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USING REINFORCEMENT AND CUEING TO INCREASE HEALTHY SNACK FOOD CHOICES IN PRESCHOOLERS

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We examined the effects of behavioral procedures to modify the food choices of preschoolers during a snack period at school (training setting) and at home (generalization setting). In the first experiment, we evaluated the usefulness of nutrition training and a generalization programming strategy of cueing to improve healthy snacking; in the second experiment we investigated the effect of nutrition training alone. In addition, three cases are presented that illustrate individualized procedures to facilitate generalization of healthy snacking to home. Results indicated that children's healthy snack choices increased in the preschool training setting, that generalization to home was achieved only when procedures to program it were implemented, and that the best results were found when the generalization procedures were tailored to the individual child.

DESCRIPTORS: healthy snacking, nutrition training, cueing, generalization

Heart disease risk factors have been associated with diets that are high in fat, salt, and sugar (Dahl, Silver, & Christie, 1958; McGill & Mott, 1976; Report of the Task Force on Blood Pressure Control, 1977). These eating patterns often develop during childhood (Frank, Voors, Schilling, & Berenson, 1977); children and adolescents share the same dietary characteristics as adults in the United States (Coates, Perry, Killen, & Slinkard, 1981), in which 40% of the daily calories are obtained from saturated fats (Frank et al., 1977; Fryer, Lamkin, & Vivian, 1971). In addition, the typical dietary cholesterol level far exceeds the 300 mg per day recommendation of the American Heart Association (Frank et al., 1977; Fryer et al., 1971). Therefore, intervention during childhood may be important for reducing the development of atherosclerosis even in children who are not identified as at risk (American Heart Association, 1980; Frank et al., 1977; Nutrition Committee of the Canadian Pediatric Society, 1981).

Most of the literature on eating behavior has evaluated dietary changes for reducing obesity, and few studies have addressed the prevention of heart disease risk factors by changing the nutritional food choices of young children. A notable exception is the Heart Health Program (Coates, Jeffrey, & Slinkard, 1981), which used twelve 45-min lectures, intermittent reinforcement, and parent education about the program to increase fourth and fifth grade students' consumption of complex carbohydrates and decrease their consumption of saturated fat, cholesterol, sodium, and sugar during lunch at school and meals at home. Change was measured for food brought into the training setting by the subjects, and generalization to the home

This article is based on the first author's master's thesis (Experiment 1) and dissertation (Experiment 2) submitted to West Virginia University. Portions of these data were presented at the meeting of the Association for Advancement of Behavior Therapy, November 1981, and the Society of Behavioral Medicine, May 1984.

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was assessed via retrospective parental report. Training was extensive, involving several class periods and parent and teacher involvement.

Given the paucity of research in this area, our study was designed to investigate the effects of a behavioral program to modify young children's food choices during a preschool snack period and to assess the effects of the program outside the training setting, in the home. In the first experiment, we evaluated the usefulness of a behavioral package consisting of nutrition training based on the Epstein, Masek, and Marshall (1978) food coding system, and cueing, a generalization promoting strategy whereby the child asks a significant other person to evaluate a particular behavior and functions as a prompt for positive consequences (Stokes & Osnes, 1986). The second experiment focused on the effectiveness of nutrition training alone. Emphasis was placed on streamlining training time and parental involvement. Attention was given to producing an increase in healthy eating behavior in the training situation, evaluating the length of time training efforts were maintained after the procedure was stopped, and evaluating the generalization of the training effects to the home environment.

EXPERIMENT 1

Method

Subjects

Subjects were eight children (five females, three males) ages 3 years 3 months to 6 years, with a mean age 4 years 4 months, enrolled in a morning preschool class in Morgantown, West Virginia. None of the children were assessed for obesity or risk factors for cardiovascular disease. There were two sibling pairs (Karen and Barry, Rob and John), and one child (Nancy) was developmentally delayed with motor and speech problems.

Setting

All snack food choices were recorded each weekday during the preschool's 15-min snack period. In addition, all parents were requested to allow home observations 5 days per week. The parents of four children (Sharon, Rob, John, and Nancy) agreed. Three assistants conducted 5- to 10-min home observations during afternoon times convenient to the parents. None of the home observers worked in the preschool nor were they aware of the experimental conditions.

Snack Foods

Four categories of snack foods were used: cookies, chips, fruits, and vegetables. They were chosen because they are commonly eaten snacks (cookies and chips) or are healthy alternatives (fruits and vegetables). Each category contained a variety of five snack foods in each (Table 1). Children were taught to use the Epstein et al. (1978) food coding system by labeling cookies and chips as "red foods—don't eat" and fruits and vegetables as "green foods—good to eat."

Dependent Measures

Food assessment. One food was randomly selected for presentation each day from each of the major food categories. Thus, the children were offered two green and two red foods and asked to choose one as a snack. The same foods were never offered on consecutive days.

Cueing. A cue was defined as any statement made by the children to evoke praise or positive comment from the snack leader, regardless of whether it was one of the sentences taught or whether the snack leader responded. Three cueing sentences were taught: "This is a snack that's good for me, isn't it?"; "I picked a good snack, didn't I?"; and "I know how to pick healthy snacks, don't I?" All of the children were able to learn to use these sentences or to paraphrase a close approximation.

Home assessment. No training was given to the parents to influence their child's food choice. They were asked to offer their child a choice between two snack foods, one green and one red, which were randomly chosen and brought into the home by the observer. To minimize the intrusiveness of the direct observation and tape recorder, the parent set up the snack foods in the child's absence and the observer remained in the background during

the snack choice. Cueing and the parent's response to the child's choice and/or cue were recorded verbatim. The parent's response was scored as a praise statement if it contained any of the following or similar phrases: "I'm proud of you," "That's terrific," or "Good boy/girl." Siblings' food choices were assessed independently without observation by the other.

Reliability

Interobserver reliability was assessed on 20% of each child's data in each setting and was calculated by dividing the number of agreements by agreements plus disagreements and multiplying by 100 for all measures. In the preschool, the snack leader collected the data, and the snack-time interaction at each table was recorded on an audiotape recorder. On one randomly chosen day each week, the data were scored independently by a person other than the snack leader. Reliability for food choice and use of a cueing sentence was 100%. An audiotape recorder and live observer were used to gather data in the children's homes. On randomly chosen days, the audiotape was independently scored by a person other than the home observer. Reliability for food choice, use of cueing sentence, and parental praise was 100%, 100%, and 95%, respectively.

Procedures

Baseline. This phase was designed to assess the children's preintervention preferences for the various snack foods. The children were shown photographs (3 in. × 5 in.) of the snacks to be offered that day and were asked which they would choose as a snack. This was done to familiarize the children with the foods and to make baseline and training procedures comparable. The children were then shown the actual foods, asked to choose their snacks, and given their chosen foods to eat.

Each child knew the names of the snacks being offered. A different child was the first to pick his or her snack each day. Neither the snack choices nor food in general was discussed during snack time. When the first intervention group began nutrition and cueing training (Day 12), stickers were introduced to the other children contingent on appropriate sitting, answering questions, etc., and not on food choices. This controlled for the possibility of change in snack food choices due to the introduction of stickers.

Table 1
Snack Foods and Serving Size

Green foods	
Fruits	**Vegetables**
¼ of apple	¼ of carrot
½ of banana	½ of celery
¼ of orange	¼ inch of cucumber
¼ of pear	1 cherry tomato
4 European grapes	1 stalk broccoli
Red foods	
Chips	**Cookies**
4 cheese puffs	1 chocolate chip
4 tortilla chips	1 peanut butter
4 corn chips	1 chocolate graham cracker
4 potato chips	1 butter cookie
4 pretzels	1 pecan sandy

Nutrition training. This phase was designed to assess the effects of nutrition training, praise, and the contingent awarding of a variety of colorful adhesive stickers on children's snack choice. The stickers were those commonly found in card shops and depicted rainbows, hearts, cars, children, etc. In addition, the children were taught the three cueing sentences. As in baseline, the children were shown pictures of the available foods for the day and asked which they would pick for snacks. Immediately after making a choice, a child received nutritional feedback in the presence of the other children.

The nutritional feedback was based on the color-coding system devised by Epstein et al. (1978). For example, the snack leader responded to red food choices by saying "You picked a cookie, that's a red food. Red foods aren't as good for you as green foods. The pear and carrot are green foods." The children were then given a second opportunity to choose from the pictures. Praise was given to children following green food choices. Next, the actual foods were placed on the table and the chil-

dren were asked individually which food they would like for a snack. If a child chose a green food, the snack leader immediately praised the child and gave the chosen food and a sticker. Red food choices were followed by minimal acknowledgment (i.e., "OK") and the chosen snack food. While the children ate their snacks, the snack leader again discussed which food was a red food and which was a green food using the pictures.

The language and motor delayed subject (Nancy) required extra training outside of the snack time to acquire the red-green concept. The training began on Day 28, the third day after the introduction of the training phase at her snack table. The extra training was needed because Nancy did not discriminate red foods from green foods. This additional training was conducted for 10 min on 2 consecutive days immediately before snack time.

The cueing sentences were introduced on the third day of nutrition training. The three cueing sentences were taught individually over 3 days. On the first day of cueing training the snack leader waited until all the children had received their snacks and then instructed them to use one of the cueing sentences if they had chosen a green food. During this phase, the children were given their snacks and received praise for choosing a green food; if the children who had chosen a green food had not cued, they were prompted to do so and were given a sticker. Only unprompted cueing was recorded.

Contingent cueing. Stickers were made contingent on choosing a green food and spontaneously saying a cueing sentence. If a child spontaneously cued after choosing a green food, praise and a sticker were given. If a child did not cue after choosing a green food, praise was provided, but not stickers, and the snack leader explained that a cueing sentence must be said in order to get a sticker.

At this time, the children were also instructed to cue at home when they chose a green food; cueing sentences were reviewed and the children rehearsed what they were to do at home. The child's food selection at home was not discussed during snack time.

Contingent home training. If the children being observed at home did not cue after being instructed to do so, additional procedures were introduced. The children were able to earn a second sticker at school if they cued at home. As the children arrived at school each morning they were taken aside by a snack leader who had prior knowledge of their snack choices and cueing behavior at home. The leader asked each child about his or her snack choice and cueing on the preceding day and rewarded accurate reports of choosing green foods and cueing with praise and stickers.

Maintenance. Maintenance was assessed following the removal of the training procedures. This phase was identical to baseline, but was limited to 9 days because of the closing of the preschool for summer vacation. Nancy, the developmentally delayed child, did not participate in the maintenance phase in order to allow more training time in the contingent home training phase.

Experimental Design

A multiple baseline across subjects design was used. Nutrition training and contingent cueing were implemented sequentially across children in the preschool. Similarly, in the home setting, contingencies on cueing were sequentially implemented across children.

Results

Preschool Setting

Figure 1 depicts the children's snack food choices on the food assessment. All eight children chose green foods on 0% to 50% of the days during baseline. Each child increased his or her green food choices to 100% promptly following the introduction of nutrition training and all children continued to choose green foods throughout the study. During maintenance, Sharon, Kathy, Rob, John, and Ellen continued to choose nutritious snacks even though no nutritional instructions, feedback, or stickers were given and praise was only given in response to cueing.

The cueing data, also shown in Figure 1, indicate that none of the eight children gave any spontaneous cues during baseline. Five of the children

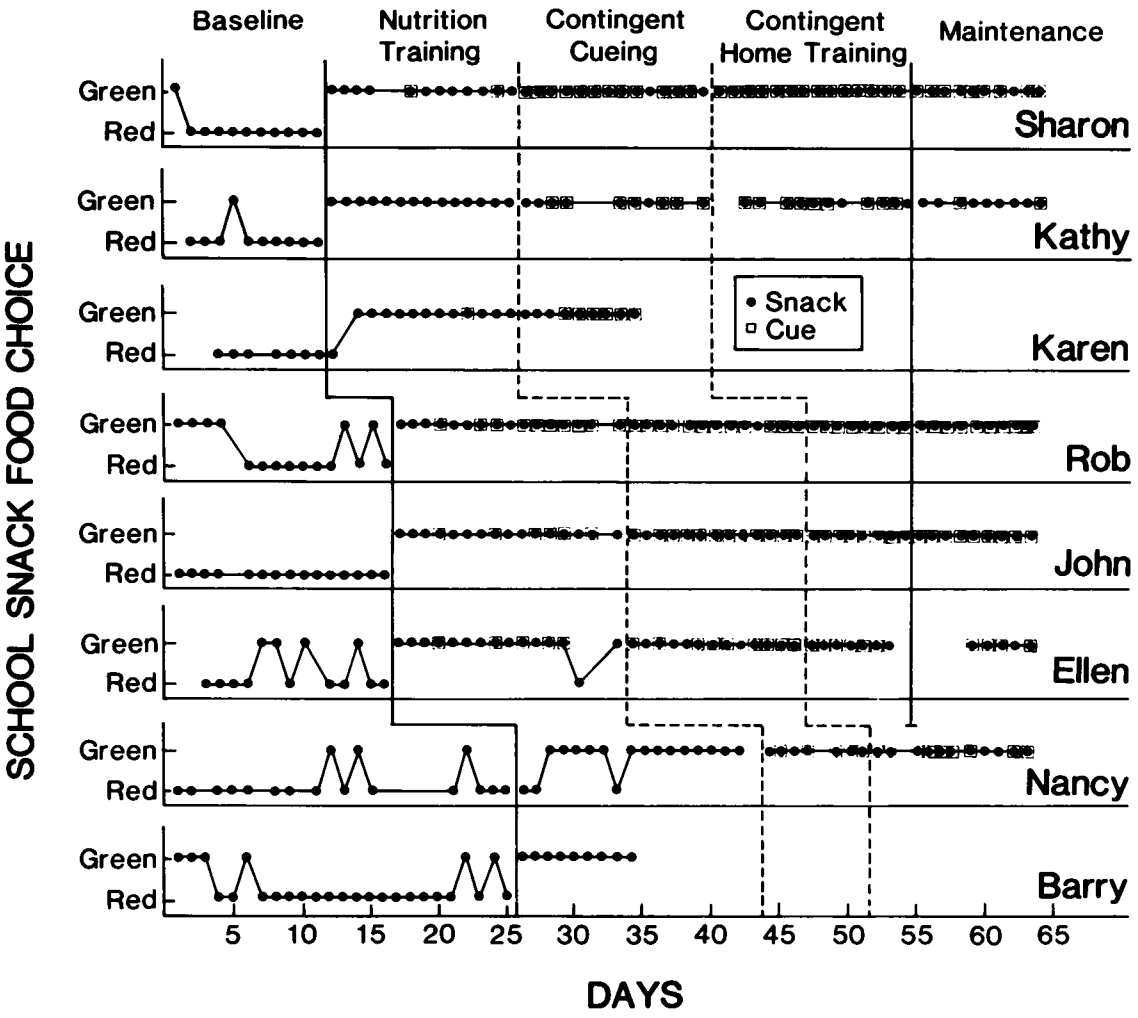

Figure 1. Snack food choices and cueing for children at the preschool across all conditions in Experiment 1.

were not consistent in using cueing spontaneously until receiving a sticker was contingent on both food choice and spontaneous cueing. Four of these five children (Sharon, Rob, John, and Ellen) continued to consistently cue during maintenance and one (Kathy) cued intermittently.

Home Observations

Data collected during home observations are presented in Figure 2. During baseline, two children (Rob and Nancy) chose green foods on 50% of the days whereas the other children (Sharon and John) never chose green foods. No cueing or parental praise occurred for any of the children during baseline. Nutrition training resulted in an increase in green food choices from 0% to 44% and 0% to 57%, respectively, by the two children (Sharon and John) who had never chosen green foods at home. There was no apparent increase in the number of green food choices of the children who had previously chosen green foods (Rob and Nancy). Sharon's mother was the only parent to praise food choices during this first phase. She correctly praised green food choices about half of the time, and never praised red food choices.

Additional increases in green food choices were observed after the introduction of contingent home training for Rob, John, and Nancy, from 50% to

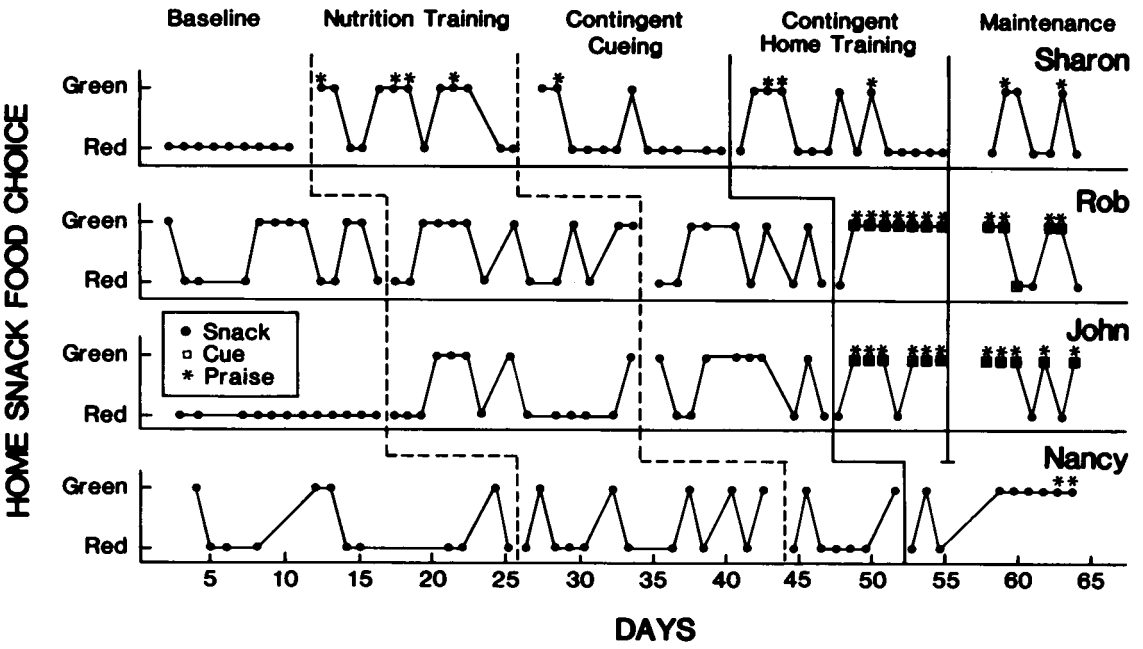

Figure 2. Snack food choices, cueing, and parental praise for the home observation children across all conditions in Experiment 1.

88%, 57% to 75%, and 50% to 78%, respectively. Further, Rob and John began using the cueing sentences at home during this phase. Although Nancy never cued, her mother began using praise after she chose a green food on 5 consecutive days. No changes were observed for Sharon. Green food choices were variable and cues were not used. Some parental praise occurred, although not consistently following every green food choice. During maintenance, Sharon, Rob, and John chose green foods on 43%, 50%, and 71% of the days, respectively. Sharon and John chose green foods at an increased rate from baseline, whereas Rob's rate was comparable to baseline. Rob and John continued to cue and receive praise in response to cueing.

EXPERIMENT 2

The results of Experiment 1 indicated that preschool children's snack choices can be modified through contingent nutrition training and cueing training, and that such procedures may promote generalization across settings and time. Experiment 2 was conducted to investigate (a) the effects of nutrition training alone on snack food choice at the preschool, (b) the effectiveness of training over a longer maintenance phase at the preschool, and (c) the generalization of nutritious snacking from school to home under these training conditions.

METHOD

Subjects

Nine children (six females and three males) enrolled in a morning class at the preschool of Carousel Services for Children and Families served as subjects. None of the subjects had participated in Experiment 1. Their ages ranged from 2 years 4 months to 5 years 8 months, with a mean age of 4 years. None of the children were assessed for obesity or risk of cardiovascular disease. There was one sibling pair (Janet and Wade) and one child (Jackie) was electively mute.

Setting and Measurement

As in Experiment 1, the snack food choices of all nine children were observed and recorded each weekday. In addition, all parents were asked to participate in home observations; parents of five of

the children (Grace, Anne, Timmy, Janet, and Wade) agreed. Home observations were arranged around the schedules of the families involved. Grace and Anne received home observations 5 days per week; Timmy, Janet, and Wade received home observations 3 days per week. Observations and data collection at school and home were conducted as described in Experiment 1. The sibling pair (Janet and Wade) was assessed independently without observation by the other.

This experiment used the same dependent measures as Experiment 1. Although cueing was never taught in Experiment 2, the children's spontaneous use of cueing was recorded verbatim by the snack leader.

Reliability

Reliability checks were performed and calculated on 20% of each child's data in both settings in the same manner as in Experiment 1. To collect reliability data on the electively mute child (Jackie), the director of the preschool randomly observed and recorded Jackie's choices. Reliability for food choices and cueing sentences was 100% for all children. Reliability of the home observation was 100% on all measures for all children.

Procedures

Baseline. Baseline was conducted as described in Experiment 1, with the exception that stickers were never delivered during this phase.

Nutrition training. This phase was conducted in the same way as the nutrition training in Experiment 1, except that cueing sentences were never taught. In addition, the children were given home assignments, similar to the contingent home training phase of Experiment 1, at the end of each school day. The preschool director would tell each child, individually, that a second sticker would be provided at school on the following day for green snack food choices at home. The child was asked to repeat the contingencies and was praised for correctly explaining them.

On each subsequent day, the preschool director, who had prior knowledge of the children's snack choices at home, took the target children aside individually and asked about their snack choices from the day before. If a child had picked a green food at home, he or she was praised and allowed to pick out a sticker, and the contingencies were reviewed. If a child had not chosen a green food at home, the director would end the interaction by explaining the contingencies to the child.

Maintenance. After the children consistently chose green foods at school, the training procedures were withdrawn. This phase was conducted as in Experiment 1.

Experimental Design

We used a multiple baseline across subjects design, which controlled for the passage of time by varying the amount of time prior to the introduction of nutrition training across subjects. Generalization across settings was assessed through the use of home observations.

Results

Preschool Setting

Figure 3 shows the children's snack food choices on the food assessment over all phases of the study. All nine children chose green foods only 5% to 17% days during baseline. Green food choices for six of the children (Grace, Deanna, Rose, Janet, Chad, and Wade) increased from 0% to 13% during baseline to 93% to 100% during nutrition training. The green food choices of the remaining three children (Anne, Timmy, and Jackie) increased from 0% to 14% during baseline to 48% to 62% during nutrition training.

After nutrition training was withdrawn, Grace continued choosing green foods for 32 days; thereafter, she began to choose red foods approximately 49% of the time. Deanna showed similar results. She continued choosing green foods for 31 days, then began to choose red foods on approximately 40% of the time. Janet, Chad, and Wade showed a similar pattern of maintenance in the return to baseline condition as that of Grace and Deanna; they each chose green foods continuously during the first 20 days of the condition, then increased their red food choices. Anne and Timmy showed less maintenance in the return to baseline condi-

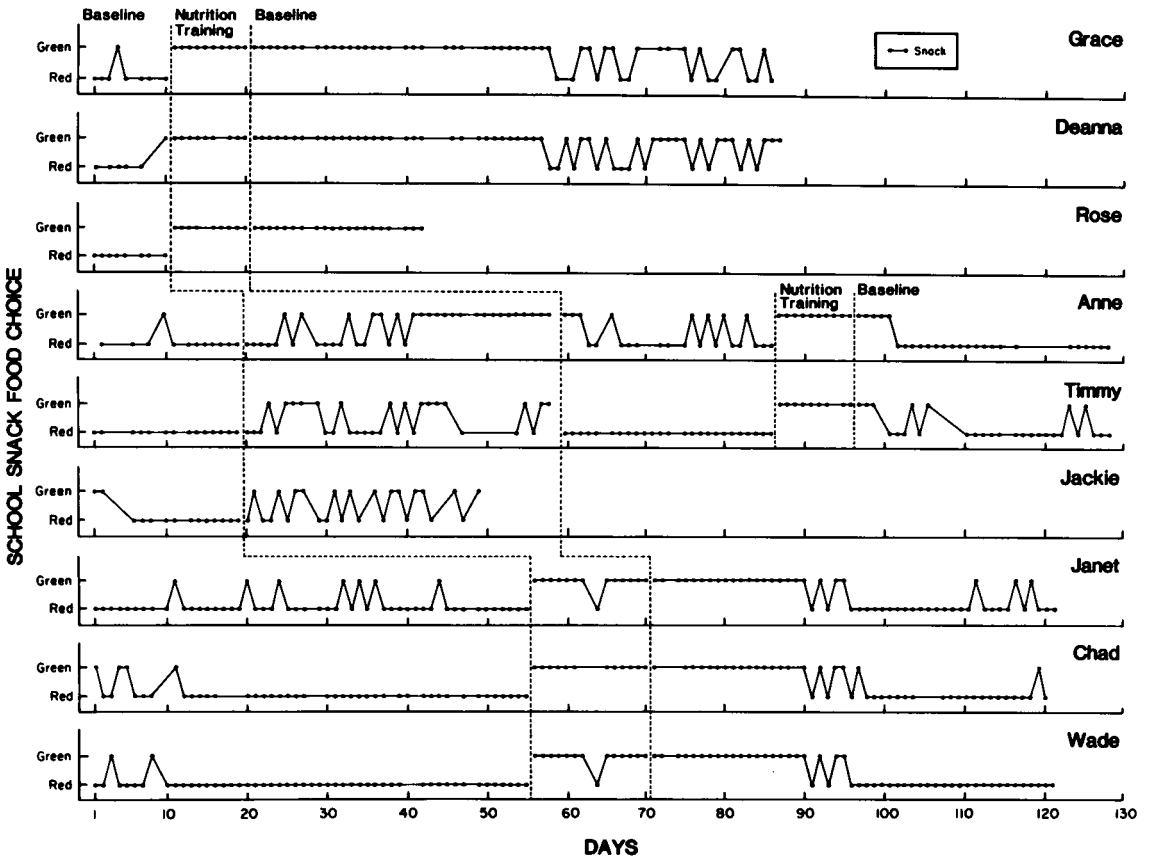

Figure 3. Snack food choices and cueing for children at the preschool across baseline and nutrition training conditions in Experiment 2.

tion. Anne began choosing red foods during the return to baseline, although she did continue to choose more green foods than during baseline (36% versus 9%). Timmy did not choose any green foods during the return to baseline. Because Anne and Timmy showed a very different pattern in their green food choices during the nutrition training condition than did the other children, nutrition training was again introduced and withdrawn. In nutrition training, they consistently chose green foods. However, green food choices decreased in the second return to baseline after 3 to 5 days. None of the children spontaneously cued at any time during the study.

Home Observations

The home snack food choices for the five children are presented in Figure 4. There was no generalization of green snack food choices from the preschool to the home during nutrition training for four of the five children (Grace, Anne, Timmy, and Wade). Grace's and Anne's home data were highly variable throughout all conditions. Timmy and Wade chose red snack foods on 100% and 79% of the days during baseline, respectively, and showed little variability across conditions. Janet's home data showed the most generalization across settings; she chose green foods on 44% of the days during baseline and on 88% of the days during nutrition training. Janet chose green foods more frequently and consistently at home when nutrition training was in effect at school than during baseline. However, she did not continue this consistent pattern at home when training at school was withdrawn.

The frequency of praise given by the children's

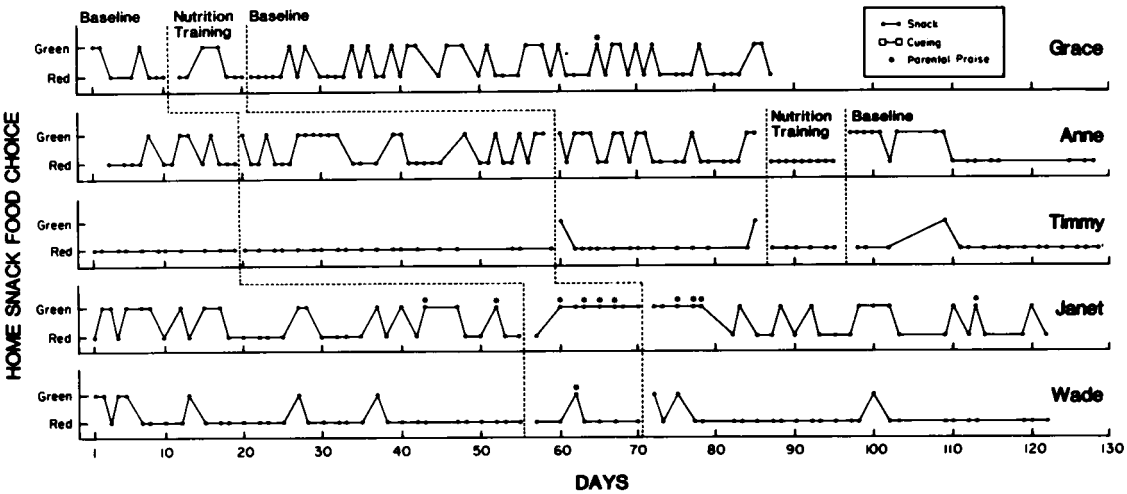

Figure 4. Snack food choices, cueing, and parental praise for the home observation subjects across baseline and nutrition training in Experiment 2.

parents across all conditions is also shown in Figure 4. The parents rarely praised their children after they chose green foods in any of the conditions. Janet received the most praise and it was most consistent when nutrition training was in effect in school, maintaining only as long as the snack behavior maintained. None of the children spontaneously cued at home during any phase of the study.

CASE MATERIAL

Intensive home generalization training: Wade, Janet, and Grace. Although all of the children changed their snack choices at school following the introduction of nutrition training, only Janet showed generalization to the home. Further, even with Janet this generalization did not maintain after training was withdrawn at the preschool. Therefore, procedures were implemented to facilitate generalization to the home environment for three of the five children whose parents agreed to continued home observations. Following the return to baseline, all of the children received nutrition plus cueing training. Following this, individualized procedures designed to target home snack behavior were implemented within the context of nutrition training or nutrition and cueing training.

Wade received a series of procedures designed to increase green food choices at home. The conditions and data are presented in Figure 5. Wade's baseline data, Days 71 through 122, were previously shown in Experiment 2 and are included here for comparison and as baseline for additional procedures. During baseline, Wade's green food choices decreased over time to 0% at school. At home Wade chose red foods on all but 3 days. Wade then received nutrition and cueing training, followed by nutrition and cueing training with new rewards for appropriate snack behavior (green food choice and cueing) at home. The rewards were still given at school but were changed from stickers to 3 min of a favorite activity. He then received nutrition and cueing training plus observation during which he was taken aside with Janet. He observed her being asked about her home snack behavior and receiving a sticker for green food choices and cueing at home. There was an immediate increase in green food choices to 100% at school when nutrition and cueing were implemented, and Wade began cueing at school on the sixth day of training (Day 129). Wade continued to choose green foods at school throughout the remainder of the study. At home, there was not change in Wade's snack food choice during any of the conditions. He never chose a green food, nor did he cue or receive pa-

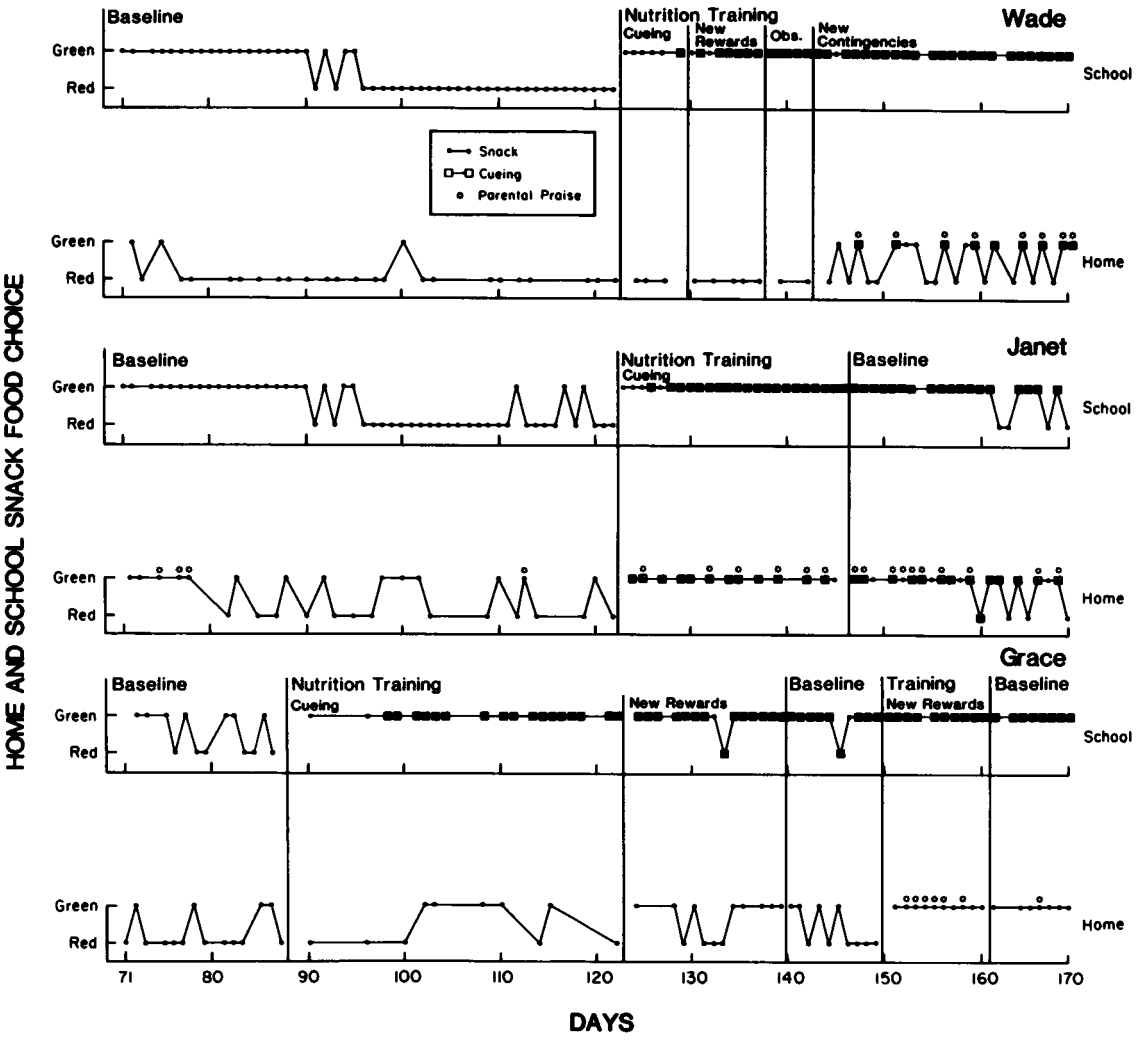

Figure 5. Snack food choice, cueing, and parental praise for Wade, Janet, and Grace at the preschool and home across baseline, nutrition training and cueing, nutrition training plus new rewards, nutrition and cueing training plus observation (Wade only), and nutrition and cueing plus new contingencies (Wade only).

rental praise. Nutrition and cueing training plus new contingencies were implemented next. Wade did not receive a sticker during snack. Instead, he was given a sticker after snack if he had picked a green food and cued at both home and school. At this time green food choices and cueing at home increased for the first time. Wade chose green foods at home on 54% of the days during this phase. Further, parental praise increased and followed green food choices and cueing on 8 of the 9 days on which they occurred.

Janet's snack food choices in all conditions at school and home are also presented in Figure 5. Days 71 through 122 (baseline) were shown previously in Experiment 2. Janet did not maintain green snack food choices at school or home during this condition. When nutrition and cueing training were introduced, Janet immediately increased her green food choices to 100% at school and at home. Also, Janet began cueing 3 days after training to cue began. Janet cued at school on all but 4 days. At home, Janet cued every day except one, and

her mother praised her on approximately half of the days she cued. These praise statements were interspersed throughout the phase.

When the procedures were withdrawn, Janet maintained green snack choices at school for 14 days. At home, there was greater maintenance in green food choices than in the reversal condition of Experiment 2 (12 versus 5 days). Janet continued to cue at home whenever she chose a green food, and her mother continued to praise. Parental praise in response to cueing increased above baseline from 14% to 56% and was interspersed over all the days.

Grace's baseline data, Days 71 through 87, indicate that her green food choices had decreased from 100% to 54% at school and continued to be low at home, 29%. Nutrition and cueing training resulted in an increase in green food choices at school to 100% and she began cueing on the third day of training. At home, however, there was little change in her snack behavior. Individualized rewards, similar to Wade's, were then offered at school for nutritious snacking at home and Grace was not required to cue; this resulted in an increase in nutritious snacking at home. Grace chose green foods on 5 consecutive days. This procedure was withdrawn, reintroduced, and withdrawn again. The increase in green food choices at home did not maintain during the first withdrawal condition, but maintained at 100% during the second withdrawal condition. Both conditions were of similar duration (7 to 10 days). Grace's parents praised her during the second nutrition training phase but did not maintain this throughout the phase or during the second withdrawal condition, even though Grace continued to choose green foods on 100% of the days.

DISCUSSION

Our data indicate that young children's snack choices can be modified through the use of a color code classification system and contingent rewards. In Experiment 1, the children's choices at school were successfully changed from foods high in salt, sugar, and fat, and low in nutrients, to foods lower in salt, sugar, and fat, and higher in nutrients. Further, short-term maintenance was found in the training setting, and generalization occurred across settings. Experiment 2 systematically replicated the results of Experiment 1; however, it also demonstrated that without a generalization promoting strategy, such as cueing, little generalization across settings occurred. In addition, it was found that, although children maintained the desired behavior change in the training setting for 4 to 7 weeks, this change was not permanent, indicating the need for inclusion of procedures to promote generalization over time. Finally, the three cases depicted in the intensive home generalization training demonstrated that generalization strategies are useful in attaining the desired behavior change across environments, but that such strategies may need to be individualized in order to be effective.

These findings indicate several directions for school programs aimed at increasing children's healthy eating and, thus, reducing the potential risk for coronary heart disease in adulthood. First, nutrition programs implemented in school systems have typically been educational. Our results indicate that knowledge of healthy eating alone may not be sufficient to change eating behavior. After withdrawal of the reinforcement procedures, snack choices eventually returned to baseline levels. School programs, therefore, would benefit from including reinforcement procedures to ensure changes in healthy eating.

Second, procedures to program maintenance of healthy food choices also appear warranted. The 4 to 7 weeks of maintenance obtained in this study are longer than other contingency management studies in preschool settings (e.g., Epstein et al., 1978), but longer periods of maintenance are desirable. Our results may be due to peer modeling, as children seated at the same snack table usually chose the same food type (red or green) during training and maintenance. Thus, providing appropriate peer models may enhance maintenance (Birch, 1980).

Third, successful food selection training in the school failed to generalize to the home. Our results provide additional impetus for school programs to

include strategies that will extend contingencies to the home environment. For example, one approach might be to train parents simultaneously in contingency management (Coates, Jeffrey, & Slinkard, 1981) or to provide individualized contingency programs implemented at school to target home behavior (as in our study). Coates, Jeffrey, and Slinkard (1981) found the former strategy an effective one with older children; the latter approach appears particularly cost effective in terms of time and personnel necessary to implement it.

In addition to implementing contingencies for generalization of nutritious snacking to the home environment, our study demonstrates the need for generalization and continuation of reinforcement to ensure the maintenance of behavior change within the generalization and training settings. Again, this may be done through direct and continued intervention (Coates, Jeffrey, & Slinkard, 1981) or through the use of a strategy such as cueing, which can be taught in the training setting. Indeed, several studies (Graubard, Rosenberg, & Miller, 1971; Seymour & Stokes, 1976; Stokes, Fowler, & Baer, 1978) have successfully used cueing to increase naturally existing positive consequences in a generalization environment for new behaviors. In our research, it appeared that praise followed green snack choices at home more promptly and consistently when cueing was used. However, our study supports other studies (e.g., Hrydrowy, Martin, & Stokes, 1984) demonstrating that additional contingencies for cueing may be necessary, at least initially, to promote the use of cueing in all relevant environments. Once occurring, however, cueing may set up a reciprocal interaction whereby the new behavior and cueing are maintained by the praise and attention evoked by cueing (Stokes & Baer, 1977).

Although our study documents the change of children's eating behaviors through low-cost school programs, there are several limitations that need to be addressed in future research. First, the types of foods used were limited and the effectiveness of these procedures with other red foods such as ice cream and and candy needs to be evaluated. Second, although we attempted to use a straightforward contingency management program, the design of the intervention introduced several other variables, such as peer modeling and adult attention and praise, that may have influenced the results. Future research should investigate the contribution of these factors separately. Third, a more systematic evaluation of cueing and contingency management versus direct training in all environments is necessary to thoroughly evaluate their usefulness as a cost-effective generalization strategy. Most important, given the potential implications for the development of behaviors, long-term studies are needed to investigate how changes in childhood eating may decrease the risk of coronary heart disease in adulthood.

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