IMPROVING DIETARY PRACTICES OF ELDERLY INDIVIDUALS: THE POWER OF PROMPTING, FEEDBACK, AND SOCIAL REINFORCEMENT

LEAH Z. STOCK AND MICHAEL A. MILAN

GEORGIA STATE UNIVERSITY

Three intervention packages consisting of (a) enhanced prompts, feedback, and social reinforcement; (b) a lottery; and (c) serving as a confederate were added and removed in sequence as adjacent conditions in an extended withdrawal design to assess their effects on the dietary choices of elderly persons. Participants were 3 elderly residents of an independent living facility who were identified as making consistently poor dietary choices and who had medical conditions that necessitated changes in their eating habits. All 3 participants demonstrated a marked increase in healthy choices of food items in response to the package of enhanced prompts, feedback, and social reinforcement. No additional increase occurred with the introduction of the lottery and serving as a confederate. Food-choice data indicated that most of these improvements could be attributed to healthier entree and dessert choices. Group data for all residents suggested small improvements in dietary practices during the three intervention conditions, with the largest proportion of the group's healthy choices occurring when the lottery was added to enhanced prompts, feedback, and social reinforcement. Food-choice data indicated that most of these improvements could be attributed to healthier dessert choices alone.

DESCRIPTORS: eating, elderly, feedback, social reinforcement, token economy

In our society, the leading contributors to physical illness are conditions that are either caused or enhanced by maladaptive behavior. As much as 50% of mortality from the 10 leading causes of death in the United States can be traced to aspects of life-style, including inappropriate dietary habits (Hamburg, Elliot, & Parron, 1982). The contribution of poor dietary habits to disease and mortality is particularly salient in elderly populations.

Inappropriate dietary habits contribute significantly to the increased risk for cancer, which makes cancer one of the leading causes of death in the elderly population (Ho, Lee, & Meyskens, 1991). Similarly, coronary heart disease, another leading

cause of illness and death in the elderly population, has been linked to poor dietary habits (Kannel, 1986). Finally, nutritional practices not only affect disease and mortality but also have a significant influence on the overall quality of a geriatric individual's life (Hamburg et al., 1982).

Most health care professionals agree that dietary behaviors are particularly resistant to modification (Brownell, 1986). Evidence indicates that many factors, including knowledge and education, have little impact on compliance with health care regimes in the elderly (Sands & Holman, 1985). In one of the few studies that examined the dietary choices of the general public, Wagner and Winett (1988) demonstrated that prompts could produce small increases in the selection of a designated healthy item offered in a fast-food restaurant.

It has also been suggested that integrating automated multimedia systems that follow National Cholesterol Education Program (NCEP) guidelines into a traditional medical setting might be an effective intervention for lowering blood cholesterol, a leading cause of heart disease (Southard et al., 1992). However, little behavior-analytic research has examined the dietary practices of the elderly.

This paper is based in part on a thesis submitted by the first author to the Department of Psychology, Georgia State University, in partial fulfillment of the requirements for the MA degree. Portions of these data were presented at the annual meeting of the Association for Behavior Analysis, Atlanta, May 1991. The authors express their appreciation to Teodoro Allyon for his comments and suggestions during the course of this study, and to the residents and staff of the Atrium at Georgetown for their cooperation and enthusiasm.

Reprints may be obtained from Michael A. Milan, Department of Psychology, Georgia State University, Atlanta, Georgia 30303.

We used an expanded withdrawal design to examine the effects of three behavioral intervention packages using prompts and reinforcers on dietary change and compliance, two of the significant factors that negatively affect the health of the elderly. The primary participants were 3 elderly residents of a retirement facility who had medical problems complicated by their poor dietary practices. Supplementary data were collected on all diners' choices for each course of the four-course dinners served at the facility.

METHOD

Participants

Residents of a private for-profit independent living facility for elderly persons participated in this study. During the course of the study, the population of the facility averaged 160 residents with a mean age of 86 years. The ratio of men to women was approximately one to three. Although the cognitive ability of the residents was not assessed, criteria for admission to the facility specified that residents have the mental and physical ability to function independently. If memory loss or disorientation developed and presented a danger to oneself or others, individuals were required to move elsewhere.

Three residents served as the primary participants in this study. They were informed that they had been identified by the nurse and the food service director as having a long history of poor eating habits that contributed to or exacerbated their medical problems and for that reason should change their eating habits. Their informed consent to contribute individually identifiable food-choice data was then obtained. The remaining residents of the facility also participated in this study and provided continuous but individually unidentifiable group data for a supplementary analysis of treatment effects.

Amy, a 68-year-old female, was medically obese and was taking medication to control high blood pressure. She had resisted following medical advice to modify her eating habits. Beth, a 66-year-old mildly obese female, had failed to comply with a

strict diet needed to control the early stages of diabetes. Although she was not yet taking medication for her diabetic condition, medical staff asserted that, unless she drastically modified her eating habits, she would need medication to control the condition. Carl, a 74-year-old male, had a history of heart disease, high blood pressure, and poor eating habits. Diet was especially important in light of his Parkinson's disease. His physician indicated that consistently appropriate eating habits were an important element in ensuring a relatively normal and comfortable life.

Setting

The study took place in the dining room and adjacent areas of the independent living facility. The dining room was designed and decorated to approximate a four-star restaurant, with carpeted floors, subdued lighting, patterned wallpaper, large windows overlooking an atrium, and small tables with linen tablecloths, formal place settings, and fresh flowers. A meal plan and 24-hr medical coverage were included in the rental cost of the facility. All residents had the option of deciding which two meals they wished to eat under the meal plan. All meals were selected from a menu and were served in the dining room. The menu was divided into four courses: appetizers, entrees, vegetables, and desserts. Generally, there were four food items offered in each category.

Each course had one low-cholesterol modified-calorie selection that had been developed by the nutritional staff in consultation with registered dietitians. These healthy selections were based on the guidelines of the American Heart Association and were designated by a small heart on the menu. Efforts were made to make menu descriptions of heart selections sound appealing (e.g., chicken breast supreme amandine with sauteed mushrooms). At the bottom of the menu was an explanation that items designated with hearts were the calorie-modified low-cholesterol selections.

Conditions

Prompts. This condition consisted of the routine practice of the facility in which hearts were used to

designate the low-cholesterol calorie-modified selection in each of the four courses of the meal.

No prompts. In this condition, the hearts designating the low-cholesterol modified-calorie food selections were removed from the dinner menu.

Enhanced prompts, feedback, and social reinforcement. This condition combined enhanced prompts, feedback, and social reinforcement. Enhanced prompts consisted of (a) media information, (b) buttons, (c) verbal prompts, (d) table tents, (e) menu fliers, and (f) health hour information. Media information was provided in the facility's weekly newsletter for residents. Included in the newsletter were reminders about the meaning of the hearts on the menus and prompts to pick heart selections for dinner.

The maitre d' and hostess who greeted the residents at the entrance to the dining room, the waitpersons who took orders and served the meals, and the other food service staff who bused tables wore large lapel buttons that read "Feel Great, Look Sharp, Pick a Heart." The slogan was in large bold print. The maitre d' and hostess also gave residents verbal prompts to make healthy choices (e.g., "Pick heart items for dinner tonight" or "Try the heart items"). Menus in which the heart selections were highlighted were used to assist visual discrimination of heart items.

The two-sided table tents were constructed by folding in half a sheet of yellow card stock (8 in. by 11 in.). The menu fliers were inside the menus. The experimental slogan, "Feel Great, Look Sharp, Pick a Heart For Dinner Tonight" was printed in black bold letters on both the tents and fliers. During the weekly health hour class, the nurse asked, "How many people made healthy choices last night at dinner?" Those residents who did were then offered encouragement and recognition in the form of applause. At the close of the class, there was a brief review of the significance of the hearts on the menus.

Feedback was based on a chart that was constructed of yellow poster board and was mounted on an easel adjacent to the entrance of the dining room. The chart consisted of a pie chart that displayed the percentage of overall healthy items cho-

sen each night and a line graph containing the previous six data points. Both components included a brief written description of the information. As the 3 participants entered the dining room, the maitre d' or hostess greeted them, directed their attention to the feedback chart, described the data on the chart, and provided verbal prompts (see above). Additional feedback was included in the facility's newsletter for residents, which published weekly reports of the percentage of residents making healthy meal choices.

Social reinforcement was provided contingent upon reports of healthy choices. As residents left the dining room following the meal, the maitre d' or hostess queried them as to what they had had for dinner and if they had enjoyed their meal. When residents indicated that they had ordered a heart selection, the maitre d' or hostess praised them and encouraged them to keep up the good work. When residents indicated that they had not ordered any heart items, they were wished a good evening and reminded to pick heart selections at dinner. The maitre d' and hostess ensured that the 3 participants were exposed to the full social reinforcement package at each meal.

Lottery. A lottery game, called the "heart game," included immediate and delayed reinforcers contingent upon choices of heart items. Menu fliers instructed residents to "Be A Winner! Play the Heart Game, Pick A Heart For Dinner Tonight!" Each time a resident ordered a heart selection, the waitperson gave the resident a token (a 0.75-in. metal washer). A maximum of four tokens could be earned by each resident each meal, one for each menu category. When the residents finished their meals, they could exchange their tokens for an opportunity to draw a bead from an instant drawing bowl. When a winning bead was picked, the resident could choose a prize (such as a small green plant or a modified-calorie muffin). When the residents selected all four heart selections, they were also entered in a drawing for a \$20 weekly cash prize. The name of the winner of the cash prize was posted at the door of the dining room and was announced in the weekly newsletter. Participation in the heart game was voluntary.

Confederate. This condition explored the effect of serving as an assistant to the maitre d' and hostess on the assistant's selections of healthy food items. Initially, the 3 participants were asked to be confederates in an effort to encourage good dietary practices. Each participant was asked to provide the name of a resident who consistently made healthy choices and another resident who did not consistently make healthy choices. The primary participants were then asked to model appropriate behavior to encourage the individuals making incorrect choices to improve their dietary practices. The procedure was repeated the next evening, with residents who had been identified as making healthy choices recruited to serve as additional confederates. The procedure continued in an additive pattern throughout the condition.

Experimental Design

An extended withdrawal design in which conditions were presented in an ABCDEDCA sequence was used (Leitenberg, 1973). The effect of existing prompts alone was examined first. Following baseline (prompts), the prompts were removed from the menu (no prompts) and were then reinstated (prompts). The effects of the three behavioral interventions were then examined in an additive sequence. The package of enhanced prompts, feedback, and social reinforcement was added to the existing menu prompts. Next, the lottery, in which individuals earned chances for prizes, was added. Finally, serving as a confederate was added. The confederate, lottery, and enhanced prompts, feedback, and social reinforcement procedures were then removed in sequence to complete the withdrawal phases of this expanded withdrawal design.

Outcome Measures

Three dependent variables were examined. The facility's food service staff recorded what each resident ordered from the dinner menu. The first dependent measure was the percentage of healthy items selected at each dinner by each of the 3 participants. The second measure was the percentage of healthy choices made by all residents dining at each meal. These percentages were computed by

dividing the number of healthy choices by the total number of choices at each meal. The third measure was the percentage of healthy choices made for each course. These percentages were computed by dividing the number of healthy choices by the total number of choices for each course across each condition.

Interobserver Agreement

Interobserver agreement was assessed using the guidelines suggested by Hartmann (1984). Waitpersons and residents were given time to acclimate to the presence of the observer before agreement data were collected. Interobserver agreement consisted of a choice-by-choice comparison of the records of waitpersons and a second observer who simultaneously and independently recorded the food items chosen by residents randomly selected from all diners.

Agreement data were collected during 31% of the dinner observation periods. An agreement was scored if both observers agreed on the food item selected. The percentage of interobserver agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100%. The average agreement was 89.9%, with a range of 60% to 100%.

RESULTS

As Figure 1 shows, during the prompts baseline a mean of only 28.2% of the 3 participants' menu selections were of healthy food items. Removal of the prompts in the no-prompts condition had little effect ($M = 33.0\%$) on the percentage of healthy food choices made at each meal. The subsequent reintroduction of the prompts reduced healthy food choices somewhat to a mean of 24.1%.

The introduction of enhanced prompts, feedback, and social reinforcement resulted in a marked increase in the average number of healthy food choices made by the 3 participants to a mean of 65.2%. The addition of the lottery and the confederate interventions resulted in only marginal increases in healthy choices ($M = 68.4\%$ and 70.7% ,

Figure 1. Percentage of healthy food choices made during each dinner by the 3 participants (Amy, Beth, and Carl) during the nine experimental conditions of the study.

Figure 2. Mean percentage of healthy food choices made during each dinner by all diners during the nine experimental conditions of the study.

respectively). Healthy choices were unchanged with the return to the lottery plus enhanced prompts, feedback, and social reinforcement ($M = 69.8\%$), and then decreased slightly during the second enhanced prompts, feedback, and social reinforcement condition to the levels originally observed ($M = 65.4\%$). During the final prompts condition, the mean number of healthy choices made by the 3 participants decreased to 33.5%. During the course of the study, each of the 3 residents won one small prize, and 1 resident (Beth) won a large cash prize.

The percentage of healthy food choices made by all residents during the nine phases of the study are displayed in Figure 2. Healthy choices during the initial prompts condition averaged 26%. During the no-prompts condition, the mean increased somewhat to 31% and then continued unchanged at 31.2% during the second prompts condition. The mean increased slightly to 34.5% with the introduction of enhanced prompts, feedback, and

social reinforcement. When the lottery was added to the enhanced prompts, feedback, and social reinforcement, the mean increased to 40.8%. Mean healthy choices decreased slightly to 37.4% during the confederate plus lottery plus enhanced prompts, feedback, and social reinforcement condition. Healthy choices then increased slightly to 40.4% upon the return to the lottery plus enhanced prompts, feedback, and social reinforcement condition. The mean decreased somewhat to 36.5% during the second enhanced prompts and social reinforcement condition. During the final prompts condition, the mean number of healthy choices made dropped to 30.5%.

The percentage of healthy choices made by the 3 participants and all residents combined in the four meal courses were averaged for each of the five procedures and are presented in Figure 3. For all 3 participants, healthy choices were lowest in the vegetable and dessert categories under the no-

Figure 3. Mean percentage of healthy food choices in the four meal courses made by the 3 participants and by all diners during the five procedures examined in the study.

prompts and prompts procedures (mean percentages below 30% for vegetables and 20% for desserts during both procedures).

The combination of the three interventions appears to have had the greatest impact on the entree and dessert selections of the 3 participants. The healthy entree choices of these participants averaged above 80% with the combined interventions, and healthy dessert choices averaged above 80% for 2 of the 3 residents and above 60% for the 3rd resident. The percentages of healthy choices for all residents in the four dinner courses were consistently higher during all intervention conditions. However, the magnitude of these differences was marginal for the appetizer, entree, and vegetable choices. A somewhat larger effect was noted in the percentage of healthy dessert choices, which averaged less than 15% during the no-prompts and prompts conditions and increased to a high of slightly more than 40% when the lottery was added to enhanced prompts, feedback, and social reinforcement.

DISCUSSION

Amy, Beth, and Carl each demonstrated a marked increase in choices of healthy food items in response to enhanced prompts, feedback, and social reinforcement. The addition of tangible and social reinforcers offered by the lottery and serving as a confederate did not increase healthy choices over those observed with prompting and social reinforcement alone. Unlike the 3 primary participants, the diners as a group showed little improvement in healthy choices in response to the enhanced prompts, feedback, and social reinforcement. However, the addition of the lottery to the package of enhanced prompts, feedback, and social reinforcement resulted in the highest percentage of healthy choices observed. Analysis of the group's food-choice data indicated that these effects could be attributed in large part to altered dessert choices.

Each of the intervention components examined in this study has been shown to be effective across a variety of populations, settings, and target behaviors (e.g., Drabman & Spitalnik, 1973; King, Lange, & Errikson, 1982; Muir & Milan, 1982;

Pinkston, Howe, & Blackman, 1986–1987; Schilling & Cuvo, 1983). Contrary to previous findings, the lottery and serving as a confederate role model had no effect on the healthy choices of the 3 participants, perhaps because of the initial impact of enhanced prompts, feedback, and social reinforcement.

Unlike the 3 participants, the diners as a group did increase their healthy choices following the introduction of the lottery. These diners received less consistent and individualized feedback and social reinforcement from the maitre d' and hostess than did the 3 participants.

Another important difference between the 3 participants and the majority of the other diners was that the primary participants had been informed of and publicly acknowledged the need to modify their eating habits. These self-descriptions, or *plys* (Zettle & Hayes, 1982), suggest a predisposition to follow a dietary regimen and may have influenced the effects of the procedures examined. The *plys* may have also contributed to the difference in the magnitude of effects observed for the 3 participants and for the diners as a group.

Many researchers have noted that elderly individuals are often socially isolated and live in an environment in which interpersonal contacts and the opportunity for social reinforcement are limited, no matter how pleasant the physical setting (Carstensen & Erickson, 1986; Lumpkin & Johnson, 1987; Retsinas & Garrity, 1985). The power of enhanced prompts, feedback, and social reinforcement observed in this study may have been magnified by the establishing conditions (Michael, 1982), such as social deprivation, that these researchers have so clearly described. However, because enhanced prompts, feedback, and social reinforcement were always combined in this study, it is impossible to determine the effects of each alone. Similarly, the lottery and confederate procedures were added in sequence to the package, so that it is impossible to determine the effects of each alone. Component analyses are clearly called for.

As would be expected, the percentage of healthy choices returned to the initial baseline levels when the interventions were discontinued. Therefore, a

cost-benefit analysis of either maintaining an environment of prompts and social reinforcement or transferring control of healthy dietary practices to the natural environment should be pursued. If the latter alternative is chosen, subsequent research should include the identification of potential reinforcers in the natural environment that can be marshaled to support healthy dietary practices.

Rodin and Ickovics (1990) noted that 1 out of every 11 Americans is now over age 65, and that by 2050 one fourth of the population will be over 65. As the population of elderly Americans grows, factors contributing to their health and independence will undoubtedly become a major component of efforts to control disease, institutionalization, and the economic costs associated with the care of elderly individuals. As our society moves toward a more cost-effective approach to geriatric health care, the demonstration of low-cost, easily implemented means of modifying eating behavior in a geriatric population, such as that described in this study, will certainly be relevant.

REFERENCES

- Brownell, K. D. (1986). Public health approaches to obesity and its management. In L. Breslow, J. E. Fielding, & L. B. Lave (Eds.), *Annual review of public health* (Vol. 7, pp. 521-533). Palo Alto, CA: Annual Reviews, Inc.
- Carstensen, L. L., & Erickson, R. J. (1986). Enhancing the social environments of elderly nursing home residents: Are high rates of interaction enough? *Journal of Applied Behavior Analysis*, 19, 349-355.
- Drabman, R., & Spitalnik, R. (1973). Training a retarded child as a behavioral teaching assistant. *Journal of Behavior Therapy and Experimental Psychiatry*, 4, 269-272.
- Hamburg, D., Elliot, G., & Parron, D. (Eds.). (1982). *Health and behavior: Frontiers of research in the biobehavioral sciences*. Washington, DC: National Academy Press.
- Hartmann, D. P. (1984). Assessment strategies. In D. H. Barlow & M. Hersen (Eds.), *Single case experimental designs: Strategies for studying behavior change* (2nd ed., pp. 107-139). New York: Pergamon Press.
- Ho, E. E., Lee, F. C. Y., & Meyskens, F. L., Jr. (1991). An exploratory study of attitudes, beliefs and practices related to the interim dietary guidelines for reducing cancer in the elderly. *Journal of Nutrition for the Elderly*, 10, 31-49.
- Kannel, W. B. (1986). Nutritional contributors to cardiovascular disease in the elderly. *Journal of the American Geriatrics Society*, 34, 27-36.
- King, R. P., Lange, M. J., & Errikson, E. A. (1982). Public posting and individualized feedback: An effective procedure to improve direct care staff performances. *Behavioral Engineering*, 8, 25-33.
- Leitenberg, H. (1973). The use of single case methodology in psychotherapy research. *Journal of Abnormal Psychology*, 82, 87-101.
- Lumpkin, J. R., & Johnson, B. (1987). An empirical test of the relationship between isolation and disengagement of elderly persons. *Psychological Reports*, 60, 823-830.
- Michael, J. (1982). Distinguishing between discriminative and motivational functions of stimuli. *Journal of the Experimental Analysis of Behavior*, 37, 149-155.
- Muir, K. A., & Milan, M. A. (1982). Parent reinforcement for child achievement: The use of a lottery to maximize parent training effects. *Journal of Applied Behavior Analysis*, 15, 455-460.
- Pinkston, E. M., Howe, M. W., & Blackman, D. K. (1986-1987). Medical social work management of urinary incontinence in the elderly: A behavioral approach. *Journal of Social Service Research*, 10, 179-194.
- Retsinas, J., & Garrity, P. (1985). Nursing home friendships. *The Gerontologist*, 25, 376-381.
- Rodin, J., & Ickovics, J. R. (1990). Women's health: Review research agenda as we approach the 21st century. *American Psychologist*, 45, 1018-1034.
- Sands, D., & Holman, E. (1985). Does knowledge enhance patient compliance? *Journal of Gerontological Nursing*, 11(4), 23-29.
- Schilling, D., & Cuvo, A. J. (1983). The effects of a contingency-based lottery on the behavior of a special education class. *Education and Training of the Mentally Retarded*, 18, 52-58.
- Southard, D. R., Winett, R. A., Walberg-Rankin, J. L., Neubauer, T. E., Donckers-Roseveare, K., Burkett, P. A., Gould, R. A., Lombard, D., & Moore, J. F. (1992). Increasing the effectiveness of the national cholesterol education program: Dietary and behavioral interventions for clinical settings. *Annals of Behavioral Medicine*, 14, 21-30.
- Wagner, J. L., & Winett, R. A. (1988). Prompting one low-fat, high fiber selection in a fast-food restaurant. *Journal of Applied Behavior Analysis*, 21, 179-185.
- Zettle, R. D., & Hayes, S. C. (1982). Rule-governed behavior: A potential theoretical framework for cognitive-behavioral research and therapy. In P. C. Kendall (Ed.), *Advances in cognitive behavioral research and therapy* (Vol. 1, pp. 73-118). New York: Academic Press.

Received April 30, 1992

Initial editorial decision August 18, 1992

Revisions received November 24, 1992; January 22, 1993;

April 2, 1993; May 4, 1993

Final acceptance May 4, 1993

Action Editor, Mark Mathews