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COMPARISON OF BITE-PRESENTATION METHODS IN THE TREATMENT OF FOOD REFUSAL

WILLIAM G. SHARP

MARCUS AUTISM CENTER AND
EMORY UNIVERSITY SCHOOL OF MEDICINE

SHELLY HARKER

MARCUS AUTISM CENTER

AND

DAVID L. JAQUESS

MARCUS AUTISM CENTER
AND EMORY UNIVERSITY SCHOOL OF MEDICINE

The current study examined the rate of expulsions and mouth cleans across 3 presentation methods (upright spoon, flipped spoon, Nuk brush) for a 3-year-old girl with a feeding disorder. The participant expelled all bites presented on an upright spoon. Results showed reduced rates of expulsions and increased mouth cleans during the flipped spoon and Nuk brush presentation methods.

Key words: alternating treatment comparisons, antecedent manipulation, bite presentation, expulsions, escape extinction, pediatric feeding disorders

Children with pediatric feeding disorders display a range of refusal topographies (e.g., disruptions, expulsions, or packing) that interrupt meals and interfere with appropriate oral intake. Consequence-based interventions, such as escape extinction in the form of nonremoval of the spoon and physical guidance, are widely used and are well-supported treatments for addressing chronic food-refusal behaviors, such as pushing away food or head turning (e.g., Ahearn, Kerwin, Eicher, Shantz, & Swearingin, 1996; Bachmeyer et al., 2009; Piazza, Patel, Gulotta, Sevin, & Layer, 2003; Volkert & Vaz, 2010). However, alternative refusal behaviors, such as expulsions or packing, may persist (Girolami, Boscoe, & Roscoe, 2007) or emerge in response to treatment (Gulotta, Piazza, Patel, & Layer, 2005), highlighting a need to identify alternative treatment avenues. Antecedent-based strategies represent treatment components that can be used in isolation or in conjunction with consequence-based procedures (Ahearn, 2003).

Although limited, the available research indicates that characteristics of food presentation (e.g., volume, type, texture, utensil) may influence consumption during meals. For example, Kerwin, Ahearn, Eicher, and Burd (1995) reported an inverse relation between acceptance and bite size for one participant. Patel, Piazza, Santana, and Volkert (2002) showed that expulsion occurred more frequently with meats compared to fruits, vegetables, or starches. Reducing the texture of meats in relation to other food types decreased expulsion to near zero.

Girolami et al. (2007) demonstrated that using a Nuk brush to present and re-present bites resulted in lower rates of expulsion than when the feeder presented bites with an upright spoon. The data from the Girolami et al. study

Correspondence concerning this article should be addressed to William G. Sharp, Pediatric Psychology and Feeding Disorders Program, Marcus Autism Center, 1920 Briarcliff Road, Atlanta, Georgia 30329 (e-mail: william.sharp@choa.org).

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suggest that the method of initial bite presentation may influence expulsion; however, a re-presentation contingency that targeted expulsion also remained in effect throughout the analysis, raising questions regarding the relative contributions of antecedent and consequence manipulations. The current study extends this research by comparing the effectiveness of different presentation methods (upright spoon vs. flipped spoon vs. brush) in decreasing expulsion and increasing mouth clean without re-presentation.

METHOD

Participant and Setting

Kelley was a 3-year-old girl who had been admitted to an intensive day-treatment program for the assessment and treatment of chronic food refusal. Her medical history included quadriplegic cerebral palsy, developmental delays, epilepsy, failure to thrive, and hypoplastic left heart syndrome, which had been partially corrected with surgery. Due to poor oral intake, Kelley underwent placement of a gastrostomy (G-) tube shortly after birth and received all of her nutritional needs via G-tube at admission. Although she intermittently accepted small amounts of pureed foods, her disruptive behavior and frequent expulsion consistently hindered adequate consumption. She had received occupational therapy for 3 years leading up to her admission, with no change in her oral intake. Prior to admission, a swallow study and occupational therapy examination indicated that she could safely swallow smooth pureed foods, but highlighted difficulty retaining food in the mouth.

Response Measurement and Reliability

Trained observers used computers to collect data on expulsion and mouth clean. Observers scored the occurrence or nonoccurrence of expulsion for each bite. *Expulsion* was defined as the presence of food larger than the size of a pea visible outside the mouth after the bite entered the mouth and included instances when Kelley actively pushed food from the mouth as well as when it passively dripped out. Observers scored the occurrence or nonoccurrence of *mouth clean*, which was defined as no residual food larger than the size of a pea remaining inside the mouth 30 s after the feeder deposited the food initially. A bite began when the feeder deposited a bite in the mouth and ended when food was no longer visible inside the mouth or Kelley expelled the bite. We calculated the percentage of bites with expulsion and mouth clean by dividing the number of bites in which each behavior occurred by the total number of bites entering the mouth and converting that number to a percentage. An independent observer collected data to assess interobserver agreement for 24% of the sessions. Interobserver agreement (total agreements on the occurrence of a behavior divided by total agreements plus disagreements) was 96% (range, 91% to 100%) for expulsion and 97% (range, 94% to 100%) for mouth clean.

Procedure

Admission lasted 8 weeks (Monday through Friday), with four 30- to 45-min meals conducted each day. Meals were divided into five-bite sessions, with between three and five sessions conducted per meal. All sessions occurred in a private treatment room with an adjacent observation room. During all sessions, Kelley sat in a highchair, and the room contained a table, feeding utensils (small maroon spoons, Nuk brush, rubber-coated baby spoon), bib, serving tray, and a scale with an intake log. We identified highly preferred leisure items (e.g., toys and videos) using a paired-choice preference assessment (Fisher et al., 1992) and provided access to these items throughout the analysis. We presented a total of 16 foods (four fruits, four vegetables, four starches, and four meats) that Kelley's mother had selected, with the guidance of a registered dietician, to match the family's eating pattern. For each meal, the feeder randomly selected one

food from each group and presented these four foods (in random order) at a pureed texture using a half-level bolus size (about 1 cc per bite) as recommended by an occupational therapist. The order of presentation remained the same within a given session.

Prior to the alternating treatments analysis, Kelley demonstrated increased acceptance of food into the mouth within 5 s (M = 99.6%; range, 80% to 100%) and decreased disruptions (i.e., turning the head more than 45 degrees away from the spoon, pushing away the spoon, touching the feeder's arms) during meals (M = 0.18 disruptions per bite; range, 0 to 1.2) in response to an intervention package involving nonremoval of the spoon (Ahearn et al., 1996), noncontingent access to preferred items, and bite presentations approximately every 30 s. Despite improvement in acceptance and disruption, Kelley expelled all bites, and no mouth cleans occurred. To assess the impact of bite-presentation methods on expulsion and mouth clean, we compared three bite-presentation methods (i.e., upright spoon, flipped spoon, brush) using an alternating treatments design. An upright spoon presentation involved depositing the food on her upper lip or teeth, which was necessary due to her open-mouth posture and lack of lip closure. Flipped-spoon presentations involved placing the spoon in the midline of the mouth following acceptance, flipping the spoon 180 degrees, and depositing the food onto the middle of the tongue by applying gentle downward pressure along with a concurrent wiping motion. The feeder used small maroon spoons for both spoon presentations. Brush presentations involved placing bites on the brush and wiping the food onto the middle of the tongue. The feeder presented all bites at midline. We alternated presentation methods across sessions, with the order randomly selected prior to each meal. The intervention package described above remained in place throughout the current analysis. The feeder removed expelled bites when they became visible on the lips and presented the next bite. If an expulsion had not occurred at the 30-s mark, the therapist prompted Kelley to show the inside of her mouth in order to check for a mouth clean, using a physical prompt with a rubber-coated baby spoon if needed. If Kelley packed the bite (i.e., held it in her mouth longer than 30 s), the therapist continued to check for swallowing every 30 s until Kelley swallowed the bite or expelled, at which time the feeder immediately presented the next bite. If Kelley continued to pack a bite of food at the end of the meal block, the procedure involved immediate removal of the bite from the mouth and meal termination; however, this did not occur during the analysis.

RESULTS AND DISCUSSION

Kelley expelled all bites, and no mouth cleans (M = 0%) occurred in the initial phase in which the feeder presented bites on an upright spoon (Figure 1). Expulsion and mouth clean improved with flipped-spoon and brush presentations during the alternating treatments analysis. The mean level of expulsion was 58% for flipped spoon (range, 20% to 100%) and 62% for brush (range, 20% to 80%). Mouth cleans occurred on 30% of trials for flipped spoon (range, 0% to 80%) and 18% for brush (range, 0% to 40%). Expulsion and mouth clean remained relatively unchanged with the upright spoon.

Despite improvements, consumption via altering the presentation method remained variable and involved small quantities of food, prohibiting significant reductions in G-tube dependence. The emergence of mouth cleans observed during the analysis, however, provided the foundation for achieving clinically significant outcomes when combined with additional treatment components. Following the present assessment, we selected the flipped spoon as the sole presentation method based on a practical advantage for increasing bite size on a spoon (as opposed to a brush).

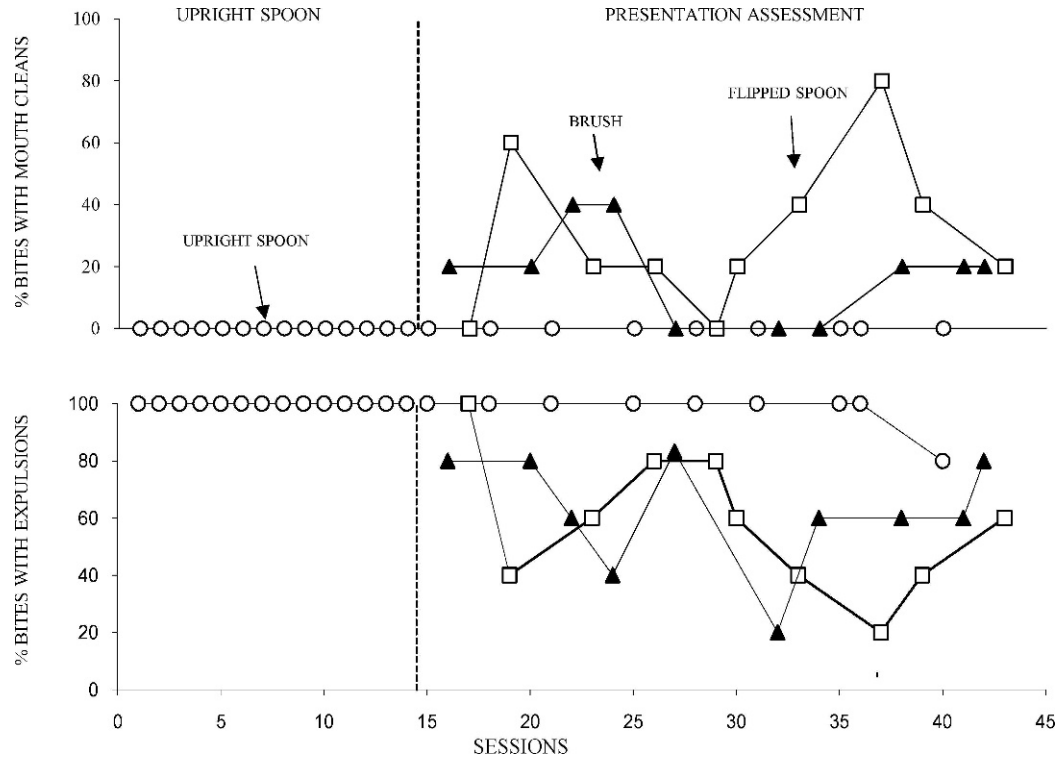

Figure 1. Percentage of bites with expulsion and mouth clean during presentation with an upright spoon, flipped spoon, and brush.

The current results highlight the importance of assessment during treatment planning. Beyond assessing the characteristics of the problem behavior or even the consequences that typically follow it, assessing effects of antecedent variables can contribute to more effective treatment planning. Conducting bite-presentation assessments at the onset of treatment may help to determine the optimal presentation method to be used in combination with consequence-based procedures, as well as elucidate possible factors that maintain poor intake.

Girolami et al. (2007) suggested that placement of food onto the middle of the tongue may compensate for underdeveloped oral motor skills. Similar to the child in Girolami et al.'s study, an oral motor assessment conducted with Kelley suggested that she had significant difficulty retaining food in the mouth, reflected by tongue protrusions, drooling, and intermittent lip closure. Modifying food placement on the tongue with both flipped-spoon and brush procedures may have afforded a better fit with Kelley's existing capabilities (rather than scraping the bite onto her teeth due to her open-mouth posture), thus optimizing food placement and decreasing the demand required to propel food to the back of the mouth.

Future research should seek to refine our understanding of the impact of presentation method on feeding and investigate how treatment influences oral motor skills. It will be important to compare alternative antecedent approaches (e.g., a lip-closure prompt or an upright spoon with re-presentation or side placement) with children who present with chronic food refusal and poor oral motor skills. This study is limited in that utensil type and bite placement (i.e., the feeder deposited food in the middle of the tongue with flipped spoon and brush) are inexorably linked, limiting the

conclusions that can be drawn regarding any differential effects of the utensils themselves. This potential confounding effect, however, may be unavoidable unless new techniques or tools for feeding are identified. Nevertheless, results suggest that altering bite-presentation method represents a relatively simple antecedent modification that may optimize food placement and set the stage for additional treatment gains.

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