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Strategies to Promote Positive Mealtime Behavior in Early Childhood

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Abstract

Picky eating and problem behavior during meals are commonly reported issues among young children, particularly toddlers (Manikam & Perman, 2000). It is estimated that up to 50% of children under the age of 5 experience difficulties during mealtimes (Benjasuwantep et al., 2013). These difficulties may include tantrums when nonpreferred foods are presented, turning their head away from bites, pushing food away, crying, spitting out bites of nonpreferred food, and holding bites in the mouth. Over time, these behaviors can lead to significant limitations in the variety and amount of foods that children consume, thus compromising their growth and development. While there are a variety of reasons a child may engage in these problem behaviors, the food refusal or selectivity often persists after other contributing factors have been resolved (Dobbelsteyn et al., 2005). A behavior analytic approach can be used to address mealtime problem behavior. These interventions are focused on changing aspects of the child's environment and caregiver response in order to change the child's behavior during meals. This approach has been well-evaluated in the literature, and many regard it to be the most effective intervention for treating children's problem behavior during meals (Kerwin, 1999). The scope of this paper was to provide evidence-based behavior analytic recommendations to caregivers, teachers, and other early childhood therapeutic providers. Recommendations provided in this article are applicable to a variety of feeding difficulties that may present in early childhood. While recommendations discussed in this paper have been supported in the literature, research lacks a comprehensive instructional guide of best practices that can

be used by providers with limited expertise or experience in feeding concerns.

Keywords: *mealtime, early childhood, feeding, behavioral intervention*

Strategies to Promote Positive Mealtime Behavior in Early Childhood

Picky eating (i.e., food selectivity) and problem behavior during meals are commonly-reported issues among toddlers and young children (Manikam & Perman, 2000). Food selectivity refers to a child being selective about which foods they will eat based on the color, taste, appearance, or texture of the food (Bandini et al., 2010). For example, a child may only eat foods that are orange or brown in color (e.g., cheese, chicken nuggets, macaroni and cheese, Goldfish crackers). Some children may only eat foods that are smoother in texture and do not require chewing (e.g., yogurt, oatmeal, applesauce). Other children may only eat foods if they are prepared a certain way or if they are a certain brand (e.g., only eating chicken nuggets from a specific fast-food restaurant or eating only one brand of frozen pizza). Estimates of the prevalence of picky eating among children are inconsistent. Studies have reported prevalence rates ranging from 5 to 59% (Wolstenholme et al., 2020). A recent review estimated that 22% of children over 2.5 years of age are picky eaters (Cole et al., 2017). Caregivers have reported that their child's food selectivity leads to conflicts during mealtime, frustration, increased stress, and concern about their child's health and growth (Wolstenholme et al., 2020).

When caregivers notice that their child's eating has become more selective, they often try a variety of tactics to get the child to accept food. Examples of this include the parent attempting to convince, negotiate with, or coax their child into eating bites of the foods that they are refusing. A parent may require the child to stay at the table until they eat, or they may offer a reward for eating the food. A caregiver may feed the nonpreferred food to the child directly by bringing the bite up to their mouth. As a result

of caregiver efforts, a child may resist and begin to engage in behaviors to avoid or escape taking bites of nonpreferred or lesser-preferred foods. These problem behaviors that occur during meals can be collectively defined as inappropriate mealtime behavior (IMB). IMB can look different for every child, but commonly-reported IMB includes turning one's head away from the food or spoon, pushing the food or the feeder away, crying, screaming, leaving the meal area, throwing food, negotiating, and delaying taking bites of nonpreferred foods (Piazza et al., 2003). Consistent engagement in IMB can result in ongoing food selectivity and may also lead to children eating a limited volume of food (i.e., only eating small portions during mealtimes), taking an extended period of time to eat a meal, or becoming dependent on or developing a preference for high-caloric drinks (e.g., formula, whole milk, Pediasure). The occurrence of IMB can exacerbate caregivers' frustration, stress, and concern about their child's eating.

In this paper, the authors describe the use of a behavior analytic approach to address food selectivity in young children and provide an instructional guide that caregivers and other professionals can utilize to increase a child's appropriate mealtime behaviors. This paper is the first comprehensive instructional guide that can be used by parents and early-childhood educators who have limited expertise or experience in addressing feeding concerns.

Consideration of Medical Variables and Oral-Motor Skill Development

Before implementing any of the strategies recommended in this paper, it is necessary that a medical provider examine the child to ensure that there are no medical or structural problems that may be contributing to a child's IMB or food selectivity (Silverman, 2015). Since eating and digesting food involves the integration of many body systems and organs, it is critical that caregivers make sure that those systems are functioning properly before they initiate any sort of intervention. This is of particular importance for young children and for children with an intellectual or developmental disability,

because they may not be able to effectively communicate pain or discomfort. For example, a child may not be able to notify their caregiver that certain foods cause them to experience pain, and this pain is what leads them to refuse those foods or cry when they are presented (Douglas & Bryon, 1996; Horvath et al., 1999; Wu et al., 2012). Common medical concerns that are associated with food selectivity are reflux, food allergies, eosinophilic esophagitis, and structural anomalies of the digestive system (Goday et al., 2019; Wu et al., 2012). It is important that these medical variables are considered and addressed before any intervention begins.

Additionally, it is important to consider the oral-motor skill development of the child to ensure that they have the skills necessary to appropriately and safely manage foods that are being presented to them. Adults might not think about the many movements and steps that it takes to chew and swallow food. The process is quite complex and requires the use and coordination of several oral-motor skills (Stevenson & Allaire, 1991; Volkert et al., 2014). For example, a child needs to be able to move the bite of food to their molars, chew the bite, recognize how much of the bite they must chew before it is safe to be swallowed, and move the masticated bite to the back of their tongue. Although most children develop these skills naturally and efficiently engage in them by around 15 months of age, some children have oral-motor skill deficits or other delays that may prevent them from being able to chew and swallow a wide variety of foods (Carruth & Skinner, 2002).

When chewing is difficult or effortful, a child may be less likely to chew foods that are dense or firm (e.g., meats, raw vegetables). They may refuse to eat those foods because they do not have the skills to sufficiently chew and swallow them. In some cases, when a child attempts to eat foods that they don't have the skills to safely chew, they may choke or swallow prematurely, which can be an aversive event that further perpetuates the avoidance of those foods (Manno et al., 2005).

Because feeding is a complex behavior, it sometimes requires cross-discipline collaboration to maximize treatment outcomes (Manno et al., 2005). Children with oral-motor skill deficits or perceived deficits should be evaluated by an oral-motor therapist (i.e., speech language pathologist, occupational therapist) and should receive interventions to support oral-motor skill development either before or in conjunction with behavioral services.

Considerations for a Multi-Disciplinary Approach

As discussed above, feeding concerns often have complex etiologies. Depending on the presentation of the concern, specific providers may be more appropriate to address the feeding problem, or a multi-disciplinary approach may be necessary. For some children, the primary problem may be solely related to oral-motor skill deficits, behavioral contingencies that exist in their environment, or medical concerns; however, some children's feeding problems may stem from a combination of concerns (González et al., 2018). Professionals in applied behavior analysis, occupational therapy, speech language pathology, nutrition, or medicine may be required to effectively target feeding concerns.

While some feeding problems can be effectively addressed by caregivers using strategies discussed in this paper, it is important to acknowledge that feeding problems may be severe enough to warrant more intensive intervention and oversight from professionals trained in the treatment of pediatric feeding disorders. Severe symptoms of pediatric feeding problems include the total refusal to eat or drink, weight loss or failure to gain weight/meet appropriate developmental growth parameters, and dehydration (González et al., 2018). Additional variables to consider when evaluating the severity of a feeding problem include the current volume, variety, and texture of food being consumed; the child's ability to engage in age-appropriate mealtime behaviors (e.g., staying seated at the table, using age-appropriate utensils or cups, etc.); and the severity of IMB they are exhibiting.

Brief Overview of Functions of IMB

When approaching the treatment of a feeding problem from a behavior analytic standpoint, it is important to consider the function of the child's IMB. A function of problem behavior can be conceptualized as the environmental variable that is maintaining a problem behavior (Piazza et al., 2003). The most common function of IMB is escape (Hodges et al., 2020). In these instances, when a bite of nonpreferred or novel food is presented, the child engages in IMB to have the bite removed or to escape the situation in which the bite is being presented. However, other functions of IMB have been documented, such as access to social attention (Woods et al., 2010). Social attention during meals may present in a variety of ways. Caregivers may engage in coaxing (e.g., "Please take this bite, it will make you big and strong!"), reprimands (e.g., "Do not spit that bite out like that!"), or comfort statements (e.g., "It's all right, you're okay."). Woods et al. (2010) found that parental social attention was commonly followed by brief decreases in IMB and an increased likelihood of food acceptance; however, decreases in IMB were not observed to be maintained over time and often resulted in reoccurrences of IMB at an increased level. This indicates that social attention may have served as a reinforcer for IMB. Children's IMB may be maintained by a single function or by multiple functions. A common combination of functions that maintain IMB is access to social attention and escape from the bite (Borrero et al., 2010; Kirkwood et al., 2020). In these instances, upon the child's engagement in food refusal, a parent may provide a brief comfort statement while simultaneously removing the bite. By providing the child with verbal comfort and the removal of the aversive food, the child's IMB is reinforced, thus making it more likely that they will repeat this in the future. These existing functions are critical to consider when designing treatment for feeding problems in order for the intervention to be functionally relevant. When an intervention matches the function of the IMB, it is more likely to be effective because the child is able to learn socially acceptable and appropriate ways to access the reinforcer without engaging in IMB.

Antecedent Strategies

Antecedent interventions are used to make changes to the events that precede problem behavior. Antecedent interventions have been widely used to address a variety of problem behaviors (Cooper et al., 2020). This involves the modification of any stimulus in the environment that was present before the problem behavior occurred. In the context of feeding, this largely refers to various stimuli related to the presentation of the food that the child does not want to eat. All of the interventions described below have been shown to be effective at addressing food selectivity and IMB.

Stimulus Fading

Stimulus fading is a procedure that involves the gradual increase of the presence of a stimulus (Cooper et al., 2020). More specifically, demand fading is an intervention strategy used to gradually increase the demand required so that, over time, the end goal is achieved (i.e., the terminal demand is delivered). Instead of presenting a demand that the parent knows their child will not complete, they present an easier version of the demand that the child is more likely to comply with. When they are successful with that demand, they can gradually modify the demand until they ultimately present the final, terminal demand. Research has shown that this strategy was effective at increasing the volume and variety of food children consumed both with and without additional reinforcement components (González et al., 2018; Knox et al., 2012; Najdowski et al., 2010).

For example, if a child refuses to eat the serving of broccoli on their plate, caregivers could instead only present a single bite of broccoli at their next meal. Over time, they could gradually increase the number of bites until they present the entire serving to the child. Demand fading can also be used to gradually increase the size of each bite. If a child refuses to eat an age-appropriate bite size of chicken (e.g., quarter-size bite), caregivers could decrease it to a dime-size bite in order to decrease the difficulty of the

demand. This decreases the response effort required to complete the demand and, therefore, makes it more likely that the child will eat the bite of chicken.

Choice

Another antecedent intervention that can be used to prevent the occurrence of IMB is the use of choice when preparing children's meals. By including choices and considering the child's preferences, caregivers are more likely to be successful with getting their child to consume the presented foods. Previous research has indicated that when a child is allowed to choose between different tasks or stimuli needed to complete the task, they are more likely to comply with the task even when it is nonpreferred. Studies have also shown that utilizing a child's choice decreases and even prevents challenging behavior that is reinforced by escape (Harding et al., 2002; Rispoli & Neely, 2013). This strategy easily applies to IMB since escape is a primary reinforcer in feeding problems. In fact, a study conducted by Fernand and colleagues (2016) found that the consumption of nonpreferred foods increased when the child was given the choice of which nonpreferred food they had to eat.

Implementation of this strategy can be done in a variety of ways depending on the presentation of the feeding problem. If a child gets to the table, looks at the plate, and complains that they don't like the foods, caregivers could give the child three food options from each food group and allow them to create their own meal with the caregivers' guidance and restrictions. On the other hand, if interventionists are working with a child who eats a variety of preferred foods but refuses nonpreferred foods, they could ask the child to choose between three different nonpreferred foods. When utilizing this strategy, it is important that the child's choices are honored and that once the meal is presented, there are no modifications made to the meal or to their choices. While this strategy allows the child to choose their own foods, it still allows the adults to control their choices and ensure that there is an appropriate variety of food from each food group.

Structured Feeding Schedules

In feeding scenarios, hunger acts as an establishing operation. An establishing operation is a setting or environmental event that temporarily increases the effectiveness of a reinforcer and, as a result, increases the occurrence of the behaviors that facilitate access to that reinforcer (Cooper et al., 2020). Hunger is an establishing operation because it increases the likelihood that someone will eat and engage in appropriate eating behaviors. The hungrier an individual is, the more reinforcing food becomes. If an individual is not hungry, however, satiation serves as an abolishing operation because it makes food less reinforcing and discourages the individual from engaging in eating behaviors.

Hunger and satiation are particularly important to consider when children are picky eaters or do not consistently eat enough during meals. If a child eats very little food during breakfast but then eats several preferred snacks before lunch, they are less likely to eat lunch because they are satiated. This can be avoided by ensuring that the child only eats during mealtimes. Establishing a mealtime schedule that is structured and consistent can maximize a child's hunger and make it more likely that they will eat during meals (Fischer & Silverman, 2007).

A critical component of meal schedules is that food is not provided or allowed between mealtimes. The child must learn that food is available contingently and is offered only during scheduled times. Caregivers should also be mindful of their child's consumption of high-caloric liquids during and between meals, particularly if they are trying to transition their child to consuming only solid foods. For those children, it is recommended that solid food be presented first before they have access to the high-caloric drink (e.g., whole milk, formula).

Use of Rules During Meals

The development and consistent use of verbal contingencies (i.e., rules) is considered best practice in any context of instruction. Research has indicated that instructional control is a critical part

of appropriate behavior maintenance, and it is only established when rules are provided (Falcomata et al., 2008). Applying this concept to mealtimes, the adult would present the rules of the meal when the child receives their plate of food. Rules should be specific and describe the contingencies that are in place. They should also include the behavioral expectations for the meal (e.g., eating a specified amount of food) and what consequences will follow meeting those behavioral expectations (e.g., access to dessert, preferred tangible item, etc.).

By providing these rules at the start of the meal, the caregiver is clearly stating the expectations that they have for the child as well as the consequences of adhering and not adhering to the rules. The use of these contingency-specific rules is only effective if the described contingencies are followed.

Bite Board Visual Prompt

Some children who are not consuming an age-appropriate volume of food may engage in IMB because the expectation for how much they need to eat is not clear or consistent across meals. One way to prevent this type of IMB is by utilizing a visual prompt that helps them understand exactly how many bites they are required to eat. It is important to note that volume requirements should be based on age-appropriate expectations and not an arbitrary amount determined by caregivers. These visual prompts have been termed "bite boards." In a study that sought to increase the food consumption of a child with food refusal and a complex medical history, the use of a bite board resulted in increases in food consumption (Williams et al., 2019).

An example of a basic bite board for a young child is five laminated pictures of spoons that are attached to a board via Velcro. At the beginning of a meal, all of the spoon images are attached to the board. When the child takes a bite of food, they get to take off one of the spoons, and the caregiver then reminds them that they have only four bites left. This would continue until all five spoons are removed from the board, and the child could

then have access to their reinforcer. This strategy allows the child to have a consistent reminder of the expectations of their meal.

Sequential Bite Presentation

When presented with a plate of food, a picky eater commonly chooses to eat all of their most-preferred food before eating any of their less-preferred foods. This makes the demand of eating the nonpreferred foods even more difficult and can often lead to lengthy meals and IMB. One strategy to combat this is to instruct the child to eat their bites in a specific sequence so that they are alternating between bites of preferred and nonpreferred food throughout the meal. For example, one could first present a bite of carrot (i.e., nonpreferred), then present a bite of macaroni and cheese (i.e., preferred), and continue this sequence throughout the meal. The preferred food serves as a built-in reinforcer for eating the nonpreferred bite. Sequential presentation has been found to be an effective strategy for addressing food selectivity and increasing the consumption of nonpreferred and novel foods in preschool-aged children (Weber & Gutierrez, 2015; VanDalen & Penrod, 2010). In one study, children reported that they preferred the sequential bite presentation over other presentation options (VanDalen & Penrod, 2010).

Noncontingent Escape

Mealtimes with young children who are picky eaters can last for very long periods of time. Often, caregivers struggle to know when to end the meal, when to stop trying to get their child to keep eating, and when to continue and require them to eat a certain amount before leaving the table. In many cases, caregivers become frustrated, stressed, and tired and ultimately decide to end the meal because their child's IMB has escalated and become intolerable and/or unmanageable. When this happens, the child learns that escape from the meal or nonpreferred foods will be provided if they engage in such IMB. This escape then serves as a reinforcer for their IMB and makes them more likely to repeat this in the future.

A strategy to prevent this continued reinforcement of IMB is to allow the child to escape from the meal after a predetermined amount of time. This escape will happen no matter what the child did or did not eat during that time, so the escape occurs noncontingently. This gives caregivers an exit strategy without inadvertently reinforcing IMB. Noncontingent escape has been recommended to address IMB, as it helps break the cycle of reinforcing IMB by ending meals prematurely (González et al., 2018). To implement this strategy, caregivers must decide on a maximum meal duration (e.g., 20 minutes) and set a timer for that amount of time as soon as they start the meal or present the food to their child. No matter what happens during the meal and regardless of how much food was consumed, the meal must end at that designated time and the remaining food must be removed so that the child is provided escape.

Noncontingent Reinforcement

Providing noncontingent reinforcement (i.e., providing access to a reinforcer [e.g., tangible item, attention from caregivers] regardless of the behavior that the individual engages in) has been well-established in the literature as an effective intervention in decreasing a variety of problem behaviors and increasing appropriate behaviors (e.g., Kodak et al., 2003; Smith et al., 2019; Wilder et al., 2005). To implement this strategy during meals, caregivers or teachers should provide the child access to their preferred items (e.g., toys, iPad, videos) throughout the entire meal. No matter what behavior they engage in during the meal, the preferred items should remain present. When reinforcement from alternative sources is freely available, children are less likely to seek reinforcement in the form of escape from their meal. Ultimately, noncontingent reinforcement decreases the likelihood that they will engage in IMB because they automatically receive reinforcement from their preferred item.

Consequent Strategies

Just as antecedent conditions can be manipulated to improve various feeding problems, consequent strategies can also be used to improve IMB. Consequent strategies that can be implemented by caregivers include the use of prompting sequences, extinction, differential reinforcement of alternative behaviors, and combinations of these strategies such as levels systems and token economies.

Three-Step Prompting

A three-step prompting hierarchy can be a useful tool for identifying the amount of support an individual currently requires to complete a task, and for ensuring that the child knows what the desired behavior looks like. Prompting hierarchies are often used to teach new skills (Libby et al., 2008) and include verbal prompts, modeling, and some form of physical prompting. In feeding, the most common physical prompt is called a hand-over-hand (HOH) prompt (Borrero et al., 2013). A HOH prompt involves the caregiver placing their hand over the child's hand and physically guiding them to complete the demand. If a caregiver wanted to use a prompting hierarchy in a meal setting, they would begin by delivering a verbal prompt such as, "Take a bite." After issuing this initial demand, the caregiver should wait a developmentally-appropriate amount of time for the child to respond (i.e., typically between 5-10 seconds). If the child does not take the bite following the verbal demand or waiting period, the caregiver should then model the expected behavior. Specifically, the caregiver should pick up the spoon and bring it to their mouth while saying, "This is how we take a bite." After modeling the behavior, the spoon should be placed back in front of the child to allow them the opportunity to respond with the appropriate behavior. If the child still does not respond, the caregiver should implement the HOH prompt. The caregiver should physically guide their child's hand over the handle of the spoon, help them pick up the spoon, and bring it to their mouth. It is important to remember to only use the demands and phrases

associated with the prompting hierarchy when utilizing this strategy; the child should not receive any additional attention or prompts.

Extinction

Extinction is a well-documented, consequent-based strategy that can be applied to decrease IMB during meals (LaRue et al., 2011; Piazza et al., 2003; Reed et al., 2004). Specifically, extinction refers to the withholding of reinforcement for engaging in a specific behavior (Cooper et al., 2020). In other words, the consequence -- good or bad -- that typically follows one's engagement in a behavior is no longer provided, rendering the current behavior ineffective. When considering extinction, it is especially important to identify the function of the problem behavior (i.e., what is maintaining or reinforcing the current behavior) so that extinction can be applied appropriately. It is a common misconception that extinction simply means ignoring a problem behavior; however, that would only be the case if social attention was maintaining the problem behavior. When discussing functions of problem behavior, the most-reported function of IMB is escape (Hodges et al., 2020). In order to apply extinction in these scenarios, escape should not be provided upon the engagement in IMB. For example, if the child swipes a nonpreferred bite of food off their plate and the parent picks the food up and places it in the trash, escape would be provided. However, parents could implement extinction by instead placing a new bite of the nonpreferred food on the child's plate following their IMB. Additionally, if the caregiver normally responds to the swiping behavior by providing social attention (e.g., "Oh no! Why would you do that?"), the caregiver would instead ignore the swiping behavior and continue as if nothing happened. It should be noted that when extinction is applied to a behavior, it may become worse for a period of time. This is because the behaviors that previously provided the child with reinforcement are no longer doing so; therefore, the child may try novel exhibitions of the behavior or increase the intensity of those behaviors in an effort to get them to work again. This is referred to as an extinction

burst (Cooper et al., 2020). When an extinction burst occurs, it is important to continue implementing extinction instead of giving in and providing reinforcement because this could reinforce the novel, more intense behavior. If extinction is being used to decrease inappropriate behavior, these procedures should not be utilized in isolation. Strategies that provide opportunities for reinforcement should be implemented in conjunction with extinction, because they increase the occurrence of appropriate behavior that will replace the IMB when it is ultimately extinguished.

Differential Reinforcement

Differential reinforcement of alternative behavior (DRA) is a common procedure used in applied behavior analysis (MacNaul & Neely, 2018). It is typically embedded within treatment plans, or used in combination with other procedures like extinction (Shirley et al., 1997). Vazquez and colleagues (2019) found in surveying parents that DRA procedures were the most preferred intervention component to treat feeding concerns. Reinforcement refers to a response that will increase the likelihood that a certain behavior will occur in the future. Reinforcement can be delivered in a variety of ways according to the functions of behavior that were discussed previously. For example, social attention, access to tangible items, and escape can all be provided to someone when they engage in previously determined appropriate behaviors. Once the caregiver identifies the behavior(s) they want to increase, they should use reinforcement while applying extinction to any undesired behaviors (Athens & Vollmer, 2010). This combination of reinforcing desired behaviors and extinguishing undesired behaviors constitutes the DRA procedures. A critical consideration when using DRA is to think about how reactions differ when a child engages in appropriate behaviors versus inappropriate behaviors. The purpose of DRA is to make sure that responses to appropriate behavior are heavily emphasized and enthusiastic, and responses to inappropriate behaviors are neutral or do not occur at all. The potency or intensity of negative reactions (e.g., yelling, reprimands, etc.) may influence

behavior, so caregivers should do their best to exhibit a neutral reaction. The use of DRA to increase acceptance and decrease IMB is prevalent throughout the literature (e.g., Berth at al., 2019; de los Santos & Silbaugh, 2020; Patel et al., 2002).

If a child's desired mealtime behaviors are increasing bites of food and staying seated during a meal, a caregiver could implement DRA by providing social attention to increase the likelihood of those behaviors. If at any time during the meal the caregiver observed their child taking a bite of food, they might say, "Wow, great job taking your bites!" If the caregiver observed their child staying seated while simultaneously pushing their food around, the caregiver would not acknowledge that they weren't taking bites of their food. Instead, they would say, "You are doing such a good job staying in your seat tonight!" In this scenario, the parents are providing an enthusiastic response for a desired behavior while not reacting to or acknowledging the lack of bite-taking.

If the desired behavior was to take a bite of carrots, one could choose to offer access to a preferred item or activity for a brief amount of time following the child's compliance. Specifically, they could present the child with a preprepared bite of carrots and say, "If you take this bite of carrots, you can play with your tablet for one minute." If the child takes the bite of carrots, praise would be provided immediately and access to the tablet would be allowed. If the demand was delivered and the child began crying before taking the bite of carrots, praise would be provided immediately for taking the bite and the child would be allowed access to their tablet despite the fact that they cried. The important thing to remember in this scenario is to provide behavior-specific praise (e.g., emphasize the behavior being reinforced) and to provide little to no reaction for any undesired behavior (e.g., crying).

Combination Strategies

While the strategies described above can be implemented in insolation, they can also be combined into an intervention package.

Levels Systems

A levels system uses a combination of differential reinforcement and response cost to simultaneously increase desired behaviors and decrease undesired behaviors (Bauer et al., 1986; Hagopian et al., 2003). As explained above, differential reinforcement is the reinforcement of desired behaviors while simultaneously placing other responses on extinction. Response cost involves the removal of a reinforcer contingent upon a certain behavior. A levels system is a combination of these two procedures. When using a levels system, a behavioral criterion is determined based on the child's current ability to perform the skill or behavior. Based on their performance and whether they meet the criterion or not, they are assigned a level. Each level is associated with varying degrees of access to preferred items and activities. Ripple and colleagues (2022) used a levels system to increase mealtime consumption in an adolescent who presented with food refusal. Prior to the meal, the child was informed of the rules and the two different levels (i.e., red and green) were described. The child was given a set amount of time to consume a meal that consisted of an age-appropriate volume of both preferred and nonpreferred foods. If the child consumed the entire meal within the specified time, they would be on the green level which allowed them access to all of their preferred activities and items. However, if they did not consume the presented volume, they would be on the red level which allowed them access to their lesser or nonpreferred activities. The child would remain on the earned level until the next meal during which they would have the opportunity to earn a different level. When choosing to use a levels system, it is critical that access to preferred items and activities are restricted when the child has not earned the green level. Failure to follow the behavioral contingencies would render the levels system ineffective.

Token Economy

Another consequence-based strategy that can be used to target feeding problems is a token economy (Kahng et al., 2003;

Williams et al., 2007). A token economy is another procedure that employs a variety of behavioral principles and strategies. When using a token economy, a target response is identified, and tokens (i.e., conditioned reinforcers) are exchanged for access to preferred items or activities (Hackenberg, 2009; Ivy et al., 2017). The child learns that a previously meaningless item (i.e., the token) is a means of gaining access to what they want (Doll et al., 2013). Tokens are beneficial because they can easily be delivered when access to other preferred items or activities are not readily available. There are several components of token economies that should be carefully considered prior to its implementation: (a) the type of tokens used (e.g., small coins, fake money, hole punches, etc.), (b) the rewards that tokens will be exchanged for, and (c) the type of schedule that will be implemented for the exchange of tokens for reinforcers. When considering which tokens to use, parents should ensure that the tokens cannot be easily counterfeited and ensure that the delivery of tokens remains under the control of the parents (Doll et al., 2013). Additionally, when deciding how frequently tokens can be exchanged, the age of the child and their understanding of delayed reinforcement should be considered (e.g., if they earn tokens all day long, will they understand and still find this reinforcing if they can't exchange them until the end of the week?). It is recommended that when first implementing a token economy, opportunities for exchange be rather frequent (Doll et al., 2013).

Prior to beginning the use of a token economy, it is critical to outline the behaviors that will earn tokens and to ensure that the behavioral expectation for earning tokens is made clear to the child (Doll et al., 2013). The behavioral expectations should always be communicated in a developmentally-appropriate format. Expectations can be communicated orally or through written communication (e.g., a list of rules), or can be modeled for the child. In the context of feeding, target behaviors for earning tokens could include taking bites of new or nonpreferred foods, staying seated at the dinner table, or finishing the food that is on their

plate. A specific number of tokens that can be earned for engaging in these behaviors should be identified. For example, one token could be earned for each bite of a new or nonpreferred food, three tokens could be earned for staying seated at the table for the entire meal, and three tokens could be earned for finishing all of the food on their plate. It is important to adjust the reward system appropriately to ensure that it is somewhat difficult to earn rewards but not impossible. Similar to the levels system, in a token economy the initial expectation for these behaviors should be based the child's current level of behavior. It is important that the child has the opportunity to access or earn the reinforcement so that they can learn and understand the contingencies in place.

Conclusion

Although feeding problems in children can be complex, this paper aimed to provide practical guidance to caregivers and providers (e.g., teachers, other early childhood therapeutic providers) addressing IMB in young children. This paper is the first of its kind to provide a comprehensive review and guidelines in the treatment of feeding problems from a behavior analytic perspective, to individuals who may have limited experience in this approach. It is important to remember that medical concerns and oral-motor skill deficits need to be addressed prior to implementing any of the recommendations provided. Practitioners working with children with feeding concerns should be willing and ready to collaborate with providers across disciplines to provide the most effective services. In addition to the group of interventions discussed in this paper, there are other evidence-based treatment options that were not included due to the level of training and expertise that are required to implement them with integrity. If mealtime behavior does not improve after consistent practice with the interventions described in this paper, it is recommended that more intensive services be provided by a Board Certified Behavior Analyst or Licensed Psychologist with specific training in pediatric feeding disorders.

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