5-2009

Proactive strategies for children with food refusal.

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PROACTIVE STRATEGIES FOR CHILDREN WITH FOOD REFUSAL

By

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M.S. Communicative Disorders, 2009

A Thesis
Submitted to the faculty of the
Graduate School of the University of Louisville
In Partial Fulfillments of the Requirements
for the degree of

Masters of Science

Department of Surgery
University of Louisville
Louisville, KY

May 2009

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A Thesis Approved on April 3, 2009

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ACKNOWLEDGEMENTS

I would like to especially thank my faculty advisor, Dr. Pat Blackwell, for her guidance and patience. I would also like to thank the other committee members, Professor James Scheetz, and Dr. David Cunningham for their commitment, and assistance over the past year. I would also like to thank the staff at the Weisskopf Child Evaluation Center and in particular Jocelyn Warren, Occupational Therapist, for her time and willingness to work with me throughout the duration of the project. Finally I would like to thank all the families who participated in the study for their willingness to help others.

ABSTRACT

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Sara E. Langlois

April 10, 2009

Feeding disorders occur when a child rejects significant amounts of food or drink. Food refusals are maintained by factors which may be behavioral based, due to structural impairments, or a combination of the two. One of the first steps to increasing a child's diet is having them try novel or previously rejected food items. The current study includes 5 case studies of behavioral based food refusals in children and applies the use of a step by step desensitization procedure as a form of proactive intervention to increase the likelihood a bite of non-preferred food will be accepted. Results of the study indicated the food item was allowed to increase in proximity to the oral cavity when the step by step procedure was implemented. Future research should explore methodology of the current investigation, include a larger sample size, revise time constraints and more clearly define subject parameters.

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INTRODUCTION

Feeding disorders are common in early childhood and occur when a child refuses to eat or drink adequate amounts to receive sufficient nutrition. As feeding disorders emerge and develop, they are maintained by a variety of factors which include organic, behavioral and/or social variables. Organic variables consist of physiological abnormalities that prevent typical eating patterns from developing, such as cleft palate or cleft lip. In comparison, behavioral and social variables related to feeding disorders are supported mainly by the environment, the contingencies surrounding meal times, and interaction with family members. Children at risk for feeding disorders are initially identified from parental complaints of the child being a "picky eater." In addition to consuming only a narrow range of food items, these children display an assortment of behaviors which are not conducive to appropriate feeding. Such behaviors include any or a combination of the following: refusing attempts to be fed, prolonged meal times, disruptive behaviors, gagging, regurgitation of food, and highly selective diets. These behaviors vary in severity and create a continuum which spreads from minor behavioral problems at meal times to complete food refusal. On the later end of the continuum, complete food refusal can have serious medical consequences and possibly result in malnutrition. Parents of these children, frequently experience high amounts of stress when dealing with behavioral problems at meal times and become anxious about their child receiving enough calories in a day (Sanders, 1993).

Of particular importance to the current study are behavioral or motivational based feeding disorders. This type of feeding disorder leads to the examination of the social interaction between parent and child at meal times. More clearly defined, children with behavioral based food refusals do not have any underlying medical conditions, skill deficits, or structural abnormalities that contribute to their food refusals. They do however, exhibit high food selectivity, inappropriate behaviors at meal times, and remain at great risk for malnutrition. Although it may be difficult to exclusively label a child as having a behavioral or physiological based feeding disorder, in order to help children with food refusal and/or food aversions, we must look to the environment, to uncover the contingencies which maintain the disorder in order to develop adequate intervention. Once the maintaining variables are identified, interventions can be designed toward altering the environment in order to promote acceptance of food items and thus work towards incorporating a more balanced diet. In addition to being at risk for malnutrition, these children also miss out on the important social interactions that surround meal times (Sanders, 1993).

For children with food refusal, appropriate meal time behaviors become a set of skills they must be exposed to and taught in order to achieve. Intervention focuses on setting up the environment to promote and encourage age-appropriate feeding behaviors. Parents must also be prepared to model and shape behaviors during meal times, just as they would with other skills and in other situations. For example, one would not expect a child to learn to dress themselves without repetitive practice and modeling. We should therefore not expect feeding behaviors to develop in some children without setting up the environment to promote positive relationships with food. Several environmental

variables can enhance or inhibit feeding skills as well. An environment which fosters development of appropriate feeding behaviors includes scheduled meal times, limited access to foods in between meals, multiple trials of novel foods, as well as praise or rewards for appropriate behaviors and food consumption. In comparison, environments which do not support appropriate feeding behaviors include access to inappropriate amounts of foods, unrestricted access to inappropriate foods (snacks with limited nutritional value such as candies, cookies, chips, etc.) in between meals, failure to encourage and reward appropriate eating and meal time behavior, excessive attention when the child refuses to eat, and/or coercive statements to try and get the child to eat (Sanders, 1993).

One area to explore regarding food refusal is the application of a systematic desensitization procedure. Previously, research in this area has been applied to a variety of conditions and phobias, such as dental fear, medication administration, and sensitivity to auditory stimuli. The goal of systematic desensitization is to reduce the anxiety and extreme behavioral responses associated with aversive conditions or stimuli. When applying the principles of systematic desensitization to food refusal, the following question arises: Could the inappropriate behaviors and reactions to presentations of non-preferred foods mirror those reactions which are displayed when a phobia is present? Research has shown that the associated inappropriate behaviors function or occur to avoid or terminate (escape) the presentation of a non-preferred food item, and many phobia related behaviors also occur to avoid or terminate interaction with the aversive stimuli associated with the phobia (Piazza et al.,2003). It therefore, must be examined whether food refusals can be treated as a type of phobia using systematic desensitization

procedures. To date, research has not looked into the application of systematic desensitization for food refusal and it is therefore important to investigate whether it can be utilized as an effective treatment.

In summary, even when anatomical etiologies are absent, some children persist and continue to display a narrow range of food selectivity. Current research supports that behavioral intervention strategies can be effective treatments for food refusal and food selectivity (Ahearn, 2002, Ahearn et al., 1996, Ahear, 2003, Dawson et al., 2003, Freeman & Piazza, 1998, Kahng, 2003, McComas et al., 2000, Patel & Piazza, 2001, Patel et al., 2006, Patel et al., 2007, and Reed et al., 2004). Such strategies may include the use of positive reinforcement, negative reinforcement, extinction, and stimulus fading. More recent findings in the behavioral literature have indicated that the use of a high-probability sequence may also be an effective strategy to increase food acceptance (McComas et al., 2000, Dawson et al., 2003, Patel et al., 2006, and Patel et al., 2007). As mentioned previously, one additional area which has not been applied to food refusal in the past is the use of systematic desensitization procedures. Thus, the present study attempts to develop a step by step desensitization procedure, which can be used as a proactive strategy to increase food acceptance in children with food refusal. The following research question is proposed: Will the use of a step-by-step desensitization procedure increase acceptance of non-preferred foods in children with food refusal?

LITERATURE REVIEW

Feeding disorders are common in early childhood and occur when the child refuses to eat or drink adequate amounts to receive sufficient nutrition. Approximately 25% of children are reported to have some type of feeding disorder, while 80% of children with developmental delays experience some form of a feeding disorder (Manikam & Perman, 2000). Etiologies related to feeding disorders include any or a combination of the following: medical, nutritional, behavioral, and psychological, and environmental factors. While some children merely require encouragement from a caregiver, other children maintain high food selectivity and often do not receive adequate nutrition during meal times without intervention (Manikam & Perman, 2000). Once feeding disorders develop they are often maintained by a variety of factors. Of particular importance to the current study are behavioral or motivational based feeding disorders. Children with behavioral based food refusals do not have any underlying medical conditions, skill deficits, or structural abnormalities that contribute to their food refusals or aversions, yet often exhibit food selectivity, inappropriate behaviors at meal times, and are at risk for malnutrition. Although it may be difficult to exclusively label a child as having a behavioral or physiological based feeding disorder, in order to help children with food refusal and/or food aversions, examination of the environment is warranted to uncover the contingencies responsible for maintaining the disorder, which will ultimately lead to the advancement of appropriate and effective interventions.

The separation of motivational or behavioral based feeding disorders and physiological or skill based feeding disorders stems from the research of Field and Williams (2003). In the study, motivationally based feeding problems included food refusal maintained by environmental changes. Such feeding problems develop over time when the child's response to food (typically inappropriate behaviors) results in avoidance or escape from eating certain foods. Motivationally based feeding problems were further broken down into categories which included: food refusal, where the child refused to eat all or most; selectivity by texture, where children refused to eat textures that were developmentally appropriate; and selectivity by type, where the children ate only a narrow range of foods that were nutritionally inappropriate. On the other hand, skill based problems occur when there are deficits in the child's underlying physiological mechanisms which are necessary for eating, such as the processes involved in sucking, chewing, or swallowing.

Results of the Field and Williams (2003) study focused mainly on the impact that medical conditions can have on feeding disorders. The majority of the participants presented with underlying medical conditions and skill based problems, which may have interfered with feeding and thus contributed to the child's food refusals. A true motivational based problem was present in only 9 of the 349 participants. Out of the nine children who presented with a motivational based feeding disorder, four of the children displayed difficulty transitioning to solid foods, and five were considered selective eaters. It is worth noting that it may be difficult to completely distinguish motivational and skill based feeding disorders. For example, a feeding disorder my start out as a physiological problem, such as aversions related to gastroesophageal reflux. With treatment the

condition may improve or be eradicated, however the feeding disorder may continue to persist if the absence of the condition if a history or aversive pairing with food items has already been established. Results of Field and Williams (2003) further indicated that children with developmental delays are at a higher risk for developing feeding disorders and that early identification and treatment of underlying medical conditions is an essential component to the early treatment of feeding disorders. More specifically, of the 339 participants with feeding disorders, ages 1 month to 12 years, 225 (64%) also had developmental delays including a range of mild speech delays, genetic syndromes, and developmental disabilities.

Children with feeding disorders are not only at risk for malnutrition, but also miss out on an important time for social interaction. In combination, social interaction and the feeding environment foster positive or negative experiences for the child and thus contribute to the child's acceptance of foods and nutritional intake (Manikam & Perman, 2000). Manikam and Perman (2000) stated that "children do not necessarily feed for nutritional values, but are rather motivated by taste and social reinforcement." Children thus equate food with the social experiences and responses to feeding behaviors. For example, it is possible that foods given during pleasurable experiences, such as at parties, during the holidays, with friends or family or in front of the television, may be more readily accepted. Foods that are paired with positive social experiences may therefore be the foods which are less threatening or aversive to the child. In comparison, novel foods presented at meals times that he child is told to eat, may be intimidating to the child. Manikam and Perman (2000) therefore suggested that an environment which provides

introduction of novel foods early on and family based meal times were suggested to foster healthy development.

Thus developing appropriate feeding behaviors involves more then merely requiring the child to take a bite, chew, and swallow. In fact, appropriate feeding behaviors rely heavily on the interactions that children have with their parents at meal times as well as how the environment shapes both positive and negative behaviors surrounding food. To explore the social component of feeding behaviors, Sanders et al. (1993) investigated the relationship between parent's feeding practices and the behaviors of children with and without feeding disorders. Participants included 19 children with feeding disorders and 26 healthy children without feeding disorders. Mothers of the children from both categories were also included in the study. Sanders et al. (1993) defined feeding disorders to include children between the ages of 12 months and 6 years with a history of significant feeding difficulties to include any or a combination of the following: persistent food refusal, refusal to self-feed, eating very slowly, fussy eater or consuming a narrow range of foods, and displaying disruptive behavior during meal times. Participants in the study also presented with no current organic condition that may have accounted for the feeding problem.

Parent-child interactions were assessed via a Mealtime Observation Schedule (MOS), which provided a measure of appropriate feeding behavior and parent responses to managing behavior during mealtimes. The MOS measures 17 categories of child-feeding behavior; 11 categories of disruptive mealtime behaviors, and 6 categories of appropriate mealtime behaviors. Measures obtained included the percentage of intervals with the following: disruptive behaviors, aversive parent behavior, appropriate feeding

behaviors, and non-aversive feeding behaviors. In addition, parents rated how challenging they felt their child's behavior was at mealtimes on a 7 point scale from easy to difficult. Finally, to determine if feeding difficulties were related to other social difficulties within the family dynamic, additional measures included The Dynamic Adjustment Scale, The Beck Depression Inventory, and The Perceived Social Support Inventory. Results of the study found a higher rate of disruptive behavior in children with feeding disorders than non-problems eaters, and showed that parents of children with feeding disorders use more coercive control tactics during meal times when faced with inappropriate behaviors. Specifically, parents try to coax their children to eat by using verbal and physical prompts. This is considered to be a parent response to the inappropriate behaviors. In addition, parental coaxing behaviors are maintained and persist, by the intermittent consumption of food (Sanders et al., 1993).

Further defined, inappropriate meal time behaviors include any of the following: resisting attempts to be fed by the parent, taking a long time to consume a meal, eating restrictive diets, gagging, and regurgitation. Often times, non-compliance also results in tantrums during meal times which, as stated previously, can be stressful for both the child and the parent resulting in negative experiences associated with food and meal times. As seen in the previous studies, the behavioral characteristics which contribute to food refusals in children therefore rely heavily on the social interaction between the child and parent during meal times (Sanders et al., 1993, Field et al., 2003). For example, if tantrums or inappropriate behaviors lead to the removal of a novel or non-preferred food item, over time the child's inappropriate behavior may be reinforced. In other words, the child is reinforced or learns to engage in inappropriate behaviors to avoid eating certain

foods. Children's inappropriate behaviors at meal times may also be reinforced if they are provided with a lot of attention from their parents, as well as access to foods they will eat in the attempt to ensure the child eats something. Thus early identification of the maintaining variables of feeding problems will improve the lives of the individual and their family (Sanders et al., 1993, Field et al., 2003, Rudolph & Thampson 2002).

First, in order to obtain an appropriate understanding of the development and maintenance of motivational based feeding disorders, the term "reinforcement" must be further defined. Reinforcement can be separated into two distinct categories, negative reinforcement and positive reinforcement. Positive reinforcement is defined as the presentation of a stimulus contingent on a behavior, which increases the future frequency of that behavior. Behaviors maintained by positive reinforcement often result in contact with preferred stimuli, such as access to tangibles, food, drink, and/or attention. However, attention is only considered a conditioned (positive) reinforcer if it has been paired with (primary) reinforcement in the past. The other type of reinforcement, negative reinforcement, is defined as the removal of an aversive stimulus, contingent on a behavior, which increases the frequency of that behavior in the future. In other words, behaviors maintained by negative reinforcement result in the escape or avoidance of aversive stimuli. Thus the function of a behavior maintained by negative reinforcement is to terminate the presenting aversive stimulus in the environment. Once the behavior has been successful in terminating the aversive stimuli, the behavior may function to avoid that stimulus in the future (Cipani et al. 1997).

In addition, treatment of food refusal not only needs to consider the role of positive vs. negative reinforcement, but also whether the treatment will be an antecedent based or

consequence based procedure. Antecedent based interventions include application of treatments before the food refusal occurs, while consequence-based procedures are applied after the food refusal occurs. Extinction is one consequence-based procedure that research has shown to be effective in the treatment of food refusal. Extinction involves the discontinuation of reinforcement of a behavior (that was previously reinforced). When reinforcing consequences no longer follow a particular behavior, that behavior should gradually decrease in frequency to the level prior to reinforcement and/or stop occurring altogether. An extinction procedure therefore, identifies and withholds all sources of reinforcement for a target behavior, and in this case, withholds reinforcement of food refusal behaviors. Often time this involves not allowing the child to avoid or escape eating a bite of a previously rejected food item. However, there are side effects to extinction procedures which include: an initial increase in the frequency of the behavior, initial increase in the magnitude or intensity of the behavior, and/or new behaviors may be emitted to try and obtain the reinforcer (Cooper et al., 1987).

When utilizing extinction as a part of the treatment package, it should be combined with other procedures so that the behavior being eliminated can be replaced by a more socially appropriate behavior which can serve the same function (Cooper et al., 1987). Research has shown that extinction procedures combined with reinforcement contingencies have been effective at treating food refusal (Ahearn et al., 1996, Ahearn, 2002, Ahearn, 2003, Freeman & Piazza, 1998, Kahng, 2003, Patel& Piazza, 2001, Reed et al., 2004). For example, procedures involving both escape extinction and reinforcement contingencies may involve non-removal of the bite of food. The bite is held in proximity to the child's mouth until it is accepted and consumed (escape

extinction). Once the bite is consumed, the reinforcement contingency may include praise (positive reinforcement), escape from the meal (negative reinforcement), or access to preferred items (positive reinforcement). In my personal experience with extinction procedures for food refusal as a behavior therapist, children have extreme responses, resulting in tantrums and increases in inappropriate behaviors for a prolonged period of time. Although this initial aversive response decreases within and across treatment sessions, it is a highly emotional reaction for the child and may be difficult to carryover to the natural environment if the parents are easily stressed or upset by the child's reaction. Furthermore, it is always a concern that the parent may become so stressed, that they allow the child to escape during the intense emotional reaction, thus reinforcing an even more intense and aversive reaction to food.

Ahearn (2002) points out that the limited exposure to a variety of foods from an early age can set the stage for selectivity to emerge. Children who are not exposed to a variety of foods get use to eating a narrow range of items, and may become more resistant with both sampling and incorporating novel foods into their diet. When this occurs, positive reinforcement contingencies play an important role for treatments to increase food acceptance. However, not all children will respond to reinforcement procedures alone. Ahearn (2002) compared two food presentation methods for children who previously did not respond to differential reinforcement procedures alone. The overall goal of the study was to get each child eating three foods from four food groups (fruit, vegetable, starch, and protein). In the study, Ahearn (2002) also introduced multiple food items, compared to presentation of one single food item at a time. Participants in the study included children ages 4 to11 years of which four were

diagnosed with autism and two were diagnosed with pervasive developmental disorder. None of the participants presented with gastrointestinal difficulties. Prior to assessment, a diet history was collected for each of the participants in the study and identified three food items from any of the four food groups that the child would be expected to consume during and after treatment.

During treatment, participants were assigned randomly to one of two groups; single food item or multi-food item. Participants in the single-item group were presented with one food item at a time, while participants in the multi-item group were presented with three items from the same food group at a time. The first food item presented in both groups included a food that the child was observed to accept at least occasionally. In the multi-item group only, two additional food items from the same food group were introduced. Following acceptance of the three target food items, a fourth target was introduced from a subsequent food category. Criterion for both groups was 80% acceptance of the food with less then 20% disruptive behavior. When criterion was met, a new target item was introduced. Since the participants previously did not respond to differential reinforcement alone, two conditions were included, non-removal of the spoon and physical guidance. In the non-removal of the spoon condition, if the participant did not accept the bite within 5 seconds from the initial presentation, extinction was initiated. Extinction involved holding the bite in front of the participant until it was consumed. In the physical guidance condition, if the participant continued to refuse the bite of food or 30 seconds elapsed, physical guidance was used to aid the child in consuming the bite of food. Generalization probes were conducted after criterion was met for the target foods.

If the child accepted a novel target item 2 or more times out of 5 presentations, food acceptance was considered to be generalizing to the new target item.

Results of Ahearn (2002) study showed that all participants were eating three foods from each of the four food groups. These findings add further support to previous research that escape extinction is an effective treatment for food refusal. Ahearn (2002) further expanded the research by demonstrating that escape extinction, as a component of treatment, was effective with both the introduction of single food items and multiple food items. However, it is important to distinguish that targeting a single food item resulted in a higher rate of acquisition whereas targeting multiple food items produced greater outcomes for response generalization. Thus clinical implications of the results show that if acquisition is the focus food items should be introduced one at a time. In comparison, if generalization is the goal, multiple items should be introduced simultaneously.

Prior to the Ahearn (2002) study, Freeman and Piazza (1998), treated food refusal in a 6 year old girl diagnosed with cerebellar atrophy, mild right hemiplegia, autism, moderate mental retardation, and a four year history of food refusal. The participant's refusals were so severe that they resulted in significant weight loss, dehydration and at times required emergency medical attention. The study used a multi-component treatment package which combined stimulus fading, reinforcement, and extinction procedures. Stimulus fading involved presentation of food in 5% increments to approximate age appropriate portions of the four food groups (fruit, vegetables, protein, and starch). Consequences included verbal praise for consumption of bites and termination of the meal. Escape extinction involved the use of guided compliance if bites were not self-initiated. One unique characteristic of this study was that each meal was

presented in a social setting, with other children and staff members at the table. Treatment meals were initiated with the verbal prompt, "take a bite." If the participant did not comply within 5 seconds, a partial physical prompt was initiated to guide the participants hand to the spoon and paired with the verbal prompt to "take a bite." If compliance still did not occur, another physical prompt to guide the spoon of food to the lips and verbal prompt were given. Once the participant consumed the bite, verbal praise was provided. The meal was concluded when all of the food was consumed or 45 minutes elapsed. When the participant was 80% compliant for three consecutive meals, a 5% increase, of non-preferred food, was included in the following meal. When 50% of an age appropriate portion was being consumed, a small amount of a new food group was introduced at meal times.

Results of the Freeman and Piazza (1998) study showed that participants consumed 50% of the age appropriate portions for all four food groups. These results support that stimulus fading may be an effective treatment for food refusal and may also help increase the variety of foods an individual will consume. One advantage of the stimulus fading procedure is that the requirement of only eating a small portion of a food item, allowed the participant to contact reinforcement (termination of the meal) faster than if a larger quantity of food had been required. This procedure may also have made the meal less aversive, as preferred food items were included in the meal. Thus a non-preferred or novel food item was paired with food items that the child already consumed. The pairing of the food items may be one way to help the child form positive associations with novel or non-preferred foods. The authors state that the combination of the stimulus fading procedure in conjunction with the use of the prompting procedure may

have increased the overall effectiveness of the study, as well as increase the amount and type of food consumption. However, a component analysis was not conducted, making it difficult to determine which parts of the treatment package (i.e., stimulus fading, reinforcement, or escape extinction) were effective or if a combination of the treatments was were responsible for the increase in acceptance of non-preferred foods.

Patel and Piazza (2001) extended the use of a fading procedure to increase fluid consumption in a 6 year old boy diagnosed with pervasive developmental disorder and a prior medical history of failure to thrive, and gastronomy tube dependence. Prior to intervention, the participant would drink small amounts of water from a cup, but refused all other liquids. Treatment involved the use of a fading procedure combined with differential reinforcement of alternative behaviors (to liquid refusal) and escape extinction (physical prompting). The fading procedure involved gradually increasing the concentration of Carnation Instant Breakfast in the water, followed by progressively increasing the concentration of milk and Carnation Instant Breakfast mixture in the water. Criterion for the fading procedure included swallowing 80% the liquid presentation or "mouth clean." Drinks were presented to the participant approximately every 30 seconds with the statement "take a drink."

Upon presentation, if the participant refused to drink the liquid within 30 seconds from the initial presentation, the researcher gentle applied pressure to the mandibular joint and the cup remained at the mouth until it was consumed (extinction). In comparison, if the participant took a drink and swallowed, within 30 seconds, he was allowed access to preferred toys and received praise from the researcher (differential reinforcement). Results showed that "mouth clean," was achieved 100% of the time for

both the Carnation Instant Breakfast-water combination and the Carnation Instant Breakfast-milk combination. These results indicate that when a fading is paired with differential reinforcement and extinction, consumption of fluids significantly increased. However, this study is limited due to the fact that more then one treatment was applied at a time and thus it is difficult to determine the effectiveness of each treatment in isolation without considering the contribution of the other treatments.

Another type of treatment for food refusal includes implementation of a token economy system. A token economy system involves pairing individual tokens or chips with reinforcement, and exchanging them for a more powerful backup reinforcer (Cooper et al., 1987). Kahng (2003) applied the use of a token economy system with differential reinforcement for treatment of food refusal in a 4 year old girl with a medical history of speech delay, pervasive developmental disorder, and received all nutrition through a bottle. The study compared the use of a differential negative reinforcement of alternative behaviors plus token economy, to the use of differential positive reinforcement of alternative behaviors and physical guidance. If the participant accepted a bite of food within 5 seconds of the initial presentation, a token was presented and placed on the token board. Meals were terminated when the participant placed a predetermined number of tokens on the token board or 30 minutes had elapsed. Results of the Kahng (2003) suggest that the use of an escape contingency and token economy may be an essential component to the treatment of food refusal. Thus escape from presentation of bites served as a more potent reinforcement then the praise or avoidance of physical guidance. Results also support that if food refusals are maintained by negative reinforcement, treatment packages must take this into consideration in order to be successful. However,

the author does state that it is possible the backup reinforcer of escape, when all of the tokens were obtained, was responsible for the treatment's success vs. that the tokens served as a positive reinforcer for acceptance of bites.

In addition to possible treatments for children with feeding disorders, investigation regarding the consequences involved in the development and maintenance of food refusal was warranted. Piazza et al. (2003) conducted a functional analysis of inappropriate behaviors related to food refusal in the attempt to identify environmental variables which perpetuate feeding disorders. Previously, functional analysis has been applied extensively in the treatment of a variety of behavior problems, and has been a key element in developing effective interventions. Prior to this study, the application of functional analysis as a component to the treatment of feeding disorders has been limited. Piazza et al. (2003) reports that parents use a variety of consequences to increase a child's motivation to eat. Consequences may include but are not limited to: terminating a meal when the child tantrums, increased attention for inappropriate behaviors, and/or providing a more preferred food following a refusal so the child will eat something (Piazza et al., 2003). Ultimately, battling with a child who will not eat is stressful for the parent and some of the consequences listed may immediately stop the undesired behavior. Over time a pattern of behaviors may develop where the child engages in behaviors to get out of eating certain food items.

As this behavioral pattern develops, the child may learn, for example, that if they scream and cry they can avoid eating foods they do not want. In response to the child's emotional reaction to certain food items, the parent may stop giving the child non-preferred foods to avoid the struggle at meal times. Despite the fact avoiding certain food

items may prevent or stop the undesired behavior, it ultimately reinforces the child's emotional reactions to food and increases the likelihood the child will refuse that food in the future. A different consequence occurs when the child receives an alternative preferred food when they inappropriately refuse one they do not prefer. This consequence will result in positive reinforcement of the child's inappropriate behavior as they gain access to a food they will eat, as well as negatively reinforce the behavior because again, the non-preferred food item was removed. Parents may present an alternative food item when the child's intake has been low and they are trying to get the child some nutrition. A final scenario is that the child will receive high amounts of attention from the parent when food refusal occurs. It is possible that high amounts of attention following food refusal, may function as a positive reinforcer for the child's rejection to eat. Regardless of the cause of food refusal, lack of nutrition can have mild to severe side effects ranging from skipping a meal, malnourishment, and a compromised immune system. Identification of the nature of the feeding disorder, (i.e., skill-based or motivation based refusals), as well as the consequences provided contingent on food refusal, are thus essential for effective intervention and treatment.

More specifically, in the Piazza et al., (2003) study, six children and their parents were observed during meal times at the program site and data was collected on both parent and child behaviors. Parents were asked to feed and respond to their child as if they were in the home environment. Parent behaviors that were measured included: delivery of escape (removal of food or termination of the meal), attention, or delivery of tangible items. Occurrence or non-occurrence of the parent behaviors was scored following each inappropriate behavior during the meal. Child behaviors that were

measured involved both inappropriate and appropriate meal time behaviors. Appropriate meal time behaviors included acceptance of a bite or drink within 5 seconds. Inappropriate behaviors varied per child, but included at least one of the following: expulsions, gagging, vomiting, head turning, batting at the spoon, throwing food or utensils, getting out of their seat, negative vocalizations, self-injury, or aggression. Results indicated that each parent used a variety of consequences when their child displayed inappropriate behaviors during meal times. Specifically, all parents provided various forms of attention (i.e., reprimands, soothing comments, or coaxing) and removed bites of food following inappropriate behavior. Three of the six parents provided a tangible item (i.e., preferred food, drink, or toys) when their child engaged in inappropriate behaviors at meal time.

Due to the fact parents used more then one type of consequence (i.e., both positive and/or negative reinforcers) during study 1, each consequence, was then evaluated individually in study 2. Three conditions were therefore established, escape, attention, and access to tangibles. In the escape condition, the bite was removed contingent on inappropriate behavior. Bites of non-preferred foods were presented to the children in 30 second intervals. If the child engaged in inappropriate behaviors when presented with the bite, it was removed (negative reinforcement) for 30 seconds and then presented again at the start of the next interval. No other consequences were provided by the researcher other than removal of the bite. In the attention condition, the researcher provided 5-10 seconds of attention immediately following inappropriate behavior (positive reinforcement in the form of attention). The attention provided involved coaxing the child to take a bite and/or providing statements of concern that the child was

not eating. The spoon remained at the child's lips for the duration of the 30 second interval and was then removed. At the start of the next interval a new bite was presented again, and procedure repeated. In the access to tangibles condition, preferred toys, foods, or drinks were presented immediately following inappropriate behavior (positive reinforcement in the form of tangible items). The child was allowed access to the items for the remainder of the 30 second interval, but the spoon remained at the child's lips. At the end of the 30 second interval the spoon and tangible item was removed. No other consequences were provided in this condition.

Results showed that 10 of the 15 participants (67%) displayed inappropriate behaviors in one or more of the conditions, indicating the environment does in fact contribute to the child's feeding problems. Specifically, 9 of the participants (60%) displayed high levels of inappropriate behavior in the escape condition (negative reinforcement), 8 of the participants (53%) displayed high levels of inappropriate behaviors in the attention condition (positive reinforcement in the form of attention), and 2 participants (approximately 7%) displayed high levels of inappropriate behaviors in the tangible condition (positive reinforcement via access to preferred foods, drinks, and toys). Thus, the results support that feeding problems are multiply controlled by negative reinforcement, escaping or avoiding a non-preferred food, as well as positive reinforcement, when access to preferred tangible items, foods, drinks, or attention follows refusal. With regards to clinical application, the results confirm that all forms of environmental consequences must be systematically evaluated and controlled during intervention. More specifically, if food refusal can be considered a form of non-

compliance (refusing to eat upon request) evidence based interventions to treat non-compliance must be incorporated into the treatment program.

Under the assumption that motivational based food refusals can be considered a form of non-compliance, they are therefore maintained, at least in part, by negative reinforcement, or escape/removal of the non-preferred food. Non-compliance can be defined as "the refusal to initiate or complete a verbal or non-verbal request within a prespecified period of time (Banda et al., 2003). One treatment to increase compliance for behaviors maintained by negative reinforcement is behavior momentum (Cipani et al., 1997). Behavioral momentum utilizes a series of pre-task instructions that have a high probability of compliance (Cipani et al., 1997, Banda et al., 2003). The individual is likely to comply with high probability instructions due to a prior history of reinforcement associated with the instructions. Using a sequence of instructional tasks that the individual is likely to comply with may create a "momentum," of compliance (high probability sequence) which may then carryover when a low probability of compliance instruction is presented immediately following the high probability sequence (Mace et al. 1988). In addition, the high probability sequence would be considered an antecedent intervention which may have advantages over consequence-based interventions as it would prevent the non-compliance, in this case food refusal, before it happens (Banda et al., 2003).

In response, Banda et al. (2003), reviewed 16 empirical studies where high probability sequences were utilized to increase compliance in children eight years of age or younger. Participants included a total of 33 children; 24 males and 9 females, whose age ranged from 20 to 96 months. Twenty-eight of the participants were diagnosed with

disabilities (i.e., autism spectrum disorder, developmental delays, emotional and behavioral disorders, mental retardation, cerebral palsy, etc.) and five of the participants were typically developing. In more then half of the studies reviewed, (63%), the researchers utilized general compliance requests. The other studies utilized more specific instructions, for example, compliance with social, communication, and transition requests. Instructions for compliance with medical care, and food intake were limited to only one study per topic. The studies were evaluated not only on the type of compliant behaviors, but also on the definitions of high-probability requests, low-probability requests, variation of the high probability sequence, interprompt time, research design, interrater reliability, and procedural integrity.

Results indicated, that 12 of the 16 studies reported the use of a high probability sequence prior to a low probability sequence was effective at increasing compliance in 29 of the 33 children. With regards to the children who were typically developing, the high probability sequence increased compliance with only two of the five children the children. Delivery of the low-probability response following the final high-probability request in the sequence was most effective when the interrprompt time (i.e., time between the final high-probability response and the low-probability task) was no more than a 2-3 second delay. The type of high-probability response also had important implication for the effectiveness of the high probability sequence. Variant high probability sequences, presented in random order, were more effective than invariant sequences. In other words, having the child complete a series of different responses was more effective than if the same task was repeated (Banda et al., 2003).

Overall, the literature supports the use of a high probability sequence as an effective intervention strategy for treatment of non-compliance. Banda et al. (2003) suggests that future research should focus on the use of the high probability sequence with typically developing children and continue to focus on children with disabilities. Additional research should further identify the components of the high probability sequence that are responsible for the behavior change or compliance, such as the type and topography of the request. In addition, research should apply the use of the technique in a group setting as well as determine if the technique can be applied to academic type tasks. Since the review by Banda et al., (2003) limited research remains available which applies the use of a high probability sequence to treat non-compliance associated with food refusals. McComas et al., (2000) conducted the first study to examine the use of a high probability sequence. The McComas et al., (2000) study used a multi-component treatment that evaluated the effects of escape extinction, with and without the use of a high probability sequence. Participants included only one child with food refusal. Results of the study indicated that food acceptance increased more rapidly with the use of high probability sequence. However, acceptance also increased after five sessions without the use of the high probability sequence. Limitations of this study are related to the fact it did not evaluate the independent contribution of the high probability sequence.

Another study, which utilized a high probability sequence for treatment of food refusal, was Dawson et al. (2003). A multi-element and reversal design evaluated the effects of the high probability sequence, escape, and escape extinction. Participants included a 3 year old female with a medical history of premature birth, gastroesophageal reflux, delayed gastric emptying, developmental delay, and gastronomy tube dependence.

The participant was exposed to four conditions: escape plus no high probability sequence, escape plus high probability sequence, escape extinction alone, and escape extinction plus high probability sequence. The high-probability instructions utilized in the study included presentation of tasks for which compliance was 80% or better at baseline. The low-probability instruction was "take a bite," plus random presentation of one of four different foods selected for the study. Sessions continued until 12 bites were consumed.

In the escape plus no high probability sequence, the child was presented with the low-probability instruction approximately every 30 seconds. If the participant did not take a bite within 5 seconds, the spoon was removed and the next bite was presented at the start of the following 30 second interval. The spoon was also removed if the participant engaged in inappropriate behaviors. If the food was accepted and swallowed, the researcher provided enthusiastic praise. The escape plus high probability sequence was identical to the escape plus no high probability sequence, with the addition of three high-probability instructions, presented in random order prior to the low-probability instruction. In the escape extinction plus no high probability sequence escape was not permitted following refusal or inappropriate behavior and instead was held at the participant's mouth until the bite was swallowed. If the bite was expelled, it was re-presented until it was swallowed. Finally in the escape extinction plus no high probability sequence three high-probability instructions, presented in random order prior to the bite of food were added. If the participant refused or engaged in inappropriate behaviors, the spoon remained at the participant's mouth until the bite was consumed.

Results of the study showed that no bites were accepted in the escape plus no high probability sequence condition. When escape extinction was added, compliance

increased to 100% regardless of whether or not the high probability sequence was present. In other words, escape extinction increased food acceptance regardless of whether a high probability sequence was present, and appeared to be the variable which increased food acceptance. This study found that the high probability sequence alone was not enough to have a desired effect on the behavior in question and did not add to the effectiveness of escape extinction. However, it should be noted that the instructions selected for high probability sequence were not topographically similar to the low-probability response. Instead, fine motor tasks, which are unrelated to eating were utilized. One of the suggestions Dawson et al. (2003) recommend is determining if similarities between the high-probability and low-probability sequence alter compliance.

Patel et al. (2006) utilized a reversal and multi-element design to evaluate the effects of a high probability sequence with and without escape extinction to follow up on McComas (2000). Participants included three children ages 2-6 years, diagnosed with a feeding disorder that previously had little to no food acceptance using escape extinction alone. Participant one was a 6 year old male with a prior medical history of congenital blindness, laryngomalacia, gastronomy tube dependence (G-Tube), gastroesophageal reflux (GER), failure to thrive (FTT), and severe oral motor deficits. Participant two was a 2 year old female diagnosed with developmental delays and prior medical history of intraventricular hemorrhage, FTT, GER, and bottle dependence. Participant three was a 2 year old female, diagnosed with mild developmental delays and a prior medical history of bronchiopulmonary dysplasia, GER and G-Tube dependence. All participants in the study also exhibited inappropriate behaviors at meal times (i.e., head turning, batting, or blocking spoon/cup, or covering mouth with arm or hand), but would comply with other

topographically similar requests. In other words, they would comply with tasks that were similar to eating behaviors, such as taking a bite from an empty spoon, or drinking from an empty cup.

A reversal design was used to examine the effects of the high probability sequence on food acceptance; in the first condition the low-probability instructions were presented alone. In the second condition the high probability instructions were presented prior to the low-probability. A trained therapist conducted all treatment sessions in the study. In contrast to previous investigations, results of the Patel et al. (2003) study showed that the high-p sequence produced consistent increases in food acceptance for 2 of the 3 participants. Food acceptance was at higher levels when the high-p procedure was used verses when it was not used. It is important to note that the high-p sequence in the Patel et al (2003) study were topographically similar to the low-p behavior (food acceptance). For the third child in the investigation, although the high-p sequence did not produce an increase in food acceptance, inappropriate behaviors did decrease when the high-p sequence was used.

Patel et al. (2007) further investigated the effects of a high-probability instructional sequence without the use of escape extinction on food acceptance. Participants included a four year old male diagnosed with Pervasive Developmental Delay. The participant received the majority of his nutrition through supplement liquids and a limited number of jarred baby foods and peanut butter sandwiches. The high probability sequence consisted of "take a bite," followed by presentation of an empty spoon. Compliance at baseline with the empty spoon was 100%. The low-probability request included "take a bite," followed by presentation of a spoon with food. Effects of

the high probability sequence were evaluated using a reversal design in conjunction with previous investigations.

During the treatment sessions, initially, only the low-probability request was presented every 30 seconds and consisted of one spoonful of a fruit, vegetable or protein. Pureed foods were used in the study to facilitate the transition from jarred baby food. Two verbal prompts were given; the first within 5 seconds if the bite was not accepted, and the second 5 seconds after the first verbal prompt. If the bite was still not accepted following two verbal prompts, it was removed. Acceptance of the bite resulted in verbal praise and light physical touch, such as a high five, pat on the back, etc. If the participant engaged in inappropriate behaviors, the bite was removed, and then presented again after a 20 seconds escape period. In the second condition, procedures were identical to the first condition with the exception that three rapid presentations of the high-probability request preceded the low-probability request.

Results indicated compliance with the low-probability request when presented in isolation without the preceding high probability sequence was zero. Compliance only increased when the high probability sequence preceded the low-probability request and remained at 100% throughout the study. Patel et al. (2007) therefore demonstrated that an antecedent based procedure may be effective at treating food refusal. Results also indicate that increased in food acceptance may be possible without the use of escape extinction. In addition, acceptance also remained high at a 3 month follow-up, and the high probability sequence was able to be faded out requiring only the verbal prompt to "take a bite." These results also differ from Dawson et al., (2003) which found the high probability sequence to be ineffective without the use of escape extinction. Of particular

notice is that the children in the Dawson et al., (2003) study exhibited non-compliance in addition to food refusal, while the participant in the Patel et al., (2007) study only exhibited non-compliance related to food refusal.

In summary, previous research indicated positive effects on non-compliance using a high probability sequence. However, limited research is available as to whether the topography of the high-probability instruction will have any effect on food acceptance in children. When applying the use of a high probability sequence for treatment of food refusal, limited and conflicting research exists. Dawson et al. (2003), suggests that a high probability sequence does not contribute to the treatment of feeding disorders and McComas (2000), found the high probability sequence may result in limited transient effects during treatment with the use of escape extinction. In comparison, the study by Patel (2006) and Patel (2007) indicated that the use of the high probability sequence not only produced consistent increases in food acceptance, but also that an antecedent based intervention may be an effective treatment for food refusal.

A final area of research which is of interest to the current study involves the use of systematic desensitization. Systematic desensitization has been applied to a variety of conditions, such as dental fear (Kvale, et al., 2004), auditory sensitivity (Koegel et al., 2004), and oral medication administration (Beck et al., 2005). Systematic desensitization entails using relaxation methods to counteract and decrease the fear response by gradually exposing the individual to the perceived aversive stimuli (Kvale, et al. 2004). Overall systematic desensitization attempts to reduce anxiety and the behavioral responses associated with aversive conditions. Kroegel et al. (2004), states that aversions to stimuli may be related to an irrational fear (or anxiety) when presented with the

stimulus rather than experience of pain in the presence of the stimulus. This can be directly applied to behavioral based food refusals as the associated behaviors functions to avoid or terminate (escape) presentation of the non-preferred food, rather than to terminate or avoid pain associated with the food. In comparison, physiological or structural based feeding disorders may in fact have a pain component associated with feeding that contributes to the food refusal. In more cognitive terms, the child's behavior could be interpreted as fear or anxiety related to presentation of the non-preferred food item. If this is the case, research to examine if the use of a step by step desensitization procedure reduces fear associated with food by increasing proximity and exposure of novel items may be an essential component to the treatment package.

Kvale et al. (2004) conducted a meta-analysis of behavioral interventions with patients who suffered from dental fear or dental phobia. The purpose of the study was to examine the application of systematic desensitization to determine if the intervention led to reductions in anxiety, increase regular dental care attendance, as well as provide long lasting changes in behavior. Thirty-eight studies were included in the analysis and characterized as either behaviorally oriented approaches or cognitively oriented approaches. Studies which utilized systematic desensitization were classified as behaviorally oriented approaches. Thirty-four of the studies were classified as behaviorally oriented approaches. Overall it was found that individuals with dental phobia refuse or avoid the dentist and report increase levels of anxiety associated with regular dental care. These implications can be related to the subject of food refusal as the behavioral component of avoiding aversive stimuli (dental care or non-preferred food) is seen in both situations. In addition, it provides an interesting insight into whether

children with behavioral based food refusal also experience an increase in anxiety during meal times. If there is a possibility that an increase in anxiety in the presence of non-preferred food exists, systematic desensitization may also be an important component for treatment of food refusal.

Koegel et al. (2004) investigated systematic desensitization related to sensitivity to auditory stimuli. Participants included three children, two males and one female, who were all diagnosed with autism. All of the participants presented with severe hypersensitivity to auditory stimuli. Aversive auditory stimuli varied for each participant and included flushing a toilet, toys with animal sounds, and noise from household appliances such as vacuums, blenders, and hand-mixers. All children reacted to the stimuli by covering their ears and engaging in behaviors to avoid or escape from the stimuli. Two of the participants were reported to become physically upset in presence of the stimuli and would begin to scream and cry, and one participant was also noted to teeth grind in the presence of the perceived aversive stimuli.

Baseline data was collected for all participants to measure reactions to sight, sound and/or mention of the aversive stimuli. A step-by-step procedure was then developed to gradually expose the participants to the aversive stimulus. The intervention steps were specific for each participant and the perceived aversive stimulus. For two of the participants, tolerating the sight of the aversive stimulus without the sound component was completed if necessary. This was followed by gradual introduction of the sound stimulus and a gradual increase in proximity to the child. Criterion of completing a step in the individual hierarchies was two to four consecutive 3 minute intervals scored as "comfortable." In other words, the participant tolerated the aversive stimulus without

signs of anxiety, such as covering ears, becoming physically upset, or teeth grinding, as well as display appropriate interaction remaining unaffected by the aversive stimulus.

Results indicated that at the end of the study all participants were judged to be, "comfortable," in the presence of their specific aversive stimuli. In other words, all participants were able to tolerate the presence of the aversive stimuli without displaying the aversive behavioral reactions as seen in baseline. It is suggested that previous reactions to the aversive stimuli may have been a conditioned response, supported by the environmental contingencies (i.e., escape from the aversive stimuli). Implications further suggest that reactions displayed by the children were related to a phobia response rather than pain associated with the stimuli. The authors explain this concept by pointing out that although the extreme reactions at baseline to the stimuli may have suggested pain was a component, all children were able to remain calm and display appropriate behavior in the presence of the stimuli upon completion of the study. Thus, systematic desensitization may be an effective treatment for hypersensitivity to audible stimuli in children with autism.

A study by Beck et al. (2005) investigated the use of systematic desensitization combined with behavioral procedures to help children with Attention Deficit Hyperactivity Disorder (ADHD) and Autism swallow pills. Similar to food refusal, barriers to compliance with medication were identified as structural based, such as lacking the skills to swallow medication (i.e., sustained attention and adequate oral motor abilities) and behavioral based, such as refusal and non-compliance with acceptance of medications. Non-compliance develops from repeated pairing of medication with aversive experiences (i.e., aversive taste, fear of choking, or gagging), which can lead to

conditioned anxiety at the site of medication. In addition, Beck et al. (2005) addresses that parents play a crucial role in medication administration, just as it was previously discussed they play a crucial role in food acceptance. When difficulties and resistance occur parents may resort to coaxing, threatening, or hiding medication in the child's food; all of which may intensify behavioral problems surrounding medication administration.

Participants in the Beck et al. (2005), study included eight children. Four of the participants were between the ages 6 and 9 years. Three of the children met the criteria for ADHA and the fourth displayed signs and symptoms of ADHD but did not fully met the DSM-IV criteria. The rest of the participants were between the ages of 4 and 6 and all four of them met DSM-IV criteria for Autism. Parents participated in the clinical sample and were asked to continue to administer medication in the same way they had prior to treatment (whole, crushed in food, etc.). Parents were also asked to develop and practice a medication routine with their child. The medication routine involved selecting a consistent time, location, and caregiver in the home to administer medication. Parents were trained on how to and when to use verbal praise and tangible reinforcement for compliance with the medication routine. Criterion for success was swallowing the pills for seven consecutive days in order to be discharged from the clinical setting. Once criterion was met, parents were instructed to continue to with the medication routine at home for generalization purposes.

During treatment, the participant was asked to sit at a table with the researcher and select a toy from a prize bag to earn as a reinforcer for compliance with verbal commands (swallowing the pills). A pill swallowing protocol that involved mock pills of increasing size was utilized to implement systematic desensitization. Initially, the

smallest mock pill was presented to the child to increase the probability of success with swallowing and limit distress or the possibility of gagging. The researcher modeled pill swallowing behavior and verbally prompted the child to open his mouth and stick out his tongue. The mock pill was then placed on the back of the tongue and a preferred drink was immediately offered. Any occurrences of inappropriate or avoidance behaviors were ignored. When the child swallowed the pill enthusiastic praise and a sticker were delivered. If the child accepted the pill into his mouth, but did not swallowed the researcher delivered praise for the attempt. Following the attempt the researcher then provided 3-5 additional trials to try and swallow the pill. Criterion to increase the size of the mock pill included 3 consecutive trials of swallowing the pill without instances of inappropriate or avoidance behaviors. Results of the Beck et al. (2005) study indicated that seven of the eight children swallowed medication with a therapist and that six of the eight children maintained treatment gains up to one year following the study with a caregiver administering the medication. Thus it appears as though in conjunction with other behavioral procedures, (modeling, positive reinforcement, and extinction), systematic desensitization may be an effective form of treatment to increase acceptance of medication.

In conclusion, one of the first steps to increasing nutritional value is to get the child to try a novel food item. The purpose of the current study was to further investigate the use of antecedent procedures to increase food acceptance in children with motivational based feeding disorders. Specifically, the current study examines the application of systematic desensitization procedure to determine if gradual approximations of a bite sized portion of food toward the mouth will increase the likelihood the food will be accepted. The

research question is: Will the use of a step-by-step desensitization procedure increase acceptance of non-preferred foods in children with food refusal? Specifically the study will examine the pre-test, treatment and post-test scores for each subject to determine if the bite was increased in proximity to the mouth using the step by step procedure.

METHODS

Participants:

Five children, ages 3-7 years, with a history of food refusal were recruited for participation in the study at the Weisskopf Child Evaluation Center (WCEC). The parents of children who met the inclusion criteria for the study and who applied/have applied for therapy or feeding evaluations were contacted in person, by telephone, or by mail. All subjects who had been admitted to the Center for the purpose of increasing food acceptance of non-preferred food items. Children with Cerebral Palsy and Cleft Palate were excluded from the study. These populations were excluded secondary to physiological impairments that could not be ruled out as a contributing factor to food refusal. Children with feeding tubes who had never been exposed to semi-solid or solid food were also excluded. Possibly, these children might not possess adequate muscle strength and knowledge of how to swallow due to tube feedings and lack of experience with mastication and deglutition. However, children who received supplemental nutrition via tube feedings were included as these children had prior experience with oral eating. Due to a small sample size, individual case studies for each subject were conducted. Each subject therefore was exposed to the treatment. Efficacy of the procedure was judged on the individual response to the procedure and upon change in the pre and post test scores. All subjects completed a pre-test, were exposed to the step by step procedure, and completed a post-test.

Setting and Materials

Subjects were seen at the WCEC or their home. This decision was based on the families schedule and available transportation. Feeding sessions lasted approximately 45-60 minutes and were conducted in the feeding room at the WCEC or the child's home. Each subject was seen for only one session. The occupational therapy room was also used in the study. It consists of a large gym area for the children to play with a variety of activities not related to eating, such as going down a slide, swinging, playing on mats, throwing a ball, etc. When the study was conducted in the child's home, the child was also allowed to play with items not related to eating.

Study Design

An individual case study design was used to determine if gradual approximations of a bite-sized portion of food toward the mouth would increase the likelihood that the food would be eaten. Descriptive statistics were used to describe differences in scores was present between the pre and post-test acceptance. In addition, a comparison to observe the relation between the pre-test, treatment, and post-test scores was conducted. Independent variable measures included the step by step procedure and time. The dependent variable measured included a score obtained from the step by step procedure which will measure proximity of the food to being chewed and swallowed.

Baseline Measurements

Oral Mechanism Exam

Prior to participation in the study, the child completed an oral mechanism exam with the researcher. The assessment procedure of oral motor function was adapted from the Robbins and Klee Oral and Speech Motor Control Protocol. The purpose was to rule

out or identify any oral motor complications which may interfere with feeding. The rationale for assessing oral motor function was to provide evidence that the child's food refusal was a behaviorally based disorder verses a structural impairment. In addition, oral motor strength and coordination are a necessary component of mastication and thus, to be successful with a variety of food items and textures, the child must possess adequate strength and coordination of the oral musculature. Specifically, the oral motor assessment examined symmetry of the structures at rest, coordination of lingual and labial movements, labial seal, the hard palate, dentition, and velum elevation. Only subjects who passed the assessment were included in the study.

Mealtime Record and Food Inventory Questionnaire

Parents were also asked to complete a food inventory questionnaire and mealtime record prior to participation in the study. The purpose of the mealtime record was to obtain information about the type and quantity of food consumed over a 72 hour period. The food inventory questionnaire obtained information about parental responses to mealtimes, variety of food items in the child's diet, preferred foods, non-preferred foods, and behavioral responses to non-preferred food items. Parents were asked to identify non-preferred foods by listing those foods which the child exhibited frequent refusal behaviors such as saying "no," pushing the food away, turning head away, crying, or screaming when the food was in proximity. Preferred food items were identified as those food items that the child did not protest when presented with and consumed as part of their daily or weekly diet. Parents were asked to provide a serving size of 3-5 non-preferred food items of their choice on the day of the study.

Pre-test

A pre-test was conducted with all subjects to verify the child rejected the non-preferred food items brought to the center on the day of the study. The researcher presented approximately one tablespoon amount of the non-preferred food item on a plate and said, "take a bite." The researcher repeated the instruction to the child three consecutive times and each reaction to the presentation of the non-preferred food was scored using the step by step procedure. Each step in the procedure was given a score of one and scores ranged from 0 to 11. A score of 0 indicated the child rejected the item in proximity (i.e., turned away, verbally refused, etc. with food item on the plate), and a score of 11 indicated the child accepted the bite of food (i.e., chewed and swallowed the bite). If the first food item presented was not rejected following all three presentations, a subsequent food item was presented until a non-preferred food item was identified by three consecutive refusals. The identified non-preferred food item was the only food item presented during the other phases of the study (treatment and post-test). Following the pre-test, the participants were taken to the occupational therapy room or other area of the home, for 10-15 minutes to provide an environment with activities that were not related to eating.

Treatment

Treatment was conducted immediately following the break in a room with gross motor toys, such as a swing and floor mats. The researcher initiated systematic application of the step by step procedure with the identified non-preferred food item from the pre-test using the following sequence:

1) Tolerate proximity of food on plate for 5 seconds

2) Tolerate non-preferred food being touched to the hand

3) Tolerate non-preferred food being moved up the forearm

4) Tolerate non-preferred food being moved up the shoulder

5) Tolerate non-preferred food being touched to the cheek

6) Tolerate non-preferred food being touched to the lips

7) Tolerate non-preferred food being touched to the teeth

8) Tolerate non-preferred food in the mouth (allow to spit out) for 1-2 seconds

9) Chew non-preferred food (allow to spit out) for 1-2 seconds

10) Chew non-preferred food (allow to spit out) for 2-5 seconds

11) Chew and swallow non-preferred food

The researcher moved through the procedure systematically starting with step 1. The researcher progressed to the next step only if the child remained calm and did not display any behaviors that would indicate refusal. No invasive measures were used to progress the child to the next step if refusal was indicated. If the child indicated refusal at any step, the researcher dropped down two steps in the sequence. Once the child was calm again, the researcher resumed the sequence and progressed to succeeding steps contingent on calm behavior. Progression through the sequence continued until the child chewed and swallowed the bite (step 11) or a duration of ten minutes elapsed.

During the sequence, the researcher also modeled the response prior to initiating the step with the child. For example, the researcher touched the food item prior to asking the child to touch the food item, or showed the food item moving up the arm prior to completing that part of the sequence with the child. Modeling was conducted for all steps

in the sequence including step 11, where the researcher chewed and swallowed a bite of the non-preferred food prior to initiating that step with the child. The researcher either moved the food item closer to the child's mouth, or allowed the child to move the food item if they initiated by independently picking up the food item to imitate the researcher. The child was not asked to pick up the item and move it through the sequence at any time during the treatment, but was not prevented from doing so if they spontaneously initiated the action. Following the treatment session, the subjects participated in activities not related to eating for 10-15 prior to the post-test.

Post-Test

A post-test was conducted with all participants when they returned from the 10-15 minute break. The post-test included the same non-preferred food that was identified during the pre-test and used during the treatment. The post-test was administered in an identical fashion as the pre-test. The researcher presented approximately one tablespoon amount of the non-preferred food item on a plate and said, "take a bite." The researcher repeated the instruction child three consecutive times and each reaction to the presentation of the non-preferred food was scored using the step by step procedure. Each step in the procedure was given a score of one and scores ranged from 0 to 11.

RESULTS

Subject one was a 7 year 6 month old male with a medical diagnosis of Attention Deficit Hyperactivity Disorder. Medical history also included low average nonverbal cognitive abilities, significant receptive and expressive language impairments, severe phonological disorder and mild graphomotor difficulties. Current medications included Focalin. In the past, medications also included Prevacid for treatment of gastroesophageal reflux disease, however, at the time of the study, the medication had been discontinued and no current problems with reflux were reported. Food allergies included peanuts. Vision and hearing were within normal limits. The subject was receiving speech therapy and occupational therapy services through the public school system at the time of the study, with no previous history of therapy directed specifically at feeding.

Information about mealtime behavior was obtained per parent report from the food inventory questionnaire and mealtime record. Subject one's mother reported that, on a scale of always, sometimes, or never, mealtimes were sometimes stressful. The following behaviors were reported in response to food refusal: pushes food away, says "no," gags, and vomits. The typical meal duration was approximately 20-30 minutes and the subject's diet consisted of approximately 6-10 different food items, which included foods such as fish, fried chicken, grill cheese, waffles, cookies, pop-tarts, chips, and pizza. Parent reactions to food refusal included ignoring the behavior and offering an alternative accepted food item.

Oral mechanism exam revealed the structures of the oral cavity to be within normal limits. Adequate size and symmetry of the structures were observed and the subject was able to coordinate labial and lingual movements. A full set of dentition was noted with no malocclusion present. The palate was intact and velum elevation was observed. A slice of meat from a lunchables pack was selected as the non-preferred food item for the study. During the pre-test when the subject was asked to take a bite of the non-preferred food item off of a plate, the subject shook his head left to right, verbalized "I don't eat meat," pulled away from the table, and appeared anxious when the researcher asked him to "take a bite." This reaction was observed on all three presentations of the food. The subject's reaction to the food was given a score of 0 from the step by step scale, as he was not able to tolerate general proximity of the meat without signs of distress.

During application of the step by step procedure, the subject appeared interested and interacted appropriately with the researcher. The subject remained calm and imitated the researcher as the step by step procedure was implemented. During the procedure, the subject independently picked up the slice of meat and manipulated it closer to the oral cavity. The subject received a total score of 7 and allowed the slice of meat to touch the front teeth. The subject also allowed the slice of meat to touch the tongue; however a score of 8 was not given because the meat never fully entered the oral cavity before ten minutes elapsed. In addition, when the food touched the tongue the subject gagged and vomited and the session was terminated. Subject one's score decrease to a 0 in the post-test as he refused the food item when it was presented on the plate in the same manner as in the pre-test.

Subject two was a 3 year 9 month old male with a diagnosis of feeding disorder and motor speech impairment with some characteristics with Childhood Apraxia of Speech. Current medications included Singular, Zyrtec, Albuterol, and MiraLax for constipation. No known food allergies were present. Vision and hearing were within normal limits. The subject was receiving feeding therapy at the Weisskopf Child Evaluation Center at the time of the study. The subject was evaluated for a feeding disorder in August of 2008 and had been receiving feeding therapy two times per week for two and a half months.

Information about mealtime behavior was obtained per parent report from the food inventory questionnaire and mealtime record. Subject two's mother reported that mealtimes were sometimes stressful. The following behaviors were reported in response to food refusal: pushes food away, says "no," whines, cries, gags, spits out food, slow eater, and tantrums. The typical meal duration was approximately 45 minutes and the subject's diet consisted of approximately 11-15 different food items, which included foods such as chicken, bread without the crust, oranges, hot dogs, apple sauce, brownies, ham, peaches, fruit snacks, hamburger and milkshakes. Parent reactions to food refusal included asking him to try what the family was eating at meal times, and offering an alternative accepted item.

Oral mechanism exam revealed the structures of the oral cavity to be within normal limits. Adequate size and symmetry of the structures was observed. The subject was able to coordinate all labial and lingual movements, except lingual elevation upon request; however, lingual elevation was observed informally during the study and did not appear to impact mastication. A full set of dentition was noted with no malocclusion

present. The palate was intact and velum elevation was observed. A cracker was selected as the non-preferred food item for the study. During the pre-test when the subject was asked to take a bite of the non-preferred food item off the plate, the subject shook his head no, pushed the food item away when the researcher asked him to "take a bite." This reaction was observed on all three presentations of the food. The subject's reaction to the food was given a score of 0 from the step by step scale, as he was not able to remain calm and tolerate general proximity of the cracker without signs of distress. .

During application of the step by step procedure, the subject interacted with the researcher and his mother who were present in the room during the study. The subject remained calm and also imitated the researcher as the step by step procedure was implemented. Throughout application of the step by step procedure, the subject picked up the cracker and independently manipulated it closer to the oral cavity. The subject received a total score of 5 and allowed the cracker to touch the cheek. The subject allowed the cracker to touch the cheek at the corner of the left portion of the lips; however a score of 6 was not given because the cracker never actually touched the lip before ten minutes elapsed. Subject two's score decrease to a 0 in the post-test as he refused the food item when it was presented on the plate in the same manner as in the pre-test.

Subject three was a 5 year 8 month old male with a diagnosis of moderate to severe feeding disorder. The subject was not taking any medications at the time of the study. No known food allergies were present. Vision and hearing were within normal limits. The subject was receiving occupational therapy services, to include feeding therapy, services at the Weisskopf Child Evaluation Center at the time of the study. The

subject was evaluated for a feeding disorder in July of 2007 and had been receiving feeding therapy one time per week.

Information about mealtime behavior was obtained per parent report from the food inventory questionnaire and mealtime record. Subject three's mother reported that mealtimes were always stressful. The following behaviors were reported in response to food refusal: pushes food away, cries, gags, vomits, slow eater, and picky eater. The typical meal duration was approximately 40-60 minutes and the subject's diet consisted of approximately 6-10 different food items, which included foods such as cheese pizza, jello, cooked carrots, cheese chocolate, yogurt, macaroni and cheese, turkey dogs, oranges, and green beans. Parent reactions to food refusal included providing alternative items that would be accepted.

Oral mechanism exam revealed the structures of the oral cavity to be within normal limits. A thin upper lip was observed, however, adequate size and symmetry of all others the structures was observed. The subject was able to coordinate all labial and lingual movements. A full set of dentition was noted with no malocclusion present. The palate was intact and velum elevation was observed. An animal cracker was selected as the non-preferred food item for the study. During the pre-test when the subject was asked to take a bite of the non-preferred food item off the plate, the subject pulled away from the table and appeared anxious. This reaction was observed on all three presentations of the food. The subject's reaction to the food was given a score of 0 from the step by step scale, as he did not tolerate general proximity of the animal cracker without signs of distress.

During application of the step by step procedure, the subject interacted appropriately with the researcher and remained calm. Throughout application of the step by step procedure, the subject picked up the animal cracker and independently manipulated it closer to the oral cavity. The subject received a total score of 7 and allowed the animal cracker to touch the front teeth. The subject also allowed the animal cracker to touch the tongue; however a score of 8 was not given because the animal cracker never fully entered the oral cavity before ten minutes elapsed. Subject three's score decrease to a 0 in the post-test as he refused the food item when it was presented on the plate in the same manner as in the pre-test.

Subject four was a 6 year 9 month old male with a diagnosis of Pervasive Development Delay-Not Otherwise Specified, Central Nervous System Dysfunction, Receptive and Expressive Language Impairment, Adaptive Skill Delay, and Eating Disorder. Current medications included Tenex, Risperdal, and Miralx. No known food allergies were present. Vision and hearing were within normal limits. The subject was evaluated for a feeding disorder in February of 2009, but had not received any therapeutic services related to feeding at the time of the study.

Information about mealtime behavior was obtained per parent report from the food inventory questionnaire and mealtime record. Subject four's grandparent reported that mealtimes were always stressful. The following behaviors were reported in response to food refusal: pushes food away, says "no," whines, cries, gags, vomits, slow eater, picky eater, and tantrums. The typical meal duration was approximately 30 minutes and the subject's diet consisted of approximately 6-10 different food items, which included foods such as pizza, chicken rings, cookies, Nutri-grain bars, puree foods, bread and

crackers. Parent reactions to food refusal included offering only food items that would be accepted.

Oral mechanism exam revealed the structures of the oral cavity to be within normal limits. The subject was able to coordinate all labial and lingual movements. The subject required maximum visual and verbal cues to comply with oral motor movements. A full set of dentition was noted with no malocclusion present. The palate was intact and velum elevation was observed. Difficulty with lingual elevation did not appear to interfere with mastication. A dried piece of corn was selected as the non-preferred food item for the study. During the pre-test when the subject was asked to take a bite of the non-preferred food item off the plate, the subject pushed the plate of food away and verbalized, "no" when the researcher asked him to "take a bite." This reaction was observed on all three presentations of the food. The subject's reaction to the food was given a score of 0 from the step by step scale, as he was not able to tolerate general proximity of the dried corn without signs of distress.

During application of the step by step procedure, the subject was resistive to interaction with the researcher. The subject's grandfather acted as the researcher and was guided through the step by step procedure by the researcher. Throughout application of the step by step procedure, the subject picked up the dried corn and independently manipulated it closer to the oral cavity. The subject received a total score of 8 and chewed the piece of dried corn three times with his front teeth while continuing to hold the corn with his fingers. Subject four's score remained an 8 in the post-test as when he was asked to "take a bite," he picked up the piece of dried corn and repeated the sequence up to the point of chewing with his front teeth and spitting the corn out on the plate.

Subject five was a 7 year 5 month old male with a diagnosis of Central Nervous System Dysfunction, Global Developmental Delays, history of refractory seizure disorder, and sleep disorder. Current medications included Depakote, Klonopin, and Lamictal. No known food allergies were present. Vision and hearing were reported to be within normal limits. The subject had been receiving speech and occupational therapy services at the Weisskopf Child Evaluation Center, but therapeutic services have not been related to feeding.

Information about mealtime behavior was obtained per parent report from the food inventory questionnaire and mealtime record. Subject five's father reported that mealtimes were sometimes stressful. The following behaviors were reported in response to food refusal: push away food, spits out food, and picky eater. The typical meal duration is approximately 20-30 minutes and the subject's diet consisted of approximately 11-15 different food items, which included foods such as oatmeal, pasta, cheeseburger, mashed potatoes, french fries, pretzels, meat sauce, tacos, nacho chips, cheetohs, chicken nuggets, macaroni and cheese, teddy grahams and cookies. Parent reactions to food refusal included accepting the refusal and offering previously accepted food items.

Oral mechanism exam revealed the structures of the oral cavity to be within normal limits for the purposes of mastication. The subject was not able to coordinate lingual movements on command, however, lingual lateralization, protrusion and elevation were observed informally during the study. In addition, labial movements were limited in range of motion. A full set of dentition was noted with no malocclusion present. The palate was intact, however velum elevation was difficult to assess due to the child's

difficulty with imitation of oral movements and positions. A banana was selected as the non-preferred food item for the study. During the pre-test when the subject was asked to take a bite of the non-preferred food item off the plate, the subject turned his head away two times and one time, threw the plate on the floor when the researcher asked him to "take a bite." The subject's reaction to the food was given a score of 0 from the step by step scale.

During application of the step by step procedure, the subject needed consistent redirection to interact and participate from the caregiver and researcher. Throughout application of the step by step procedure, the researcher manipulated the piece of banana to move toward the mouth. During one of the sequences, the subject took the bite of banana out of the researcher's hands and placed it in his mouth and immediately spit it out. At this time the researcher was working toward getting the bite of food to approximate the cheek area. The subject received a total score of 5 as during the procedure the researcher was able to touch the food item to the cheek. The subject did not receive a score of 8 (food item in the oral cavity) because although the food item was placed in the mouth, it was done unexpectedly and out of sequence. Subject five's in the post-test was a 0 as the subject again reacted in the same manner as in the pre test.

RESULTS TABLE

#	age	sex	Diagnosis	#Foods Accepted	Food used	Oral Mechanism	Pre test	Tx	Post test
1	7.6	M	ADHD	6-10	Lunch meat	WNL	0	7	0
2	3.9	M	Feeding Disorder, Motor Speech Impairment	11-15	Cracker	WNL	0	5	0
3	5.8	M	Feeding Disorder	6-10	Animal Cracker	WNL	0	7	0
4	6.9	M	PDD-NOS CNS Dysfunction, Receptive and Expressive Language Impairment, Adaptive Skill Delay, and Eating Disorder.	6-10	Dried corn	WNL	0	8	8
5	7.5	M	CNS Dysfunction, Global Developmental Delays, Refractory Seizure Disorder, and Sleep Disorder	11-15	Banana	WNL	0	5	0

DISCUSSION

The underlying purpose of the study was to get the child to accept one bite of a non-preferred food. The present study did not consider quantity or type of consumption in the child's diet, nor attempt to create a lasting change in the child's diet when the treatment was finished. Although the goal of feeding therapy would be to change the child's diet and increase caloric consumption of a variety of foods, the premise for looking at initial acceptance was centered on the assumption that one of the first steps in feeding therapy is to get the child to try a novel or previously rejected food item. In order for the child to take a bite of food, the food must first get closer to the mouth with the child remaining calm before it can be accepted into the mouth, chewed, and swallowed. Clinical application of this method would involve getting the child not only to try the initial presentation of a novel or non-preferred food item within a session, but also across successive sessions until the child demonstrated they could independently take the bite of food off of a plate, spoon, or fork without the researcher proactively using the procedure.

The step by step procedure was considered a proactive procedure because it was implemented as a means to desensitize the child to a non-preferred food item before refusal occurred, as opposed to a procedure that would be reactive or consequence based and implemented following the child's refusal. As stated previously, extinction procedures were not incorporated into the design of the study as they were considered a reactive procedure. More specifically, the use of extinction was excluded in order to

avoid the side effects associated with extinction that can generate negative emotional reactions and coincide with not allowing the child to avoid or escape eating a bite of a previously rejected food item. In the current study, once the child indicated refusal, the researcher backed off and as time allotted would restart the sequence one to two steps back from where the refusal occurred in the progression. During the study all subjects interacted appropriately with the researcher and remained calm during the step by step procedure. The scores for the subjects ranged from a 5 (touching the cheek) to an 8 (food in oral cavity and chew). The subject's who received higher scores during the treatment age ranged from 5 years 8 months to 7 years 6 months. In addition all but one subject imitated the sequence voluntarily by picking up the food item and imitating the researcher. Subjects 2 and 3 had previously received feeding therapy, but the other three subjects had not been exposed to treatment for feeding disorders.

The subjects were allowed access to various toys in the treatment area, such as bubbles, cars, blocks, games, etc. The child was able to access the toys throughout the entire study which included the oral mechanism exam, pre-test, step by step procedure, and post test. The only exception being the 10-15 minute breaks between the pre-test and step by step procedure and between the step by step procedure and the post test. During this time the subject was able to access different items then those in the treatment area. Throughout the study, the researcher would interrupt play to try and increase the proximity of the bite to the mouth however access to toys was not contingent on the bite of food getting closer to the mouth. In other words, the toys were available to the child even if they displayed signs of refusal. The toys were also accessible when no demands were being placed on the subject.

It is important to note that access to toy items when the child did comply with allowing the food to approximate the mouth may have been a form of positive reinforcement for staying calm during the treatment and complying with the procedure by allowing the bite of food to get closer to the oral cavity. Additional consideration must include that taking something non-preferred (the food item) and pairing it with items that were preferred (the toys), may have formed positive associations with the non-preferred food. However, the subject had access to these preferred items throughout the entire duration of the study non-contingently. In other words, the toys were available to the subject regardless of compliance and performance. It is therefore unlikely that access to preferred items was the only variable responsible for increasing proximity of food to the mouth.

Another environmental variable in the study was the presence or absence of the caregiver. Each parent or guardian was asked if they wanted to be present during the study. For subject 2, 4 and 5, the caregiver chose to be present in the room. The researcher guided the caregiver through the procedure by telling them what to say and modeling how to present the food item in the step by step fashion. The researcher also provided instructions on how to react to the child's behavior, by continuing or discontinuing the procedure as a whole as well as with each individual step. The caregiver only helped with the step by step procedure and was not involved in the oral mechanism exam, pre and post test. Performance during the step by step procedure, for the three subjects whose caregiver was present, may have been altered by allowing the caregiver to be present.

Behaviorally speaking, if a strong history of refusal with the parent is present, this could hinder performance when compared with no history of refusal with the researcher. This is related to the fact that in the past, the child has refused and escaped from eating non-preferred foods with the parent, but has not had this experience with the researcher. In comparison to the subjects who only interacted with the researcher, scores were relatively similar. The score obtained for both subjects that interacted with the researcher only, subject 1 and 3, were a 7. The scores obtained for subjects that interacted with the caregiver, subject 2, 4 and 5, were 5, 8, and 5 (see results chart). Although this can be seen as an alteration in the methodology of the study, ultimately in the long run, the caregiver will be the one feeding the child so it may be important to include parent participation from the start of feeding therapy as no major discrepancies in the scores was observed.

Some further confines of the current study include a limited number of subjects and limited contact with each subject. Approximately 20 subjects were recruited for the study and only 5 completed the experiment. This does, however, extend previous research in this area, which has relied on single case studies of no more than three subjects. Although the low number of subjects in the study makes it difficult to generalize the results to the population at large, the results indicate that although none of the children chewed and swallowed the bite of non-preferred food, the proximity of the food item to the mouth was considerably increased for all participants to a certain extent.

The subject's compliance with the step by step sequenced drastically slowed once the bite of food approximated the mouth. Two reasons are proposed to have contributed to this plateau in the sequence. First, perhaps more steps should be created to work on

desensitization around and within the oral cavity before asking the child to take a bite, chew, and swallow. Additional steps prior to asking the child to chew could involve, kissing the food item, licking the food, touching between the central incisors, touching on the back molars on each side, touching the food to the palate, breaking off a piece of the food with the teeth, putting the food in the oral cavity and spitting out, putting the food in the oral cavity and moving it from side to side and then spitting out. Extension of the step by step procedure will add to the amount of time required for implementation. Future research should examine if providing more stimulation to the oral cavity and more experience with the non-preferred food will increase the likely hood the child will chew and swallow the item.

In addition to the possible need for extending the step by step procedure, in general, time constraints were a limitation of the study. Every subject progressed through the step by step procedure, but 10 minutes elapsed prior to all but one of the subjects reaching a point in the sequence where the food item would have entered the oral cavity. It would be interesting to see how the child would have responded if more time was allotted for the procedure in a single treatment session as well as across treatment sessions. Since all of the subjects had a long history of food refusal, it may be presumptuous to assume that one session could provide sufficient desensitization in order for the child to feel comfortable enough to chew and swallow the bite of non-preferred food.

Subject population is another consideration for future research. The exclusionary criteria for the current study were somewhat broad. In the present study all of the subjects were male and two were receiving speech therapy specifically for feeding at the

time of the study. This confound may have increased the likelihood that these subjects would comply or resist the procedure due to previous therapy. However, the foods selected for those participants were not items that had previously been introduced in feeding therapy. In addition, the subjects that did not previously receive feeding therapy performed similarly during the study. In fact one of the subjects receiving feeding therapy received the lowest score out of all the subjects. It should be questioned if this is related to age as he was also the youngest subject.

To further define subject characteristics, all subjects in the study ate a limited quantity of fruits and vegetables but had no more then 15 foods included in their diet. Meal time duration ranged from 20-60 minutes and all but one of the subjects received a pre and post test score of 0 indicating that the treatment may have been responsible for the increase in proximity of the food to the mouth, but did not change the subject's response to a request to take a bite of food. In addition, all but one of the subjects independently manipulated the food item to the mouth area. The subject who did not manipulate the food independently required maximum cues for attention and to remain at the table in the treatment area. He presented with a diagnosis of Pervasive Development Delay-Not Otherwise Specified, Central Nervous System Dysfunction, Receptive and Expressive Language Impairment, Adaptive Skill Delay, and Eating Disorder, all of which may have impacted his ability to participate and require more time for him to learn or comply with the sequence. Additional research should consider not only cognition, but also consider the child's level of attention and imitation skills.

Future research should also examine the application of the step by step procedure over multiple sessions. Results indicated that a child may bring a bite closer to the mouth

using the step by step procedure. Multiple therapy sessions with this technique may result in completion of the steps in the procedure. Replication should also include a larger number of subjects and incorporate a control group to provide further information about treatment efficacy.

In summary, all subjects moved the bite of food closer to the oral cavity using the step by step procedure, however the methodology of the current investigation should be explored further, the time constraints revised, and subject parameters more clearly defined. Replication of the present study under these guidelines would contribute more information in an area of research which is narrow. Use of statistical analysis instead of descriptive statistics would provide more evidence as to whether the treatment was responsible for the change as well as to match subjects by age and cognition to determine if any differences were present between a treatment and control group. Despite its limitations, the current study does provide some initial preliminary data for the use of a step by step procedure as a form of initial treatment and intervention for children with behavioral based feeding disorders.

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APPENDIX A

From: <InstitutionalReviewBoard@louisville.edu>
Wednesday - January 21, 2009 1:16 PM
To: <pbblac01@gwise.louisville.edu>, <selang06@gwise.louisville.edu>
Subject: BRAAN2: New IRB Protocol Approved Attachments: Mime.822 (2730 bytes)
[View] [Save As]

The following new IRB Protocol has been approved.

Tracking #: 09.0025
PI: Blackwell, Pat
Title: Proactive Feeding Strategies for Children with Food Refusal
Approval Date: 1/17/2009 12:00:00 AM
Expiration Date: 1/16/2010 12:00:00 AM

Link to BRAAN2 LoginHelp is available at the BRAAN2 Help Site
For additional assistance please call the Human Subjects Protection Program at 502-852-5188.

APPENDIX B

From: <InstitutionalReviewBoard@louisville.edu>
Monday - February 16, 2009 9:59 AM
To: <pbblac01@gwise.louisville.edu>, <selang06@gwise.louisville.edu>
Subject: BRAAN2: Amendment Approved Attachments: Mime.822 (2548 bytes)
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The following Amendment has been approved.

Tracking #: AMEND-954 (09.0025)
PI: Blackwell, Pat
Title: Proactive Feeding Strategies for Children with Food Refusal

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APPENDIX C

From: <InstitutionalReviewBoard@louisville.edu>
Tuesday - March 10, 2009 11:53 AM
To: <pbblac01@gwise.louisville.edu>, <selang06@gwise.louisville.edu>
Subject: BRAAN2: Amendment Approved Attachments: Mime.822 (2551 bytes)
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The following Amendment has been approved.

Tracking #: AMEND-1025 (09.0025)
PI: Blackwell, Pat
Title: Proactive Feeding Strategies for Children with Food Refusal

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