feeding problems.

### **Peer Modeling**

Peer modeling is a popular technique used in behavior therapy. The concept behind it is that the subject will observe and imitate target behaviors from typically developing peers in order to learn the wanted behavior (Sira, 2012). Sira (2012) looked into peer modeling using differential reinforcement as the treatment method to be used. The study looked at a nine year old male named Desmond who has autism and his sister a typically developing six year girl named Veronica. The study used reinforcement (preferred food and access to toys) contingent on consumption. Both children were given a one bite at a time starting with Veronica as Desmond observed. Spoonfuls of food were presented one per trial and the child was instructed to “take a bite”. If the bite was not taken or inappropriate behavior occurred the target food was removed after 30 seconds of initiation and the next trial began with the other sibling (Sira, 2012). At baseline Desmond had 0% consumed of spaghetti with sauce which improved using the treatment package to an average of 90% bites consumed at follow up. This was similar to the other target foods, hamburgers from 0% to 100%, scrambled eggs from 0% to 100% (Sira, 2012). Peer modeling can be used in conjunction with other treatment packages in order to help treat feeding problems such as picky eating.

### **Parent Implemented Interventions**

Parent implemented interventions follow more naturalistic guidelines of therapy meaning they take place in natural settings (at home) and with natural providers, in this case the parents. Parent implemented interventions allow for cheaper treatment as a clinician is not required to be there at all meals and more practical as the therapy can be conducted on more occasions than therapy in a hospital or clinic can occur. A study by Tarbox, Schiff, and Najdowski

(2010) looked at the effectiveness of non-removal of spoon escape extinction and natural meal times. They saw that NRS was often not practical in the home setting and witnessed that often times during a meal; children were not excused from the table until the meal was complete. This became to be known as non-removal of meal, keeping the target food on a plate in front of the child until acceptance and consumption was accomplished instead of a spoon placed in the child's face in NRS. The study looked at one child, a 3-year-old boy with autism named Ed. The procedure involved meal times, which lasted until the entire meal was consumed or 20 minutes had elapsed. Ed was told he had to consume the entirety of the meal presented to him and that he would have to remain seated at the table if he did not consume his meal. A second consequence of having the remainder of the meal for the following feeding session was also explained to him. If Ed attempted to leave the table his mother used partial physical prompting to return him to his seat. Reinforcement for completing the meal in a timely fashion was rewarded with playtime until his next scheduled activity (Tarbox, Schiff, and Najdowski, 2010). During baseline Ed had an average of 29% of meal completion. Immediately results were seen with averages of 97% meal completions and durations of meal times began to drop. To determine if the therapy was effective, the study included a return to baseline, which resulted in a drop of consumption to 17%. Upon the reimplementation of the intervention, consumption increased to 100%. With continued treatment, meal duration stabilized to 25.4 minutes. On follow-up, consumption remained at 100% and the duration remained low (Tarbox et al., 2010).

Another study conducted by Najdowski, Wallace, Reagon, Penrod, Higbee, and Tarbox (2010), looked at differential reinforcement and NRS with reinforcement fading conducted by parents in the natural settings. The study involved three children all with issues related to food

selectivity. Annabelle, a two year old girl with autism, Colin a four year old with autism, and Kari a four year old typical developing girl participated in the study. Sessions were unlimited unless a child did not accept food for 30 minutes straight in which the session would be terminated. A session consisted of instruction i.e., “take a bite”. If after five seconds no self-feeding occurred NRS was implemented. Inappropriate behaviors were ignored, and expulsions were represented. Food acceptance and consumption were reinforced with high preference foods. Bite requirements increased using a demand fading technique of increasing the number of bites presented. While this occurred, the reinforcement schedule was thinned requiring more and more bites before the reinforcing food was presented (Najdowski, Wallace, Reagon, Penrod, Higbee, and Tarbox, 2010). During baseline Annabelle had 0% bites swallowed. With therapy this was increased to 100% including during follow up. Colin had similar results in that at baseline 0% of bites were swallowed. With therapy bites of non-preferred items improved to 100% and remained there during follow up. Kari at baseline had swallowed bites of banana at 100% but the remainder of non-preferred items remained between 0-0.03%. Kari advanced with treatment to 100% bites swallowed, which continued through follow up (Najdowski et al., 2010). These studies demonstrate strong correlation between parent guided treatment methods and improvement of feeding problems.

### **Conclusion**

While individually many of the following components: antecedent manipulations, consequence procedures, peer modeling and parent implemented therapy are effective on their own as feeding interventions; empirically studies which used combinations of treatment options often yielded better results. The techniques which appeared more effective and were

frequently used in conjunction with one another were escape extinction paired with differential reinforcement and/or stimulus fading. They were most effective when all three techniques were used together. As seen with peer modeling and parent implemented therapies, the use of treatment packages or at least other treatment models yielded drastically improved results especially those using consequence procedures such as escape extinction and differential reinforcement. It is difficult to generalize the effectiveness of different treatment packages and treatment options due to the fact that each study looked at numerous children with varying severities of feeding disorders. Because of the variability, results can be skewed considering that no two studies used the exact same severity and feeding disorder. Some studies looked specifically at treating liquid refusal, others looked at food which ranged from picky eating to full food refusal resulting in emesis. This leads to questions such as how effective some interventions used for picky eating are for full food refusal or adipsia. Future studies should look at using treatment options with a varying demographic, targeting both those with severe and those with mild feeding problems as well as varying problems to determine overall effectiveness. This information could be extremely helpful for interventionists in determining the best treatment route to follow in regards to the specific feeding problem at hand.

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