TREATING CHRONIC FOOD REFUSAL IN
YOUNG CHILDREN: HOME-BASED
PARENT TRAINING

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We evaluated the effects of a behavioral parent training program on parent and child feeding-related behaviors in the home. We trained mothers to initiate regular offerings of previously rejected (target) foods and to provide contingent attention (i.e., specific prompts, positive reinforcement) to increase their child's acceptance of nonpreferred foods. For 1 subject, we also directed training at increasing self-eating. Results of a nonconcurrent multiple baseline design across 3 mother–child dyads demonstrated that, with training, all mothers increased offerings of target foods and use of specific prompts, and 2 mothers increased levels of positive attention. In turn, children increased their acceptance of target foods and self-eating, thus demonstrating the functional effects of parent training on in-home mealtimes. Temporary increases in food refusals occurred when treatment was initiated but declined as treatment continued. We discuss the results in terms of the potential benefits and limitations of a home-based treatment model.

DESCRIPTORS: parent training, food refusal, home-based treatment, parent–child interactions

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Food refusal is characterized as a pattern of voluntarily accepting a limited range of food, only soft textures, or an insufficient amount of food to maintain appropriate weight (Ginsberg, 1988; Williamson, Kelley, Cavell, & Prather, 1987). Food refusal in young children is often accompanied by disruptive behaviors such as resisting self-feeding, gagging on or spitting out food, and eating on an inconsistent schedule (Linscheid, 1992; Riordan, Iwata, Finney, Wohl, & Stanley, 1984). Children with chronic food refusal display more severe and persistent feeding problems than the transitory feeding difficulties common in normal development (Christophersen & Hall, 1978). Chronic food refusal may result in excessive weight loss, malnutrition, delayed development, growth retardation, and, in severe cases, death (Bithoney & Dubowitz, 1985; Howard & Winter, 1984).

Food-refusal problems rarely have a single cause. Many organic factors have been identified, includ-

ing physiological abnormalities, neuromuscular conditions (e.g., cerebral palsy), allergies, and acute infectious conditions (Illingworth & Lister, 1964; Linscheid, 1992; Palmer & Horn, 1978). However, a defining feature of food refusal is that organic causes have been ruled out as sufficient to explain the problem's persistence (Chatoor, Dickson, Schaefer, & Egan, 1985; Ginsberg, 1988; Williamson et al., 1987). Instead, environmental factors such as behavioral mismanagement of children during feeding (Iwata, Riordan, Wohl, & Finney, 1982; Riordan et al., 1984) and aversive eating experiences (Siegel, 1982) are presumed to play an integral role.

Most research on treatment of food refusal consists of clinical case studies or single-subject experiments using behavioral strategies, sometimes in combination with dietary changes (e.g., Bernal, 1972; Handen, Mandell, & Russo, 1986; Linscheid, Tarnowski, Rasnake, & Brams, 1987; Palmer, Thompson, & Linscheid, 1975; Riordan et al., 1984). Intervention procedures have included using specific prompts when presenting food; providing praise and pleasurable events for desired eating; pairing nonpreferred food with access to preferred food; ignoring mild disruptive behaviors; and using time-out, physical guidance, or other negative consequences for food refusal or expelling food. These procedures, used in various combina-

tions, have repeatedly reduced food refusal and improved eating in children.

A crucial test of any behavioral intervention is whether the changes generalize beyond the hospital or clinic setting to the natural environment (Stokes & Baer, 1977). To facilitate generalization, some feeding interventions have involved training parents to serve as treatment agents (e.g., Bernal, 1972; Custer, Page, Mailman, Iwata, & Midkiff, 1988; Hatcher, 1979; Ives, Harris, & Wolchik, 1978; Siegel, 1982; Thompson, Palmer, & Linscheid, 1977). Measures of the child's weight or parent records of food intake are often used to monitor treatment effects outside the clinic or hospital environment. However, to date, no studies have formally evaluated the effects of behavioral treatment on feeding interactions at home. We suspect that the physical and social environment of home mealtimes differs from clinical feeding settings, so it remains to be seen whether treatments developed thus far are sufficient to achieve sustained improvements in parent–child feeding patterns in the natural environment. Direct observations of the home feeding routine would allow researchers to evaluate treatment outcomes more comprehensively and perhaps to identify factors specific to the home that impede successful treatment. In addition, data from home-based observations could be used to generate hypotheses about variables that may be functionally related to the maintenance of children's feeding disorders (Mathisen, Skuse, Wolke, & Reilly, 1989).

The present study investigated behavioral treatment for chronic food refusal where and with whom the problem occurs—during mealtimes with a parent at home. The purpose of this study was to evaluate systematically the effects of behavioral parent training on parent and child feeding-related behaviors in the child's natural eating environment. By conducting both parent training and assessment at home, this study also explored the feasibility of a home-based model of feeding treatment.

METHOD

Subjects

The participants were 3 boys (aged 21 to 54 months) and their mothers. They were referred by an outpatient psychology clinic in suburban Chicago because of chronic problems with selective food refusal. Medical explanations for feeding problems had been ruled out for all children. Selective feeding patterns had persisted for 15 to 50 months, and each parent reported having virtually given up trying to feed the child nonpreferred foods. Instead, they described other methods (e.g., nutritional supplements or high-calorie snacks) for insuring that their child got enough calories to meet dietary needs. The children were developmentally capable of independent self-feeding (i.e., using fingers, spoon, fork, and cup) and were able to follow simple directions. None was significantly underweight. All came from two-parent middle-class families and had no siblings with feeding problems.

Steve, aged 3.5 years, refused to eat any fruits or vegetables and most grains. Steve's diet consisted mainly of potato chips and sweetened breakfast cereal, eaten without milk, which he fed himself. According to the parents, Steve's feeding difficulties began when table foods were introduced at 18 months. When presented with fruits or vegetables, Steve refused to open his mouth, hid his face, cried, spit food out, or attempted to leave the table. Due to his restricted diet, Steve was given a nutritional drink (Nutrament®) at most meals on the recommendation of his pediatrician. Steve ate separately from his parents and his 4.5-year-old sister. He was nonverbal, and psychological testing confirmed significant overall developmental delays; however, oral-motor assessment at the age of 3 years ruled out organic explanations for his feeding problems. He was enrolled in a special education preschool during the study.

Feeding problems for Frank began with formula intolerance during infancy and continued with failure to progress beyond pureed foods. Aged 4.5 years, Frank's main feeding problem was that he refused most solid foods. When presented with foods that were not blended or strained, Frank would often turn his face away, cry, and attempt to leave his seat or run from the table. Frank gagged or vomited on occasion during meals; however, interdisciplinary assessment revealed no oral-motor deficits that might account for the pattern. Because of Frank's feeding difficulties, his mother fed him

separately from the parents and his 2-year-old sister. Although Frank was capable of feeding himself, his mother spoon-fed most items and entertained Frank with books or toys during meals. At the preschool he attended during the study, Frank also refused solid foods, which led the teachers to discontinue serving him lunch. Instead, Frank's mother fed him a snack immediately after school. Results of intellectual and preacademic evaluation indicated that Frank had severely delayed overall development. Prior to Frank's referral for the study, a clinic-based parent training program for noncompliance had been attempted by the referring psychologist, but the program was terminated when Frank's parents reported difficulty following through with the suggested procedures at home.

The mother's primary concerns regarding 21-month-old Bob's feeding patterns were that he refused to eat fruits in any form (including jellies and fruit juices) and that he often spit out all types of foods. Medical and dietary evaluation, as well as the mother's report, indicated problems with chronic food refusal since Bob was 6 months old. His mother reported being unable to get Bob to accept anything except liquids until age 13 months, when his grandmother succeeded in feeding him oatmeal. Thereafter, Bob ate selective solids but continued to refuse all fruits and most meats. The mother stated that she gradually gave up trying to introduce new foods or nonpreferred items because she found his food expulsion upsetting. She provided him with frequent milk snacks to maintain sufficient growth. Bob's mother usually fed him separately from the rest of the family, which included his 6-year-old sister and 4-year-old brother. Bob used his fingers most often to eat preferred foods. No formal test data were available on Bob's cognitive or developmental functioning, but, excepting his lack of expressive language, he appeared to be progressing normally.

Setting and Data Collection

The kitchen area of the family's home served as the setting for all assessment and training sessions. Videotaped recordings of the children's mealtimes occurred an average of once per week for 30 min or until the meal was finished, whichever came first.

Sessions were scheduled at the parents' convenience and typically occurred at a consistent time for each family. Parents were asked to have no outside visitors and to limit phone calls during videotaping, although no restrictions were placed on other family members' presence.

An investigator transported videotape equipment to the home for observations and set up the equipment immediately before the meal. The investigator left the kitchen during mealtime observations except to check intermittently on equipment functioning, and she returned after 30 min or when the parent indicated that the meal was over. We recorded observations using an RCA® CMR300 ProWonder video camcorder mounted on a tripod. We scored videotapes after sessions using a feeding observation code.

Behavioral Definitions

The feeding observation code included 12 parent and seven child behaviors, seven food groups eaten, and six food textures eaten. Five parent behaviors were most relevant for the current study, including three responses in the category of prompts (food-related commands, requests, or suggestions directed at eating) and two responses in the category of positive attention. Specific prompts were defined as clear, directive statements that indicated an action involved in eating (e.g., "open your mouth," "take a bite"). Promises were defined as clear prompts stated along with a positive offer of a presumed incentive (e.g., preferred food, interactive game) to be delivered after the child complied (e.g., "chew the apple and you can have a sip of milk"). For purposes of this study, specific prompts and promises were combined into a category called trained prompts. Vague prompts were either unclear ("get going"), suggestive rather than directive ("let's eat"), questions ("want some beans?"), or more than two prompts in a row before the child had an opportunity to respond.

The other parent category of primary interest in this study was positive attention, which consisted of approvals and rewards. Approvals were defined as verbal or physical indications of pleasure demonstrated toward the child's food-related actions (e.g., "good boy," "nice eating," hugging the child).

Rewards were actual delivery of a presumed incentive such as preferred food or access to a toy. Other categories of parent attention were not relevant to this study, either because they occurred at a low rate across all conditions (e.g., negative attention) or because they were not targeted as part of treatment (e.g., neutral attention); thus, they are not discussed further. (A complete copy of the observation code is available from the third author.)

Child behaviors were organized into the categories of acceptances of foods, rejections of foods, and other negative behaviors. Acceptances included eats and drinks (the child consumed a bite of food or a sip of liquid in response to the parent holding it up to the child's mouth), and self-eats and self-drinks (the child placed food or liquid in the mouth independently or with partial assistance). Rejections included refusals (the child verbally or physically indicated unwillingness to engage in food-related behavior) and expels/vomits (the child spit food out or allowed it to drop out of his mouth). Other negative child behavior consisted of cries/protests, which was any physical or verbal behavior, other than refusals or expels/vomits, that signaled the child's displeasure with food-related events (e.g., child says "I hate you" after being given a non-preferred food, child wails after being prompted to begin eating). Cries/protests occurred at a low rate throughout the study and was not targeted for treatment, so data on this response are not presented.

The seven food groups coded were milk and dairy products, meat and meat alternatives, fruits, vegetables, grains, desserts and sweets, and other foods (Pipes, 1989). We coded each bite of food accepted or rejected according to food group(s). For each food that qualified as only one food group, credit was given for one whole bite accepted or rejected (e.g., a bite of apple counted as one bite of fruit). For each food that qualified as more than one food group, the bite was divided arbitrarily into equal parts depending on the number of food groups included (e.g., a bite of spaghetti with meat sauce counted as a third of a bite of grains, a third of a bite of vegetables, and a third of a bite of meats). For items with multiple ingredients, we

determined the content by examining the labels on prepared foods or inquiring about preparation with the mother.

We coded nonliquid textures into six categories defined specifically for this study. We developed categories based on the size of whole pieces of foods and number of chews needed to permit swallowing. Similar criteria have been used in various texture classifications associated with feeding assessment. For example, Lewis (1982) delineated five categories in the developmental progression of oral-motor skills related to feeding: strained, junior, ground/mashed/toddler, chopped fine, and chopped regular. The texture categories we used generally paralleled Lewis's, except we divided strained into two categories. We defined the following food textures in ascending order of coarseness: smooth, fine, lumpy, chunky, chewy, and crunchy. Smooth foods included those with no granular lumps or identifiable pieces (e.g., pudding or smooth peanut butter). Fine foods included granules or small seeds that could be eaten without chewing (e.g., farina or tapioca pudding). Lumpy foods were those that could be broken down by gumming or by pressing the tongue against the roof of the mouth (e.g., cottage cheese, mashed bananas). Soft foods with pieces that required four or more chews to break up in the amount of 1 teaspoon or more per ounce (e.g., junior baby food with ground meat) were coded as having a chunky texture. Chewy foods were pieces 1.5 cm or larger that required a minimum of five chews before swallowing (e.g., cheese, hot dog, crackers). Crunchy foods were bite sized, required 10 or more chews, had a more solid, rough texture, and would not soften in the mouth without chewing (e.g., raw fruit or vegetable, pretzels). Textures were scored in reference to each bite accepted or rejected.

Recording and Reliability

Two investigators and a graduate assistant scored videotaped observations of mealtimes, denoting defined behaviors each time the responses occurred during continuous 1-min segments. An observer reviewed each tape at least twice, first to code parent and child behaviors and then to code bites accepted

and rejected according to food groups and textures. Observers could review videotaped observations as many times as needed. A stopwatch function attached to the camera recorded the elapsed time in 0.1-s intervals and displayed the time in the lower left corner of the videotaped image. The stopwatch insured consistency of time measurement across observers, who scored sessions individually.

We assessed interobserver agreement on parent and child behaviors by comparing the observational records of two independent observers for 50% of baseline and intervention sessions. We calculated interobserver reliability for individual behaviors using the occurrence-only formula of agreements divided by agreements plus disagreements multiplied by 100%. To be considered an agreement, observers needed to record a behavior within the same 1-min interval and at the same point in a sequence of parent–child behaviors. If one observer scored more than one instance of a behavior during an interval, each individual occurrence was examined for agreement or disagreement.

To assess reliability on foods and textures served during home observations, we trained parents to record everything their child ate or drank during videotaped sessions on a food record form. The form requested information on the type of food, amount eaten, and the texture of food (when pertinent to the child's feeding problems). For example, a parent might indicate that the child ate a half cup of plain yogurt (smooth texture) and a quarter of an apple (crunchy texture). Training involved providing verbal instructions and, in the case of texture categories, written definitions, followed by verbal feedback on the parent's accuracy in recording for two or three sessions. The observer independently recorded the foods and textures present at videotaped meals, and we compared the records of the observer with those of the mother. Reliability was calculated on individual food types and textures presented at the meal for 30% of all the observations per condition, using the occurrence-only formula of agreements divided by agreements plus disagreements multiplied by 100%.

Table 1 displays mean reliability percentages for each mother–child dyad on observational categories

Table 1

Mean Percentage of Agreement on Target Responses

Target response	Mother/child dyad		
	Steve	Frank	Bob
Parent			
Trained prompts	78	94	78
Vague prompts	75	71	86
Positive attention	89	70	79
Child			
Swallows	94	94	98
Refusals	92	77	86
Self-eating	91	92	89
Food types	89	100	93
Food textures	—ᵃ	91	—ᵃ

ᵃ Dash indicates that data were not recorded for these responses.

of interest. Reliability between the mothers and the investigators regarding the food types and textures is also listed. Textures were not a problem for Steve or Bob, so their data were not coded on this category. Reliability levels ranged between 70% and 100%.

Experimental Design and Procedures

We used a nonconcurrent multiple baseline design across parent–child pairs (Baer, Wolf, & Risley, 1968; Barlow & Hersen, 1988) to evaluate the effects of parent training on child and parent behaviors.

Baseline. Standard instructions encouraged parents to behave as they naturally would with their child during mealtime sessions. We asked mothers to simulate a typical meal with respect to family members present, duration, foods served, manner of presenting foods, and methods of getting the child to eat.

Parent training. Once a stable baseline had been established for a mother–child dyad, we introduced a behavioral treatment program. The general content of the program was similar across families, although we identified specific food groups or textures appropriate to each child and individualized recommendations for the target foods. For each mother–child dyad, two phases of treatment (i.e., training on food variety or texture and training on

self-eating) were planned for use if needed. Only Frank and his mother participated in the second training condition.

Training began with basic educational information on child nutrition and suggestions on how to introduce target foods in small quantities. Contingent attention skills taught to all parents included providing clear, direct prompts; using verbal and physical praise and other rewards (e.g., preferred foods, interactive games) for cooperating with eating; ignoring disruptive behaviors such as crying or refusing; and following food expulsions or attempts to leave the table with a mild corrective procedure (e.g., saying "no" in a firm voice and physically blocking the child's attempts to leave the meal area). To the mothers of Frank and Steve, we also taught a brief time-out, in which the mother left the table or rotated the child's chair away from the table for 30 to 60 s as a means of interrupting continued disruptive behavior. We recommended that time-out be used only as needed for persistent refusals, crying, noncompliance, or other negative episodes. Training methods included instruction, discussion, handouts, role plays, behavioral rehearsal during mealtimes, verbal feedback after meals, and periodic videotape review. The first and second authors (graduate students in clinical psychology) conducted training sessions, with supervision from the third author. We encouraged the mothers to use the intervention procedures during all mealtimes rather than only when the researcher was present; however, data were collected only for videotaped meals.

Training continued for 5 to 13 sessions for the first treatment condition, depending on parent and child responses during mealtime observations. Frank and his mother participated in six sessions for the second treatment condition. During treatment sessions, the parent and researcher first spent 20 to 30 min discussing the techniques to be used with the child during mealtime. Then videotaped observation occurred, followed by a brief discussion of the parent's use of the procedures and the child's response to them. The investigators made decisions about training progress and intervention changes based on frequent review of the videotapes, visual

inspection of parent and child behavior graphs, and clinical impressions of parents' cooperation with recommended procedures.

Steve's mother participated in 10 training sessions to increase Steve's acceptance of a broader array of food groups. Dairy solids were identified as the first target food. When Steve's intake of dairy solids had increased to a level considered acceptable to both the mother and the researcher, Steve's intake of fruits was targeted. Toward the end of treatment, the mother began adding vegetables to Steve's diet. Treatment ended when the mother reported that Steve had met her expectations for improving food intake.

Frank's mother received nine training sessions aimed at introducing more coarsely textured foods into Frank's diet. During baseline, Frank accepted mainly foods with smooth or lumpy texture. Treatment focused on increasing Frank's intake of foods that were chunky or chewy. Subsequently, the mother participated in seven sessions to increase Frank's self-eating. Parent skills taught during treatment on self-eating were the same as those for increasing food intake (i.e., providing praise and rewards, using specific prompts, ignoring inappropriate behaviors), but now emphasized encouraging Frank to use his spoon and fork and to pick up food with his fingers. As part of training, we requested that the mother give Frank a plate or bowl containing food that he could feed himself, place a spoon or fork on the table, and verbally encourage self-feeding before offering physical assistance. Treatment ended when Frank's mother underwent extensive hospitalization for a physical ailment.

Training sessions for Bob's mother concentrated on increasing his intake of fruits. The mother completed five treatment sessions before withdrawing from the program. During one of the treatment sessions, the parent and child were not videotaped for formal data collection. Instead, the researcher observed the mealtime interaction and prompted the parent in the use of behavioral treatment procedures in order to facilitate skill acquisition. After five sessions, the mother reported that she felt Bob's behavior had improved and that she did not have enough time to continue the program.

RESULTS

Figure 1 shows the effects of parent training on the mothers' positive attention to appropriate feeding behaviors and prompts. Before training, each mother displayed very low levels of positive attention (a mean of 0, 0.08, and 0.16 positive responses per minute, respectively). When the first training phase was implemented, Steve's and Frank's mothers increased their positive attention to an average of 2.01 and 0.90 behaviors per minute, respectively. Positive attention levels for Steve's mother rose markedly in treatment and then declined to a moderate level that approximated the mean rate for the condition. Frank's mother showed a stable increase in positive attention during the initial training condition. After a brief acceleration at the beginning of the second training phase directed at self-eating, her positive attention continued at a level comparable with the initial training phase. By contrast, Bob's mother showed little change in frequency of positive attention from baseline to treatment.

The three graphs on the right side of Figure 1 indicate that both trained and vague prompts occurred infrequently in baseline. Trained prompts occurred at mean levels of 0.06, 0.24, and 0.23 responses per minute, respectively, across parents, and vague prompts occurred at mean levels of 0.20, 0.70, and 0.41, respectively. During the first training phase, levels of vague prompts remained generally stable (mean rates of 0.23, 0.88, and 0.53, respectively). However, the average level of trained prompts increased notably to 1.75, 0.93, and 1.30 responses per minute, respectively. During the second treatment component, Frank's mother further increased her use of trained prompts to an average of 1.44 per minute. An unstable baseline trend of trained prompts obscures the effects of training on Frank's mother. Overall, the data suggest that parent training resulted in increased use of trained prompts and little change in the level of vague prompts.

Figure 2 shows the effects of treatment on children's intake of target food (depicted in the left column) and nontarget food (right column). The graphs display the number of swallows (i.e., number of acceptances minus the number of expels/vomits) and the number of refusals across mealtime sessions. During baseline, the children consumed very few, if any, bites of the target food (0, 0.1, and 0.3 bites per meal, respectively). They also refused very few bites of target food, which indicates that the parents rarely offered these items during baseline. Both swallows and refusals went up markedly when treatment began. For Steve, the proportion of bites swallowed exceeded those refused after seven sessions. For Frank, intake of target food improved during the first training component and then increased substantially during the second training component, and refusals decreased gradually to a mean of five bites per meal for the second training condition. Both Steve and Frank consumed over 20 bites of the target food during each of the last six treatment sessions. A similar pattern of increased swallows and refusals was seen when training was introduced with Bob's mother. The mean number of bites Bob swallowed during treatment increased to 11; the mean number he refused in treatment increased to 15. Due to his mother's premature withdrawal from the treatment program, the effects of continued treatment could not be observed.

Intake patterns of nontarget food (i.e., all foods except target types or textures) varied across the study for individual children. Steve and Bob displayed variable levels both within and across conditions. Frank's consumption of nontarget food decreased somewhat from baseline to the first treatment condition, which was expected, given that he was eating more coarsely textured foods. Notably, none of the children showed an increase in refusals of nontarget foods across treatment. Thus the effect of treatment was primarily a broadening of the array of food accepted to include previously rejected target food.
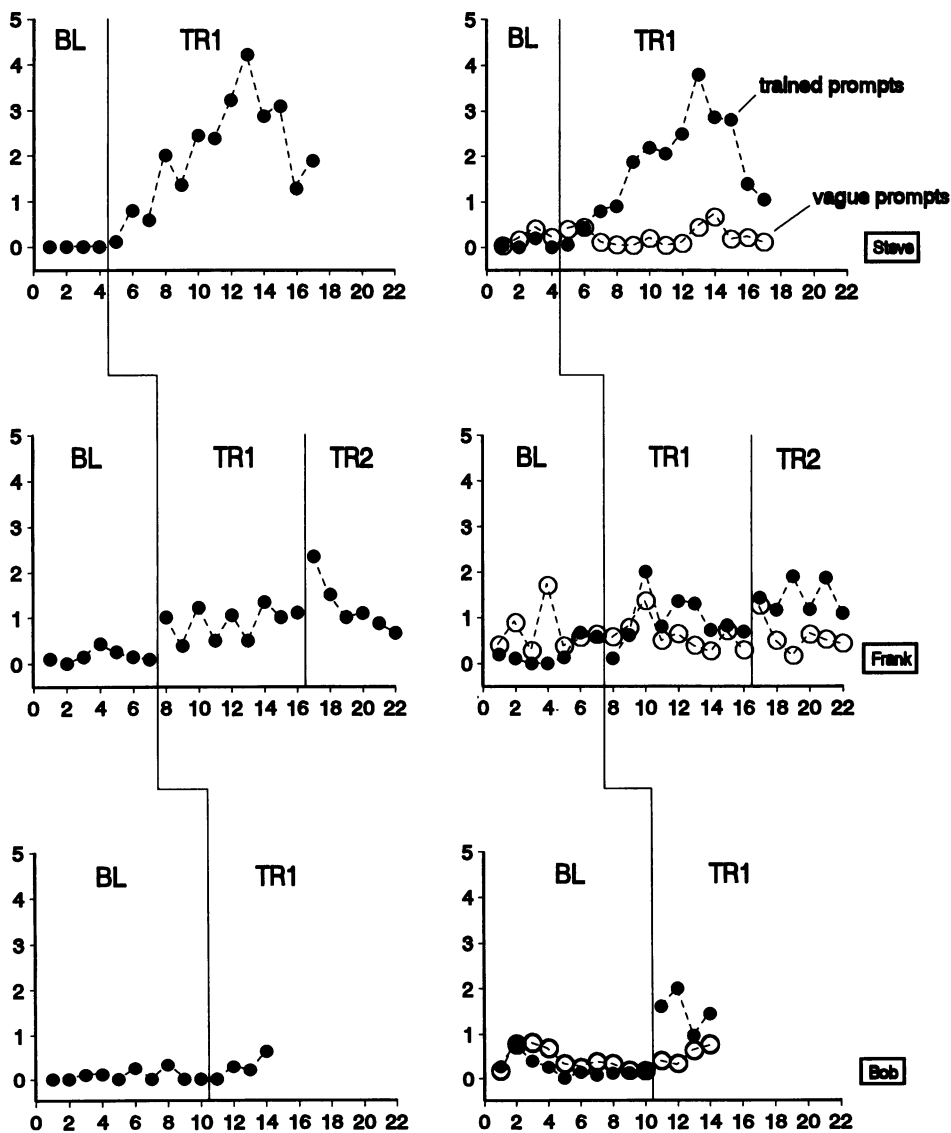
Figure 3 displays the effects of treatment on Frank's intake of individual texture groups and on self-feeding. (Fine and crunchy textures were rarely offered to Frank, so they are not displayed here.) Smooth foods, such as pudding, and lumpy textures, such as junior baby foods, comprised 94%

Figure 1.   Mean episodes per minute of positive attention (left column) and trained and vague prompts (right column) across sessions for individual mother–child dyads. BL = baseline, TR 1 = training on food variety or texture, TR 2 = training on self-eating.

Target Food   Nontarget Food

Fruits and Dairy Solids

Chunky and Chewy Textures
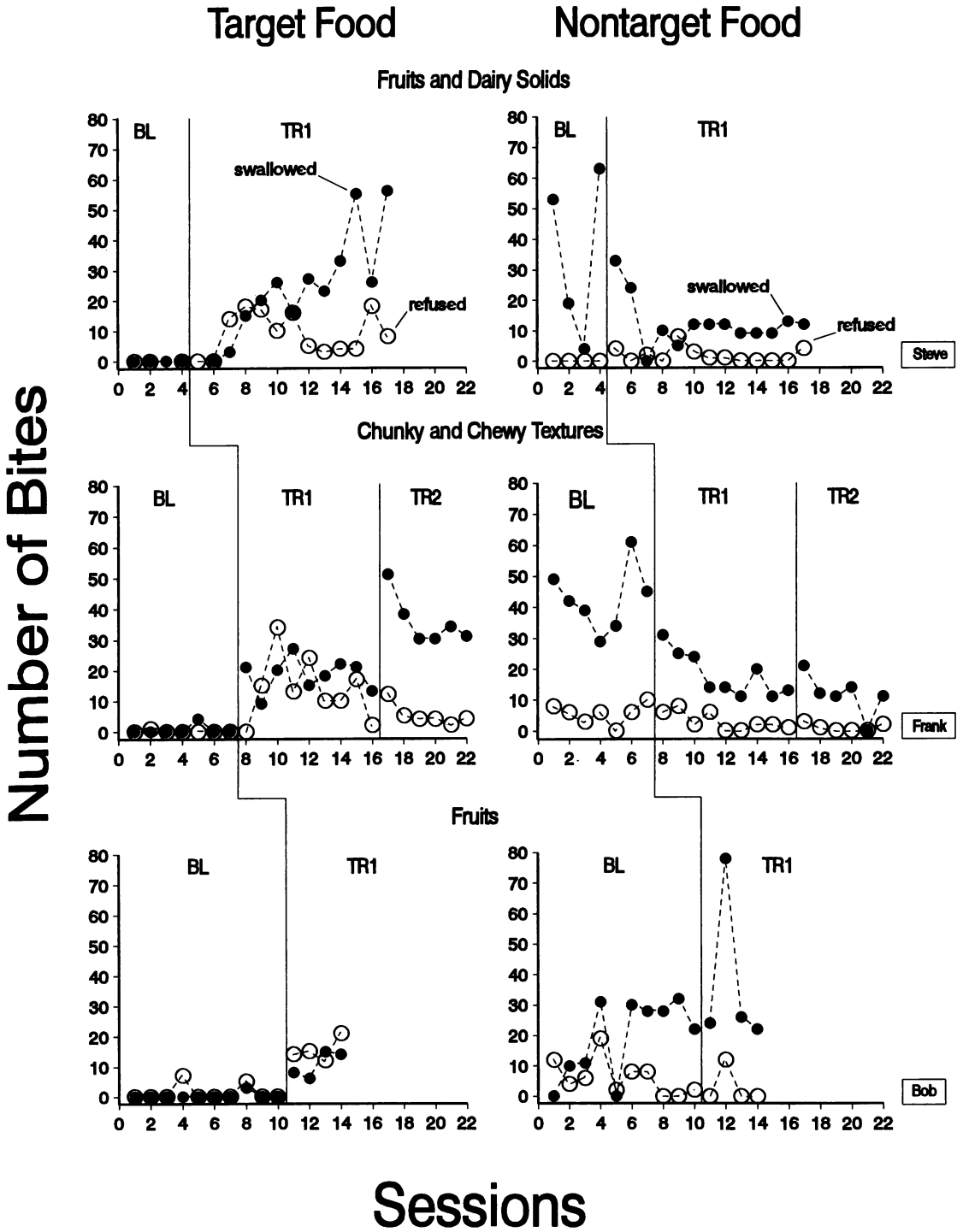

Fruits

Number of Bites

Sessions

Figure 2.   Number of bites swallowed and refused for target food (left column) and nontarget food (right column) across sessions for individual mother–child dyads. BL = baseline, TR1 = training on food variety or texture, TR2 = training on self-eating.
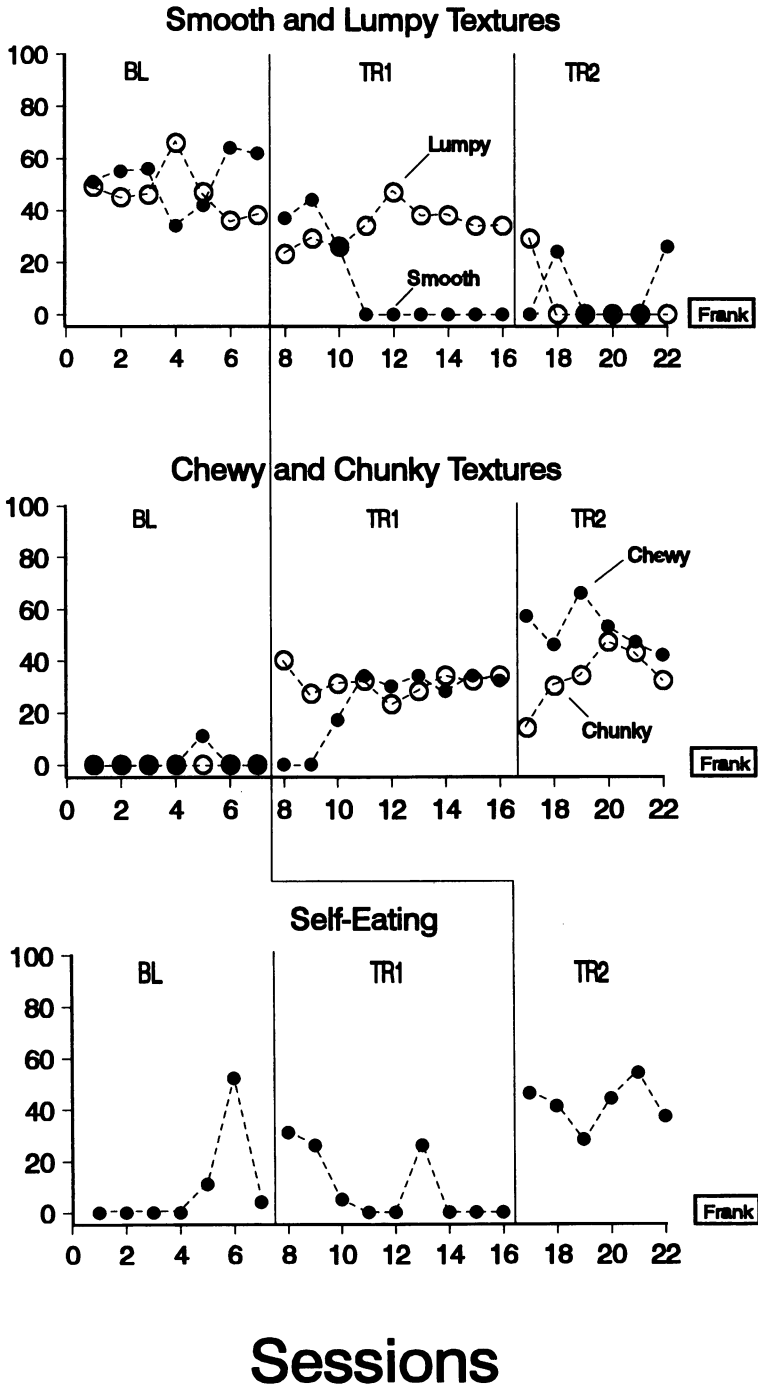
Figure 3. Percentage of Frank's intake of four texture categories and self-eating of total bites accepted across sessions. The top graph displays the proportion of smooth and lumpy textures; the middle graph displays the proportion of chewy and chunky textures; and the bottom graph shows the percentage of self-eating of total bites eaten. BL = baseline, TR1 = training on food variety or texture, TR2 = training on self-eating.

of his total food intake in baseline. When parent training was directed at increasing intake of other textures, Frank began to eat chunky foods, such as yogurt with pieces of fruit, and chewy foods, such as cheese or crackers, and he decreased his intake of smooth items. During the second training component, when self-eating was specifically targeted, Frank's intake of smooth and lumpy textures decreased further to 8% and 5%, respectively, and chunky and chewy textures increased to account for 33% and 52%, respectively, of his intake. The bottom graph shows that Frank rarely fed himself during baseline or the initial training condition on texture acceptance, averaging only 10% self-eating of total bites. The second training component, directed specifically at more independent feeding, appeared to produce a substantial increase in Frank's self-eating to 42% of total bites.

DISCUSSION

The present study showed that home-based behavioral parent training resulted in systematic changes in maternal behaviors and concomitant improvements in target eating responses for 3 young children with chronic food refusal. The findings add to research knowledge on behavioral feeding treatment in two respects. First, by using a controlled single-subject design and formal observation procedures, the present study extends previous studies (e.g., Bernal, 1972; Siegel, 1982) of parents' effectiveness as primary treatment agents for children with feeding disorders. All mothers initiated regular offerings of previously rejected foods and increased their use of specific prompts, and 2 mothers increased their levels of positive attention. In turn, the children's acceptance of target foods increased, as did more independent eating in the subject for whom it was targeted. These findings demonstrate the functional role of parent training in children's feeding improvements.

Second, this study extends the literature by formally documenting mealtime interactions in the home in conjunction with behavioral treatment of

food refusal. Whereas previous observational analogues of feeding have been conducted in clinic or hospital settings (Custer et al., 1988; Sanders, Patel, Le Grice, & Shepherd, 1993; Thompson et al., 1977), the current research examined parent–child interactions in the natural mealtime environment. Systematic home observational data provide a more direct measure of parent training effects than do records of the child's weight or parent reports of food intake. The results verify that parent training in fact produced changes in home feeding interactions, thus confirming anecdotal reports of home-based impact in other studies.

The home observations also suggest potential maintaining factors in feeding disorders that bear further systematic study. For example, during baseline, Frank's mother maintained control of the feeding situation by physically restricting his access to food, spoon-feeding Frank despite his ability to self-feed, and using books or toys as distractors. During treatment, the mother was taught to give Frank control of some food items, to use the recreational activities in a contingent fashion, and progressively fade her use of the activities. Observation of Bob's meals showed that his mother often offered him other food items during a meal if he refused the initial menu she presented. Also, her reports revealed that Bob was offered meals or snacks an average of eight times per day, too frequently for him to regularly experience hunger. If treatment had continued, training for Bob's mother would have been directed at presenting only one set of foods per meal and decreasing the daily number of meals and snacks to promote hunger. These informal observations suggest that home-based assessment may provide clues about variables that maintain feeding disorders. A direction for future research is to determine the extent to which naturalistic observation adds to the information available from standard clinical sources (e.g., parent interviews, parent records, clinic observations, and medical records).

In addition to the findings regarding home-based treatment, this study documents temporary increases in children's food refusal following initi-

ation of behavioral treatment. All 3 children showed increases in both refusals and acceptances of target foods for the first few sessions of intervention; however, refusals declined notably after five to seven sessions for both children who remained in treatment long enough to examine the trend. This pattern has been described informally in clinical reports, but rarely has it been demonstrated in formal mealtime observations.

Although the findings indicate that parent training was functionally related to changes in the children's feeding behavior, the active ingredients of treatment cannot be determined from this study. Parents were trained to institute regular offerings of previously rejected foods and to apply various contingent attention techniques as part of the intervention. It is possible that the mere introduction of target foods on a repeated schedule would be sufficient to increase children's acceptance of these foods, without the need for contingent attention procedures. Considering the lengthy (i.e., 15 to 50 months) history of food selectivity reported for these children, the parents' reports of negative interactions associated with nonpreferred foods, and the difficulties of modifying feeding problems cited in applied research (cf. Iwata et al., 1982; Linscheid, 1992; Linscheid & Rasnake, 1985), this explanation seems unlikely. Nevertheless, the possibility merits future investigation, perhaps in a controlled setting (such as a school or inpatient facility) in which target foods could be introduced systematically to evaluate child responses while feeder behaviors remain constant. Birch and her colleagues have investigated the impact of repeated exposure on food preferences of normal preschoolers. Their research showed that children were significantly more receptive to the novel foods after approximately 10 or more exposures (Birch & Marlin, 1982). They found that children must actually taste the new foods, rather than simply see or smell the foods, in order for their preferences to be affected (Birch, 1990). It is important to examine the generality of these findings to children with a history of chronic food refusal.

Our study has several limitations, including a small number of subjects, absence of follow-up data, and the fact that 1 mother dropped out of

treatment prematurely. The dropout may have been related to the lengthy baseline period (10 sessions), limited effectiveness of the intervention procedures on child feeding behavior in initial treatment sessions, concerns about the social acceptability of treatment, or unrelated family and child-care pressures. These and other possibilities merit examination in future research. Although the findings suggest that parent training is a viable approach for treating food refusal, we noted anecdotally that conducting training in the home was difficult on some occasions, given parents' simultaneous responsibilities for child care. In addition, some authors (e.g., Hatcher, 1979; Macht, 1990) have recommended that intervention be carried out, at least initially, by trained feeding specialists with whom the child has no history of aversive feeding interactions. On the other hand, parent training in the natural environment may offer a greater likelihood of generalized change. Clearly, subsequent research is needed to investigate further the relative merits of different treatment locales, agents, and strategies for selective food refusal.

Despite the shortcomings and unanswered questions raised by this research, the findings extend the existing literature by demonstrating the functional impact of parent training on mother–child feeding interactions in the home. Feeding is an integral part of everyday family interactions, and this research suggests that examination of feeding in the home highlights relevant aspects for planning and evaluating treatment. Systematic observation of feeding in the natural environment constitutes an important avenue for enhancing our understanding of feeding disorders and their amelioration.

REFERENCES

Baer, D. M., Wolf, M. M., & Risley, T. R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis, 1*, 91–97.

Barlow, D. H., & Hersen, M. (1988). *Single case experimental designs* (2nd ed.). New York: Pergamon.

Bernal, M. E. (1972). Behavioral treatment of a child's eating problem. *Journal of Behaviour Therapy and Experimental Psychiatry, 3*, 43–50.

Birch, L. L. (1990). The control of food intake by young children: The role of learning. In E. D. Capaldi & T. L. Powley (Eds.), *Taste, experience, and feeding* (pp. 116–

135). Washington, DC: American Psychological Association.

Birch, L. L., & Marlin, D. W. (1982). I don't like it; I never tried it: Effects of exposure on two-year-old children's food preferences. *Appetite, 3,* 353–360.

Bithoney, W. G., & Dubowitz, H. (1985). Organic concomitants of nonorganic failure to thrive: Implications for research. In D. Drotar (Ed.), *New directions in failure to thrive: Implications for research and practice* (pp. 47–68). New York: Plenum.

Chatoor, I., Dickson, L., Schaefer, S., & Egan, J. (1985). A developmental classification of feeding disorders associated with failure to thrive: Diagnosis and treatment. In D. Drotar (Ed.), *New directions in failure to thrive: Implications for research and practice* (pp. 235–258). New York: Plenum.

Christophersen, E. R., & Hall, C. L. (1978). Eating patterns and associated problems encountered in normal children. *Issues in Comprehensive Pediatric Nursing, 3,* 1–16.

Custer, D. A., Page, T. J., Mailman, J. E., Iwata, B. A., & Midkiff, R. M. (1988, May). *Treating pediatric feeding disorders: A competency-based parent training program.* Paper presented at the annual meeting of the Association for Behavior Analysis, Philadelphia.

Ginsberg, A. J. (1988). Feeding disorders in the developmentally disabled population. In D. E. Russo & J. H. Kedesdy (Eds.), *Behavioral medicine with the developmentally disabled* (pp. 21–41). New York: Plenum.

Handen, B. L., Mandell, F., & Russo, D. C. (1986). Feeding induction in children who refuse to eat. *American Journal of Diseases of Childhood, 140,* 52–54.

Hatcher, R. P. (1979). Treatment of food refusal in a two-year-old child. *Journal of Behaviour Therapy and Experimental Psychiatry, 10,* 363–367.

Howard, R. B., & Winter, H. S. (1984). *Nutrition and feeding of infants and toddlers.* Boston: Little, Brown.

Illingworth, R. S., & Lister, J. (1964). The critical or sensitive period, with special reference to certain feeding problems in infants and children. *Journal of Pediatrics, 65,* 839–848.

Ives, C. C., Harris, S. L., & Wolchik, S. A. (1978). Food refusal in an autistic type child treated by a multi-component forced feeding procedure. *Journal of Behaviour Therapy and Experimental Psychiatry, 9,* 61–64.

Iwata, B. A., Riordan, M. M., Wohl, M. K., & Finney, J. W. (1982). Pediatric feeding disorders: Behavioral analysis and treatment. In P. J. Accardo (Ed.), *Failure to thrive in infancy and early childhood: A multidisciplinary team approach* (pp. 297–329). Baltimore: University Park Press.

Lewis, J. A. (1982). Oral motor assessment and treatment of feeding difficulties. In P. J. Accardo (Ed.), *Failure to thrive in infancy and early childhood: A multidisciplinary team approach* (pp. 265–295). Baltimore: University Park Press.

Linscheid, T. R. (1992). Eating problems in children. In C. E. Walker & M. C. Roberts (Eds.), *Handbook of clinical child psychology* (2nd ed., pp. 451–473). New York: Wiley.

Linscheid, T. R., & Rasnake, L. K. (1985). Behavioral approaches to the treatment of failure to thrive. In D. Drotar (Ed.), *New directions in failure to thrive: Implications for research and practice* (pp. 279–294). New York: Plenum.

Linscheid, T. R., Tarnowski, K. J., Rasnake, L. K., & Brams, J. S. (1987). Behavioral treatment of food refusal in a child with short-gut syndrome. *Journal of Pediatric Psychology, 12,* 451–459.

Macht, J. (1990). *Poor eaters: Helping children who refuse to eat.* New York: Plenum.

Mathisen, B., Skuse, D., Wolke, D., & Reilly, S. (1989). Oral-motor dysfunction and failure to thrive among inner-city infants. *Developmental Medicine and Child Neurology, 31,* 293–302.

Palmer, S., & Horn, S. (1978). Feeding problems in children. In S. Palmer & S. Ekvall (Eds.), *Pediatric nutrition in developmental disorders* (pp. 107–129). Springfield, IL: Charles C Thomas.

Palmer, S., Thompson, R. J., & Linscheid, T. R. (1975). Applied behavior analysis in the treatment of childhood feeding problems. *Developmental Medicine and Child Neurology, 17,* 333–339.

Pipes, P. L. (1989). *Nutrition in infancy and childhood* (4th ed.). St. Louis: Mosby.

Riordan, M. M., Iwata, B. A., Finney, J. W., Wohl, M. K., & Stanley, A. E. (1984). Behavioral assessment and treatment of chronic food refusal in handicapped children. *Journal of Applied Behavior Analysis, 17,* 327–341.

Sanders, M. R., Patel, R. K., Le Grice, B., & Shepherd, R. W. (1993). Children with persistent feeding difficulties: An observational analysis of the feeding interactions of problem and non-problem eaters. *Health Psychology, 12,* 64–73.

Siegel, L. J. (1982). Classical and operant procedures in the treatment of a case of food aversion in a young child. *Journal of Clinical Child Psychology, 11,* 167–172.

Stokes, T. F., & Baer, D. M. (1977). An implicit technology of generalization. *Journal of Applied Behavior Analysis, 10,* 349–367.

Thompson, R. J., Palmer, S., & Linscheid, T. R. (1977). Single-subject design and interaction analysis in the behavioral treatment of a child with a feeding problem. *Child Psychiatry and Human Development, 8,* 43–53.

Williamson, D. A., Kelley, M. L., Cavell, T. A., & Prather, R. C. (1987). Eating and elimination disorders. In C. L. Frame & J. L. Matson (Eds.), *Handbook of assessment in childhood psychopathology: Applied issues in differential diagnosis and treatment evaluation* (pp. 461–487). New York: Plenum.