

*TRAINING PARENTS TO IMPLEMENT  
PEDIATRIC FEEDING PROTOCOLS*MICHAEL M. MUELLER, CATHLEEN C. PIAZZA,  
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Four different multicomponent training packages were evaluated to increase the treatment integrity of parents implementing pediatric feeding protocols. In Study 1 we exposed 3 parents to a training package that consisted of written protocols (baseline), verbal instructions, therapist modeling, and rehearsal training. Results suggested that the package was successful in increasing treatment integrity of the feeding protocols to high levels. Study 2 investigated three different parent-training packages comprised of components used in Study 1. Two parents were exposed to written protocols, verbal instructions, and modeling; 2 parents were exposed to written protocols, verbal instructions, and rehearsal; and 2 parents were exposed to written protocols and verbal instructions. Results of Study 2 showed that each parent-training package produced very high treatment integrity. Follow-up data in the clinic and home for 5 participants suggested that the results were durable for up to 3 months. These results demonstrate a first step in the transfer and application of research findings into routine clinical practice because we evaluated several methods for training parents to implement behavioral feeding protocols, and we demonstrated that these methods resulted in high levels of treatment integrity in a controlled clinical setting.

DESCRIPTORS: parent training, pediatric feeding disorders, translational research, treatment integrity

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One method of treatment for pediatric feeding problems involves the manipulation of antecedent or consequent events during meals. These manipulations have included stimulus fading (Freeman & Piazza, 1998; Patel, Piazza, Kelly, Ochsner, & Santana, 2001; Shore, Babbitt, Williams, Coe, & Snyder, 1998), simultaneous presentation of preferred and nonpreferred foods (Kern &

Marder, 1996; Piazza et al., 2002), alterations of food type or texture (Patel, Piazza, Santana, & Volkert, 2002), positive reinforcement for acceptance or swallowing (Patel, Piazza, Martinez, Volkert, & Santana, 2002; Piazza, Patel, Gulotta, Sevin, & Layer, 2003; Riordan, Iwata, Finney, Wohl, & Stanley, 1984), and extinction of refusal behavior (e.g., nonremoval of the spoon, Cooper et al., 1995; Hoch, Babbitt, Coe, Krell, & Hackbert, 1994; Piazza et al., 2003; jaw prompting or physical guidance, Ahearn, Kerwin, Eicher, Shantz, & Swearingin, 1996). Studies that have evaluated the success of these operant strategies in treatment of pediatric feeding problems have used trained individuals (e.g., Ahearn et al.; Ker-

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win, Ahearn, Eicher, & Burd, 1995; Hoch et al.), parents (e.g., Anderson & McMillan, 2001; Stark, Powers, Jelalian, Rape, & Miller, 1994; Werle, Murphy, & Budd, 1993), or trained individuals and parents (e.g., Cooper et al.; Kern & Marder) as therapists. Nevertheless, most children with feeding problems consume the majority of their meals in the home once treatment is completed; therefore, it seems logical to conclude that the ultimate success of any intervention program will be a function of the extent to which caregivers implement treatment procedures accurately and consistently.

Few studies have examined the effects of training parents to treat pediatric feeding problems. Notable exceptions were investigations by Werle et al. (1993) and Anderson and McMillan (2001). Werle et al. trained 3 parents in their homes in general prompting and verbal attention strategies using a large array of training techniques. After baseline data collection, parents were trained via discussion, handouts, role-plays, behavioral rehearsal during mealtimes, verbal feedback after meals, and periodic videotape review of previous training sessions. After training, parents' use of prompting and verbal attention strategies during mealtimes increased sharply for 1 parent and slightly for 2 parents. The changes in the parents' behaviors corresponded with an increase in appropriate feeding behaviors for each child.

Anderson and McMillan (2001) provided in-home training and feedback to parents to treat 1 child's feeding problems. Parents were trained via verbal and written instructions, modeling, videotape review, and performance feedback during and after in-home outpatient feeding services. Initially, levels of treatment integrity were low during the first treatment session when the parents fed the child a nonpreferred food. Therefore, only preferred foods were offered for the next five meals. Nonpreferred foods then were reintroduced, and levels of treatment integrity

reportedly increased to above 90%. The treatment integrity results from Anderson and McMillan were not depicted graphically and are therefore difficult to interpret with regard to treatment integrity on a session-to-session basis. In addition, it is not clear if the manipulation of preferred and nonpreferred food or the training procedure produced the increased treatment integrity. Nevertheless, the studies by Werle et al. (1993) and Anderson and McMillan suggest that parents can be trained to implement feeding treatments successfully. However, it is unclear which strategies (e.g., modeling, feedback) are necessary to train parents to implement feeding treatments most effectively.

As indicated, the literature on training parents to use operant methods to treat child feeding problems is small, especially in comparison with the much larger literature on training diverse types of individuals, including parents, to use operant methods to treat other behavior problems. One plausible method for extending the literature on training parents to treat pediatric feeding problems would be to adopt methods shown to be effective for training on other problems (Johnston & Pennypacker, 1980). A select sample of that larger literature includes (a) verbal instruction or didactic training, in which a learner is instructed through verbal dialogue or written materials (e.g., Watson & Kramer, 1993), (b) modeling, in which a learner is instructed by viewing the proper implementation of the procedures (e.g., Iwata et al., 2000), (c) rehearsal, in which the learner participates in role-play of the procedures (e.g., Moore et al., 2002), or (d) feedback, in which a learner receives correction during or following practice (e.g., Noell, Witt, Gilbertson, Ranier, & Freeland, 1997). These techniques are used most often in the context of a package that consists of multiple components (e.g., Feldman et al., 1992; Greene, Kamps, Wyble, & Ellis,

1999; Isaacs, Embry, & Baer, 1982; Marcus, Swanson, & Vollmer, 2001; Petrie, Kratochwill, Bergan, & Nicholson, 1981; Salzberg & Villini, 1983). To date, few studies have evaluated individual components systematically to determine their effectiveness outside a multicomponent training package.

Studies that have evaluated individual components of training packages have produced the following results. Didactic training methods (i.e., verbal and written materials) have been found to be ineffective without other training methods such as modeling and feedback (Feldman, Case, Rincover, Towns, & Betel, 1989; Rickert et al., 1988; Roto & Kratochwill, 1994; Sterling-Turner, Watson, & Moore, 2002; Sterling-Turner, Watson, Wildmon, Watkins, & Little, 2001; Watson & Kramer, 1993). Several studies have shown that training teachers with performance feedback produces higher treatment integrity than didactic methods alone (e.g., Jones, Wickstrom, & Friman, 1997; Mortenson & Witt, 1998; Noell et al., 1997). Finally, Watson and Kramer found no procedural advantage to training with modeling or with rehearsal and performance feedback when teaching college students to learn consultation skills in an analogue situation.

Even though these studies suggest that individuals can be trained to implement behavioral interventions successfully, many of the training studies did not use parents as participants. Thus, the extent to which the training techniques will produce equivalent results with parents is not clear. In addition, it is not clear whether or not a multicomponent training package is needed to obtain high levels of treatment integrity when training parents. If a multicomponent package is not needed, the specific components that do lead to adequate levels of treatment implementation should be investigated.

Study 1 of the current investigation extends the work of Anderson and McMillan

(2001) and Werle et al. (1993) by investigating treatment integrity after a multicomponent method was used to train parents to implement behavioral feeding protocols. Study 2 then evaluated the effectiveness of components of the treatment package used in Study 1 to determine if fewer components could produce levels of procedural integrity that were comparable to the multicomponent package. The components we evaluated included verbal instructions plus modeling, verbal instructions plus rehearsal, and verbal instructions alone.

## GENERAL METHOD

### *Settings*

All clinic-based training and sessions took place in rooms (3 m by 2.5 m) containing chairs, tables, and objects relevant to the feeding sessions. During training, a parent and one or two trainers were in the session room. During sessions in which data were collected on parental treatment integrity, the parent and child were in the session room and one or two data recorders observed from behind a one-way observation window. Home sessions were conducted in the parent's home following his or her child's discharge from the treatment program. During home-based sessions, the parent, child, and one or two observers were in the same room, or the observers were in a room adjacent to the room used for feeding. Follow-up sessions took place in the clinic setting or in the home as described below.

### *Data Collection and Interobserver Agreement*

In all sessions, parents were told that data were being recorded on their implementation of the treatment protocols. Data for parent and child behavior were recorded on laptop computers.

*Parent behaviors: Definitions.* Target behaviors for parents were correct prompts and

correct consequences. The child's individual protocol determined when prompts and consequences were scheduled to be delivered. *Correct prompts* were defined as correct delivery of verbal instructions (e.g., "take a bite") within 5 s of when they were to be delivered, correct placement of the feeding utensil at the child's mouth within 5 s of when it was supposed to be placed, and correctly checking the child's mouth for mouth clean (see definition below) during each opportunity during a bite presentation. *Correct consequences* were defined as correctly delivering verbal or physical praise within 5 s of when it was to be delivered and correctly delivering a reinforcer within 5 s of the behavior being reinforced.

*Parent behavior: Measurement.* The number of prompts and consequences delivered during a bite presentation often varied for each child from presentation to presentation. The child's behavior dictated the number of prompts and consequences that were needed for each presentation. The parent had to deliver every prompt accurately during presentation for a correct prompt to be scored. If any prompt was omitted or implemented inaccurately, the prompts for that presentation were scored as incorrect. Similarly, the number of consequences could vary from presentation to presentation. The parent was required to deliver all the consequences during that presentation accurately for correct consequences to be scored. If any consequence was omitted or delivered inaccurately, the consequences were scored as incorrect. This conservative measure of treatment integrity was used to ensure that the entire sequence of prompts and consequences during bite presentations was implemented correctly by the parent. The percentage of correct prompts and consequences for each session was computed by summing the number of correct prompts and correct consequences within a session and dividing that number by the number of possible correct prompts

and correct consequences and multiplying by 100%. The number of possible correct prompts and correct consequences (i.e., the denominator used for this calculation) equaled two times the number of bite presentations in a session (because in each presentation, there was the opportunity for one correct prompt and one correct consequence).

*Feeding treatment procedure.* Parents were trained on the procedures to be used with their children during day-treatment admissions. Parents were instructed not to discuss the protocols with each other. Specific procedures for each child varied because effective treatments were developed and systematically implemented for each child, based on their specific feeding difficulties. However, each child's treatment consisted of differential (DRA) or noncontingent (NCR) reinforcement and nonremoval of the spoon or Nuk® brush (NRS). Protocols with the DRA procedure specified that the parent deliver a programmed reinforcer (e.g., praise, watching a movie) for 30 s following a mouth clean. During NCR procedures, the child had continuous access to a reinforcer (e.g., verbal attention from the therapist, movie). Preferred items and activities were identified via a paired-choice preference assessment (Fisher et al., 1992). During NRS procedures, the utensil was presented to the child's mouth and remained there until the bite was accepted. Expelled bites were re-presented, and emesis was ignored. Problem behavior such as batting at the spoon was blocked with no differential verbal attention. Parents were trained to block (i.e., use their hands to prevent their children's hands from pushing the spoon or Nuk® away from the mouth), and no additional personnel were used to block during sessions in which the parent fed the child.

*Child behavior.* Trained therapists used laptop computers to collect frequency data on acceptance and mouth clean. Data were converted to percentage of trials for accep-

tance and mouth clean by dividing the number of acceptances or mouth clean by the number of bite presentations within each session. *Acceptance* was defined as the child placing a bite of food past the lips within 30 s of presentation for self-feeders and food being placed in the mouth past the lips within 5 s of presentation for non-self-feeders. *Mouth clean* was defined as no food larger than the size of a pea in the child's mouth 30 s after acceptance, but did not include the absence of food in the mouth as a result of expulsion (spitting out the food).

*Interobserver agreement.* Interobserver agreement for treatment integrity was calculated by summing the total prompts and consequences during a session from each observer, dividing the lower frequency by the higher frequency, and multiplying by 100%. Agreement data were collected on 43%, 42%, 43%, 53%, 50%, 40%, 57%, 60%, and 42% of sessions for Parents 1, 2, 3, 4, 5, 6, 7, 8, and 9, respectively. Mean agreement was 98% (range, 95% to 100%), 99% (range, 97% to 100%), 95% (range, 91% to 100%), 98% (range, 96% to 100%), 95% (range, 93% to 100%), 98% (range, 96% to 100%), 95% (range, 93% to 100%), 98% (range, 97% to 100%), and 100% for Parents 1, 2, 3, 4, 5, 6, 7, 8, and 9, respectively. Agreement for child behavior was calculated by dividing the lower frequency by the higher frequency and multiplying by 100%. Agreement data were collected on 7%, 21%, 43%, 53%, 50%, 40%, and 57% for child behavior during training for Parents 1, 2, 3, 4, 5, 6, and 7, respectively. These data were not archived for child behavior for Parents 8 and 9. Mean agreement was 92.6% (range, 84.8% to 98%) for acceptance and 92.4% (range, 82.8% to 99%) for mouth clean during training across Parents 1, 2, 3, 4, 5, 6, and 7.

#### *Experimental Design and Procedure*

Each training package was compared to a written-protocol baseline in a multiple base-

line design across participants. A three-series multiple baseline across participants was used in Study 1. Three two-series multiple baselines across participants were used in Study 2.

Three to seven 5-min clinic-based sessions were conducted each day. One to five sessions were conducted in a parent's home during follow-up. One to three sessions were presented during a "meal," which consisted of a small group of 5-min sessions separated by a 2- to 5-min break used to weigh food, clean the area, and to answer questions posed by the parents. Meals were separated throughout the day by 30 min to 2 hr.

## STUDY 1

### *Participants*

Three parents of 2 children who had been admitted to a day-treatment program for the assessment and treatment of severe pediatric feeding problems served as participants. Parents 1 and 2 were the father and mother, respectively, of 1 child, and Parent 3 was the father of a different child.

### *Feeding Treatment*

Parents 1 and 2 were trained to implement a DRA procedure with NRS. Parent 3 was trained to use an NCR procedure with NRS.

### *Parent Training*

Baseline consisted of written instructions only. Following baseline, the parents were trained with a multicomponent package consisting of verbal instructions, modeling, and rehearsal. Each component (verbal instructions, modeling, rehearsal) was used during one training session that lasted approximately 2 hr prior to the multicomponent-training-package phase. Following all training and baseline sessions, no additional feedback was given, and all questions were

answered by referring the parent to the written protocol.

*Written instructions (baseline).* Each parent was told to take as much time to read over the written protocol as he or she needed. After a parent expressed that he or she had read and completely understood the protocol, therapists answered any questions by reading the information contained in the protocol. No information was given to the parents beyond that in the protocol. The protocol contained all relevant information to perform the feeding session with 100% treatment integrity. Parents took 15 min to 2 hr to read the protocol. The parents did not have access to the protocol or any other script or guide during the feeding sessions. However, after a session, the parents again had access to the written protocol. Protocols were evaluated for reading level by using the Flesch-Kincaid method through Microsoft Word®. Protocols were written at a sixth-grade level.

*Verbal instructions.* A therapist verbally explained the protocol to the parent. The therapist progressed item by item through the written protocol and verbally explained what to do during the sessions. No feedback was given that would indicate to a parent which aspects of the protocol he or she was implementing correctly or incorrectly in the written instructions phase, and no specific aspect of the protocol was emphasized based on the parent's previous performance.

*Modeling.* Two therapists role-played implementation of the protocol using a training script to ensure that all prompts and consequences were demonstrated so that the parent was trained to respond to any behavior that occurred during the meal. One therapist performed the role of the feeder, and one performed the role of the child. For example, therapists modeled prompts and consequences when acceptance of bites occurred at different points in the prompting sequence, physical guidance following refusal,

evaluation of mouth clean, and re-presentation of an expelled bite. The therapist also modeled appropriate responses for batting at the spoon, head turns, and emesis. All prompts and consequences were modeled five times each.

*Rehearsal.* Each parent role-played feeding situations with a therapist serving as the child. The therapist and the parent rehearsed the same situations that were modeled above using the same training script so that the modeling and rehearsal phases were equivalent. That is, the therapist and parent rehearsed the child accepting bites at different points in the prompting sequence, physical guidance following refusal, evaluation of mouth clean, and re-presentation of expelled bites. The therapist and parent also rehearsed appropriate responses for batting at the spoon, head turns, and emesis. Parents rehearsed each situation five times. During rehearsal training, the therapist explained to the parent which situation would be rehearsed and then corrected the parent as needed so that the parent was implementing the given situation correctly.

*Postsession feedback (Parent 3 only).* Following a session, a therapist entered the room and provided the parent with corrective feedback regarding incorrect implementation of the protocol. The therapist described what the parent did that was incorrect and then instructed the parent on how to implement the procedure correctly. For example, a parent may have been told, "You are not praising your child for accepting bites. Immediately after your child accepts the bite, you need to say 'good job taking a bite.'"

*Follow-up.* A follow-up probe was conducted in the clinic 1 month after clinic-based training was completed for Parent 2. During the follow-up probe, the therapist observed the parent feeding the child using the same protocol that was evaluated above.

No additional training was provided to the parent before or after the follow-up probe.

### *Results*

Figure 1 depicts the percentage of correct prompts and consequences for Parents 1, 2, and 3. Parents 1 and 2 demonstrated treatment integrity varying between 0% and 60% following the written-only training. Parent 3 demonstrated 0% treatment integrity. After the multicomponent training package consisting of verbal instructions, therapist modeling, and rehearsal was implemented, the mean level of correctly implemented prompts and consequences for Parents 1 and 2 was 93.9% and 88.8%, respectively. Treatment integrity increased but varied between 43% and 93% with Parent 3 following the multicomponent training. Postsession feedback was implemented and treatment integrity increased to high levels ( $M = 94.4\%$ ). A follow-up probe was conducted with Parent 2 in the clinic 1 month following training, and treatment integrity remained high.

Means for parent treatment integrity and child behavior across baseline and treatment are depicted in Table 1. Child behavior remained relatively stable, even though parental treatment integrity increased from baseline to treatment. The mean percentages of acceptance during parent training for baseline and treatment were 89.8% (range, 76.9% to 100%) and 80.9% (range, 73.9% to 100%), respectively. The mean percentages of mouth clean during parent training for baseline and treatment were 89% (range, 80% to 100%) and 91.7% (85.2% to 100%), respectively.

### *Discussion*

The results of Study 1 extend the literature on parent training in several ways. First, these results replicate those of Werle et al. (1993) and Anderson and McMillan (2001) by showing that parents can be trained to

implement feeding treatments successfully. Werle et al. showed that a large array of training techniques produced variable levels of treatment integrity across parents. Anderson and McMillan also used a multicomponent training package and a manipulation of food type (i.e., preferred vs. nonpreferred), and reported levels of treatment integrity above 90%. We examined three specific components (verbal instructions, modeling, and rehearsal) in a multicomponent training package and showed that these specific training components produced consistently high levels of treatment integrity across 2 parents.

We also presented point-by-point data on treatment integrity following training. By contrast, Anderson and McMillan (2001) did not depict treatment integrity data graphically. The data from the current investigation showed that treatment integrity increased immediately above 70% for Parents 1 and 2 and remained high throughout the study. Treatment integrity for Parent 3 also increased following the multicomponent training package, but levels were more variable and lower. Treatment integrity for Parent 3 increased to above 90% following postsession feedback. It is not clear why Parent 3 required this additional training to obtain high levels of treatment integrity. The verbal report of Parent 3 was that he did not think that precise implementation of the treatment was necessary to sustain appropriate eating for his child. And, in fact, the data supported this observation in that levels of acceptance were high and levels of inappropriate behavior were low throughout the study (i.e., independent of Parent 3's level of treatment integrity).

Even though treatment integrity increased relative to baseline for all 3 parents following training, it was not clear which components were responsible for the increases in treatment integrity. Therefore, in Study 2 we sought to evaluate the effectiveness of com-

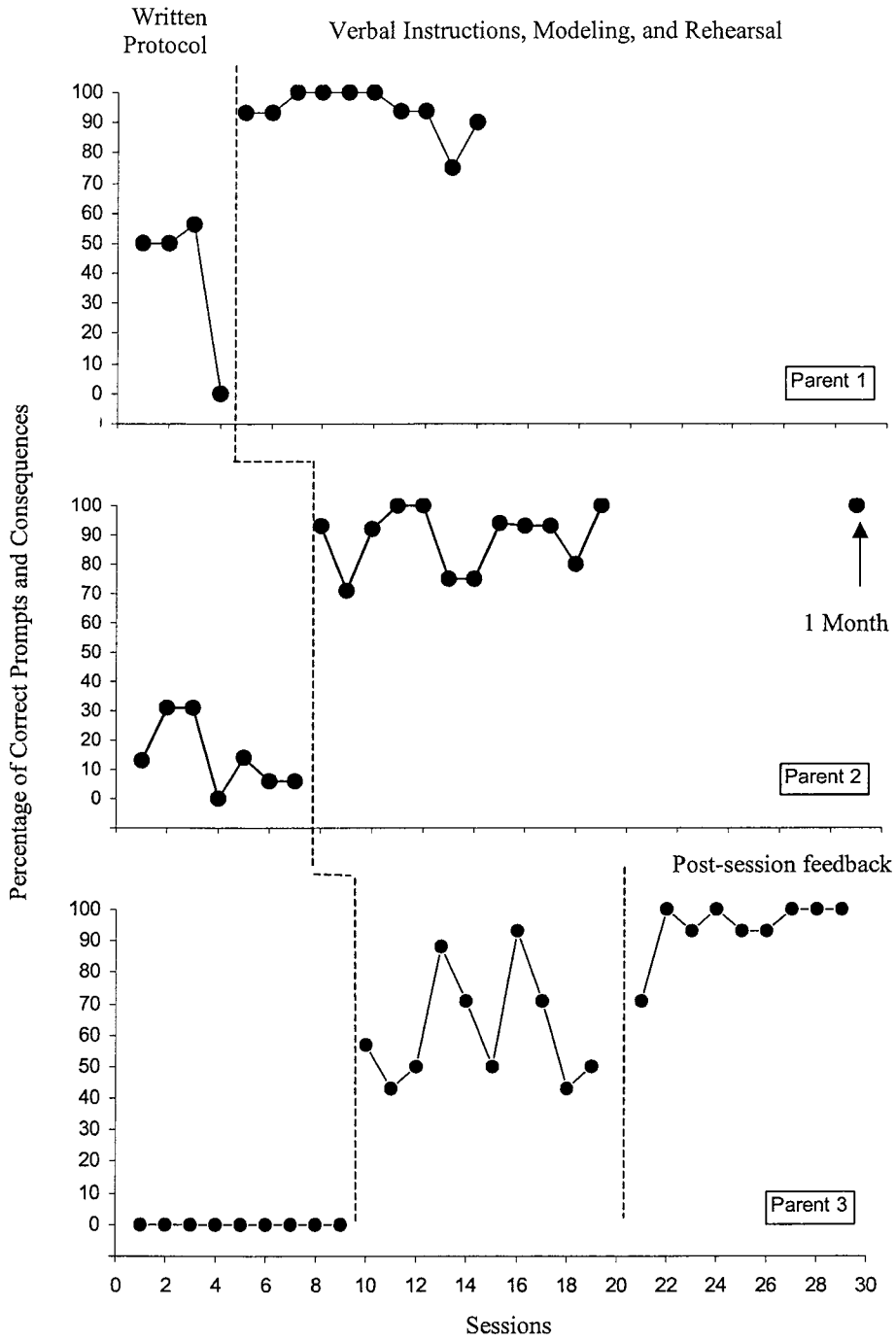


Figure 1. Percentage of correct prompts and consequences for Parents 1, 2, and 3 during written-only baselines and training with verbal instructions, modeling, rehearsal, and postsession feedback (Parent 3 only).



Table 1  
 Mean Percentage of Treatment Integrity for the Parent and Percentage of Acceptance and Mouth Clean for the Child in Baseline and Treatment Phases Conducted in the Clinic

Parent	Dependent measure	Baseline	First treatment phase	Second treatment phase
Study 1				
1	Treatment integrity	39.06	93.82	
	Acceptance	76.88	73.95	
	Mouth clean	80.00	88.15	
2	Treatment integrity	14.44	88.78	
	Acceptance	92.60	68.83	
	Mouth clean	83.87	86.94	
3	Treatment integrity	0	61.6	94.44
	Acceptance	100	100	100
	Mouth clean	94.44	100	100
Study 2				
4	Treatment integrity	0.08	89	
	Acceptance	100	100	
	Mouth clean	100	100	
5	Treatment integrity	33	86	
	Acceptance	100	95.33	
	Mouth clean	100	100	
6	Treatment integrity	23.33	95.83	
	Acceptance	100	100	
	Mouth clean	100	100	
7	Treatment integrity	21.67	100	
	Acceptance	88.33	99.17	
	Mouth clean	93.33	100	
8	Treatment integrity	6.67	51.67	96.60
	Acceptance	100	100	100
	Mouth clean	54.33	97.17	93.00
9	Treatment integrity	0	40.33	96.86
	Acceptance	100	100	100
	Mouth clean		66.17	95.57

*Note.* The second treatment phase was performance feedback for Parent 3 and a second presentation of verbal instructions for Parents 8 and 9.

ponents of the multicomponent training package to determine if increases in treatment integrity could be produced with fewer components.

## STUDY 2

### *Participants*

In Study 2, 6 parents of 3 children who had been admitted to a day-treatment program for the assessment and treatment of severe feeding problems served as participants. Parents 4 and 5 were the father and mother, respectively, of 1 child. Parents 6

and 7 were the father and mother, respectively of a 2nd child. Parents 8 and 9 were the mother and grandmother, respectively, of the 3rd child.

### *Feeding Treatment*

All parents were trained to use a DRA with NRS procedure.

### *Parent Training*

Baseline for all participants consisted of the written instructions described for Study 1. Following the written instructions baseline, verbal instructions always preceded

modeling or rehearsal for all parents. Training for Parents 4 and 5 consisted of verbal instructions and modeling. Training for Parents 6 and 7 consisted of verbal instructions and rehearsal. Training for Parents 8 and 9 consisted of verbal instructions.

The training procedures for verbal instructions, modeling, and rehearsal were identical to the procedures described in Study 1. Verbal instructions, verbal instructions and modeling, or verbal instructions and rehearsal were used once prior to the first session of the phase. Verbal instructions were used again prior to the first session of the second verbal phase for parents who received two sets of verbal instructions (Parents 8 and 9). Training time was approximately 10 to 20 min for each set of verbal instructions, 30 to 45 min for modeling, and 45 min for rehearsal.

*Follow-up.* Follow-up probes were conducted with 4 of the 6 parents 6 days to 3 months after clinic-based training was completed. As described above, the therapist observed the parent feeding the child using the same protocol that was evaluated above. No additional training was provided to the parents before or after the follow-up probes. Follow-up probes were conducted at 6 and 8 days in the home for Parent 4. Follow-up probes in the home were conducted at 7, 8, and 9 days for Parent 5. Follow-up probes in the clinic were conducted after 1, 2, and 3 months for Parent 7. Home-based follow-up probes were conducted at 3 and 5 days and clinic-based follow-up probes were conducted after 1, 2, and 2.5 months for Parent 8.

### Results

Figure 2 depicts the percentage of correct prompts and consequences for Parents 4 and 5 following written baseline and a training package consisting of verbal instructions and therapist modeling. Parent 4 did not implement any correct prompts or consequences following written protocol training. Parent

5's treatment integrity was low, varying between 20% and 50% during baseline. The treatment integrity of both parents increased following verbal instructions and modeling. A drop in treatment integrity occurred for Parent 4 during the first follow-up session 6 days after clinic training but recovered to high levels in the second session. Follow-up sessions conducted in the home 7, 8, and 9 days after clinic training resulted in 89% mean treatment integrity for Parent 5.

Figure 3 depicts the percentage of correct prompts and consequences for Parents 6 and 7 following the written protocol baseline and training consisting of verbal instructions and rehearsal. Treatment integrity during baseline ranged from 15% to 35% for Parent 6 and from 0% to 45% for Parent 7. Treatment integrity for both parents immediately increased and remained at high levels following training ( $M_s = 95.8\%$  and  $100\%$  for Parents 6 and 7, respectively). Follow-up data for Parent 7 were collected in the clinic at 1-, 2-, and 3-month visits with treatment integrity at 85%, 100%, and 75%, respectively.

Figure 4 depicts the percentage of correct prompts and consequences for Parents 8 and 9 following written-only baseline and then following verbal instruction. Parent 8 demonstrated low integrity (0% to 20%), and Parent 9 demonstrated no correct prompts or consequences during baseline. Treatment integrity increased following verbal training, but parents were implementing only about half of the prompts and consequences correctly ( $M_s = 51.7\%$  and  $40.3\%$  for Parents 8 and 9, respectively). Treatment integrity for both parents increased and remained high after a second verbal training ( $M_s = 96.6\%$  and  $96.9\%$  for Parents 8 and 9, respectively). In-home observations were conducted 3 and 5 days following training for Parent 8, and treatment integrity remained high. Treatment integrity was 100% at 1-,

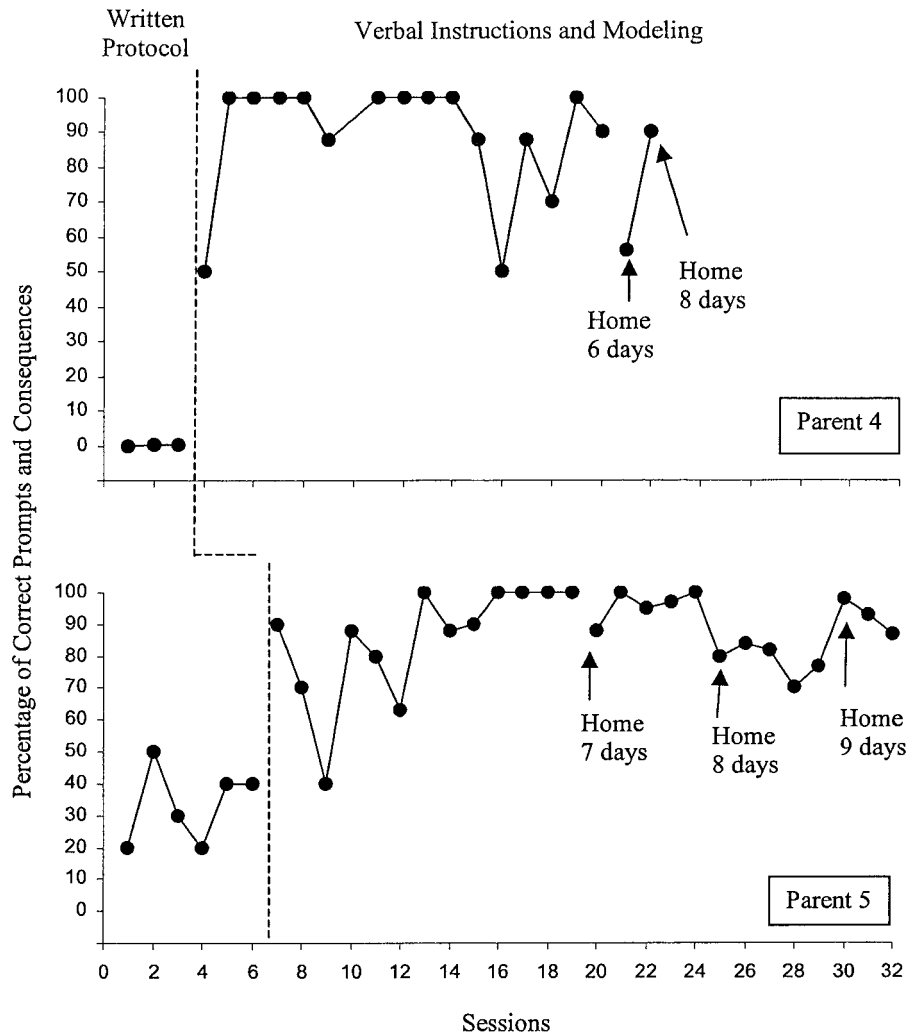


Figure 2. Percentage of correct prompts and consequences for Parents 4 and 5 during written-only baselines and training with verbal instructions and modeling.

2-, and 2.5-month follow-up visits in the clinic.

Means for parent treatment integrity and child behavior across baseline and treatment are depicted in Table 1. Similar to Study 1, child behavior in Study 2 remained relatively stable, even though parental treatment integrity increased from baseline to treatment. The mean percentages of acceptance across children during baseline and treatment were 98.1% (range, 88.3% to 100%) and 99.1% (95.3% to 100%), respectively. The mean percentages of mouth clean across children

in Study 2 during baseline and treatment were 89.5% (range, 54.3% to 100%) and 93.9% (range, 66.2% to 100%), respectively.

*Discussion*

Once we demonstrated that the multi-component training package was effective, we then sought to evaluate subsets of components to determine if training could proceed more efficiently using fewer components. The components we evaluated were verbal instructions and modeling for Parents

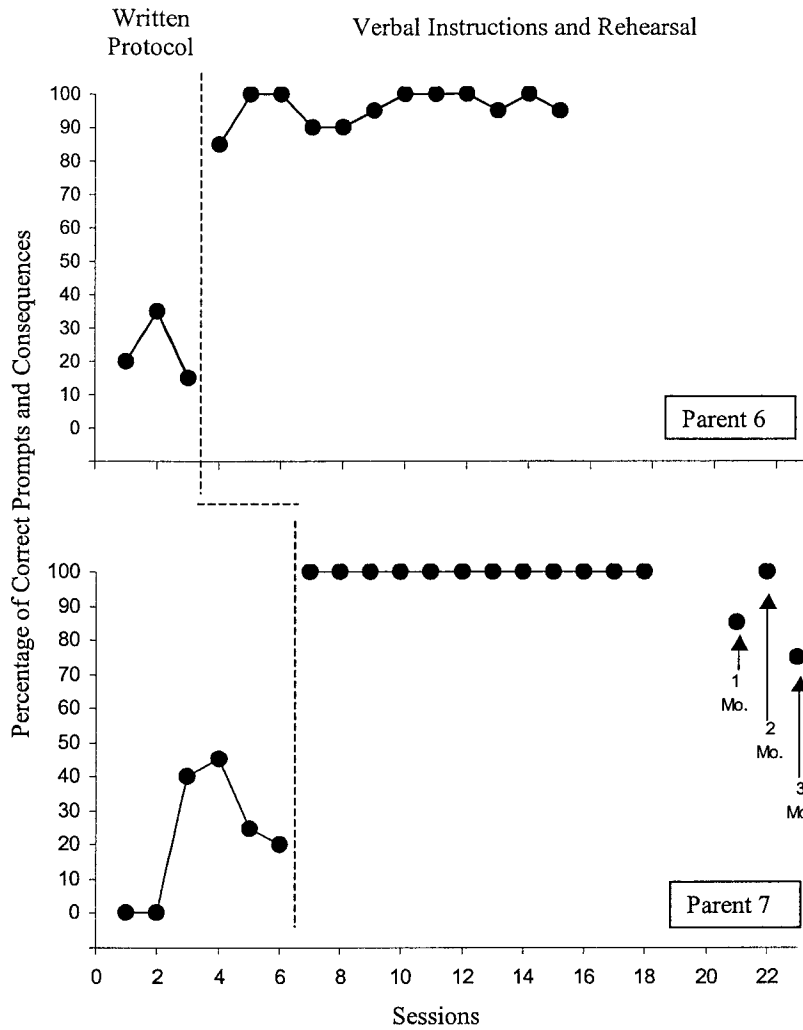


Figure 3. Percentage of correct prompts and consequences for Parents 6 and 7 during written-only baselines and training with verbal instructions and rehearsal.

4 and 5, verbal instructions and rehearsal for Parents 6 and 7, and verbal instructions alone for Parents 8 and 9. Our results suggest both modeling and rehearsal were sufficient to obtain high levels of treatment integrity when combined with verbal instructions, a finding that is consistent with previous research on modeling and rehearsal (Hudson, 1982; Watson & Kramer, 1993).

By contrast, didactic instruction (written and verbal instructions) delivered once did not produce acceptable levels of treatment integrity, a finding that also is consistent

with the training literature (Iwata et al., 2000; Moore et al., 2002; Sterling-Turner et al., 2002). However, when verbal instructions were delivered a second time for Parents 8 and 9, treatment integrity increased to above 90%, suggesting that didactic training may result in higher levels of treatment integrity if used at least twice. The current results do not suggest any definitive reason for the increase in treatment integrity following the second set of verbal instructions. However, one way to conceptualize these data is that each successful training proce-

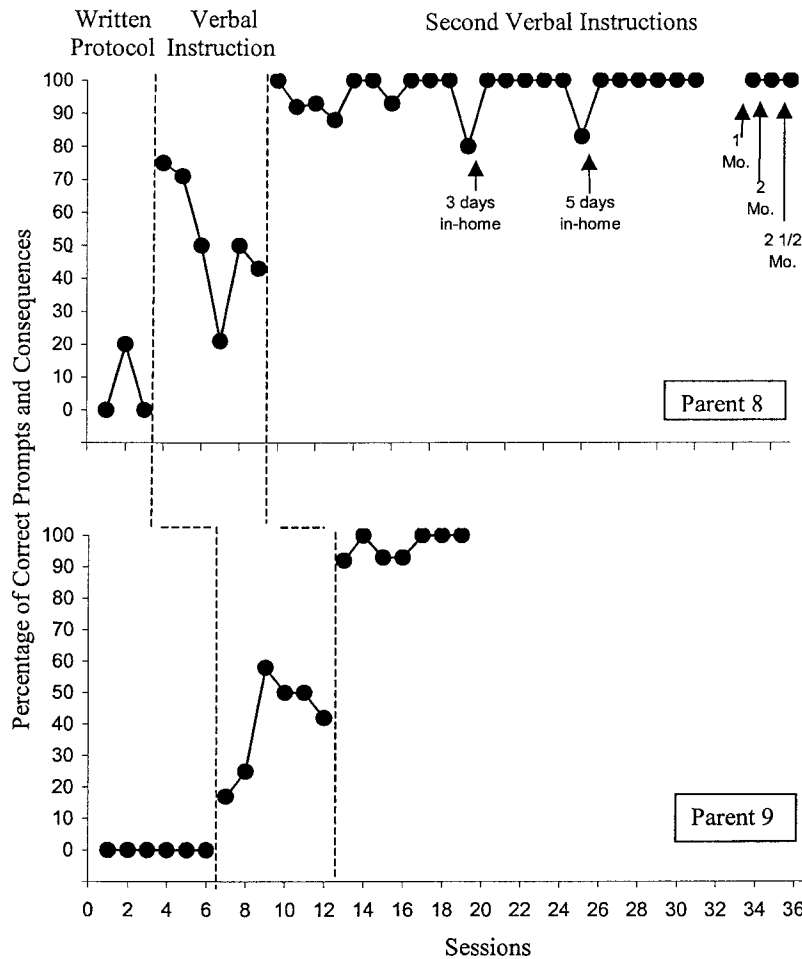


Figure 4. Percentage of correct prompts and consequences for Parents 8 and 9 during written-only baselines and training with verbal instructions.

cedure consisted of at least two components (i.e., instructions and modeling, instructions and rehearsal, two sets of instructions) in addition to written instructions. Thus, it is possible that successful training should consist of multiple reiterations of the procedure, and that the form of the reiteration (e.g., modeling vs. rehearsal) is not as important as the fact that the procedures are reiterated. Further, the second set of verbal instructions could have served as a method of feedback to the parents. During this training, no additional emphasis was given to the poorly implemented areas of the protocol. However, if the parents were able to discriminate

between their behavior during implementation of the protocol during the first verbal-instructions phase and what the trainer was instructing them to do during the second verbal-instructions training, the second set of verbal instructions could have been informative in addressing their implementation deficiencies.

It is not clear whether the written instructions contributed to the ultimate success of the training, because written instructions always were implemented first. It is possible that the training procedure would have been effective with any two of the final components of training (verbal instructions and

modeling, verbal instructions and rehearsal, two sets of verbal instructions) in the absence of written instructions. It also is possible that the final two components of training would not have been successful if written instructions were not presented. Future investigations should evaluate the effectiveness of each of the training components individually and in various combinations. Future investigations also should control for order effects by presenting the various components in different places in the training sequence.

### GENERAL DISCUSSION

Taken together, the results of Studies 1 and 2 showed that parents could be trained to implement treatments for children with severe feeding problems. In addition, the results suggested that even though multicomponent training packages may be effective, presentation of all components might not be necessary to achieve high levels of treatment integrity. This finding is important because time often is limited in clinical practice (Derby *et al.*, 1992; Northup *et al.*, 1991). Our results show that a training package with just two components—written protocols and verbal instructions—was as effective as packages with three or more components. Depending on the extent to which these results are replicated, they could help clinicians training parents to save resources, especially time. For example, the training used with Parents 8 and 9 (two verbal training components) was approximately 90 min shorter than the training used with Parents 1, 2, and 3 (verbal instructions, modeling, and rehearsal), approximately 30 to 45 min shorter than training Parents 4 and 5 (verbal instructions and modeling), and approximately 45 min shorter than training Parents 6 and 7 (verbal instructions and rehearsal). Based on the outcomes from this study, a strategy to train parents to implement feeding protocols could progress from less to

more with respect to training time. That is, verbal training could be used and evaluated with retraining as needed. Additional components could be added until treatment integrity reaches high levels.

One question that remains unanswered is why the training procedures used in the current investigation produced high levels of treatment integrity. One explanation may be that the effectiveness of the treatment for improving the child's feeding problems may have functioned as reinforcement for the parent's appropriate performance of the treatment. That is, prior to treatment, no parent was successful in treating his or her child's feeding problem. Once the parent observed that the treatment improved the child's eating, the parent then was motivated to obtain the same level of success by implementing the procedure with high levels of treatment integrity.

Another variable that may have affected the success of the training procedures is that training in the current investigation was carried out with parents of children with severe feeding problems that warranted admission to an intensive program. Most of the children in the current investigation had longstanding feeding problems and had participated in other forms of treatment that had not been successful. All of the parents in the current investigation were highly motivated to admit their children to the program, and many viewed the program as their last chance to obtain help for their children's feeding problems. Parents in this situation may be more likely to follow through on professional recommendations. Thus, future studies should evaluate the effectiveness of parent-training procedures with other groups of parents and children, such as parents of children with less severe feeding problems (e.g., mild selectivity), parents of children who are participating in less intensive services, or parents who are compelled

to treat their children's feeding problem (e.g., court-ordered treatment).

The two explanations provided above for the success of the training procedure do not explain why treatment integrity failed to increase with written instructions only. It is possible that the written protocols were above the reading levels of some parents. The protocols were written at the sixth-grade level and the trainers were available for questions, but parental reading level was not assessed prior to the investigation. It also is possible that the treatments were of such a complexity that even if the protocols were within the reading levels of the parents, additional training beyond written instructions was necessary to achieve high levels of treatment integrity. Future research should examine the variables that contribute to the success or failure of the various training methods. For example, protocols with different reading levels or different levels of complexity could be given to parents to determine how these two variables affect training.

The results of the current investigation demonstrated that parents could be trained to implement behavioral feeding protocols with high levels of treatment integrity (i.e., generally above 90%); however, it is not clear that these high levels of treatment integrity were necessary to maintain treatment effects. For example, Vollmer, Roane, Ringdahl, and Marcus (1999) implemented DRA procedures with 3 individuals with severe behavior disorders. Initially, DRA procedures were implemented with 100% treatment integrity such that appropriate behavior always produced reinforcement and inappropriate behavior never produced reinforcement. Subsequently, the treatment was implemented with various levels of treatment integrity (e.g., 50% of appropriate and inappropriate behavior produced reinforcement). Participants showed a bias toward appropriate behavior even when the treatment was imple-

mented with less than 100% treatment integrity. That is, treatment effects (increased appropriate and decreased inappropriate behavior) were relatively robust even when the treatment was implemented with poor treatment integrity.

The relation of child behavior to parental treatment integrity was not the focus of the current investigation. Nevertheless, Table 1 shows that most children demonstrated high levels of appropriate eating even when parents were not demonstrating high levels of treatment integrity. The results of the current investigation appear to be similar to those of Vollmer et al. (1999) in that the feeding treatments appeared to be relatively robust in the face of "mistakes." However, we did not manipulate the levels of treatment integrity systematically; therefore, these data should be interpreted with caution with respect to the relation between child behavior and treatment integrity. In addition, most of the children had been exposed to the treatments for at least 4 weeks in which trained therapists fed the children multiple times a day. Therefore, it is not clear how this level of exposure contributed to the resilience of the treatments during violations of treatment integrity.

Follow-up data were collected for 5 participants (Parents 2, 4, 5, 7, and 8). Treatment integrity follow-up data were collected in the home after training was conducted in the clinic setting for 2 participants, in the clinic for 2 participants, and in the home and in the clinic for 1 participant. Treatment integrity remained high for Parents 2, 7, and 8 and dropped slightly for Parents 4 and 5 before recovering. The importance of in-home treatment integrity data should be stressed because parents trained in the clinic setting will ultimately feed their children in their homes where the problems occurred prior to the clinic treatments. Thus, it is important to evaluate the extent to which parents are able to use the behavioral strategies

with high treatment integrity in the settings in which feedings are most likely to occur.

One limitation of the current investigation is that no parents from the first or third training groups (all components and verbal instructions and rehearsal, respectively) were followed in their homes for different reasons. Therefore, the extent to which training generalized for those participants is unknown. Future research should investigate the extent to which training with different techniques will generalize to other settings and whether families implement the procedures with high treatment integrity in the absence of a trainer. A second limitation is the use of two-leg multiple baseline designs in Study 2; future studies could employ more conservative experimental designs to demonstrate functional control. A third limitation is that length of follow-up was as short as 8 days for 1 participant and as long as 3 months for another. In addition, the extent to which parents carried out the procedures with high treatment integrity in the home when the trainer was not present is unknown. A final limitation is the absence of interobserver agreement data for child behavior during training for Parents 8 and 9, and the limited amount of these data for child behavior during training for Parent 1. Future research should investigate the relation between treatment integrity and appropriate child feeding behaviors in a more controlled evaluation than was conducted in the current study.

Despite the limitations of the follow-up and generalization data, the current investigation is important because we demonstrated that parents could be trained to implement feeding treatments. Even though a number of studies have demonstrated effective treatments for feeding problems (e.g., Ahearn *et al.*, 1996; Cooper *et al.*, 1995; Hoch *et al.*, 1994; Patel, Piazza, Martinez, Volkert, & Santana, 2002; Piazza *et al.*, 2002, 2003), few studies have shown that this technology can be taught to care pro-

viders. Nevertheless, the transfer and application of research findings into routine clinical practice is an important goal for applied behavior analysis. Thus, the current investigation represents a first step in the translational process relative to the treatment of feeding problems. That is, we evaluated several methods for training parents to implement behavioral feeding protocols, and we demonstrated that these methods resulted in high levels of treatment integrity in a controlled clinical setting. In some cases, we also demonstrated that the procedures were implemented with high treatment integrity during follow-up and in the home. A reasonable next step in transferring this technology to routine clinical practice would be to evaluate treatment integrity in the home and other settings for extended periods of time under less structured conditions.

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#### STUDY QUESTIONS

1. What were the dependent measures of parent behaviors, and how were they scored?
2. Describe the treatment interventions that were in place for the children's eating behavior.
3. Briefly describe the four components of training and the manner in which they were implemented in Study 1.
4. What effects did parent training have on the parents' ability to implement treatment and on the children's feeding behavior in Study 1?
5. What combinations of training were used in Study 2?
6. In discussing the positive results obtained with repeated verbal instruction, what did the authors suggest might be the most important component of training?
7. Results from both studies showed high levels of appropriate children's eating prior to as well as following parent training. What might have accounted for the high baseline of children's feeding behavior, and why, nevertheless, was parent training in order?
8. Suggest several reasons why the written instructions condition was relatively ineffective.

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