JOURNAL OF APPLIED BEHAVIOR ANALYSIS 2001, **34,** 357–360 NUMBER 3 (FALL 2001)

USING A FADING PROCEDURE TO INCREASE FLUID CONSUMPTION IN A CHILD WITH FEEDING PROBLEMS

MEETA R. PATEL AND CATHLEEN C. PIAZZA

THE MARCUS AND KENNEDY KRIEGER INSTITUTES AND
JOHNS HOPKINS UNIVERSITY SCHOOL OF MEDICINE

AND

MARKELL L. KELLY, CORRINE A. OCHSNER, AND CHRISTINE M. SANTANA

THE MARCUS INSTITUTE

Stimulus fading was combined with differential reinforcement and extinction to increase intake of a calorie-dense fluid by a 6-year-old child with feeding problems. The fading procedure consisted of adding Carnation Instant Breakfast™ and then milk to water (a fluid the child would drink).

DESCRIPTORS: fading, food refusal, food selectivity, pervasive developmental disorder

A feeding disorder is characterized by insufficient intake of solids or fluids (Kirkland, 1994). Even though fluid refusal may be a component of a feeding disorder, little is known about the prevalence of fluid refusal and even less is known about methods to treat the problem. Failure to consume sufficient fluids poses a significant health risk in the form of vomiting, diarrhea, shock, and even death (Kirkland). In addition, fluids are a potential source of calories, which may be important if fluid refusal occurs in conjunction with food refusal (low caloric intake). Therefore, we evaluated the effects of stimulus fading combined with differential reinforcement and extinction to increase consumption of a calorie-dense fluid (milk with Carnation Instant Breakfast™; hereafter, CIB).

METHOD

Ray was a 6-year-old boy who had been diagnosed with pervasive developmental disorder and had been admitted to an outpatient pediatric feeding disorders program for assessment and treatment of food and fluid refusal. His medical history included failure to thrive and gastrostomy (G-) tube dependence. Prior to his admission, Ray was receiving all of his nutritional needs via G-tube. During admission, Ray received his tube feedings in the evening. Treatment for solid foods resulted in an increase in calorie intake; however, tube feedings could not be discontinued because his total calorie and fluid needs were not being met. Ray drank small amounts of water from a cup but refused other fluids. The goal was to teach Ray to drink milk with CIB to increase his caloric and fluid intake such that tube feedings could be discontinued.

All sessions were conducted in a room with a one-way mirror. A high chair, cup, and toys were present during all sessions. The dependent variable was mouth clean (no visible liquid in Ray's mouth 30 s after acceptance). Data on mouth clean were collected on laptop computers using an event-recording procedure and were converted to a percentage by dividing the number of oc-

Address correspondence to Cathleen C. Piazza, The Marcus Institute, 1605 Chantilly Dr., Atlanta, Georgia 30324-3268 (E-mail: Cathleen.Piazza@Marcus.org).

currences of mouth clean by the number of drinks accepted (any liquid entering the mouth following presentation) multiplied by 100%. Ray accepted all drinks presented. A second observer independently coded 25% of the sessions, and mean total interobserver agreement was 91% (range, 71% to 100%).

Prior to this assessment, differential reinforcement for alternative behavior (DRA) (mouth clean) and escape extinction (physical prompting; Ahearn, Kerwin, Eicher, Shantz, & Swearingin, 1996) were implemented during 11 sessions using milk with CIB and 42 sessions alternating between chocolate and vanilla Pediasure™. Mouth clean occurred 0% of the time. We continued DRA and escape extinction throughout the fading assessment. Drinks (3.75 ml) were presented approximately 30 s from the initial acceptance, using the concentrations of water, CIB, or milk described below. Sequential verbal ("take a drink"), gestural (drinking was modeled), and physical (hand-over-hand guidance) prompts were used to prompt Ray to drink. If Ray refused to drink the entire bolus within 30 s of presentation, the therapist applied gentle pressure to Ray's mandibular joint and the cup remained at Ray's lips until the entire drink was consumed. If Ray consumed his drink within 30 s, he was given access to a preferred toy and praise for 20 s. The next drink was presented after the 20-s reinforcement interval. However, if he did not consume the entire bolus within 30 s, the next drink was presented immediately after the previous drink had been consumed. Sessions lasted 5 min or until Ray finished the last drink presented when time elapsed. Ray was presented with a mean of eight drink trials per session. Twelve sessions were conducted each day. If Ray expelled any portion of the drink, it was re-presented.

A reversal design was used to evaluate the water-to-milk fading procedure. Fading was accomplished by (a) establishing consistent consumption of water, (b) gradually increasing the concentration of CIB in water, and (c) gradually increasing the concentration of milk in the water with the CIB mixture.

In baseline, milk (240 ml) with CIB (one packet) and water (240 ml) with CIB (one packet) were presented to Ray. The purpose of baseline was to demonstrate that Ray would not drink either milk or water with CIB. Following baseline, sessions were conducted with water only to demonstrate that Ray would drink water. CIB-water and milk-CIB sessions (identical to baseline) were conducted after each fading step was completed.

Fading with CIB and water involved increasing the percentage of the packet of CIB added to 240 ml of water (e.g., 20% refers to 20% of the CIB packet). CIB was increased initially in 5% and then 10% increments following three consecutive sessions of 80% mouth clean or above. If mouth clean decreased below 80% for three consecutive sessions, CIB was decreased to the previous amount. In the milk-CIB fading procedure, milk was added in 10% increments to the water (240 ml) plus CIB (one packet). For example, 20% refers to 20% milk and 80% water plus CIB (one packet). The criterion for fading milk was identical to the CIB-water procedure. Fading continued for the CIB-water or milk-CIB until (a) the final goal (100% CIB-water or 100% milk-CIB) was reached or (b) occurrences of mouth clean during the reversal sessions were greater than 80%. If mouth clean occurred at or above 80% during the reversal session, fading steps were terminated and the CIB-water or milk-CIB sessions were conducted at the 100% concentration.

Ray's mother was introduced to the session following training (procedures available upon request) after he met criterion at 30% milk due to his impending discharge. A therapist was reintroduced to the session because mouth clean decreased to 0%. Once

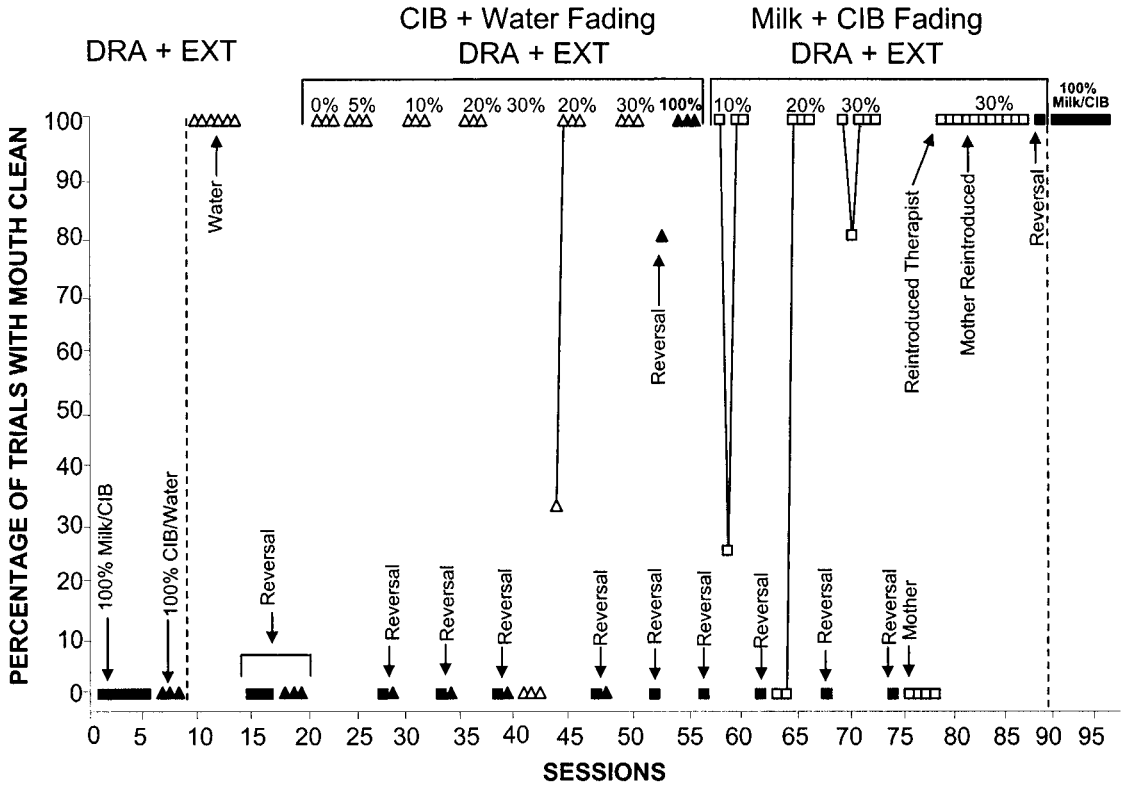

Figure 1. Percentage of trials with mouth clean. CIB = Carnation Instant Breakfast; DRA+EXT = differential reinforcement for mouth clean and escape extinction.

mouth clean increased to 100%, Ray's mother was introduced into sessions according to the following steps: (a) mother in the room with the therapist, (b) mother conducting sessions with the therapist present, and (c) mother conducting the sessions alone.

RESULTS AND DISCUSSION

The data from the fading procedure are displayed in Figure 1. In baseline, occurrences of mouth clean were 0% for milk-CIB and CIB-water. Mouth clean was 100% for water alone. Occurrences of mouth clean during the reversals to both CIB-water and milk-CIB remained at 0% until Ray reached criterion for 30% CIB-water. Mouth clean increased to 80% for the 100% CIB-water reversal session; therefore, we continued with 100% CIB-water and then began fading in the milk. Mouth clean during the milk-CIB reversal sessions was 0% until Ray reached criterion at 30% milk, when mouth clean increased to 100% in the 100% milk-CIB reversal session and remained at 100% with 100% milk-CIB.

Freeman and Piazza (1998) used a stimulus fading procedure to increase the amount and type of food consumed by a 6-year-old girl. However, fading has not been applied to fluid refusal. In the present study, it was necessary to increase intake of calorie-dense fluids so that eventually G-tube feedings could be eliminated. Although drinking water is beneficial for hydration purposes, it does not provide the much-needed caloric benefit of milk with CIB, which has 280 calories per 240 ml of whole milk. Therefore, we gradually changed the characteristics

of water by introducing small quantities of CIB followed by small quantities of milk. Ray was receiving 100% of his caloric requirements (1,188 kcal) by mouth at discharge.

The study is limited because experimental control was not demonstrated unequivocally for the fading procedure. Nevertheless, each time a reversal was conducted, the percentage of mouth clean decreased to zero in both the CIB-water and milk-CIB conditions until the fading procedure reached 30% in the CIB-water condition. At that point, mouth clean increased dramatically in the 100% CIB-water condition but not in the 100% milk-CIB condition. In addition, the percentage of mouth clean remained at zero in the 100% milk-CIB condition until the fading procedure reached 30% in the milk-CIB condition. The consistency of these results suggests that the effects of fading generalized within conditions (from 30% CIB-water to 100% CIB-water and from 30% milk-CIB to 100% milk-CIB) but not across conditions (from 30% CIB-water to 100% milk-CIB). If the changes in the percentage of mouth clean for the 100% solutions were due to repeated exposure to the DRA plus extinction (DRA+EXT) components of the treatment package, then changes in both the CIB-water and milk-CIB conditions should have occurred at approximately the same time, which did not occur. It would be highly unusual for the effects of DRA+EXT (without fading) to produce immediate improvement, with almost no learning curve, in each condition at these specific times. Finally, the participant was exposed to DRA+EXT during 11 sessions with milk-CIB and 42 sessions with Pediasure™ prior to fading, and mouth clean remained at 0%. Taken together, these results are highly consistent with (but do not prove) the supposition that fading, when superimposed on DRA+EXT, resulted in large increases in occurrences of mouth clean. However, it is not possible to determine from these data whether fading without DRA+EXT would have produced similar results, and this question should be the focus of future research.

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Received November 20, 2000
Final acceptance June 3, 2001
Action Editor, Linda Cooper-Brown