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ALTERING SHOPPERS' SUPERMARKET PURCHASES TO FIT NUTRITIONAL GUIDELINES: AN INTERACTIVE INFORMATION SYSTEM

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This study reports the results of one effort to help supermarket shoppers alter food purchases to make purchases (and meals) that are lower in fat and higher in fiber. A prototype interactive information system using instructional video programs, feedback on purchases with specific goals for change, weekly programs, and the ability to track user interactions and intended purchases was evaluated. The major dependent measure was users' actual food purchases as derived from participants' highly detailed supermarket receipts. After a 5- to 7-week baseline phase, participants were randomly assigned to an experimental or control condition for the 7- to 8-week intervention phase. A follow-up phase began 5 to 8 weeks after participants completed the intervention and discontinued use of the system. The results indicated that experimental participants, when compared to control participants, decreased high fat purchases and increased high fiber purchases during intervention, with evidence for some maintenance of effect in follow-up. Plans for increasing the use and impact of the system are discussed.

DESCRIPTORS: health promotion, nutrition, cancer prevention, supermarket intervention

The Surgeon General's Report on Nutrition and Health (Koop, 1988) and the National Research Council's *Diet and Health* (Committee on Diet and Health, 1989) have reached similar conclusions about the role of diet in risks for cancer and coronary heart disease. A diet high in fat and low in fiber has been linked to cancers of the gastrointestinal tract, some sex hormone-specific sites and, possibly, cancers in the urinary bladder and in the respiratory system (Greenwald, Sondik, & Lynch, 1986). It has been estimated that 25% to 35% of cancer mortality may be related to dietary factors (Greenwald et al., 1986). A diet high in fat has been associated with obesity, whereas a diet high in saturated fat has been associated with high blood cholesterol and increased risk for coronary heart disease (Committee on Diet and Health, 1989; Koop, 1988). Such evidence has led the National Cancer Institute and the National Heart, Lung, and Blood Institute (the Expert Panel, 1988) to issue guidelines, both for the general public and for those individuals identified at risk (i.e., for hypercholesterolemia), recommending reduced consumption of fat, saturated fat, and cholesterol and increased consumption of complex carbohydrates and fiber (Koop, 1988).

One set of initiatives by the National Cancer Institute (NCI) involves promoting nutrition to the general population using diverse community, media, and organizational strategies (Greenwald et al., 1986). However, reviews of nutrition promotion efforts (Mayer, Dubbert, & Elder, 1989; Winett, King, & Altman, 1989) have concluded that (a) few programs were based on theories and frameworks for behavior change, (b) general educational interventions affect knowledge but not food purchases or meal choices, (c) more specific targeted interventions (e.g., shelf tags in supermarkets) usually influence specific purchases, (d) few studies

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used a complement of conceptually sound and empirically based intervention strategies; furthermore, few studies have been true experiments or have been able to monitor repetitively the purchase patterns or meal choices of individuals over time. These same points pertained to many supermarket interventions (Duff, 1989a, 1989b; "Getting the Most . . . ," 1989; Lekoski, 1989). With few exceptions (e.g., Greene, Rouse, Green, & Clay, 1984; Levy, Matthews, Stephenson, Tenney, & Schucker, 1985), the increased interest and activity in supermarket interventions (Duff, 1989a) have rarely been matched by conceptually driven and empirically based interventions.

The present paper reports the evaluation of a public access, interactive nutrition information system in a supermarket. The system fully automates procedures based on social cognitive, health belief, and communication principles (Bandura, 1986; Janz & Becker, 1984; Rogers, 1984; Taylor, 1990). Aspects of these principles and procedures were tested in previous work (Winett, Kramer, Walker, Malone, & Lane, 1988) that showed how video modeling, combined with feedback and goal setting, helped consumers reduce fat and increase complex carbohydrates in their supermarket purchases. However, those procedures were not in a format that could be practically used. This study extends the earlier research by fully automating those procedures within an interactive nutrition information system in the supermarket.

An interactive system attempts to combine the reach of mass media with the more effective behavioral influence qualities of individualized media (Taylor, 1990). The system is designed to be either a stand-alone intervention or part of a broader intervention. Consistent with the NCI's Phase III research guidelines (Greenwald et al., 1986), a prototype was evaluated first in a relatively optimal setting, using true experimental designs with more homogeneous groups of people.

The major objective of the first studies of the system was to demonstrate the system's efficacy in influencing supermarket shoppers to alter purchases to approach NCI's guidelines (i.e., reduce fat and increase fiber) and to demonstrate the system's fit (i.e., compatibility, durability) in the supermarket setting. The research also emphasized a process of modification and refinement of the system based on feedback from procedural and outcome data.

METHOD

System Description

The Nutrition for a Lifetime System (NLS) is a public access, interactive nutrition information system. The NLS has been designed and field tested at Virginia Tech with funding from the NCI. The NLS is still in a prototype stage and is not yet commercially available. The NLS is a highly visually oriented system that requires no computer literacy skills. Other than the NLS, there were no additional interpersonal or store-based interventions used in this study. Two prototype systems, NLS-1 and NLS-2, are the subject of this report. The NLS-1 is described in detail, followed by a brief description of the NLS-2.

NLS-1

The NLS-1 had the following parts: (a) a custom-designed kiosk (57.5 cm wide, 122.5 cm deep, 210.0 cm high) to house and protect all its components; (b) a computer, color monitor with touchscreen, videodisc player, printer, and mark-sense optical scanner; (c) software designed to perform the functions noted later; (d) video content in the form of six weekly programs; and (e) a printed feedback-on-intended-purchase function. Figure 1 shows the NLS-1 in the supermarket.

Identification Screens

A series of touchscreens allowed participants to activate the NLS-1 and to identify themselves by their social security number. All interactions between participants and the NLS-1 were automatically recorded.

Video Content

The duration of videodisc programs ranged from about 2 to 8 min each. The programs were a linear series, and each was available for 1 week. Programs

2 through 6 had 15- to 45-s optional review segments of the previous weeks, and each program ended with a short (about 10 s) preview of the next week's program.

The video programs followed a nondemanding, successive approximation model that emphasized gradual change and variety in food purchases and meals. The format and language of the programs were not overly prescriptive or incisive. The presentation was consistent with NCI's emphasis on variety in meals and the supermarket's concern that any health claims be moderated (e.g., the term "sound nutrition," not "healthy nutrition," was used throughout the programs).

Program 1 (available during the 1st week) presented general nutrition information, established the personal saliency and potential personal control of the diet, health, and disease prevention links, and presented a brief quiz (via the touchscreen monitor). Every subsequent program (a) offered an optional review of the prior week's program; (b) presented visual and graphic information on reducing fat and increasing complex carbohydrates and fiber in supermarket purchases and subsequent meals; (c) presented options for new purchases and new meals for the user to consider; (d) asked the user to commit to new purchases and meals by use of the touchscreen with prompting ("Which ones do you think you can do?"), guidance ("Do you want to make an additional choice?"), and praise ("You're off to a good start this week."); and (e) had the user indicate his or her confidence ("efficacy") level in these commitments using a 4-point scale on the touchscreen.

Program 2 provided more nutrition information and suggested one simple change and commitment (e.g., buy a few pieces of fruit this week). Programs 3 and 4 stressed additional commitments to decrease purchases and meals higher in fat and to increase purchases and meals higher in complex carbohydrates and fiber. Program 4 also emphasized developing new meals; however, all "new meals" presented were variations of common meals eaten at home, as assessed by the project's prior formative research. For example, because we found in the formative research that a hamburger meal

Figure 1. The Nutrition for a Lifetime System (NLS) in the supermarket.

was the most frequently served dinner, one of the ideal meals prominently shown was a hamburger dinner. However, this ideal meal had a small hamburger, made from lean meat, on a whole wheat bun, with a large baked potato topped with low-fat yogurt, and a large serving of broccoli. The meal contained only 20% calories from fat and had 10 g fiber. Likewise, recommended high-fiber foods were those commonly eaten (e.g., beans, cereal, bread), plus a few less commonly eaten foods (e.g., whole wheat pasta, extra high-fiber cereals).

Program 5 focused on strategies to overcome common problems (e.g., reactions of guests and relatives), while still expanding food purchase choices and meals. Program 6 presented maintenance strategies and enlisted a long-term (1 year) commitment to change. All commitments were made by the user via a touchscreen interaction.

Each program followed a consistent visual and

audio format. Motion video content, still pictures, and graphic material were interspersed in the programs, with a female narration soundtrack. Movement in the program was rapid, and other format devices (e.g., rotating graphics) were used to maintain attention. Overall, the format, the formative features of the video programs, the successive approximation approach, and the commitment strategy were based on principles found essential for media-based behavior change research (Winett, 1986).

Data Entry

Participants entered their intended food purchase data into the NLS-1 during their main weekly shopping. They completed two opscan forms ("NutriScans") at home or at the NLS-1 kiosk. These forms listed about 220 food items (e.g., low-fat yogurt), each with five potential quantities (e.g., 16 oz), with items listed under a categorical heading (e.g., dairy and eggs). Larger quantities could be indicated by marking more than one quantity entry.

A scanner inside the NLS-1 read the opscans. During baseline, the opscans were inserted and read after the participant used the touchscreen monitor to enter and confirm his or her social security number and indicate that the opscans were ready. During the intervention phase, social security identification touchscreens preceded the videodisc program, which was then followed by the opscan entry screens. The NLS-1 stored each participant's intended purchases in a separate data file.

In each phase, participants received an aisle-by-aisle printed shopping list after both opscan sheets were read. The participant's interaction with NLS-1 ended after receipt of the shopping list.

Feedback

During the intervention phase, feedback on intended food purchases appeared on the printed shopping list. It consisted of suggested substitutes for high-fat and low-fiber items and praise of new purchases of low-fat or high-fiber products. Both types of feedback were based on intended food purchase data. Suggested substitutes for an item (e.g., skim milk for whole milk) were based on a table look-up procedure that randomly presented one of several potential substitute items; the suggested substitute appeared next to the selected item on the printed shopping list.

Any low-fat or high-fiber item that had not been entered during the baseline phase was highlighted on the printout in another section appearing above the shopping list printout. The item was categorized as lower in fat or higher in fiber, and the participant was congratulated for choosing it for the first time during the study.

NLS-2

The NLS-2 design changes were based on responses of participants who used NLS-1. These responses included unobtrusive observations of NLS-1 use in the supermarket, detailed post-follow-up phone interviews, and impact on intended and actual purchases. The main changes in NLS-2 entailed the addition of more specific information via additional short video segments (optionally selected by participants) to supplement the regular video programs, more specific (visual, graphic) feedback and goal-setting information, and enhanced usability by replacing the opscan data entry system with a touchscreen food item data entry system. The touchscreen entry system set up a hierarchy of screens from general food categories (e.g., poultry), to exemplars of the category (e.g., chicken breast), to quantities (e.g., 2 lb). For each item, the user went through the three touchscreens. Unobtrusive observations and data automatically recorded by the NLS indicated that one item entry (three screens) took a mean of 20 s to enter (i.e., a 20-item shopping list took about 7 min).

The user was also given more control over the visual presentation (stop, start, skip), and the preliminary (nonprescriptive) information of Week 1's video program from NLS-1 was shown in segments during a baseline phase. For feedback and goal setting, users were shown simple bar graphs during the intervention phase that depicted their progress in reaching specific, individualized goals for changes in fat and fiber food items (defined by set criteria) and for reaching the NCI goals (percentage of calories from fat and grams of fiber; these are described

Table 1
Components of NLS-1 and NLS-2

System	Data entry	Video	Feedback	Shopping list
NLS-1	Opscan	6 programs 2–9 min No control by viewer	Print New choices Substitutions	Aisle by aisle
NLS-2	Touchscreen	5 programs 2–9 min Control by viewer 5 branches	Print New choices Substitutions Visual Items Fat and fiber Macronutrient Fat and fiber	Food categories

below). Bar graphs used three colors, with one color showing the user's baseline level (e.g., 38% calories from fat), another color the current level (34%), and a third color, the goal (30%). Each bar grew as the user watched. Further, each graph was preceded by instructions and followed by feedback on the screen. For example, the user who reduced purchases from 38% to 34% calories from fat would be congratulated, told to keep up the good work, and continue to reduce purchases of high-fat items. Table 1 summarizes the main components of NLS-1 and NLS-2.

Recruitment and Participants

All research participants were recruited using a face-to-face method at the supermarket. Recruiters were at the front (at the point where most people started their shopping) of the supermarket behind a large table. About half the passing shoppers were stopped and engaged in a verbal description of the project, which took about 5 min. The shopper, if interested, was given a written description of the project, a background information form (e.g., demographic and health information), and a consent form. The background and consent forms could be completed at the point of recruitment or returned after the day's shopping was finished.

Approximately one third of persons contacted in this way agreed to participate. All participants were paid $80 for completing forms, using the NLS weekly, and mailing in receipts each week. They were paid an additional $20 for mailing in receipts during the follow-up phase. During recruitment and on a consent form, it was emphasized that payment was in no way tied to alteration of food purchases.

The participants' mean age was about 40, with a gross annual household income of $35,000; about 80% of the participants (who did most of the shopping and meal preparation) were female. All participants did their food shopping primarily in the study's supermarket. Other data provided on the background form indicated that participants had few health problems. However, persons with a diagnosed medical condition (e.g., diabetes), or otherwise on medically prescribed diets, were not allowed to participate in the project. A large percentage (about 50%) of participants had completed 4 years of college. However, education levels ranged from 10th grade to attainment of PhD.

Participants were included in data analyses only if they sent in four or more receipts with 15 or more food items during both the baseline and intervention phases. Two receipts were required for inclusion in analyses of the follow-up phase. Shoppers who purchased fewer than 15 items per week were excluded because their buying patterns were difficult to track and minimal effects were found.

There were 45 shoppers in the NLS-1 study and 32 shoppers in the NLS-2 study who fit the minimum purchase and receipt criteria (N = 77; 37 control, 40 experimental) for baseline and inter-

vention analyses. By the follow-up phase, 4 shoppers in the NLS-1 study and 4 shoppers in the NLS-2 study had moved or discontinued shopping in the project supermarket. This left 69 shoppers who fit the receipt and purchase criteria (33 control, 36 experimental) for follow-up analyses. Seven shoppers in the NLS-1 study did not meet the minimum purchase criteria and 9 did not meet the receipt criteria. In the NLS-2 study, 50 shoppers did not meet the minimum purchase criteria and 8 did not turn in sufficient receipts.

Setting

The NLS-1 and NLS-2 studies were conducted in the same supermarket, a 40,000-square-foot store owned by the Kroger Co., Inc., a large supermarket chain. The NLS was located at the front of the store where shoppers generally began a day's food shopping. All items recommended and tracked by the NLS were readily available in the store.

Dependent Measures

Measures of a participant's intended and actual purchases were used. A participant entered all intended purchases for that shopping trip into the NLS using the opscan entry system in NLS-1 or the touchscreen entry system in NLS-2. Each system included about 230 major food items (e.g., 2% milk, apples, whole wheat bread, tuna fish in water). Participants indicated the item and the amount (e.g., 1 pound, 1 gallon) they intended to buy. Thus, for each participant, it was possible to track continuously the frequency and amount of intended food items. These food items were categorized during data analysis into 13 categories (e.g., high-fat meat, low-fat dairy). In this way the frequency and amount of intended purchases within categories could be tracked for each participant across weeks and phases of the study.

Highly detailed receipts from the supermarket were obtained from participants. A data clerk placed all actual items purchased within the same 230 items and 13 categories used for the intended purchases. The amount of an item was derived from a price data base that was periodically updated. Thus, both the frequency and amount of actual food items purchased were also continuously tracked.

All receipt data were entered into a computer by a data clerk who was unaware of the experimental condition of a participant. The reliability of data entry was checked by randomly selecting 6 participants and then randomly selecting 3 weeks of data for both the baseline and intervention phase for each participant. These receipts were reentered and the resulting files were compared to the previously created files. An agreement was scored when both the item and amount from the two files matched exactly. Reliability was 97% (499 of 514 items matched).

Additional data derived from both intended and actual food purchase data included dollars spent per week on food purchases and estimates of percentage calories from fat and grams of fiber per day per household member (demographic and household composition data were available for each participant). The placement of a food item in a category was based on food type and nutritional content, using standard sources (Adams, 1975; Pennington & Church, 1985; USDA, 1989). Estimates of percentage calories from fat and grams of fiber per day per household member were based on a measure of "cooked yield" from an uncooked food item (Adams, 1975), updated dietary fiber data (USDA, 1989), and the number of household members noted by the participant. Other data collected included measures pertaining to system and strategy use, system breakdowns, and consumer, store personnel, and management acceptance of the NLS.

Design of NLS-1 and NLS-2 Studies

The studies were conducted in the same supermarket, but at different times (Study 1, November 1988 through May 1989; Study 2, June through November 1989) and with different participants. Each study included a 7-week baseline phase (holiday periods were excluded) during which all participants completed paper-and-pencil forms, entered their intended food purchases into the NLS, and sent in their food receipts of actual purchases.

At the end of the baseline phase, participants

were randomly assigned to experimental (videos, feedback, goal setting) or control (no videos, no feedback, no goal setting) conditions. The intervention phase lasted 7 to 8 weeks. However, regardless of condition, all participants continued to enter their intended food purchase data each week into the NLS and to send in their food purchase receipts. Five weeks after the intervention phase (all use of NLS had been discontinued), all participants were again contacted. Participants sent in their food receipts only (but did not use NLS) for the next 3 weeks of the follow-up phase.

RESULTS

The results of the two studies are presented as one (combined) study. NLS-1 and NLS-2 were very similar. The methods were the same, and the separate results for each study were very similar. An additional focus of this paper was the actual food purchased in seven food categories (low-fat meat, high-fat meat, fruits/vegetables, high-fiber grains/cereals, low-fat dairy, high-fat dairy, low-fat fish/poultry), the same categories with items targeted more than three times across the NLS weekly video programs. All data were analyzed using ANCOVAs with the participant's baseline mean score for each measure used as the covariate. Prior to ANCOVAs, food category data at baseline were analyzed with ANOVAs. At baseline, only the frequency of purchase of fruits and vegetables was significantly different: the experimental group had more frequent purchases, $F(1, 75) = 5.11$, $p < .05$.

During the intervention phase, significant differences favoring the experimental participants were found for the high-fat meat category (lower amount, $F(1, 74) = 14.87$, $p < .001$; lower frequency, $F(1, 74) = 17.60$, $p < .001$), the high-fiber grains/cereals category (greater amount, $F(1, 74) = 11.95$, $p < .001$; greater frequency, $F(1, 74) = 10.36$, $p < .01$), and the high-fat dairy category (lower amount, $F(1, 74) = 4.53$, $p < .05$).

During the follow-up phase, significant differences favoring the experimental participants were found for high-fiber grains/cereals (greater amount, $F(1, 66) = 5.05$, $p < .05$), low-fat dairy (greater amount, $F(1, 66) = 5.16$, $p < .05$), and high-fat dairy (lower amount, $F(1, 66) = 6.13$, $p < .05$; lower frequency, $F(1, 66) = 6.32$, $p < .05$). There were no other significant differences between groups during intervention or follow-up for any other food category.

Figure 2 depicts the amount (in grams) and frequency of purchases in four key categories during the baseline, intervention, and follow-up phases. The graphs indicate that, during the intervention phase, substantial changes were made by the experimental group (when compared to the control group) in high-fat meat (about a 37% decrease in amount and about a 31% decrease in frequency; this was partly attributable to the increase in high-fat meat purchased by the control group), high-fiber grains/cereals (about a 62% increase in amount and a 25% increase in frequency), and high-fat dairy (about a 20% decrease in amount and about a 10% decrease in frequency). However, the shift in high-fat meat by experimental participants during intervention was not maintained during the follow-up phase. The substantial increase by experimental participants in high-fiber grains/cereals was largely maintained at follow-up; low-fat dairy showed a somewhat irregular pattern but, at follow-up, experimental participants were buying more (about a 20% increase in amount and about an 11% increase in frequency compared to the control group) in this category; and the experimental group maintained about the same changes in amount and frequency in the high-fat dairy category at follow-up when the group's data were compared to the control group.

Individual participant data were examined in the high-fat meat, high-fiber grains/cereal, low-fat dairy, and high-fat dairy categories. During the intervention phase, the percentage of experimental participants decreasing their amount of purchases in the high-fat meat category (57.5%) and the high-fat dairy category (67.5%) was about 25% greater than the percentage of control participants (32.5%; 43.2%) decreasing their amount of purchase when the intervention phase was compared to the baseline phase. For the high-fiber grains/

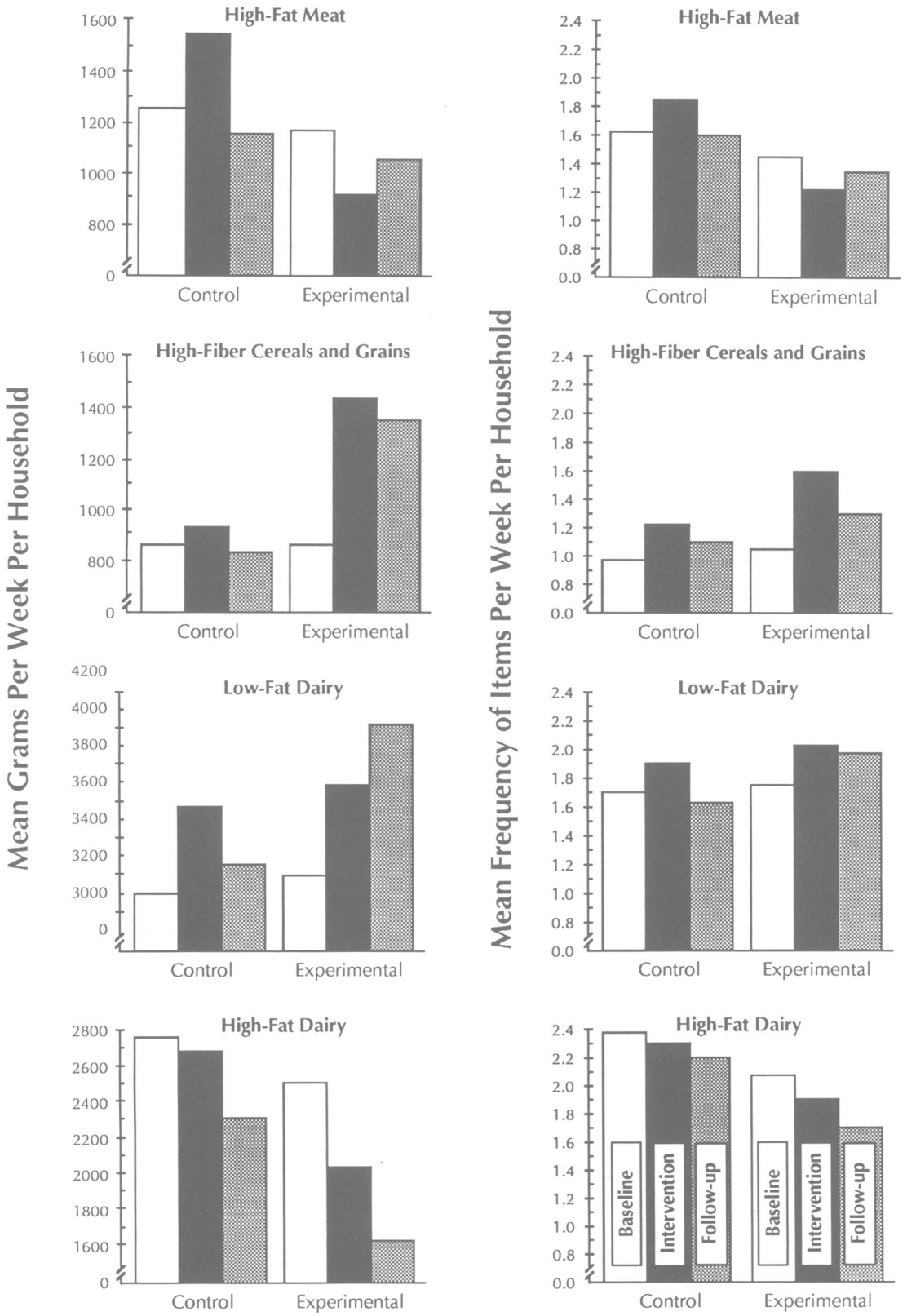

Figure 2. The amount and frequency of actual food purchased by experimental and control participants across phases of the study in the high-fat meat, high-fiber cereals/grains, low-fat dairy, and high-fat dairy categories.

cereal category, 77.7% of the experimental participants increased purchases compared to 51.3% of control participants. These differences in individual data between experimental and control participants were similar in the follow-up phase compared to baseline for these three categories. The low-fat dairy category showed a difference (increase amount) favoring the experimental participants only in the follow-up phase (55.0% vs. 45.9%). Other data concerning the use and functioning of the NLS and outcomes related to changes in food purchases are discussed below.

DISCUSSION

This paper reports results of the initial studies of the NLS-1 and NLS-2 prototypes. The NLS was designed to help shoppers alter food purchases in order to fit the NCI's guidelines for reducing fat and increasing fiber in the diet. The overall results of the first two studies showed that the NLS can help users increase the purchases of some high-fiber foods and low-fat foods and decrease the purchase of high-fat foods. The group and individual data also suggested the NLS may have enhanced or expedited prevailing market trends. This is best shown by the changes made by experimental participants over and beyond changes made by control participants. However, at this point, we have no explanation for the failure to maintain reduction in the high-fat meat category (nor can we explain the initial increase in this category by the control participants during intervention).

Because individual food items were tracked, it was possible to delineate key items for which the difference in appropriate changes by experimental participants exceeded appropriate changes by control participants by more than 100%. Key items that showed decreases were hot dogs, sausage, frozen meat dinners, whole milk, and sour cream. Key items that showed increases were whole wheat pasta, whole wheat bread, bran muffins, high-fiber cereal, skim milk, 1% milk, nonfat yogurt, and canned tuna in water. Although it is tempting to suggest that programs simply focus on these same key items (there are not vast differences in eating patterns among population groups; Patterson & Block, 1988), our subsequent research suggests that key items can be influenced by sociodemographic characteristics, prominence of display and availability in the supermarket, media promotions, price, and prevailing market trends. Preintervention formative research may be able to identify potential key items for particular times, places, and shoppers.

The choice of starting in a relatively optimal setting with a more homogeneous group of participants, a strategy recommended for costly applied research (West, 1985), may have influenced the specific outcomes in a number of ways. For example, an estimate of percentage calories from fat for all food purchases across all participants and phases of the study was about 37%. This estimate was the same as the national mean (Koop, 1988). The experimental participants reduced calories from fat during intervention and follow-up by about 3%, and control participants remained about the same. However, the estimate of grams of fiber per day per person for all purchases across all participants and phases of the study was about 22 g. This estimate is twice the national mean, but somewhat below the NCI goal (Greenwald et al., 1986). Experimental participants increased fiber about 3.5 g during intervention and follow-up phases, whereas control participants remained about the same. An examination of food items indicated large purchases of fruits and vegetables by experimental and control participants across all phases of the study. It is possible that participants had reached a ceiling for purchases in this category. On the other hand, the observed changes in purchases did not affect mean dollars spent on food items. The mean was about $54 across all conditions and phases of the study.

At this point, it is unclear how the present study, using self-selected, middle-income shoppers who, perhaps, had already made food purchase and dietary changes, overestimated or underestimated the potential impact of the NLS. In other words, it is uncertain how the seemingly supportive environment for the intervention enhanced or detracted from the study's outcome.

One other caveat must be added about the over-

all results. Except for informal follow-up reports (see below), we do not know how information from the NLS and corresponding altered food purchases in the supermarket affected the preparation and composition of meals consumed within or outside participants' homes. Standard instruments exist to track eating patterns (e.g., Block, 1989), but these instruments rely on self-reports. However, if the changes in purchases observed with the NLS (i.e., decrease in fat, increase in fiber) are strongly related to food consumed and if those changes are maintained, then the NLS could produce a dietary change of some public health significance. For example, a 3% to 4% reduction in dietary fat should result in reduced risk for cardiovascular disease and cancer across a population (Koop, 1988).

Other data pertaining to the use, durability, and acceptance of the NLS were reasonably encouraging. Parts or all of NLS-1 and NLS-2 were used by over 1400 (nonpaid) individuals, although only several nonpaid shoppers in each store used all of the weekly programs. There were only seven instances of NLS breakdown (software problems fixable by reprogramming and user problems fixable through maintenance) across the two studies, and only a few instances of minor vandalism (also fixable through maintenance). NLS users reported high satisfaction with the NLS and use of the suggested strategies (purchase and meal changes). Store personnel and managers reported liking the NLS because the system did not disrupt store operations.

Based on feedback from NLS users, assessments of the procedures based on telephone interviews with participants after follow-up (e.g., "How were suggestions for new meals acted upon and with what consequences?"), study outcomes, and other practical considerations, we are planning changes for subsequent NLS prototypes. These changes include more individualization of content based on a user's literacy level and more emphasis on attracting and holding users. To meet these objectives, we are designing a coupon-dispensing system that will be part of the NLS. As a user progresses through the NLS programs, he or she will be able to select and receive individualized coupons. The coupons will be redeemable only for low-fat or high-fiber products and only by the designated user. The number of coupons available to the user will be contingent on their progress in meeting NCI goals. If the coupon system attracts and holds many new NLS users, the coupon system could make the NLS appealing to manufacturers and distributors. These commercial concerns could rent, lease, or buy the NLS (which, at present, costs about $10,000 each). In this way, the NLS could become a more typical addition to the supermarket.

Thus, the eventual goal of our subsequent research is to refine the NLS sufficiently so that it is an effective stand-alone nutrition intervention or can be used as part of a more comprehensive supermarket program. More generally, the NLS research illustrates the process of using well-recognized concepts and procedures (i.e., modeling, feedback, and goal setting), adapting those concepts and procedures to fit a specific domain (food purchases) and setting (supermarkets), and then, through additional field research, developing an easily disseminated system.

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