PROMOTING LOW-FAT ENTREE CHOICES IN A PUBLIC CAFETERIA

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Reductions in dietary fat have been recommended in the prevention of coronary heart disease. Because entrees contribute substantially to total meal fat content, we evaluated a cafeteria-based intervention for increasing the purchase rate of low-fat entrees ($M = 6.83$ g) relative to nonlow-fat entrees ($M = 25.59$ g). The intervention included a poster listing the benefits of a LF diet and the daily LF entrees (i.e., broiled or baked chicken and fish dishes). During 6 days per phase, food selections ($N = 3,264$) were monitored by trained observers. The intervention, which cost \$80.00, produced significant increases (i.e., from 20% to 35%) in the purchase rate of LF entrees.

DESCRIPTORS: nutrition education, prompting, cafeteria, cardiovascular risk reduction, point-of-purchase information

Coronary heart disease (CHD) is the major killer of Americans and accounts for approximately 38% of all deaths (Harris, 1981). Reductions in one of the major risk factors for CHD, elevated serum cholesterol, have been demonstrated conclusively to reduce CHD incidence (Lipid Research Clinics, 1984). Consequently, reduction of CHD risk and incidence through dietary approaches has become an important public health goal (National Institutes of Health, 1985). The development of large-scale, low-cost strategies for changing nutrition-related behavior could facilitate the achievement of that goal.

Antecedent procedures at the point of purchase (e.g., supermarkets, restaurants) may be particularly well suited for modifying dietary habits. Environmentally based prompting procedures have

been used successfully to promote changes in a variety of nondietary behaviors, including litter control (Geller, Farris, & Post, 1973) and exercise (Brownell, Stunkard, & Albaum, 1980; Mayer & Geller, 1982). Moreover, point-of-purchase prompting strategies for influencing dietary behaviors have been effectively implemented by the Stanford Heart Disease Prevention Program (King, Flora, Fortmann, Maccoby, & Farquhar, 1984), the Pawtucket Heart Health Program (Lefebvre, in press), and the Minnesota Heart Health Program (Blackburn et al., 1984). Results from these programs have suggested that interventions in supermarkets and restaurants are acceptable to both vendors and customers. However, because the strategies have been introduced in conjunction with multicomponent interventions, their independent effects have not been evaluated.

On the other hand, several recent studies have used cafeteria-based nutritional prompting as a primary intervention (Cincirpini, 1984; Davis-Chervin, Rogers, & Clark, 1985; Dubbert, Johnson, Schlundt, & Montague, 1984; Mayer, Heins, Brown, Bishop, & Morrison, 1986; Zifferblatt, Wilbur & Pinsky, 1980a). Cafeterias may be optimal settings for influencing dietary behavior, given the high rate of dining out in the United States (National Restaurant Association, 1986) and the wide variety of selections usually available.

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To date, findings have been mixed. In two studies, nutrient labeling failed to increase selections of targeted items (Cincirpini, 1984; Mayer *et al.*, 1986). In contrast, in two other studies, nutrient labeling (Dubbett *et al.*, 1984) or a nutrition awareness game (Zifferblatt *et al.*, 1980a) produced changes in purchases of some categories of the meal but not of entrees. In targeting heart-healthy changes, entrees are important because they may contribute the most to total meal fat and caloric values. Nevertheless, only one investigation, using nutrition labeling, has shown significant changes in entree selection (Davis-Chervin *et al.*, 1985). However, interpretation of the results was hampered by the absence of reversals when the prompts were withdrawn, a relatively small number of observations (*i.e.*, approximately 22 per phase), and a very homogeneous sample (*i.e.*, college freshmen using a dormitory cafeteria).

In our study, an intervention was designed to remedy some of the weaknesses in previous cafeteria-based prompting research. More specifically, a poster plus labeling procedure that targeted low-fat entrees was introduced in a public cafeteria in a within-setting design. It was predicted that the intervention would increase the purchase rate of low-fat entrees relative to a baseline condition.

METHOD

Subjects and Setting

The setting was a family-owned cafeteria located in a business district on the periphery of an urban university campus in St. Louis, Missouri. It had a seating capacity of 200 and served an average of 140 customers per evening. Approximately one-third of the dinner clientele were regular customers (*i.e.*, weekly or biweekly), and one-third were age 65 and over. The clientele included equal proportions of males and females.

Observation Procedures

Entree selections on food trays were monitored throughout the study. The observers, who collected data alone for the majority of observation sessions, were two undergraduate seniors majoring in

psychology and one clinical psychology graduate student. They were trained in the observation procedures and conducted pilot observations prior to the study. On randomly selected nights during each experimental phase, two of the observers monitored food selections simultaneously to obtain an index of interrater agreement.

Prior to each observation session, the observer recorded all entree items on a checklist and became familiar with the visual identity of each item. The observer stood approximately 60 cm behind the cashier to achieve a clear view of the food tray as the customer paid. In order to appear as unobtrusive as possible, observers wore aprons that were identical to those worn by the cafeteria employees. If the observer was asked about the specific nature of the monitoring, the customer was told that a survey was being conducted; no further details were given. In addition to entree selections, the number of customers choosing a dessert (other than fruit) was recorded.

Observations were conducted during the prime dinner hours (*i.e.*, 4:45 p.m. to 7:00 p.m.) on Tuesday, Wednesday, and Thursday evenings. The study lasted 9 weeks and included 24 observation sessions divided equally among experimental phases.

Experimental Design and Procedures

The study included four consecutive phases in an A-B-A-B design: Baseline 1, Intervention 1, Baseline 2, and Intervention 2. Prior to the initial baseline phase, low-fat entrees were identified. They were defined as chicken and fish dishes that were broiled or baked and served without sauce or gravy. To verify the classification scheme, nutrient analyses of both low-fat (LF) and nonlow-fat (NLF) entrees were performed by a registered dietitian using *Handbook No. 456* (USDA, 1975) and *Bowes and Church's Food Values of Portions Commonly Used* (Pennington & Church, 1985). The mean fat values of LF and NLF entrees were 6.83 g ($SD = 3.06$) and 25.59 g ($SD = 16.20$), respectively, and the mean caloric values were 194.7 ($SD = 35.7$) and 423.63 ($SD = 157.54$), respectively. Thus, the combined criteria of food type

Figure 1. Intervention poster. The entree labels were changed daily in accordance with the low-fat offerings.

(chicken and fish) and preparation method (broiled and baked) discriminated well with respect to absolute nutrient values. The kitchen staff was asked not to change the regularly offered menu items during the study and to offer at least three LF entree items per evening.

Six different LF entrees and 42 different NLF entrees were offered. The mean numbers of LF and NLF entrees offered nightly did not differ between experimental phases, and were 3.21 ($SD = 0.59$) and 13.13 ($SD = 0.95$), respectively. All entrees were represented in all phases. The LF and NLF entrees were comparable in price, with the former exceeding the latter by an average of 15¢.

Intervention consisted of (a) placing a large (76.0 cm $\times$ 101.5 cm), colorful poster at the beginning of the food line, (b) posting two smaller (10.0 cm $\times$ 15.0 cm) LF entree menus in the entree section, and (c) placing small (10.0 cm $\times$ 12.5 cm) fliers with the same message as the poster on each dinner table. (The table fliers were included

at the request of the cafeteria owners, who wanted to remind customers, after they were seated, about the availability of low-fat items.) The poster, depicted in Figure 1, was placed on an easel and included a rationale for a low-fat diet, several recommendations for food selection (e.g., broiled and baked foods, chicken and fish), and the names of the LF entrees offered that day.

During Baseline 2, all intervention materials were removed from the cafeteria and were subsequently reinstated during the second intervention phase.

Manipulation Check

During the first three evenings of Intervention 1, customers ($N = 70$) were surveyed briefly as they exited the cafeteria to determine whether or not they had noticed the poster. They were asked: (a) "Did you notice the poster about low-fat foods?" and (b) "Did you notice the smaller low-fat food menus?" This survey was conducted by a psychologist and a psychology graduate student.

Figure 2. Proportion of low-fat entrees selected relative to total entrees, by experimental phase.

(These customers were also asked their age and their frequency of patronage. However, because the survey did not include customers in large, private parties, who were relatively younger (30–45) and frequented the cafeteria less often than the other customers (but were exposed to the intervention), these data were not considered accurate.)

RESULTS

Manipulation Check

The majority of customers who were interviewed (84%) reported that they had noticed the poster, whereas a smaller proportion (60%) reported that they had seen the menus in the entree section. Anecdotal data suggested that the observers were perceived by customers as regular cafeteria staff.

Entree Selections

Interrater agreement on entree selections was computed by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. Of the 190 observations that were made simultaneously (6% of the total observations), 181 (95%) were in agreement.

Of all observed meals ($N = 3,264$), the pro-

portion that included an entree remained stable throughout all phases, and ranged from 85% to 87%. For the four consecutive phases, LF entrees comprised 20% (153/758), 37% (239/652), 27% (181/680), and 34% (230/676) of total entrees selected. The proportion of LF entrees increased significantly when the intervention was implemented, from Baseline 1 to Intervention 1 $\chi^2(1, n = 1,410) = 47.82, p < .001$, and from Baseline 2 to Intervention 2, $\chi^2(1, n = 1,356) = 8.73, p < .005$. Figure 2 illustrates the proportion of LF entrees selected during each observation session.

Dessert Selections

The purchase rate of desserts did not change from Baseline 1 to Intervention 1, $\chi^2(1, n = 1,388) = 0.35, p > .50$, or from Baseline 2 to Intervention 2, $\chi^2(1, n = 1,356) = 0.36, p > .50$. The data for LF entrees and NLF entrees were then examined separately. The proportion of LF entrees accompanied by desserts did not differ between Baseline 1 and Intervention 1, $\chi^2(1, n = 392) = 0.20, p > .50$, or between Baseline 2 and Intervention 2, $\chi^2(1, n = 411) = 0.84, p > .50$. Likewise, the proportion of NLF entrees accompanied by desserts did not differ between Baseline 1 and Intervention 1, $\chi^2(1, n = 996) = 0.71, p > .50$, or between Baseline 2 and Intervention 2, $\chi^2(1, n = 945) = 0, p > .50$. The mean proportion of all entrees accompanied by a dessert was 29% throughout the study.

DISCUSSION

A prompt containing both specific nutritional information and a low-fat entree menu increased the purchase rate of low-fat entrees. The increase from the initial baseline phase to the introduction of the intervention was substantial (i.e., an 85% increase), whereas the increase was somewhat smaller when the intervention was repeated. The prompt, which was presented via a poster, had characteristics that had been found effective by previous research, including: (a) it referred to specific behaviors; (b) it specified desirable behaviors that

were convenient; (c) it was stated in polite language; and (d) perhaps most importantly, it occurred in close proximity to the desired target behavior (see review by Geller, Winett, & Everett, 1982).

Although the overlap in data points between the last three phases could be suggestive of a relative lack of experimental control over entree purchase rate, the methodology used helped to rule out competing explanations for the significant increases in LF purchase rate both times the intervention was introduced. First, the number and content of both LF and NLF entrees that were offered remained stable across phases. Second, the study was conducted during relatively stable daily temperatures. Thus, the possibility that seasonal fluctuations (Zifferblatt, Wilbur, & Pinsky, 1980b) were responsible for the increases in LF purchase rate is highly unlikely. Finally, the possibility that the intervention per se attracted a new, more health-conscious type of customer to the cafeteria should be considered. To our knowledge, no publicity about the intervention was generated until the study was terminated, since the goal was to evaluate the impact of the intervention on the typical customer. Therefore, although the data do not allow for the identification of individual customers, there is no reason to believe that the customer population as a whole differed between phases in terms of preexisting eating patterns. The stability in the proportions of customers choosing entrees both within and between phases supports this. In sum, the relative stabilities of menu, temperature, and type of clientele strengthen the internal validity of the study.

A second methodological aspect of this study that deserves comment is the absence of data for customers' total meal fat selections. Some may argue that customers choosing LF entrees may have been simultaneously choosing high-fat items from other food categories. Our data on the purchase rate of desserts partially address that issue; LF entrees were not accompanied by desserts more often than NLF entrees. On the other hand, it is possible that some LF entree customers were adding high amounts of fat to their meals by using large quan-

ties of salad dressing, sour cream, or other condiments that would not have been reflected in our observations. Thus, future studies should assess the ways in which individuals dress their foods, as well as the selections themselves.

Another weakness of this study is the short-term nature of the intervention, which limits conclusions regarding its long-term effects on both selections and profits, and its potential for institutionalization. Although the intervention was low-cost and did not result in decreased sales to the cafeteria, it was not continued by the owners after the study was terminated. Possible reasons for the abandonment of this and similar interventions have been addressed by formative research at the Pawtucket Heart Health Program, which indicated that health concerns of vendors and customers may be necessary but not sufficient conditions for vendors to implement long-term nutritional programs. More specifically, an increase in profits and business, participation by competing vendors in a similar program, and publicity for adopting a program may be needed (Peterson et al., 1986).

In sum, although these findings are promising, the long-term efficacy of nutrition prompting in cafeterias remains to be demonstrated. In future studies, the monitoring of all food categories, including condiments, will be needed to evaluate the breadth of the intervention's impact. In addition, to encourage the adoption of the intervention by the cafeteria, the concerns of the vendors must be addressed.

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