DOI: 10.1002/bin.1468

WILEY

RESEARCH ARTICLE

An evaluation of a caregiver training protocol on the generalization and maintenance of successful pediatric feeding interventions

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Previous researchers have documented the positive effects achieved by trained clinicians providing behavioral interventions for pediatric feeding disorders; however, few have evaluated the maintenance of those treatments when subsequently implemented by primary caregivers. Further, the majority of previous caregiver training research has relied on the use of multicomponent training packages making it difficult to determine which components are necessary for success. The purpose of the current investigation was to evaluate the effects of instructions and feedback on caregivers' implementation of feeding protocols in a home setting. Results of the current study suggest that feedback may be the most effective training component in training packages designed to teach caregivers to implement an effective feeding protocol. Potential concomitant changes in child behavior are also discussed.

1 | INTRODUCTION

Pediatric feeding problems are identified when the food consumed by a child is insufficient in volume or variety of food that may impeding weight gain and/or growth (Patel, Piazza, Santana, & Volkert, 2002). Previous researchers have documented the positive effects of behavioral interventions for the treatment of pediatric feeding problems when provided by trained clinicians; however, relatively few have included results related to subsequent caregiver implementation. Direct caregiver training is imperative given their integral role with respect to maintaining success over time.

Recently, Pangborn, Borrero, and Borrero (2012), Najdowski et al. (2010), and Penrod, Wallace, Reagon, Betz, and Higbee (2010) documented positive outcomes with parents implementing feeding protocols conducted in the home setting. It is, however, unclear which training components contributed to the achieved caregiver accuracy in protocol implementation given the inclusion of numerous independent variables (written instructions, modeling, role-play, and feedback). Further, across both investigations, the parents implemented the intervention from the outset, and

This investigation was conducted in partial fulfillment of the requirements for a master's degree in Applied Behavior Analysis from The Chicago School, Los Angeles, for the primary author. We thank the Center for Autism and Related Disorders for allowing us to recruit participants for this investigation. At the time of data collection, the second author was Rachel Tarbox.

extended treatment evaluations were required to achieve clinically significant outcomes. Limited published component analyses of caregiver training procedures, paired with relatively few publications on parental success with interventions that were initially provided by a trained clinician, indicate the need for further research in this area. Examination of these variables may be helpful in identifying the critical components of training thus producing more efficient and effective caregiver training with respect to the implementation, generalization, and maintenance of effective feeding interventions.

Feedback has been documented as an important component when training caregivers to implement feeding protocols in the home. For example, Werle, Murphey, and Budd (1993) documented a successful home-based parent training procedure including feedback to treat chronic food refusal in young children. Feedback has also been used to improve the performance of staff in residential facilities (e.g., Richman, Riordan, Reiss, Pyles, & Bailey, 1988; Roscoe, Fisher, Glover, & Volkert, 2006), teachers in the classroom (e.g., Codding, Feinberg, Dunn, & Pace, 2005), and parents implementing discrete-trial training (e.g., Lafasakis & Strumey, 2007). Although feedback has been documented as a valuable training component, there are two potential limitations to this previous research worth noting. First, concomitant changes in client behavior have not been consistently reported in this research; specifically, there is a lack of evidence on the impact of the treatment protocol implementation by caregivers on subsequent client behavior post training (e.g., Roscoe et al., 2006). Second, as previously mentioned, most caregiver training procedures included multiple components (e.g., Najdowski et al., 2010; Pangborn et al., 2012; Penrod et al., 2010) and as such which are the effective training components remains unclear. Given these potential gaps in the literature, the purpose of the current investigation was to evaluate the effects of instructions and feedback on the implementation of feeding protocols by two caregivers in the home setting. Potential concomitant changes in child behavior are also discussed.

2 | METHOD

2.1 | Participants, setting, and materials

Two caregiver-child dyads participated after recent successful treatments for food selectivity by food type were achieved with a trained clinician. Dyad 1 included Robin, a 50-year-old mother with no previous experience implementing behavioral protocols, and Stella, an 8-year-old girl with autism. Treatment followed a self-feeder format (adult-sized spoon and/or fork and a plate with 10 bites) and consisted of differential reinforcement for completing all bites in 15 min. Dyad 2 included Lily, a 36-year-old mother who had previously received training on a different feeding protocol, and Ted, a 4-year-old boy with autism. After minimal progress under the conditions of differential reinforcement in the presence of the clinician and parent, success was achieved with the introduction of nonremoval of the spoon presented by the clinician, and no parent training was provided for this protocol prior to the current investigation. For the final treatment, Ted was presented a bite and instructed to "Take a bite." No consumption within 5 s resulted in the presentation of a model prompt paired with an instruction to "Take the bite like this." Nonremoval of the bite in the form of placing the utensil within ¼ in. of Ted's mouth was employed contingent on no consumption within 5 s and/or if the food was expelled at any time. This procedure remained in place until Ted consumed all bites and/or 30 min elapsed. For both dyads, all instances of inappropriate mealtime behavior were ignored or blocked, social praise was provided for each bite consumed, and informal preference assessments were conducted prior to each session.

All experimental sessions were videotaped and were conducted at the dining room table in the child's home. The primary investigator recorded all sessions for dyad 1 but did not directly interact with the participants during the sessions. For dyad 2, the caregiver was provided with a video camera to film each feeding session. The caregiver was instructed to email the taped meal by the end of the day in order for the primary investigator to provide feedback before the next feeding session. Sessions lasted no longer than 30 min and included 20 bite presentations of either

mastered foods (80–100% accuracy across five consecutive clinic sessions) or novel foods (nonpreferred per parental report and not previously targeted by the clinician).

2.2 | Response measurement and interobserver agreement

Data were collected on both the caregiver's and child's behavior in the present investigation. The following antecedents were recorded *correct* for caregivers: (a) gaining the child's attention, (b) placing the food in front of the child, and (c) presenting the initial instruction (i.e., an isolated point, placing the plate in front of the child, or stating "take the bite"). The following antecedents were recorded as *incorrect*: (a) not gaining the child's attention, (b) placing the food in front of the child before any distracters have been removed or if the child had food in the mouth, and (c) not presenting the initial instruction. The following consequences were recorded *correct* for caregivers: (a) providing access to a tangible or social praise within 5 s of consuming the food, (b) denying access to the tangible or social praise if the child did not consume the food within the allotted time, and (c) blocking or redirecting any occurrence of combined inappropriate behavior. The following consequences were recorded as *incorrect*: (a) providing access to a tangible or social praise more than 5 s after consuming the food, (b) providing positive reinforcement if the child did not consume the bite when time expired, and (c) providing attention for combined inappropriate behavior.

The experimenter delivered feedback for correct and incorrect implementation of session contingencies for mastered foods. Feedback for correct caregiver responses consisted of discussion of instances where the caregiver followed the protocol correctly. Additionally, the experimenter provided suggestions to maintain and increase current performance for the next session. Feedback for incorrect caregiver responses consisted of discussion of areas that required improvement, stating specific instances from the previous session where the protocol was not implemented correctly, and suggestions to improve performance for the next feeding session.

In addition to collecting data on caregiver behavior, data were also collected on the child's behavior. *Correct bite consumption* was defined as the compliance with initial instructions to take the food and consume it within the time given. *Incorrect bite consumption* was defined as noncompliance with the initial instructions to consume the food, expelling and/or vomiting the food, and not consuming the food within the allotted time. Inappropriate behaviors were also recorded using a frequency measure and were defined differently for Stella and Ted. *Inappropriate behavior* for Stella included any instance of vocal protesting (i.e., "yuck, I don't like it") with or in the absence of a facial grimace. *Inappropriate behavior* for Ted included any instance of gagging, expelling, vomiting, crying, batting at the hand, utensil or feeder's hand, or turning of the head 45 degrees from the midline.

A second observer independently viewed the videotapes and collected data for the purposes of assessing interobserver agreement (IOA). IOA was calculated by dividing the agreements by agreements plus disagreements and multiplying by 100.The mean IOA for correct implementation of feeding protocol was 96% (range, 75% to 100%) for Robin and 80% (range, 33% to 100%) for Lily. Mean IOA for caregiver delivered consequences for behavior was 89% (range, 67% to 100%) for Robin and 92% (range, 85% to 100%) for Lily. Mean IOA for bites consumed was 94% (range, 80% to 100%) for Stella and 92% (range, 85% to 100%) for Ted. Mean IOA for inappropriate behavior was 89% (range, 67% to 100%) for Stella and 82% (range, 50% to 100%) for Ted.

2.3 | Experimental design and procedures

A multiple baseline across dyads was used across baseline, post-feedback, and follow-up conditions. Caregivers emailed session videos to the experimenter immediately following each session. Baseline consisted of written instructions for protocol implementation and the opportunity to ask questions (no longer than 15 min). There were no additional programmed contingencies. Postbaseline, performance feedback (for mastered food sessions only) was provided via phone and/or e-mail within 12 hr. Feedback included (a) praising accuracy, (b) identifying inaccuracies, and (c) suggesting targets for improvement. Positive feedback was first provided (e.g., "Good job with X"), followed by corrective feedback (e.g., "You forgot X"), and feedback concluded with the presentation of a goal for the next

session (e.g., "Next time, try X"). Follow-up probes were conducted 6 days to 3 weeks post-feedback and no programmed consequences were provided.

3 | RESULTS

Results suggest improvement in caregiver behavior across both dyads, marked by lower levels of accuracy during baseline as compared to relatively higher levels post-feedback. The children also maintained high levels of appropriate mealtime behavior at the conclusion of the investigation and during the follow-up probes.

Figure 1 represents caregiver performance in implementing their child's feeding protocol. For dyad 1 (top panel), Robin demonstrated low levels of correct implementation of the feeding protocol and low levels of accurate responding to problem behavior during baseline for both mastered and novel foods. Contingent on feedback correct implementation of the feeding protocol increased to high levels for mastered (range, 75% to 10; *M* = 90%) and novel foods (*M* = 100%). In addition, contingent on feedback, there were no opportunities to respond to problem behavior for mastered foods; however, with novel foods accurate responding to problem occurred. Correct implementation of

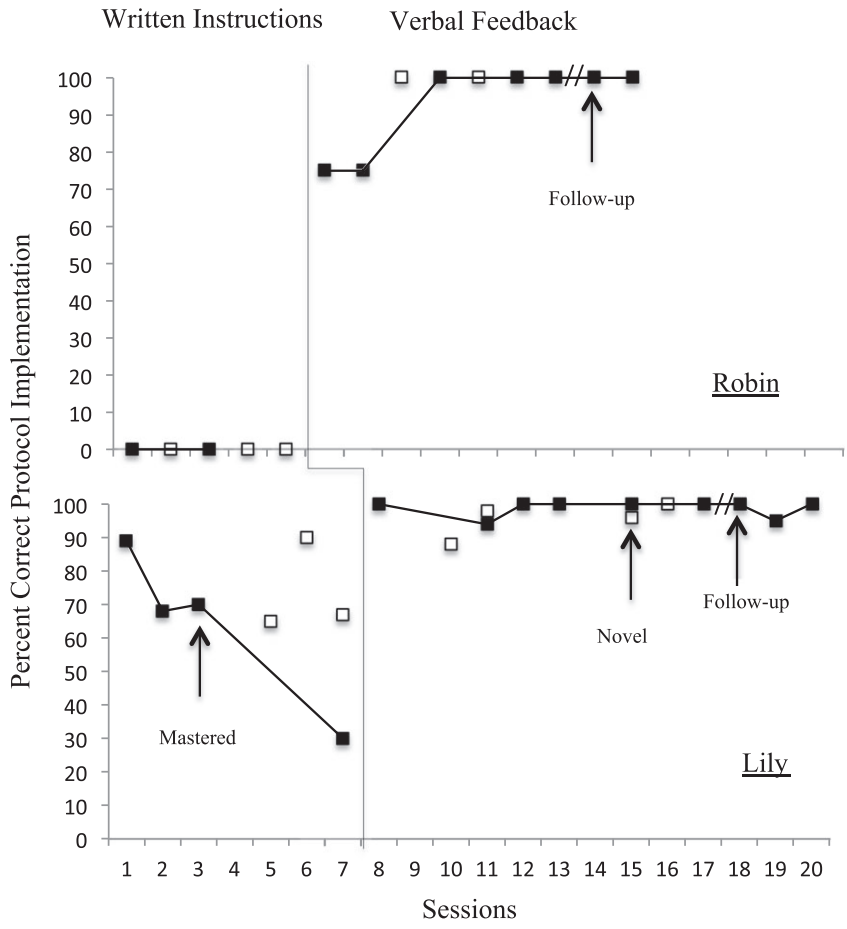

FIGURE 1 Percent correct protocol implementation on the Y-axis. Closed squares for mastered foods and open squares for novel foods for dyad 1 (top panel) and dyad 2 (bottom panel) across baseline (written instructions) and post-feedback (verbal feedback) conditions

the protocol and accurate responding to problem behavior maintained at high levels for mastered and novel foods during 6-day to 3-week follow-up.

For dyad 2 (bottom panel), Lily demonstrated low levels of correct implementation of the feeding protocol for mastered (range, 65% to 89%; *M* = 64%) and novel (range, 35% to 65%) foods during baseline. In addition, she did not accurately respond to problem behavior during baseline for mastered and novel foods. Contingent on feedback, correct implementation of the feeding protocol increased to high levels for mastered and novel foods (range, 88% to 100%; *M* = 98% and range, 75% to 100%; *M* = 91%). In addition, contingent on feedback, accurate responding to problem behavior increased for both mastered novel foods. Correct implementation of the protocol and accurate responding to problem behavior maintained at high levels for mastered and novel foods during 6-day, 3-week, and 6-week follow-up.

Figure 2 represents child's meal completion, and Figure 3 represents the rate of inappropriate mealtime behaviors when the caregiver implemented the protocol. For dyad 1 (Figure 2, top panel), Stella demonstrated moderate levels of meal completion during baseline for mastered (range, 60% to 95%; *M* = 78%) and novel (range, 75% to 85%; *M* = 80%) foods. Stella engaged in moderate levels of inappropriate mealtime behavior during baseline for mastered (range, 2 to 7 instances; *M* = 5) and novel (*M* = 3 instances) foods. Contingent on caregiver feedback, bite consumption increased of high levels for mastered (*M* = 100%) and novel (*M* = 100%) foods. Inappropriate mealtime

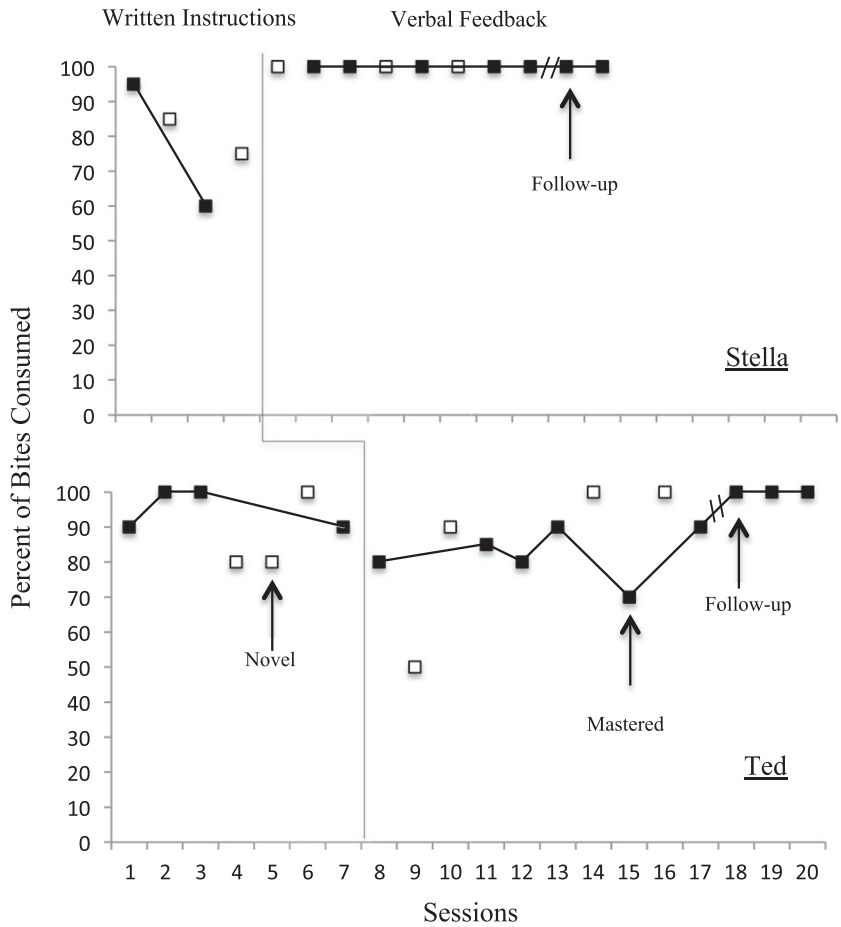

FIGURE 2 Percent of bites consumed on the Y-axis. Closed squares for mastered foods and open diamonds for novel foods for dyad 1 (top panel) and dyad 2 (bottom panel) across baseline (written instructions) and post-feedback (verbal feedback) conditions

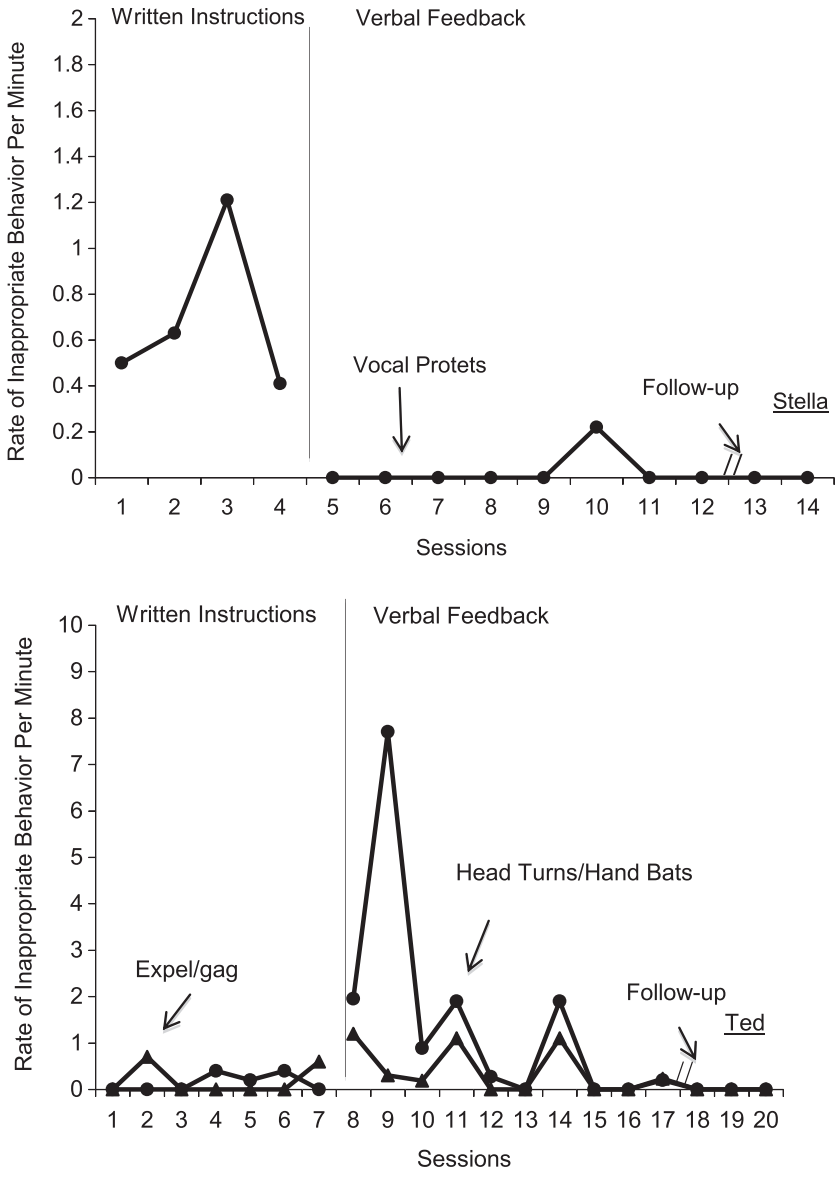

FIGURE 3 Rate of inappropriate behavior on the Y-axis. Closed circles represent vocal protests for dyad 1 (top graph) and open triangles depict expels or gags and closed triangles depict head turns and hand bats for dyad 2 (bottom graph)

behavior decreased to low levels for mastered (*M* = 0 instances) and novel (range, 0 to 2 instances; *M* = 0.7 instances) foods. Correct bite consumption remained high, and inappropriate mealtime behavior maintained at low levels during 6-day and 3-week follow-up.

For dyad 2 (see Figure 2, bottom panel), Ted demonstrated moderate levels of bite consumption during baseline for mastered (range, 90% to 100%; *M* = 95%) and novel (range, 80% to 100%; *M* = 87%) foods. Ted engaged in moderate levels of inappropriate mealtime behavior during baseline for mastered (range, 0 to 7 instances; *M* = 3) and novel (range, 1 to 2 instances; *M* = 2 instances) foods. Contingent on caregiver feedback, bite consumption increased of high levels for mastered (range, 70% to 90%; *M* = 83%) and novel (range, 50% to 100%; *M* = 85%) foods. Inappropriate mealtime behavior increased to high levels during the first two sessions of mastered foods and decreased to low levels

during the remaining four sessions (range, 0 to 48 instances; *M* = 14 instances). Inappropriate mealtime behavior increased to high levels during the first two sessions of novel foods to decreased during the remaining two sessions (range, 0 to 67 instances; *M* = 28 instances). Correct bite consumption remained high, and inappropriate mealtime behavior maintained at low levels during 6-day, 3-week and 6-week follow-up.

4 | DISCUSSION

Generalization and maintenance were observed for both dyads suggesting that feedback was an important caregiver training component. Some unexpected findings were noted: feedback was effective without a programmed incentive, incorrect caregiver responding did not correlate with child behavior, problem behavior increased post-feedback for Ted, and improvements were observed with novel foods without direct intervention.

A first unexpected finding was that written instructions alone were not effective. These results suggest that feedback may have functioned as reinforcement given that it strengthened future caregiver accuracy; either because of positive reinforcement (i.e., praise was preferred) or negative reinforcement (i.e., corrective feedback was aversive). A second unexpected finding was that Lily's correct or incorrect responding did not correlate with Ted's behavior. Ted's high levels of accuracy during baseline indicate sustained treatment gains from the clinic setting, and although further improvements were not observed post-feedback, it was possible that Lily was then better equipped to address future challenging behaviors. A third unexpected finding was that Ted demonstrated initial high levels of problem behavior post-feedback resembling an extinction burst. It is possible that Lily provided intermittent reinforcement during baseline and that her subsequent accurate implementation effectively discontinued that response–reinforcer relation. Alternatively, it is possible that Lilly's post-feedback behavior closely resembled that of Ted's previous clinicians, and to this end his behavior may be better attributed to stimulus control; specifically, increases in problem behavior may indicate that the initial presence of the clinician held aversive properties. Finally, desirable outcomes were observed with novel foods without direct intervention. These results may be attributed to generalization; feedback on mastered foods may have influenced caregiver responding in the presence of novel foods, and previous success with novel foods in the clinic setting may have influenced child responding in the presence of all novel foods across settings.

There are also several potential limitations to this investigation worth noting. First, the primary investigator was present during sessions for dyad 1, which may have produced observer reactivity. Second, prior training on a different protocol may have influenced Lily's success. And third, few participants were included. Although there are several potential limitations to the current investigation, these limitations may be outweighed by the achieved positive outcomes. For example, caregiver performance improved under the conditions of limited training components (written instructions paired with feedback alone), and clinically significant treatment gains were maintained when clinician provided treatment was introduced into the home setting. These positive outcomes mark two primary contributions to the available research in this area: first, a component analysis of caregiver training procedures yielded results indicating the utility of a less complex training procedure, and second, the employed procedures set the occasion for the generalization of successful feeding interventions across settings. Future researchers should address the above-mentioned potential limitations and continue to evaluate efficient and effective intervention and training procedures for families of individuals with and without developmental disabilities who demonstrate challenging behaviors.

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How to cite this article: Aclan MD, Taylor RS. An evaluation of a caregiver training protocol on the generalization and maintenance of successful pediatric feeding interventions. *Behavioral Interventions*. 2017;32:182–189. https://doi.org/10.1002/bin.1468