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BRIEF PRACTICE

Reduction of Rapid Eating in an Adolescent Female with Autism

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Abstract Rapid eating, a potentially dangerous and socially inappropriate behavior, has received relatively little attention in the literature. This study sought to extend the research in this area by further evaluating the effectiveness of a vibrating pager combined with a rule for increasing inter-response time between bites in one adolescent female diagnosed with autism. Results indicated that inter-response time increased from baseline only after a vocal prompt to "wait" was introduced across clinic and home settings. Implications for promoting autonomy in individuals with developmental disabilities are discussed.

- This antecedent-based intervention can easily be generalized to caregivers
- The unobtrusive nature of the intervention allows for implementation in inclusive settings
- There are implications for promoting social skills in naturalistic environments
- The intervention can promote independence through teaching self-management

Keywords Rapid eating · Vibrating pager · Autism · Stimulus control

Rapid eating is a common problem among individuals with developmental disabilities (Favell, McGimsey, & Jones, 1980). This behavior might be considered socially inappropriate when the pace at which one eats is significantly faster than the eating pace of others, and even more so when the individual, upon finishing their meal, proceeds to help herself to seconds before others have finished their first helping or potentially starts eating food from others' plates. Further, rapid eating may draw negative attention to the individual. Rapid eating can also lead to a variety of health problems such as overeating (Azrin, Kellen, Brooks, Ehle, & Vinas, 2008), obesity (Otsuka et al., 2006), choking (Wright & Vollmer, 2002), vomiting, and aspiration (Kedesky & Budd, 1998). Given these potential dangers, further evaluation of interventions to remediate rapid eating seems warranted.

Favell, McGimsey, and Jones (1980) were of the first to examine a behavioral intervention to reduce the pace of eating in four adults with profound intellectual disabilities. Investigators provided praise and bites of preferred foods contingent on increasingly longer pauses between bites up to 10 s. Response blocking was necessary for participants to initially contact the reinforcement contingency, however, prompts were then faded from physical blocking paired with a vocal prompt to "wait" to the vocal prompt alone.

Lennox, Miltenberger, & Donnelly (1987) examined the use of a spaced-responding differential reinforcement of low rates (DRL) procedure with three adults with profound intellectual disabilities. Attempts to take a bite before the 15-s interval elapsed resulted in response blocking and resetting of the interval. It was not until a physical prompt to place the hands in the lap coupled with a vocal prompt (i.e., "down") was added, that clinically acceptable reductions in eating pace were achieved for two of the three participants.

Wright & Vollmer (2002) also employed a DRL procedure to reduce the pace of eating in an adolescent female with developmental disabilities. An adjusting DRL based on mean IRT was introduced, gradually reinforcing longer and longer pauses between bites. An audible timer was used to signal the end of the 15-s interval and the interval was reset contingent on attempts to take a bite prematurely. In addition, premature

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bites resulted in the same response blocking and redirection to place the hands in the lap used by Lennox et al. (1987), paired with a vocal prompt to "eat slowly". This procedure was effective in increasing IRT to the 15 s mark and eventually prompts were faded to only the vocal prompt issued after each bite.

In a later study, Anglesea, Hoch, & Taylor (2008) evaluated the use of a vibrating pager to prompt an appropriate eating pace in three teenagers with autism. Participants wore an active vibrating pager, which vibrated every 10–25 s, and were trained to take a bite when the pager vibrated. This training involved physical prompting to place the hand on the pager, physical guidance to take a bite when the pager buzzed coupled with praise for doing so, and response blocking of premature bites with redirection to place the hand back on the pager. All participants learned to eat to the pace of the pager within five training sessions and mealtime duration was increased.

Most recently, Echeverria & Miltenberger (2013) taught two adult participants with moderate intellectual disabilities to eat to the pace of the pager using modeling, physical and vocal prompting, response blocking, and praise. Researchers then evaluated a pager alone condition and a pager plus verbal prompts condition. In the pager alone condition, the participant wore the vibrating pager and received praise for eating to the pace of the pager. In the pager plus verbal prompts condition a prompt was issued when the participant attempted to take a bite before the vibration. Results showed that the verbal prompt was necessary in order to achieve desirable outcomes. Experimenters suggested that the effectiveness of the procedure was due to the acquired discriminative function of the vibrating prompt, indicating that attempts to eat would be allowed.

In summary, studies have demonstrated that treatment packages including the use of combined physical and vocal prompts, response blocking, vibrating pager prompts, and praise are effective in reducing the pace of eating (Anglesea et al., 2008; Echeverria & Miltenberger, 2013). Vibrating pagers are unobtrusive and may have strong social acceptability, particularly for individuals in mainstream environments and community settings. The purpose of this study was to extend the literature in this area by training an adolescent girl with autism to eat to the pace of a vibrating pager using a rule and a vocal prompt in the absence of physical prompting, response blocking, or programmed reinforcement.

Method

Participant and Setting

The participant in this study was a 12-year-old female diagnosed with autism spectrum disorder. She lived at home with her parents and siblings and was enrolled in general and special education classes at her local middle school. She could follow multi-step instructions, had extensive rule governed behavior, and frequently engaged in conversational exchanges with her parents, siblings, and the researchers. Parent interview and informal observations of several family dinners were conducted to confirm the clinical need to reduce the pace of eating. The participant's eating pace was notably rapid and messy, frequently resulting in overeating; after eating an age appropriate portion, the participant would routinely ask for seconds and was also observed sneaking food from her siblings' plates.

Sessions were conducted in a university-based feeding clinic and the participant's family dining area. Both settings included a dinner table with six chairs and place settings (i.e., utensils, plates, napkins, cup of water). All parties (i.e., participant, researchers, parents, siblings) were seated around the table together in a typical family mealtime arrangement. Experimenters ate with the participant and family, while monitoring the interval timer and participating in mealtime conversation. Sessions did not exceed 40 min and no more than one session was conducted per day, with a maximum of two sessions per week.

Materials

Parents reported that foods the participant could eat with her hands were particularly problematic. The participant, family, and researchers consumed the same problematic meal in all sessions throughout the course of the study: two half-pound bean burritos and chips and salsa from a popular fast food chain. The plate with food was weighed prior to the start of the meal to ensure that the quantity of food served remained constant across sessions. Additional materials included a vibrating pager (i.e., MotivAider©), an interval timer synced to the pace of the MotivAider©, a food scale, and a video camera.

Experimental Design and Dependent Measures

The design was a reversal design embedded within a multiple baseline across settings design (Kazdin, 2011) with a multiple probe component (Horner & Baer, 1978). In all conditions, data on IRT between bites and frequency of prompts were collected via video recordings. A bite was defined as a portion of food larger than the size of a pea crossing the plane of the lips and deposited into the mouth. Since the participant frequently held the food close to her face without actually taking a bite, a new bite was recorded only if the food came away from the lips more than 1 in. Mean IRT was calculated by dividing the total meal duration by the total number of bites. Vocal prompts separated by 2 s or more were counted as separate instances.

Interobserver Agreement

A secondary, independent observer collected data from video on mean IRT and frequency of prompts for 100 % of sessions. Interobserver agreement (IOA) was calculated using the total agreement method, in which the smaller IRT was divided by the larger IRT and then multiplied by 100. Mean IOA across sessions for IRT was 98.4 % (range, 73.6–99.9 %). For vocal prompts, an agreement was defined as both observers scoring the same frequency of prompts during the meal while a disagreement was defined as observers scoring a different frequency. The total agreement IOA for number of vocal prompts was 87.75 % (range, 50–100 %, with one outlier at 50 %).

Procedure

Baseline Condition In baseline (and all subsequent conditions), the participant wore an inactive vibrating pager (i.e., no vibration) clipped to her waistband. The researcher placed the meal on the table in front of all dining parties saying, "Here's your dinner." There was no other discussion of eating or food, although general mealtime conversation occurred. There were no programmed consequences (e.g., praise, comments, reprimands) related to the rate of consumption.

Active Pager with Rule Condition In this condition, the pager was activated and programmed to vibrate every 20 s. This timing was selected as an appropriate IRT based on review of the previous literature (Anglesea et al., 2008) in which vibration intervals varied between 10 and 25 s. An IRT value at the higher end of this range was selected given the participant took relatively large bites that filled her mouth. Although not a safety concern, the large bite size contributed to messiness, which was addressed clinically subsequent to this study. These parents sought services because the participant's pace of eating was faster than other family members causing disruption at mealtimes (e.g., stealing food from siblings' plates); thus, the 20-s IRT was also selected based on observations of the participants' siblings eating the same food.

When the participant was served her plate, the experimenter stated, "Here's your dinner. When you take a bite, chew 20 times, and wait for the buzz to take another bite". There was no other discussion related to eating or food, although mealtime conversation occurred as usual. The purpose of this condition was to determine if the rule and activated pager were sufficient to produce the desired behavior change in the absence of any other formal training. There were no programmed consequences related to compliance with the rule or eating to the pace of the vibrating prompt.

Active Pager with Rule and Vocal Prompt Condition This condition was procedurally the same with one exception. If the participant attempted to take a bite before the pager vibrated, the experimenter issued a vocal prompt to "wait". The experimenter used a buzzing interval timer (i.e., IntervalTimer iPhone App) synced to the timing of the

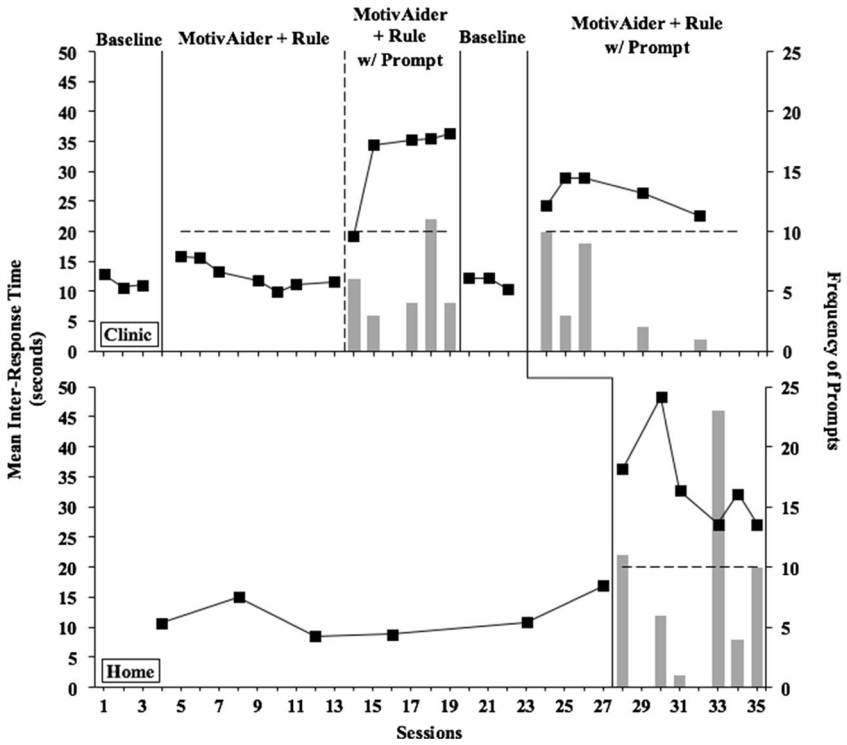

Fig. 1 The graph depicts the mean time between bites in seconds along the primary *y*-axis and frequency of vocal prompts along the secondary *y*-axis (denoted by *gray bars*) across clinic and home settings

MotivAider© to ensure the participant was waiting for the vibrating prompt before initiating the bite. This timer was run for 3 m prior to the start of each session to ensure it was calibrated correctly. There were no programmed consequences related to a reduced pace of eating or compliance with the rule, the vibration, or vocal prompts.

Results

The mean IRT between bites, across initial baseline sessions was 11.52 s in the clinic setting (see Fig. 1). The introduction of the vibrating pager paired with a rule produced a slight yet inconsistent increase in the mean IRT across sessions to 12.68 s between bites. When the vocal prompt "wait" was introduced in the active pager and rule condition in the clinic, a significant reduction in pace was observed, with a mean IRT of 32.10 s across sessions. The functional relationship between the vibrating pager, the vocal prompt, and the slowed pace was demonstrated when a reversal to baseline conditions was conducted (mean IRT = 11.60 s). Reimplementation of the treatment package replicated the intervention effect, shifting average time between bites to 26.22 s across sessions. In the home setting, mean IRT across baseline sessions was 10.78 s. Once the vibrating pager plus rule and vocal prompt were introduced at home, mean IRT increased to 33.99 s. On average, five vocal prompts (range, 1–11) to "wait" were issued during clinic sessions and nine vocal prompts (range, 1–23) during home sessions.

Discussion

In this study, the pace of eating was targeted by introducing components in a sequential fashion: the inactive pager (baseline), the active pager paired with a rule, and the active pager with a rule and a vocal prompt. Simply stating the rule and providing the vibrating pager was not sufficient to change the pace of eating. It was not until the vocal prompt "wait" was introduced that a slower pace of eating was observed. This finding replicates previous research and demonstrates that, at minimum, a vocal prompt is necessary in order to effectively train eating to the pace of the MotivAider©.

A component analysis was not conducted, and it is possible that the vocal prompt or instruction alone would have been sufficient. Since the rule was introduced simultaneously with other components, there is no evaluation of the effects of this instruction alone on participant's behavior. Even so, the use of a MotivAider© is advantageous in terms of the potential for promoting autonomy. Our intention was to evaluate if the slowed pace of eating could eventually come under control of the MotivAider© alone; however, this was not possible due to family constraints. Although we did not have an opportunity to systematically fade our vocal prompts, the marked decrease in the frequency of prompts observed in the clinic setting in the second treatment phase is promising. Future research should evaluate if the slowed pace of eating can come under the control of a vibrating prompt alone to further strengthen this demonstration and impact the overall social validity of such a procedure. Future research might isolate the effects of the rule with no vibrating prompt.

Limitations notwithstanding, the primary purpose of our study was to extend the literature in this area by isolating the treatment component(s) necessary for behavior to come under the control of the vibrating pager. Since the participant had an extensive verbal repertoire (both speaker and listener skills) and could follow multistep instructions, it was of interest to determine if she could be taught to eat to the pace of the vibrating pager by issuing a rule and minimally intrusive vocal prompts as opposed to physical prompting, response blocking, and programmed consequences used in previous studies. Results show that the absence of these treatment components did not impact the efficacy of the procedure and fewer treatment components may actually be required to produce a measurable reduction in pace for participants who have a relatively advanced behavioral repertoire.

Also noteworthy, increased engagement in conversation might have facilitated slower eating. As treatment sessions progressed, the participant engaged in more conversation while waiting to take another bite. Contact with social reinforcement may have come to compete with food as a reinforcer or may have facilitated tolerance of the delays between bites. As noted by Lennox et al. (1987) when describing their requirement for participants to place their hands in their laps between bites, mealtime conversation in this study may have served as a mediating response in the delay to reinforcement. Future investigations should collect data on mediating behaviors as this may shed light on the role social cues play in controlling the pace of eating. Using a napkin, cutting or moving one's food around the plate, or taking sips of water could potentially be taught as appropriate mediating responses.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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