The Relationship of Parent and Child Food Choices: Influences of a Supermarket Intervention

by

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Specific Aims

The purposes of this study were to:

1. investigate the influence of a supermarket intervention on parent's food choices and preferences, and

2. assess how changes in parental food choices, as a result of a supermarket intervention, affected their children's food choices and preferences.

Overview

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 about 40% of the daily calories are obtained from fats and about 13% are from saturated fats. These eating patterns may contribute to the increased levels of cardiovascular risk factors (i.e., obesity, high blood pressure, high serum cholesterol) among American children (Lauer, Connor, Leaverton, Reiter, & Clarke, 1975; Frerichs, Srinivasan, Webber, & Berenson, 1976) and increased cancer risk (Koop, 1988).

Interventions during childhood appear to be important for reducing the risk in adulthood of heart disease and certain site cancers. Therefore, nutrition health promotion programs based on a foundation of behavior change and empirical studies of eating patterns should be encouraged for children.

Many individual, family, and environmental factors appear related to the development of food preferences in children. However, research has only begun to investigate the complex parent-child interactions which affect food preferences and eating habits. Furthermore, it is important to develop interventions which permanently change behavior, not just attitudes, knowledge, or short-term weight loss.

Researchers also have begun to acknowledge the importance of parental involvement in school-based nutrition education programs (e.g., Perry & Luepker, 1988) and treatment of childhood obesity (e.g., Epstein, Wing, Koeske, & Valoski, 1984). However, the low participation and high drop-out rates found in traditional parent (nutrition) education programs suggest that an alternative is needed (Perry, Crockett, & Pirie, 1987).

The Nutrition for a Lifetime System (NLS) discussed here provides one innovative alternative. The NLS is a public access, interactive information system which was located in the supermarket (Winett, Wagner, et al., 1989; Winett, Wagner, et al., 1990). Parents received feedback about supermarket food purchases in combination with nutrition information.

The effect of this family-based nutrition project on parents and children was evaluated. To date, few experimental studies have investigated how parents and children make changes in their food choices. Correlational studies concerning preference suggest that culture and family preferences are positively correlated with children's food preferences. Other studies have investigated how modeling and availability may affect consumption. Thus, the data from this study may add to our understanding of food preferences and consumption patterns. Such data may be used for designing more effective nutrition interventions for children and adolescents.

Background

Nutrition and Disease

The National Research Council (1989) reports, "A comprehensive review of the epidemiological, clinical, and laboratory evidence indicates that diet influences the risk of several chronic diseases." The evidence appears to be very strong for atherosclerotic cardiovascular diseases and hypertension; highly suggestive for certain forms of cancer; a predisposing factor in certain cases to dental caries and chronic liver disease; and important for producing obesity (National Research Council, 1989; p. 655).

As shown in Table 1, dietary factors play a prominent role in five of the ten leading causes of death for Americans (Koop, 1988). Diseases such as coronary heart disease, stroke, cancer, and diabetes remain leading causes of death and disability in the United States. Substantial scientific research over the past few decades indicates that diet can play an important role in prevention of such conditions. "It is evident that dietary patterns are important factors in the etiology of several major chronic diseases and that dietary modification can reduce these risks" (National Research Council, 1989, p. 655).

Evidence presented in the Surgeon General's recent landmark report (Koop, 1988) suggests that such overall dietary changes could lead to substantial improvements in

Table 1

Estimated Total Deaths and Percent of Total Deaths or the 10 Leading Causes of Death: United States, 1987 (from Koop, 1988)

Rank	Cause of Death	Percent of Total Deaths
1*	Heart Disease	35.7
2*	Cancers	22.4
3*	Strokes	7.0
4	Unintentional injuries	4.4
5	Chronic obstructive lung disease	3.7
6	Pneumonia and influenza	3.2
7*	Diabetes mellitus	1.8
8	Suicide	1.4
9	Chronic liver disease and cirrhoses	1.2
10*	Atherosclerosis	1.1

morbidity and mortality rates. The report's main conclusion is that disproportionate consumption of certain foods is now a major concern for Americans. While many macronutrients and micronutrients appear involved, the most solid evidence is that overconsumption of foods high in fats and underconsumption of foods high in complex carbohydrates and fiber may be most related to morbidity and mortality rates.

The following points are made in the Surgeon General's report (see Table 2):

Fats and Cholesterol. Epidemiologic, clinical, and animal studies provide strong and consistent evidence for the relationship between saturated fat intake, high blood cholesterol, and increased risk for coronary heart disease. Conversely, reducing blood cholesterol levels may reduce the risk for death from coronary heart disease. In addition, there is substantial, although not yet conclusive, epidemiologic and animal evidence in support of an association between dietary fat intake and increased risk for cancer, especially breast and colon cancer. Similarly, epidemiologic studies suggest an association between gallbladder disease, excess caloric intake, high dietary fat, and obesity.

Energy and Weight Control. Epidemiologic and animal studies have shown consistently that overall risk for death is increased with excess weight, with risk increasing as severity of obesity increases. The Surgeon General

Table 2

Nutrition Recommendations (from Koop, 1988)

---

* Fats and Cholesterol: Reduce consumption of fat (especially saturated fat) and cholesterol. Choose foods relatively low in these substances, such as vegetables, fruits, whole grain foods, fish, poultry, lean meats, and low-fat dairy products. Use food preparation methods that add little or no fat.

* Energy and Weight Control: Achieve and maintain a desirable body weight. To do so, choose a dietary pattern in which energy (caloric) intake is consistent with energy expenditure. To reduce energy intake, limit consumption of foods relatively high in calories, fats, and sugars, and minimize alcohol consumption. Increase energy expenditure through regular and sustained physical activity.

* Complex Carbohydrates: Increase consumption of whole grain foods and cereal products, vegetables (including dried beans and peas), and fruits.

* Sodium: Reduce intake of sodium by choosing foods relatively low in sodium and limiting the amount of salt added in food preparation and at the table.

* Alcohol: To reduce the risk for chronic disease, take alcohol only in moderation (no more than two drinks a day), if at all. Avoid drinking any alcohol before or while driving, operating machinery, taking medications, or engaging in any other activity requiring judgment. Avoid drinking alcohol while pregnant.

---

recommends that weight control may be facilitated by decreasing energy intake, especially by choosing foods relatively low in calories, fats, and sugars, and by minimizing alcohol consumption.

Complex Carbohydrates and Fiber. Dietary patterns emphasizing foods high in complex carbohydrates and fiber are associated with lower rates of diverticulosis and some types of cancer. The national norm for dietary fiber is 11 grams per day; the NCI recommendation is 25 to 30 grams per day.

The report also presents evidence concerning the diet-disease relationship:

Coronary Heart Disease. High blood cholesterol is one of the three major modifiable risk factors for coronary heart disease (CHD). The relationship of dietary fat and cholesterol to CHD is supported by extensive and consistent clinical, epidemiologic, metabolic, and animal evidence (although some controversy remains). These studies indicate that the formation of atherosclerotic lesions in coronary arteries - contributing to the risk for CHD - is increased in proportion to levels of total and LDL (low density lipoprotein) cholesterol in blood, which, in turn, are increased by diets high in total and saturated fat, but possibly decreased by diets containing polyunsaturated and/or monounsaturated fat and reduced total fat (30%) and saturated fat (10%).

High Blood Pressure. Dietary factors that clearly contribute to high blood pressure include obesity, diets high in fat, and excessive intake of sodium and alcohol. Thus, maintenance of desirable body weight should be a goal for the population.

Cancer. Studies of carcinogen-induced tumorigenesis in experimental animals and international epidemiologic comparisons have provided substantial but not conclusive evidence that dietary fat increases the risk for cancers of the breast, colon, and prostate. The results of epidemiologic investigations within more homogeneous population groups, however, are inconsistent. While inconclusive, research suggests that a decrease in fat consumption by the general public from the current 37 percent of total caloric intake might reduce the risk for certain cancers. Epidemiologic studies suggest an association between diets low in fiber and increased risk for colon cancer, while results from case-control studies are mixed. While inconclusive, evidence suggests that an overall increase in intake of foods high in fiber might decrease the risk for colorectal cancer.

Obesity. The extraordinarily high prevalence of obesity in the United States - one-fourth of American adults are overweight and nearly one-tenth are severely overweight - coupled with its role as a risk factor for diabetes, hypertension, coronary artery disease and stroke,

gallbladder disease, and some types of cancer, suggests that a reduction in the average weight of the general population may entail adopting a lifestyle that includes more physical activity and a diet containing fewer calories.

Gastrointestinal Diseases. Dietary fat, fiber, and alcohol are significant factors associated with gastrointestinal diseases, although the great variety of these conditions makes generalizations difficult. Current evidence on whether dietary fiber helps prevent diverticulosis is not conclusive. Similarly, whether dietary fiber helps prevent inflammatory or irritable bowel disease is uncertain. Nevertheless, evidence that dietary fiber helps treat and prevent constipation and manage chronic diverticular disease suggests the prudence of consuming diets higher in fiber and lower in fat.

In addition to these recommendations, it should be noted that differences in proportions of individuals consuming various foods among age, sex, race and income groups are generally quite small, while the proportions not eating some of the recommended foods are quite large in all subgroups (Patterson & Block, 1988). Thus, interventions which encourage appropriate eating habits could benefit many groups in our country.

Children and Nutrition

An overview of several research areas provides insight into the study of children and nutrition. This summary focuses primarily on children and early adolescents. The treatment of childhood obesity demonstrates the importance of intervening early and including parents in the program. Food preference research sheds light on the variety of factors which may influence children's food preferences (and, thus, consumption). Finally, a number of programs have been successful in decreasing risk factors, and changing attitudes, beliefs and behavior in children.

Research investigating the relationship of children and nutritional practices also involves diverse variables, i.e., developmental, parental, family, and ecological. A preliminary list of these variables and research studies is given in Table 3. Because these factors are intertwined in a complex way, it is difficult to investigate any singular set of variables. However, the following overview serves to highlight several important points that come from this research (see Table 4 for a summary).

Obesity. Fatness during infancy correlates with fatness in young adulthood. Research indicates that a significant proportion of obese youngsters do not "outgrow" their obesity (Charney, Goodman, McBride, Lyon, & Pratt, 1976). Obesity appears to be an increasing problem in

Table 3
Factors Affecting Food Choice

DEVELOPMENTAL	PARENTAL
Age 6,34,37	Style 14
Grade	Consumption 11
Eating Style (impulsive) 30	Parent Weight 13
Style (obesity) 15	Nutritional Knowledge 1
Exposure 5,7,34,39	Modeling 6,17,24,33,34,36
Health Concerns 2	Parent-Child Interaction Style 8,10
Locus of Control 2	
Eating Patterns 18	

FAMILY	ECOLOGICAL
Family Characteristics 25,26	Social Context 9,16
Socialization 27,31	Culture 6,27,34
SES	Meals at Home
Ethnic Background 38	T.V. 19,20,21
Residence	Peers 4,21,32
Family Size	Admired Adults/Advertisement 12,19,21
Attitudes 28	Education 18,33
	Reinforcement 3,23.29

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4 Bandura (1986)
5 Beauchamp & Moran (1984)
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7 Birch & Marlin (1982)
8 Birch, Marlin, Kramer & Peyer (1981)
9 Birch, Zimmerman & Hind (1980)
10 Bryan & Lowenberg (1958)
11 Burt & Hertzler (1978)
12 Caliendo & Sanjur (1978)
13 Charney, Goodman, McBride, Lyon & Pratt (1976)
14 Cross, Herrman & Warland (1975)
15 Drabman, Hammer & Jarvie (1977)
16 Duncker (1938)
17 Epstein, Nudelman, & Wing (1987)
18 Frank, Voors, Schilling & Berenson (1977)
19 Galst (1980)
20 Galst & White (1976)
21 Goldberg, Gorn & Gibson (1978)
22 Gorn & Goldberg (1982)
23 Hall & Holmberg (1974)
24 Harpers & Sanders (1875)
25 Hertzler (1983)
26 Hertzler & Owen (1984)
27 Hertzler & Vaughan (1979)
28 Hollis, Carmody, Connor, Fey, & Matarazzo (1986)
29 Ireton & Guthrie (1972)
30 Israel, Stolmaker & Prince (1983)
31 Kintner, Boss & Johnson (1981)
32 McCarthy (1935)
33 Perry & Luepker (1988)
34 Pliner (1982)
35 Pliner (1983)
36 Pliner & Pelchat (1986)
37 Rozin, Fallon & Mandell (1984)
38 Sanjur & Scoma (1971)
39 Zajonc (1968)

Table 4

Research Overview - Children and Nutrition

Obesity

*Fatness during infancy correlates with fatness in young adults

*Obese children are more likely to have obese parents

*Certain prenatal influences and feeding practices increase the risk of obesity

*Parental component important to effective intervention

Food preferences

*Potential influences include: parents, peers, and exposure

*Culture is a confound

*Most food preference research is correlational

Health Promotion

*Programs to decrease the risk of cardiovascular disease have been successful with children

*A variety of factors affect health, which includes diet

Interventions

*Most are school-based

*Parental involvement is crucial for behavior change and maintenance

Television

*Commercial/advertisements can influence children's food preferences

Culture

*Food preferences may not follow 1:1 with culture

*Difficult to pull apart

children as well as in adults. In addition, results from several large prospective studies indicate that obesity is an important long-term predictor for a variety of problems (e.g., Hubert, Feinleib, McNamara, & Castelli, 1983; Lew & Garfinkel, 1979). Hirsch and Knittle (1970) propose that because of the cellular composition of adipose tissue childhood onset obesity may be more resistant to treatment than adult onset obesity (i.e., the number of cells may remain constant; only the size of the cells changes upon weight loss). Thus, it is important for individuals to learn proper eating habits early.

The relationship between obese children and their parents has been investigated. Obese children are more likely to have obese parents (Charney, et al., 1976); less likely to lose weight in a weight loss program (Epstein & Wing, 1987); less likely to exercise (Epstein, Wing, Koeske, Ossip, & Beck, 1982); eat faster and take fewer chews per bite, interrupt their eating less, hesitate less between bites, and toy less with their food (e.g., Drabman, Hammer, & Jarvie, 1977). There is also considerable evidence that prenatal influences and feeding practices during infancy play a significant role in increasing the risk of obesity (e.g., Striegel-Moore & Rodin, 1985).

The mother-child interaction may be different for obese children than for normal weight children. Birch, Marlin, Kramer, and Peyer (1981) investigated the relationship

between the degree of fatness in young children and mother-child interaction behavior in an eating and non-eating situation. Results indicated that triceps skinfold thickness was correlated negatively with several verbal interaction measures. Mothers of fatter children talked less to their children in both settings, were less responsive to their children's behavior, gave their children less approval, and used less impulse control to keep the child focused on the task. During a lunch situation thinner children and their mothers ate less food and at a slower rate, talked more to each other during lunch about both food and nonfood topics, and made relatively more positive comments about the food. The lunch consisted of high-fat, low-fat food items (e.g., fried chicken; white bread). No "healthy" lunch was used for comparison.

The success of multifaceted programs for helping obese children lose weight has been shown. These programs appear promising, particularly if the programs include other family members, exercise, and changes in nutrition, as well as traditional behavior modification techniques (Epstein & Wing, 1987). Additional components, such as exercise, may be especially helpful for a successful long-term outcome (Stern & Lowney, 1986; Harris & Halbauer, 1973; Stalonas, Perri, and Kerzner, 1984).

It also seems that it is never too late to begin to practice healthful eating habits. There is evidence that when overweight persons lose their excess weight, and maintain that reduced weight, their life expectancy increases to the level of persons who were never overweight (Bray, 1987).

In conclusion, targeting young children and their parents for weight loss or weight control programs appears to be promising, especially if these programs include other family members and exercise. However, at this point, there appear to be minimal data about parent-child interactions concerning nutrition and meals, and how parental variables affect child variables.

Food Preferences. Although there is considerable variation in human food attitudes and preferences, little of this variance has been explained. Some research suggests that cultural background accounts for more of the variance than any other identificable factor (Rozin, Fallon, & Mandell, 1984). The most likely sources of within-culture variance are genetic factors and early experience. However, prior research has not yet unraveled how family influences affect children's food preferences and choices within different cultures (Rozin, et al., 1984).

Researchers have investigated the influence of a variety of factors on childrens' food preferences, including: parents and familiar adults (e.g., Rozin, et al.,

1984; Pliner, 1982; Pliner, 1983; Birch, 1980a; Harper & Sanders, 1975; McCarthy, 1935; Bryan & Lowenberg, 1958; Sanjur & Scoma, 1971; Weidner, Archer, Healy & Matarazzo, 1985), siblings, (e.g., McCarthy, 1935; Pliner & Pelchat, 1986) peers (e.g., Birch, 1980b), the social environment (e.g., Birch, Zimmerman, & Hind, 1980; Duncker, 1938), and exposure to different foods (e.g., Beauchamp & Moran, 1984; Birch, 1979a; Birch & Marlin, 1982).

The results of correlational research investigating the relationship between children's and parents' food preferences are surprisingly weak or absent (e.g., Bryan & Lowenberg, 1958; Birch, 1980a; Weidner, et al., 1985). However, as Birch (1980a) notes, the nature and strength of the relationship between children's and parents' food preferences have been obscured by methodological problems of data collection and analysis (e.g., group data, parent report). These results may be confounded by a strong cultural influence. For example, Birch (1980a) found that parental preferences are no more strongly related to their children's preferences than are the preferences of unrelated adults of the same subcultural group.

Similar findings appear in the correlational research which investigates the match between children's and parents' preferences. Some researchers have found that mother-child preferences were more closely correlated than father-child preferences (e.g., Birch, 1980a), while others have found

the opposite. Rozin, et al. (1984) found small positive correlations for food preferences, but they were equally related to mother and father. It may be that the shared culture and environment is more important than the relationship to the child (Pliner & Pelchat, 1986). Several studies have obtained similar results with sibling resemblance (e.g., Pliner & Pelchat, 1986). This is supported by a twin study which found no clear evidence for a genetic component in food preferences (Rozin & Millman, 1987). Although the results of this correlational study indicate a food preference resemblance in siblings, this was not significantly greater for twins than for non-twin siblings.

In addition, reported preference may differ as a function of food type. For example, Weidner et al. (1985) investigated food preferences for low fat, low cholesterol foods of 30 mother-child pairs. Results indicate that for "heart-healthy" foods, preferences of mothers and children were <u>not</u> related.

Because of the difficulties of collecting data from children, several studies have studied food preferences with young adults (instead of young children) (i.e., Rozin, et al., 1984; Pliner, 1983). The authors suggested that using young adults provided more reliable data because young adults had many years of exposure to their parents. Rozin et al. (1984) found small positive parent-child correlations

for food preferences. Children's preferences and attitudes were about equally related to those of their mother and father. Pliner (1983) found similar results. In his study, correlations with real parents were significantly greater than pseudoparents. Adolescent's food preferences seem to be more similar to their parents than younger children. In addition, Birch (1980b) found that older children were less affected by peer modeling than younger children. Singleton and Rhoads (1982) found that age significantly affected consumption and preference with children ages 3-12 grade. Thus, with age (and more time for learning through modeling), food preferences are more likely to become "set," and less likely to change.

Contradictory findings regarding food preferences have been found in exposure research. Typical protocols for exposure research involve asking participants to rate a food item which is presented in written form or prepared and placed on a plate. Subjects might be asked to rate their liking on a scale of 1 (dislike extremely) to 9 (like extremely) for a list of items on a questionnaire. Or the food is presented to them and they are asked if they would like to have it; the response is coded, such as no contact, smell, eat, etc. Generally, the results of this research indicate that there appears to be a weak, but positive relationship between exposure and food preferences (Beauchamp & Moran, 1984; Birch & Marlin, 1982). However,

it is difficult to separate out the effects of culture. Also, most of the exposure research has taken place in laboratory settings (e.g., Birch & Marlin, 1982).

Exposure tests conducted with 6-month-old infants and 2-year-old children indicated that a positive relationship existed between presentations of sucrose solutions and previous exposure of those infants to similar taste stimuli (Beauchamp & Moran, 1984). Intake of sucrose solutions during taste tests was related to prior dietary exposure to sugar water. This was not true, however, when the sucrose was put into a fruit-flavored drink base (Beauchamp & Moran, 1984). In addition, this was true of sweet, but not salty substances (Beauchamp & Moran, 1984). Thus, effects of exposure may depend on the medium.

Birch (1979a) did not find a significant increase in children's preferences as a result of exposure. In addition, she found large variablility in individual differences. Subjects in her studies (Birch, 1979a; Birch, 1979b) were 17 children age 3 to 4 years. Birch (1979b) found that preference and consumption were correlated, and that familiarity accounted for most of the variance. For adults, the exposure effect appears to be most pronounced when the stimulus is novel (Zajonc, 1968). However, Birch and Marlin (1982) found that with novel cheeses and fruits, preference was a function of increased exposure frequency.

Thus, there may be an interaction between frequency of exposure and familiarity with the stimuli.

Furthermore, there is evidence to suggest that the social-affective context is also important in the formation of children's food preferences (e.g., Birch, et al., 1980; Duncker, 1938). Birch, et al. (1980) found that reward and non-contingent attention conditions produced a significant effect on preferences, while nonsocial and snack time conditions did not produce a significant effect. Duncker (1938) found that the social context of presented information could produce temporary shifts in pre-school children's food preferences. In addition, peer models can significantly affect food selection of target children (Birch, 1980b).

In many other contexts, modeling has been shown to be a very powerful process by which children acquire complex behaviors (Bandura, 1986). With regard to food preference acquisition, modeling by related variables of "significant other" and "age of the child" were found to be important variables. Harper and Sanders (1975) found that mothers were more successful models than strangers and younger children were more strongly affected than older children. In addition, parental style may influence eating habits. Birch et al. (1981) found that mothers of fatter children talked less during food and nonfood settings.

In conclusion, the food preference research indicates that parents' and siblings' preferences influence the choice of the child. Also, older children seem to be more similar to their parents than younger children and less likely to be influenced by peer modeling. These relationships in the literature are neither that strong or consistent. However, it would appear then that if parental food preferences and choices were altered, their children's preferences and choices may also change.

Health Promotion Research. Children as well as adults may benefit from interventions which promote healthful eating as a way of preventing diseases, such as atherosclerosis. Specific behavior patterns that are learned in childhood and adolescence are implicated in the development of chronic diseases. These behaviors logically become the targets for early intervention (i.e., primary prevention) (Perry, Klepp, & Shultz, 1988).

However, it also is the case that a better understanding of health belief differences between children and adults is needed. For example, McKinney, Chinn, Reinhart, and Trierweiler (1985) found that for 7th-graders, although their ratings of health were correlated with their parents, the quality and content of their report was significantly different. In their study, 23 seventh-graders and one of their parents completed health questionnaires which focused on current health status and ways to

"maintain" or "damage" health. Ratings of health came from questions such as number of doctor visits. They found significant correlations between parent's and children's ratings of child's health, number of doctors visits, and number of school visists. The quality and content was evaluated by examining the relationship between prescriptive (e.g., dressing warmly) and proscriptive (e.g., not smoking) answers. The results indicate significant differences between parents and children for prescriptive and proscriptive answers. Thus, children and parents may have different cognitions on which they base their health care decisions (McKinney, et al., 1985).

Age of children also must be considered. Younger children (less than 10 years) appear to be more concerned about health and they rate their health more positively compared to older children (older than 13 years) (Altman & Revenson, 1985). If health behaviors are closely linked to cognitions regarding health (Rosenstock, Strecher, & Becker, 1988), then it is important to obtain these data. For example, behavior change interventions can be designed to fit different health beliefs. More definitive research in the areas of health behavior change and health beliefs is needed before successful interventions can be developed (Altman & Revenson, 1985).

There is evidence, though, that early intervention is necessary. Atherosclerosis, the progressive development of lipid and fibrous tissue plaques in the intima lining of the arteries, can be a pediatric problem (Kannel & Dawber, 1972). The fatty streak stage of atherosclerosis is already evident in many children (Berenson, et al., 1980; Strong & McGill, 1969), and progression to the plaque stage is not unusual by age 20 (McGill, 1980). Elevations in plasma cholesterol have been reported in a sizable number of children and adolescents (e.g., Lauer, et al., 1975). Also, youth blood lipid levels were found to be predictive of adult levels (Berenson & Epstein, 1983).

All the major ongoing community-wide primary prevention programs do have youth commponents (Perry, et al., 1988). Programs like the Bogalusa Heart study and Heart Smart support early intervention for the primary prevention of chronic disease. Heart Smart is a cognitive behavioral intervention designed to address health enabling and reinforcing factors within the school environment (Butcher, et al., 1988) to prevent cardiovascular disease through early dietary and activity intervention. It is a comprehensive cardiovascular (CV) health promotion program for elementary school children which is based on data from the Bogalusa Heart Study (Frank, Farris, Cresanta, Webber, & Berenson, 1985). It includes classroom curriculum, aerobic fitness, school lunch, and teacher staff development

components. Also, a parent newsletter delivers information and recipes, and encourages exercise and participation in risk factor screenings. Research results of this study should be available soon, and may indicate new recommendations for cholesterol and lipid profile, blood pressure levels, and aerobic capacity with children.

Since the diet of the typical American family is affected by a variety of factors unrelated to the maximization of health, it would seem important to gain information about attitudes towards low fat, low cholesterol foods, and their consumption by family members (Weidner, et al., 1985). Perceptions of family members on each other's food preferences could conceivably have an impact on menu planning and food selection. For instance, inaccurate parental perceptions of their child's attitudes expressed towards certain foods may present an obstacle to change of dietary habits and the introduction to new foods.

Intervention Programs. Most of the interventions that focus on children's eating habits have used the school setting. The school is a natural setting for implementing such programs, since they can be built into the educational setting, reach a very large number of children, are relatively inexpensive, run continuously, include appropriate counseling and social support, can sometimes alter school cafeteria offerings, and be inaugurated before problems become too serious (Bloom, 1988, p.139).

School-based interventions can increase students' knowledge (Fieldhouse, 1982; Stare, Aronson, & Behan, 1986). However, few programs have successfully altered children's eating patterns. This may be attributable to a number of factors, e.g., a limited understanding of children's eating patterns, weak intervention strategies, poor research designs, or outcome measures that are unable to detect changes in behavior (Saylor, Coates, & Killen, 1982).

Perry, Mullis, and Maile (1985) did find significant results for behavior change with their 10-week "Hearty Heart and Friends" school-based program. Using a 24-hour recall measure they found that children in the experimental group significantly decreased their reported consumption of sugared cereal and fried foods and significantly increased their consumption of dark green vegetables and fruit. No significant results between groups were found for potato chips, meat, fish, or chicken. They suggested that parents be included in future interventions.

Perry and Luepker (1988) completed an evaluation study to determine the effect of including parents. The study, with over 2000 third grade children, compared the efficacy of a school-based program to an equivalent home-based program. The authors were interested in fat and sodium consumption. The school-based program consisted of 15 lessons which were presented over five weeks in the third

grade classrooms. The home-based program consisted of a five-week correspondence course with parental involvement. Parents of the home-based intervention group were invited to attend screening sessions and received information kits which the children took home. Both programs incorporated information, modeling, skill-building, and goal-setting. The results indicate that students in the school-based program had gained significantly more knowledge at posttest than students in the home-based program or controls. Students in the home-based program, however, reported more behavior change, had reduced the total fat, saturated fat, and monounsaturated fat in their diets, and had more of the encouraged foods on their food shelves (Perry & Luepker, 1988).

Similarly, in their research to increase healthy snacks, Stark, Collins, Osnes, and Stokes (1986) found that generalization to home only was achieved when program generalization procedures were implemented. Likewise, Epstein, Masek, & Marshall (1978) found little generalization when they failed to include parents. Although they found a decrease in caloric intake as a function of either increasing activity or eating regulation procedures (i.e., food color coding) with obese children in a school setting, these changes in food selection were only observed during the eating regulation procedures. Epstein,

Nudelman, and Wing (1987) found positive results with family involvement even through the follow-up phase.

Since parental involvement may be crucial for the implementation and maintenance of new health behaviors, interventions should investigate ways to include parents. However, few studies have evaluated the importance of the family context on changing health-related behaviors (Perry, et al., 1987). One program, the San Diego Family Health Project (Nader, et al., 1986) focused on the family as a whole. The intervention consisted of 12 weeks of intensive intervention with six maintenance sessions. Participants were 206 Mexican-American and Anglo families with a 5th or 6th grade child. The 90-minute family meetings were constructed within a cognitive-social learning framework and included exercise classes, separate adult and child education groups, family management sessions, and heart-healthy snacks. A multivariate measurement program was conducted at three-, six-, twelve-, and 24-months which evaluated variables such as fat intake, height and weight, and fasting serum cholesterol. Also, an intensive evaluation via direct observation of targeted health behaviors was completed during a visit to a local zoo. The results of the observation study indicate that direct observation of physical activity and dietary behaviors discriminated between intervention families (n=30) and control families (n=30) (Patterson, et al., 1988). Thus,

health education interventions which include all members of the family may promote longer-lasting health behavior changes (Nader, et al., 1986).

Television. The effects of television programming on children are quite powerful. Research has shown that children's snack choices can be affected by commercials (Galst, 1980; Goldberg, Gorn, & Gibson, 1978). Gorn and Goldberg (1982) found that eliminating candy commercials proved as effective in encouraging the selection of fruit as did exposing subjects to fruit commercials or nutritional public service announcements. In their study, four conditions (candy commercials, no commercials, fruit commercials, or public service announcements) were evaluated during two weeks of daily (30 minutes only) T.V. exposure at a summer camp for 288 5-8 year old children.

Also, Galst and White (1976) and Galst (1980) found that television has a significant effect on food preferences. In the study by Galst (1980) children were exposed to cartoons with commercials for food products with added sugar content or commercials for food products with no added sugar content and pro-nutritional public service announcements (PSAs), with or without adult comments about the portrayed product. Subjects were allowed to select a snack each day after the T.V. observation. Subject selection of snacks with added sugar was most reduced by exposure to commercials for food products without added

sugar and PSAs with accompanying positive comments by adult co-observers.

In addition, Dietz and Gortmaker (1984) found that childhood obesity correlated with an increased number of hours spent watching television. Jeffrey and Lemnitzer (1981) also have suggested that the most powerful general influence on eating behavior is advertising. They maintain that "healthy" foods are rarely discussed, and snacking is encouraged. Thus, the media environment is important to the diet of children.

Culture. The role of culture in the development of food preferences was discussed earlier. It was noted that because of factors such as weak methodology, familial and cultural variables are not easily separated. The research indicated that each generation may learn something new or different about food preferences and eating habits. Although cultural factors are important, it is not always clear how culture affects particular family's food preferences and choices (Hertzler & Owen, 1984).

Hertzler and Owen (1984) propose adoption of a systems framework which is interdisiplinary to study food habits. In their approach, the focus is on the family as a system, with many factors interacting. Caliendo & Sanjur (1978) have also noted that food choices made by a family depend on physiological, psychosocial, economic, environmental, and cultural factors. While future research in nutrition must

evaluate the whole system, evaluating how a change in parental behaviors affects their children's behaviors is a first step in the much more involved, longer-term process.

More Specific Interventions

In recent years, point-of-purchase interventions for encouraging nutritious food selections have been implemented in cafeterias, restaurants, and supermarkets (e.g., Mayer, et al., 1986; Dubbert, et al., 1984; Wagner & Winett,1988). The advantages of in-store campaigns include greater saliency, immediacy, specificity, and ready access; the disadvantages include less time for comprehension, interaction, and less incisiveness of interventions because of commercial restrictions (Winett, King, & Altman, 1989, p.268). In most cases, though, these programs have usually not evaluated outcome for individual consumers at specific sites (Mayer, Dubbert, & Elder, 1989). Further, although community-based programs may reach a large number of individuals (e.g., Puska, et al., 1982; Blackburn, et al., 1984), it may be the case that a simpler and much more focused approach could be effective (Winett, King, et al., 1989, p. 267). An emphasis on the specificity and proximity of food labelling is recommended by Mayer, et al., 1989.

The Nutrition for a Lifetime System (NLS) followed these recommendations. It had instructional, modeling, prompting, commitment, and feedback components that in prior research positively influenced the choice of more nutritious

food purchases and meal selections (Winett, Kramer, Walker, Malone, & Lane, 1988). The NLS will be described at length in a later section.

One study has already evaluated food choice segmentation with children. Michela and Contento (1986) found that three factors identified groups with respect to motivations, they were: taste-oriented, health-oriented, and multiple-motive. In their study, elementary children provided ratings of 15 foods in terms of possible choice criteria and social or environmental influence. Food consumption and cognitive-developmental levels were measured. The researchers believe that messages tailored to each type of group could improve the effectiveness of an intervention.

Summary

In conclusion, there are many factors which affect children's dietary practices, such as weight (and parent's weight), preferences, modeling, and culture (see Tables 3 & 4). Research indicates that nutrition programs can be successfully implemented with children. Parents play a part in the development of food preferences and eating patterns, and their involvement appears to be crucial for behavior change and maintenance. Including a parental component seems to enhance program efforts. Other refinements are needed, however, such as using more specific interventions and individualized feedback which are matched more closely

to specific populations (e.g., supermarket shoppers).

Interventions which are designed to change behavior as well as attitudes have begun to show promise. The parental component appears to be crucial to this process, although traditional parent education programs have had only minimal success. Thus, interventions to change the eating behaviors of children should be designed for early intervention but include parents in innovative ways.

The NLS attempts to meet the criteria for changing food purchases and meal preparations. It also is important to examine how a parent-based nutrition intervention with easy public access can affect the children of these participants.

This study investigated the influence of a supermarket intervention on food choices. Pre- and post-intervention measures were administered to parents and children who participated in the NLS study. Is is important to note that the NLS was designed to eventually promote modest but meaningful changes with many NLS users. Thus, its eventual goal was to provide a large scale nutrition intervention via the multiplier effect of many smaller individual changes. For any given sample of users, changes in purchases and meals are likely to be small. However, it was hypothesized that parents and children in the experimental condition would make significant changes in choices consistent with lowering fat and increasing fiber in the diet compared to the control condition.

Method

Overview

The purposes of this study were to: (a) investigate the influence of a supermarket intervention on parent's food choice and (b) assess how changes in parental food choices affect children's choices.

The food choices of parents and their children were investigated using pre- and post-intervention interviews. Families were participating in the Nutrition for a Lifetime System studies (NLS-1 & NLS-2) (Winett, Wagner, et al., 1989; Winett, Wagner, et. al., 1990), which were supported by the National Cancer Institute.

The NLS was a prototype interactive information system which was located in the supermarket. It was designed to help users decrease high-fat food purchases and increase high-fiber food purchases by providing nutrition education, goals for change, and feedback on progress.

The measures and procedures used in the author's family study are noted, and those used in the overall NLS are separately noted. Participants in the family study also were participants in the NLS study.

Setting

This study was conducted in a large supermarket in Blacksburg, Virginia. Blacksburg is a rural community with a population of approximately 35,000; the largest employer was Virginia Polytechnic Institute & State University, which

employed approximately 5000 persons with about 23,000 students. The store was part of the largest chain of supermarkets in the country. The store had approximately 40,000 square feet, and was open 24 hours per day.

Participants

Family Study Selection

Participants were 24 families with children ages 8 to 15 years who were participating in the NLS studies. Thirteen families (7 experimental and 6 control) were recruited from the NLS-1 study and 11 families (4 experimental and 7 control) were recruited from the NLS-2 study. One target child was assigned from each family. The target child was the oldest child from 10 to 13 years, or an only child. Seven families were single parent families. A single parent family was defined as a family with only one parent completing the pre- or post-assessment measures. Of these, four mothers were divorced/separated, one husband was employed at another location, one mother did not understand English well enough to complete the pre-assessment forms, and one mother began a restricted diet during the intervention phase. Twenty-four children and 41 parents were interviewed.

Recruitment

NLS. NLS participants were recruited face-to-face at the supermarket location by graduate students in clinical psychology. Recruitment of participants proceeded in a step-

by-step fashion which followed the plan outlined in Table 5. Participants were paid (up to $80.00) for their participation in the NLS project. Payment was not contingent on alteration of food purchases, but only on completion of forms and handing in of receipts.

Family Study. Family participants were recruited by mail, with a follow-up telephone call. All NLS participants with children ages 8 to 16 received a descriptive letter and informed consent form (see Appendix A). Consent to participate was obtained from parents in writing prior to the interview, and from children verbally at the time of the interview. Informed consent forms were completed by 34 families.

Family Interviews

Appointments were scheduled by telephone. Participants agreed to be interviewed two times during the NLS project. Additional payment ($20.00) was provided for their participation in these interviews.

Family Participant Characteristics

Demographic information is provided in Table 6. The mean age of the children was 11.2 years. The modal age range of both mothers and fathers was 41-45 years (the range was about 26 to 50 years for mothers and 26 to 60 years for fathers).

Table 5

NLS Subject Recruitment plan (NLS-1 and NLS-2)

Step 1	Schedule on-site recruitment
Step 2	Place poster with tear-off reminders in supermarket 1-3 weeks prior to recruitment
Step 3	Train graduate students to recruit
Step 4a	Recruitment begins; staff approach customers in store with question, "Are you interested in hearing about the Nutrition Project?"
Step 4b	Describe study to interested shoppers
Step 4c	Obtain commitment from participants, take phone #, give information about introductory meeting (NLS-1); or obtain signed consent, demonstrate system and provide materials (NLS-2)
Step 5	Send thank you letters (NLS-2) or make reminder calls about Introductory Meeting (NLS-1)
Step 6	Explain study in detail at the Introductory Meeting (NLS-1), participants complete pre-intervention measures, sign informed consent, provide packet with baseline Opscan forms (NLS-1) or make explanatory calls to participants who completed informed consent forms at the store to be sure they understand the directions (NLS-2)

Table 6

Demographic Information of Family Participants

Group	Children (N=24)	Parents (N=41)
Age	Mean 11.2 years (SD=2.14)	Modal Range 41-45 (Female) 41-45 (Male)
Education		Modal Range > 50% higher ed.
Income		Modal Range $50-60,000
Height		Approximate Mean 5'5" (F) 5'10" (M)
Weight		Approximate Mean 141 (F) 177 (M)

Participants were primarily middle to upper-middle socioeconomic status; greater than 50% had one or more family member who had or was working towards a graduate degree; the educational range was from middle school to doctorate level. The modal income range was $50,000-60,000 (the range was from less than $10,000 to greater than $60,000).

Mean height and weight were calculated from ranges, by using the middle number per range. The approximate means for height and weight of mothers in the Family Study was 5 ft. 5 in. (range from 5'1" to 5'10"), and 141 pounds (range from 113 to 200), respectively. The approximate means for height and weight of fathers in the Family Study was 5 ft. 10 in. (range from 5'0" to 6'1"), and 177 pounds (range from 143 to 208).

Measures

Family Study

Card Sorting Task. A Card Sorting Task (CST) was designed for use in this experiment. The CST was composed of five card sets (i.e., Snacks, Grains, Dairy, Entrees, and Side Dishes). It was based on a task used by Birch (1980a). Each card set contained either six or eight food photographs (see Appendix B). Each set contained 3 or 4 low-fat, high-fiber items (e.g., apple) and 3 or 4 high-fat low-fiber items (e.g., low-fiber cereal). Ten categories were analyzed (e.g., low-fat, high-fiber snacks). See Table 7

Table 7
Items from Card Sorting Task

Food Category	% Calories From Fat	Fiber (in grams)
DAIRY		
High-Fat:		
Whole Milk	50	0
Eggs	65	0
Cheese	70	0
Low-Fat:		
Low-Fat Milk	30	0
Low-Fat Cottage Cheese	10	0
Low-Fat Yogurt	20	0
GRAINS		
Low-Fiber:		
Sugar Cereal	10	0
White Bread	13	0
Doughnuts	55	0
High-Fiber:		
High-Fiber Cereal	10	3-10
Whole-Wheat Bread	25	2-3
Bran Muffin	30	1-2
ENTREES		
High-Fat:		
Spaghetti/Meat	35	0
Fried Chicken	35	0
Fish Sticks	40	0
Hot Dogs	80	0
Low-Fat:		
Spaghetti/Tomato	<10	0
Pasta/Vegetables	0	0
Chicken Breast	<10	0
Cheese Pizza	30	0
SIDE DISHES		
Low-Fat:		
Potato	0	2
Rice	0	0
Salad	0	1
Broccoli	0	2
High-Fat:		
Macaroni/Cheese	60	0
Bacon	75	0
French Fries	45	0
SNACKS		
Low-Fat:		
Dried Fruit	0	2
Apples	<10	3
Banana	<10	2
Popcorn	0	2
High-Fat:		
Crackers	40	0
Potato Chips	60	0
Cookies	50	0
Peanuts	75	0

for a summary of food items by category, and their fat and fiber content.

Participants sorted the food cards into two piles to indicate low or high frequency of consumption. Card sets were placed into piles for "a little" or "a lot" to answer three self-report questions (i.e., behavior, preference, and knowledge) (see Table 8). For example, participants sorted the cards into two piles to indicate what foods they ate a little or a lot for the behavior question. Perry, Mullis, and Maile (1985) used these questions in a task they designed.

Scoring was derived by assigning one point for each a low-fat high-fiber food in the high frequency group and one point for each high-fat low-fiber food in the low frequency group (see Figure 1). Scores for the CST ranged from 1 to 8 points.

Food History Questionnaire. A Food History Questionnaire (FHQ) was designed for use in this experiment (Appendix C). The FHQ was used to obtain information about an individual's usual diet. It was based on the (standard) Health Habits and Diet Questionnaire (Block, Hartman, Dresser, Carroll, Gannon, & Gardner, 1986), which has been used as a main outcome measure in a number of large-scale nutrition interventions (e.g., National Cancer Institute supported, University of Massachusetts and University of Minnesota projects). The FHQ was a self-administered diet

Table 8

Card Sorting Task Questions

1. What do you eat most often?	(behavior)
2. What would you most like to eat?	(preference)
3. What do you think you should eat?	(knowledge)

	1 "A Little" (high-fat,low-fiber)	2 "A Lot" (low-fat,high-fiber)
Sample Answer:		
	potato chips	crackers (incorrect)
	cookies	apple
	peanuts	dried apricots
	popcorn (incorrect)	banana
Score:	3 out of 4	3 out of 4 = 6 out of 8 Total score=6

Figure 1 Sample Card Sorting Task scoring for one question in one category

history questionnaire which took about 20 minutes to complete.

Participants estimated the frequency of consumption (i.e., by day, week, or month) for 56 food items (e.g., apples, beans, hot dogs). These items were divided into 11 categories (e.g., low-fat dairy) (see Table 9). Each food item was scored by determining the number of times per month it was consumed. Sample FHQ items and scoring are presented in Figure 2. Parents were allowed to assist younger children with the FHQ.

Parent Rating Form and Child Rating Form. The Parent Rating Form (PRF) and Child Rating Form (CRF) were based on the Health Beliefs Scale (Janz & Becker, 1984). These forms (see Appendix C) were used to assess food preference/choice, knowledge, availability, and communication. Questions were rated on a 4-point scale (1 = Not At All to 4 = A Lot). PRF questions are provided in Table 10. Sample questions on the PRF included: (a) How much does your child influence what you eat? and (b) How strong is the relationship between what your child eats and how well s/he feels on a daily basis? CRF questions (see Table 11) included: (a) How much is food your parent buys and serves like food other parents serve their children? and (b) How much is what you eat related to how often you get sick?

Table 9

Food History Questionnaire Categories and Items

Category	Food Items
Fruit	Apple, Orange, Banana
Low-Fat Meat	Pasta with Tomato Sauce & Pizza with Cheese
Low-Fat Fish/Pltry	Chicken, Fish Filet
Low-Fat Vegetables	Beans, Broccoli, Carrots, Salad, Potatoes, Rice, Brown Rice
Low-Fat Dairy	Low-Fat Yogurt, Skim Milk, 2% Milk
High-Fiber Grains	Whole Wheat Bread, Extra High-Fiber Bread, High-Fiber Cereal, Extra High-Fiber Cereal
High-Fat Meat	Hamburger, Beef, Beef Stew, Pork, Pasta with Meat Sauce, HotDogs, Ham, Bacon, Sausage
High-Fat Fish/Pltry	Fried Chicken, Chicken, Fish Sticks, Fish Filet
High-Fat Vegetables	Cole Slaw/Potato Salad, French Fries, Vegtables with Cheese Sauce
High-Fat Dairy	Eggs, Cheese, Whole Milk Regular Yogurt
Low-Fiber Grains	Bread, Cold Cereals

Food Group	Item	Amount	Total Score
			# per month
	Apple	3/month	3
	2% Milk	1/day	30
	Beans	2/week	8
Fruit	orange		6
	banana		15
	apple		8
		category total =	29

Figure 2 Sample Food History Questionnaire scoring for several items

Table 10
Questions from Parent Rating Form which were analyzed

1.	How much do you influence the foods your child eats
2.	How much does your child influence what you eat
	How likely is it that you could influence a change in your child's...
3.	breakfast selection
4.	dinner selection
5.	snack selection
	How likely is it that your child would...
6.	accept a change in food you offer
7.	continue to eat new foods which you buy
8.	How strong is the relationship between what your child eats and how well s/he feels on a daily basis
9.	How likely is it that what your child eats is related to his/her health
10.	How likely is it that your child will become ill now or in the future by not eating a nutritionally sound diet?
	How confident are you that your child can make healthy food choices for...
11.	dinner
12.	snack
	During the last month, how often did you discuss the following nutrition information...
14a.	sugar content
14b.	fat content
14c.	fiber content
14d.	advertising
14e.	cost
14f.	vitamin/mineral content
	What does your child...
15.	not eat
16.	like
17.	dislike
18.	eat for breakfast
19.	eat for snack
20.	eat for cereals
21.	eat for breads
	How much do these things affect what your child eat...
22a.	child's age
22b.	what husband eats
22c.	time
22d.	cost
22e.	mother's preference
22f.	television
22g.	peers
22h.	child's schedule
22i.	child's preference

Table 11

Child Rating Form Questions which were analyzed

	Of the foods your mother serves you, how much
1a.	do they have variety
1b.	do they taste good
1c.	would other kids like to eat them
1d.	are they healthy
1e.	are they what you like
1f.	are they often the same
2.	How much is food your mother serves like other mothers
	How much do you believe you could change the foods you eat for...
3.	breakfast
4.	dinner
5.	snack
	How much is what you eat related to how...
6.	you feel each day
7.	often you get sick
8.	How confident are you that you can make healthy food choices for a snack
9.	How much food do you buy on your own without your mother

Reliability. A food observation form was used to evaluate the reliability of the FHQ measure (form provided in Appendix C). Participants in the NLS-2 study were asked for their permission for the experimenter to observe what food products they had in their home during the post-assessment interview (similar to Perry & Luepker, 1988). Participants showed the experimenter 4 food types: rice, bread, cereal, and milk. The experimenter wrote down the name/brand of each item (i.e., brown or white rice). This was used to evaluate the match between availability and the FHQ report.

The NLS Study

Food Purchases. Intended food purchases were provided by participants via the NLS computer. Participants indicated what they were planning to purchase during that shopping trip. These purchases were measured by amount (in mean grams per week) and frequency of purchase. The frequency was determined by the mean number of times an item was entered each week into the NLS. Family participants used the NLS an average of 13 weeks (mode).

Actual food purchases were obtained from detailed receipts. Participants sent these receipts back in envelopes which were provided by the experimenters. Receipts offered extensive information about products, including a description, amount and price (see Appendix F).

These purchases were measured by amount (in mean grams per week) and mean frequency per week of purchase.

Based on food type and nutritional content (Adams, 1975; Pennington & Church, 1985; & USDA, 1989), items for intended and actual were placed into 14 food categories. These included: Beverages; Low-Fat Meat; High-Fat Meat; Fresh/Frozen Fruits & Vegetables; High-Fiber Grains & Cereals; Low-Fiber Grains & Cereals; Low-Fat Oils, Dressings, Soups & Sauces; High-Fat Oils, & Dressings, Soups & Sauces; Other Low-Fat/High-Fiber Foods; Other High-Fat/Low-Fiber foods; Low-Fat Dairy; High-Fat Dairy; Low-Fat Fish & Poultry; High-fat Fish & Poultry.

Additionally, macronutrient data were analyzed. It was possible to derive a "percentage calories from fat" and "daily per capita consumption of fiber" for intended and actual purchases using a measure of "cooked yield" from an uncooked food item (e.g., meat; Adams, 1975) and updated dietary fiber data (USDA, 1989), and (for fiber) the number of household members.

Procedure

Family Study

Pre- and post-intervention interviews were conducted at the home of each participant family. Data were collected during two phases, from October, 1988 through May, 1989 (NLS-1) and June-October, 1989 (NLS-2) (see Figure 3). Participants were individually interviewed by graduate

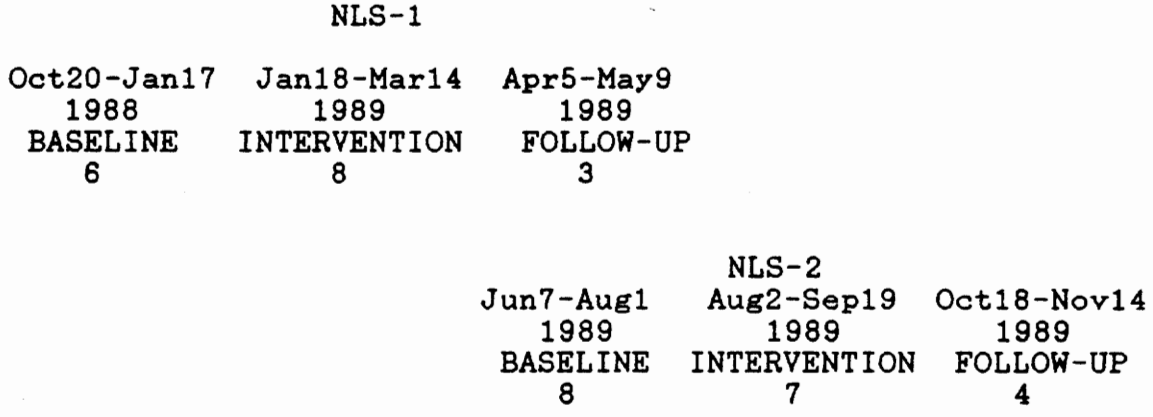

Figure 3 Experimental Plan for the NLS Nutrition Project

students in clinical psychology. Pre-intervention interviews were scheduled during the baseline phase. Post-intervention interviews were scheduled no later than four weeks following the intervention.

Pre-assessment interviews for Study 1 were scheduled from January 4, 1989 through January 15, 1989. Post-assessment interviews were scheduled from March 12, 1989 through April 9, 1989. Pre-assessment interviews for Study 2 were scheduled from June 30, 1989 through August 3, 1989. Post-assessment interviews were scheduled from September 6, 1989 through September 20, 1989. Family interviews were completed in approximately 1 1/2 hours.

CST. A response board was used to assist participants during the CST presentation. Cue words for each of the three questions were written down the side of the board (i.e., do eat, would like to eat, should eat). The words "a little" and "a lot" were written across the top of the board. For each set of cards the interviewer said, "Put these cards into two sets to indicate which foods you eat a little or a lot." Next, the interviewer said, "Put these cards into two sets to indicate which you foods you would like to eat a little or a lot." Finally, the interviewer said, "Put these cards into two sets to indicate which foods you should eat a little or a lot." The interviewer gave these instructions for each set of cards.

The NLS Study

NLS. The NLS was a public-access interactive information system which included a computer, color touchscreen monitor, printer, and two videodisc players. It was housed in a specially designed kiosk (58 cm wide, 109 cm deep, 213 cm high) (see Figure 4). System parts are shown in Figures 5a and 5b.

NLS Measures. The computer collected and analyzed information about **intended** food purchases via an opscan reader (NLS-1) or touchscreen entry (NLS- 2). Two opscan forms were completed by NLS-1 participants to enter intended purchases, which included 209 food items (see Appendix D). NLS-2 participants used a touchscreen entry system (see Appendix E) to input food items they intended to purchase. A shopping list or "map" was designed to help uses enter items (see Appendix D). Intended purchase data were collected during the baseline and intervention phases with items placed into 14 food categories as noted above.

Actual purchase data were derived from detailed shopping receipts which were coded and entered into a computer by trained data entry persons to provide information about actual food purchases. Detailed information about food purchases (e.g., carrots 2 lb) was obtained from these receipts (see Appendix F). Actual purchase data were collected during the baseline,

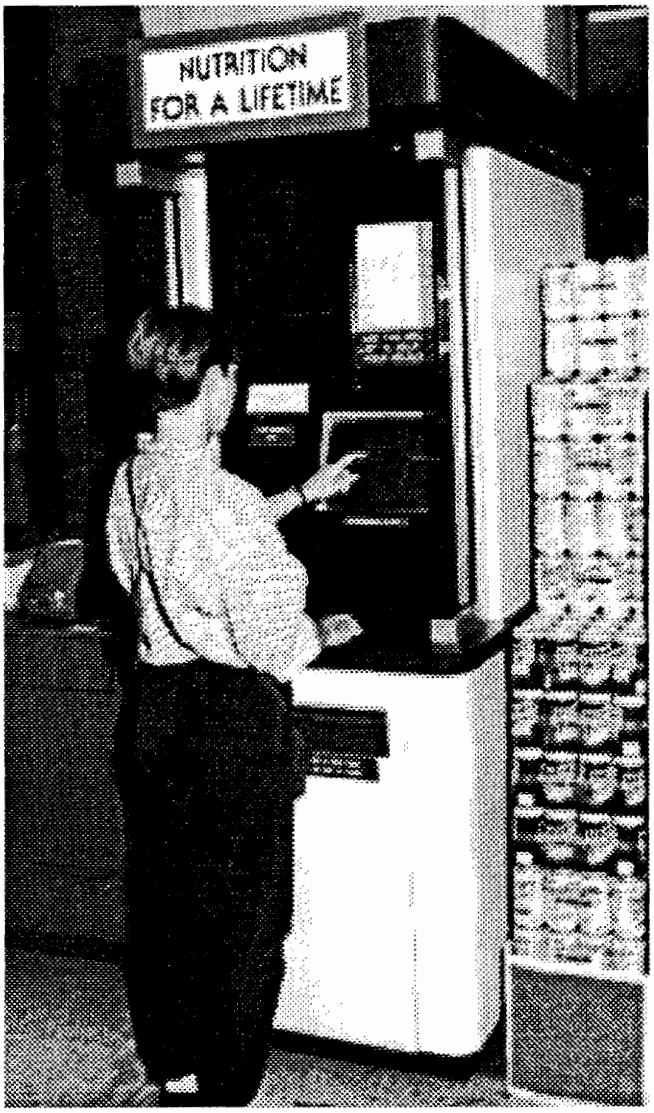

Figure 4. NLS in the supermarket setting

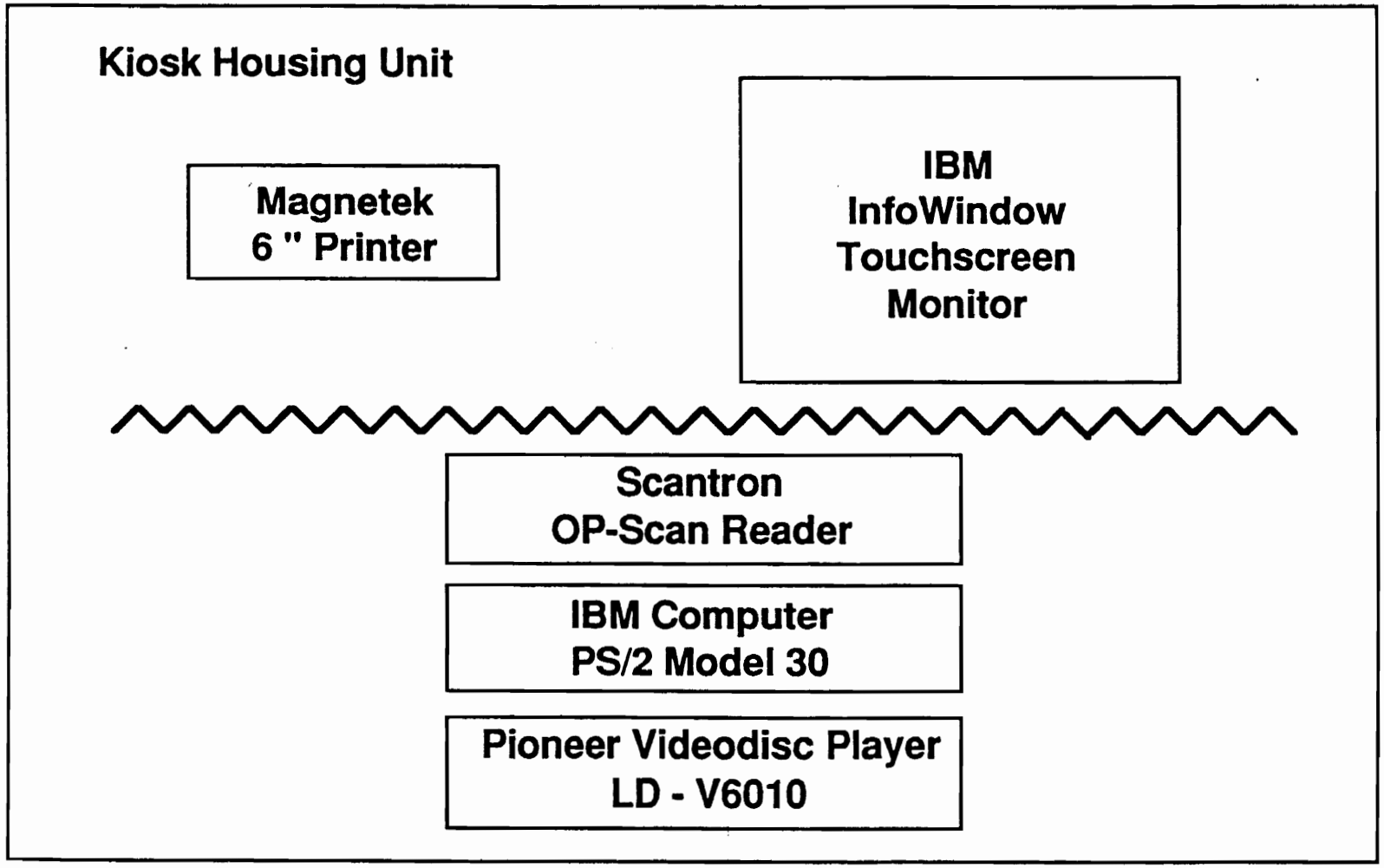

Figure 5a. NLS hardware system parts (NLS-1)

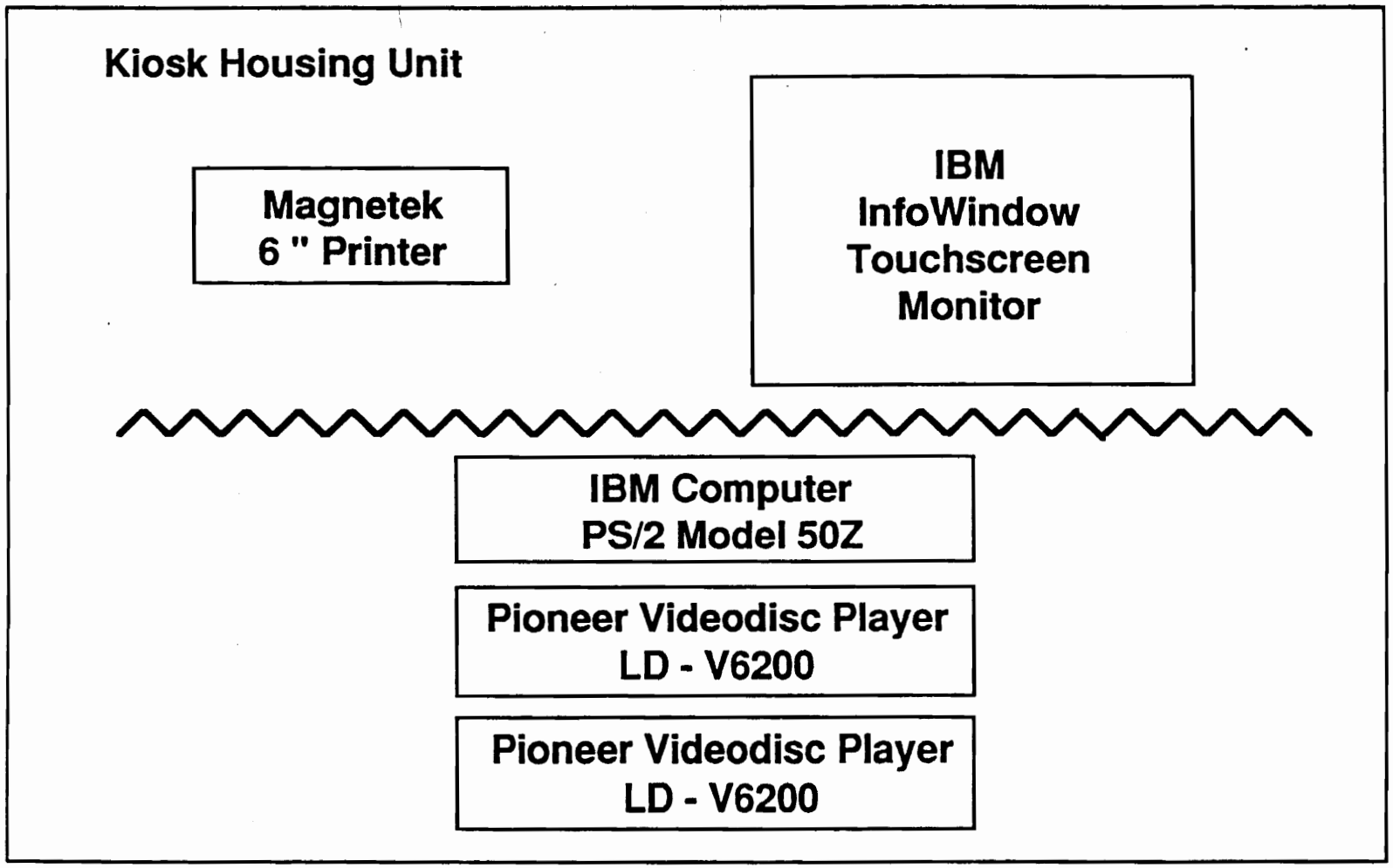

Figure 5b. NLS hardware system parts (NLS-2)

intervention, and follow-up phases with items placed into the same 14 food categories as intended purchase items.

Study Phases. The phases were: baseline (6 weeks), intervention (8 weeks) and follow-up (3 weeks) (NLS-1); and baseline (8 weeks), intervention (7 weeks) and follow-up (4 weeks) (NLS-2). Holiday breaks were taken during NLS-1. The dates are given in a time-line in Figure 3 above.

Participant Assignment. Participants in the NLS were randomly assigned to the experimental or control condition during the end of the baseline phase using a stratified random selection procedure. Participants were assigned based on a median split of: (a) dollar amount spent per week (actual purchases) during baseline above or below $60.00, (b) system use above or below 3 times, and (c) whether or not families had children. Experimental participants only received the intervention.

Intervention. The intervention consisted of nutrition education (presented via videodisc programs) and feedback with specific goals (printed on paper for participants to take home) which focused on reducing fat and increasing fiber in supermarket purchases and subsequent meal preparation. The NLS used a prescriptive, successive approximation approach that emphasized gradual change. Participants viewed a different videodisc program each week for six weeks (NLS-1) or five weeks (NLS-2). The duration was about 2-8 minutes each (see Table 12 for a program

Table 12
Outline of Videodisc Segments

Week		Themes/Strategies
NLS-1	NLS-2	
1		Make simple, easy, step-by-step changes Eat more fruit
2	1	Eat a variety of foods Decrease consumption of fat, saturated fat, & cholesterol Eat more foods which are high in fiber & high in complex carbohydrates Eat less of foods that are high in sugar & sodium
3	2	Same as above plus: Make one change to decrease fat in your diet by: substituting chicken or fish for a meat dinner, or having a dinner that emphasizes pasta, or decreasing the size of a meat portion & increasing the carbohydrates also, decrease high-fat add-ons, such as butter Make one change increase fiber & complex carbohydrates by: buying and eating more vegetables, or substituting whole-grain breads or rolls for your usual breads or rolls, or buying and eating more fruits, or substituting a whole-grain cereal for your usual cereal, also, substitute an apple for another snack
4	3	Follow these key strategies: change the proportions in meals decrease how often you have certain meals decrease the number of times you buy and use certain products, or buy and eat more fruits and vegetables
5	4	For this week: change the proportions of one or two more meals decrease the number of times you have one more dinner that is high in fat make two or three more lower fat or higher fiber product substitutions, and eat more fruits and vegetables Possible problems and suggested solutions: increase fiber slowly, children may resist changes, lunches, occasional splurges
6	5	Make changes for a lifetime Making a few changes will make a big difference After a few weeks it will start to feel permanent Be creative

outline). These programs were arranged in a step-by-step series. In addition, participants received opscan forms (NLS-1) or shopping lists (NLS-2) with starred low-fat, high-fiber items, to indicate which foods were recommended (see Appendix D). Participants in NLS-2 were given more user control over videodisc programs (i.e., start, stop) and the option to view several additional information branches.

Participants received feedback (intervention weeks 3-8 for NLS-1 and weeks 2-7 for NLS-2) about intended food purchases. Feedback on intended purchases consisted of: (a) lower fat or high fat substitutions for high-fat and low-fiber items (e.g., suggest skim milk for whole milk), and (b) noting of new purchases of low fat or high fiber that had not been recorded by the participant during baseline (i.e., positive reinforcement for buying skim milk) (see Figures 6 & 7). Suggested substitutions and positive statements were printed out for participants.

In the NLS-2 study, participants received the same feedback as in NLS-1 plus additional individualized feedback. The NLS-2 feedback included item bar graphs and macronutrient bar graphs (see Appendix G for photographs). The item bar graphs were provided during each intervention week, and included feedback about the percentage of high-fat and high-fiber items purchased by the user for: (a) baseline, (b) the current week, and (c) as a personal goal (i.e., 50% reduction of high-fat items, 50% increase high-

Date: 08/24/89 Time: 2:08 PM

Nutrition for a Lifetime Feedback Report

Dear Majors Household:

Congratulations on making the following nutritious new selections:

Low-Fat Foods	High-Fiber Foods
- Cott. Cheese (low fat)	- Peas, green
- 2% Milk	- Tomatoes, fresh
- Plain Yogurt, low-fat	

Also, you are to be congratulated for continuing to purchase the following nutritious foods:

Low-Fat Foods	High-Fiber Foods
- Skim Milk	- "Some Fiber" Cereal
	- Broccoli/Brusl Sprt, frsh
	- Carrots
	- Lettuce

High Fat Foods

Try to buy less of these foods and foods like them in the future. In each of these items, over 40% of the calories come from fat.

* * 41-60% Fat * *
Chips

* * 81-100% Fat * *
Bacon

High Fiber Foods

Good work! Try to buy more of these foods and foods like them in the future. Each has at least 2 grams of dietary fiber per serving.

* * 2-3 grams/serving fiber * *
Peas, green

* * 3-4 grams/serving fiber * *
"Some Fiber" Cereal; Broccoli/Brusl Sprt, frsh; Carrots

- Virginia Tech/NCI/Kroger Co. Nutrition Project (703-231-8746)

Figure 6. Feedback report printed for experimental participants

Date: 08/03/89 Time: 4:25 PM

Majors Household
Nutrition for a Lifetime

SHOPPING LIST		POSSIBLE SUBSTITUTES
EGGS, MILKS & ICE CREAMS		
Cott. Cheese (low fat)	24 oz	
Skim Milk	1 gal	
2% Milk	1 gal	
Plain Yogurt, low-fat	24 oz	
ENTREES, MEAT, FISH & POULTRY		
* Bacon	2 lb	Use Less
NONFOODS, BABY/PET NEEDS		
Baby Food, Supplies		
Pet Food, Supplies		
OTHER FOOD, SNACKS & DESSERTS		
* Chips	24 oz	Bran Muffins
PASTAS, BREADS & CEREALS		
* Wheat Bread	1 loaf	Extra High Fiber Bread
"Some Fiber" Cereal	20 oz	
VEGETABLES		
Broccoli/Brusl Sprt, frsh	3 lb	
Carrots	3 lb	
Lettuce	1 head	
Peas, green	24 oz	
Tomatoes, fresh	3 lb	

Figure 7. Printed shopping list (experimental participants)

fiber items). In addition, macronutrient feedback was provided for any user who purchased at least 70 food items during baseline and at least 70 food item purchases during intervention. These bar graphs provided information about the percent calories from fat and per capita fiber consumption for: (a) baseline, (b) the current week, and (c) as personal goal (i.e., 30% calories from fat; 30 grams of fiber per day).

Hypotheses

The following hypotheses were formulated:

1. It was hypothesized that participants in the experimental condition would report increases in their purchases of certain food categories, and decreases in their purchases of other food categories that reflected an increase in fiber and commplex carbohydrates and a decrease in fats.

2. It was hypothesized that parents in the experimental condition would report making changes in meals and food preferences (CST & FHQ) which followed the guidelines presented during the intervention.

3. It was hypothesized that self-report of food choices and preferences for adult participants in the experimental group would be similar to reported changes in choices and preferences of their (target) children.

Overview of Data Analyses

A summary of the data analyses procedures is presented in Table 13. The separate procedures are presented below. Also note that consistent with the exploratory nature of this project, conventionally significant results ($p<.05$) and trends were reported (see Lipsey, 1990).

Family Study

CST. Each of the ten food categories in the CST was scored by alloting one point for each appropriate response (See Figure 1). The CST data were analyzed using Wilcoxon tests.

FHQ. The FHQ was scored by determining the total monthly consumption of each food item. FHQ category data were analyzed using analysis of covariance (ANCOVA) with the pre-assessment score as the covariate. Pearson product-moment correlations revealed substantial relations between all pre- and post-assessment scores ($p<.01$). Analyses of variance (ANOVA) were used to determine whether there were pre-intervention differences between groups.

Correlations were used to analyze the FHQ category data to determine changes made by parents and children. Parent and child difference scores were calculated (post-assessment score minus pre-assessment score) for each category.

PRF and CRF. Questions from the CRF and the PRF were analyzed using linkage analysis. Linkage analysis is used

Table 13

Measures and data analyses for family study, including NLS measures

Measure	Purpose	Group	Format	Data Analyses
FAMILY STUDY				
Card Sorting Task	Evaluation of preference, consumption, and knowledge	Parent & child	Photographs of food items, sorted into low & high frequency piles	Wilcoxon
Food History Questionnaire	Provides an estimate of the usual diet	Parent & child	Estimates of frequency of consumption	ANCOVA, with pre-score as the covariate
Parent Rating Form	Investigate beliefs, availability, etc.	Parent	Open-ended & Likert-scale questions	Linkage Analysis
Child Rating Form	Investigate attitude, beliefs	Child	Likert-scale questions	Linkage Analysis
NLS STUDY				
Category Data	Evaluation of food purchases by group	Family Unit	Actual & Intended Data by amt & freq	ANCOVA, with pre-score as the covariate
Macronutrient Data	Evaluation of food purchases by % fat & fiber (in grams)	Family Unit	Actual & Intended Data by amt & freq	ANCOVA, with pre-score as the covariate

to classify items into clusters of similarity (McQuitty, 1961). This is accomplished by evaluating the strengths of correlations in a matrix of correlations. Fourteen questions from the CRF and 27 questions from the PRF were analyzed (see Tables 10 and 11 above). In addition, seven open-ended questions were analyzed with Wilcoxon tests. These include questions 15 through 21 from the PRF (see Table 10 above).

Reliability. Items found in the home during the food observation were compared to those reported on the FHQ. The food observation form was compared to the FHQ for one randomly selected member from each family. Reliability was calculated by scoring any item the participant reported they ate frequently (i.e., daily or weekly). Agreement meant that the individual reported the food type was eaten, and it was also found in the home. Disagreement meant that the individual reported the food type was frequently eaten, but it was not found in the home on the observation day. The reliability of the FHQ measure was calculated to be 83% (35 agree/42 total). This reliability measure indicates that these participants had most of these four items (i.e., rice, bread, cereal, & milk) available to them in their homes.

NLS Study

Food Purchases. Food items from intended and actual purchases were analyzed in two ways. Purchase data were

analyzed in food categories and by macronutrients. Participant data were excluded if the family failed to purchase an average minimum of 11 food items per week.

For the category data, items were distributed into 14 categories, but only seven categories (i.e., Low-Fat Meat, High-Fat Meat, Fruits/Vegetables, High-Fiber Grains/Cereals, Low-Fat Dairy, High-Fat Dairy, and Low-Fat Fish/Poultry) were the focus of the overall NLS study and this study. The analyses focused on the seven categories wherein items from that category were shown or stated (on the audio track) more than three times across all of the videodisc programs (see Table 14). Intended and actual data were analyzed by frequency and amount (in grams) using ANCOVA's, with the baseline score as the covariate.

From the macronutrient data it was possible to derive an estimate of percent calories from fat and daily per capita consumption of fiber for intended and actual purchases. These data were analyzed using ANCOVA's with the baseline score as the covariate.

Table 14

NLS Categories

Low-Fat MEAT
High-Fat MEAT
Low-Fat FISH/PLTRY
FRUITS/VEGETABLES
Low-Fat DAIRY
High-Fat DAIRY
High-Fiber GRAINS

Results

The overall results of this study are presented in a summary table (see Table 15), and include analyses of family purchase data and individual consumption data. The separate results are discussed below.

Family Study

CST. Significant effects were found for two CST categories: Snacks and Entrees. A positive increase in a CST score reflects an increase in low-fat, high-fiber food choices and a decrease in high-fat, low-fiber choices. Changes in scores from pre- to post-test indicate that participants made shifts in food choices. Wilcoxon tests were used to determine pre-experimental differences between control and experimental groups. There were no significant pre-treatment differences between the experimental and control groups.

The results indicate that for the Snack category, both parents and children in the experimental condition increased their scores for consumption, preference, and knowledge compared to participants in the control condition (see Figures 8a, 8b, & 8c). There were differences for children in the experimental condition for behavior ($p<.10$), preference ($p<.05$), and knowledge ($p<.10$) compared to the

Table 15

Summary of Significant Results

	PURCHASE DATA Families (N=24)	CONSUMPTION DATA Parents (N=41)	CONSUMPTION DATA Children (N=24)
Category Data			
(Frequency)			
High-Fat Meat	*		
High-Fiber Grains	*		
(Grams)			
High-Fat Meat	*		
High-Fiber Grains	tr.		
Macronutrient Data			
Fat- Intended	tr.		
Fiber-Intended	*		
Card Sorting Task			
Snack			
Behavior		tr.	tr.
Preference		tr.	*
Knowledge		tr.	tr.
Entree			
Behavior			tr.
Preference		*	
Knowledge			tr.
Food History Questionnaire			
Fruit		tr.	tr.
Low-Fat Dairy		tr.	tr.
High-Fiber Grain			tr.
Low-Fiber Grain			tr.

* $p<.05$ tr. = trend $p<.18$

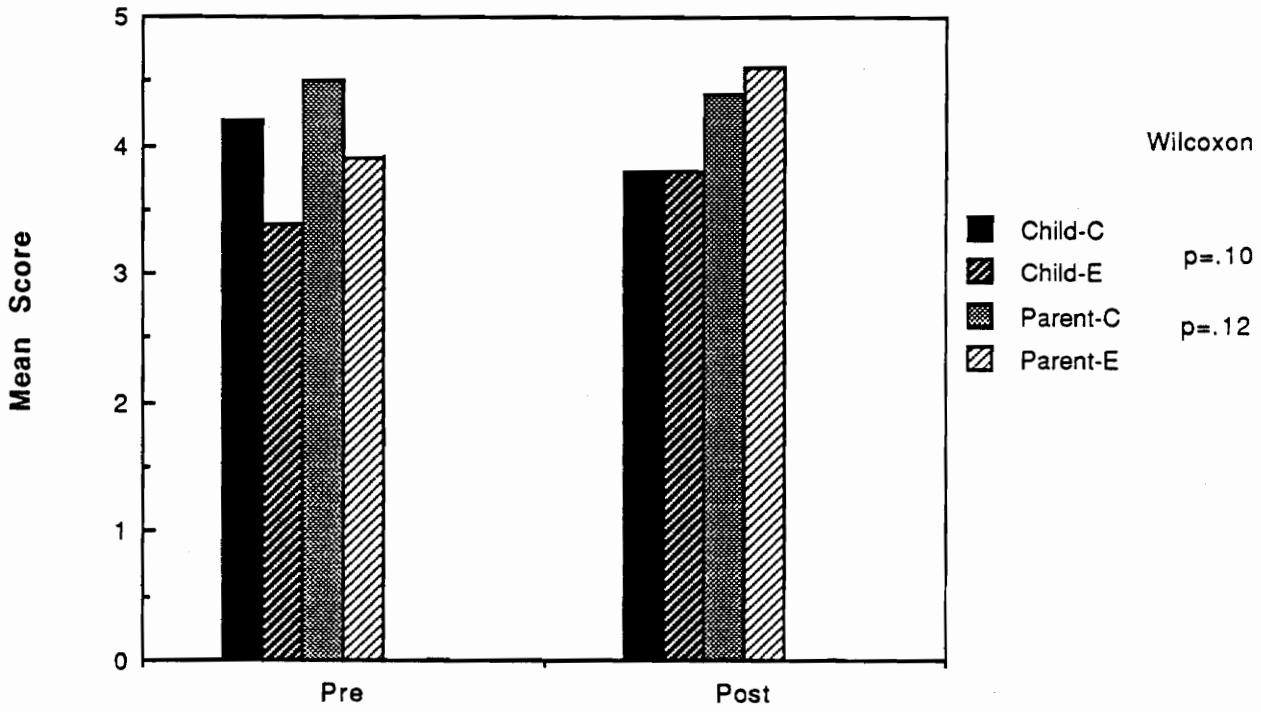

Figure 8a. Mean score on the Card Sorting Task for the Snack Category behavior question

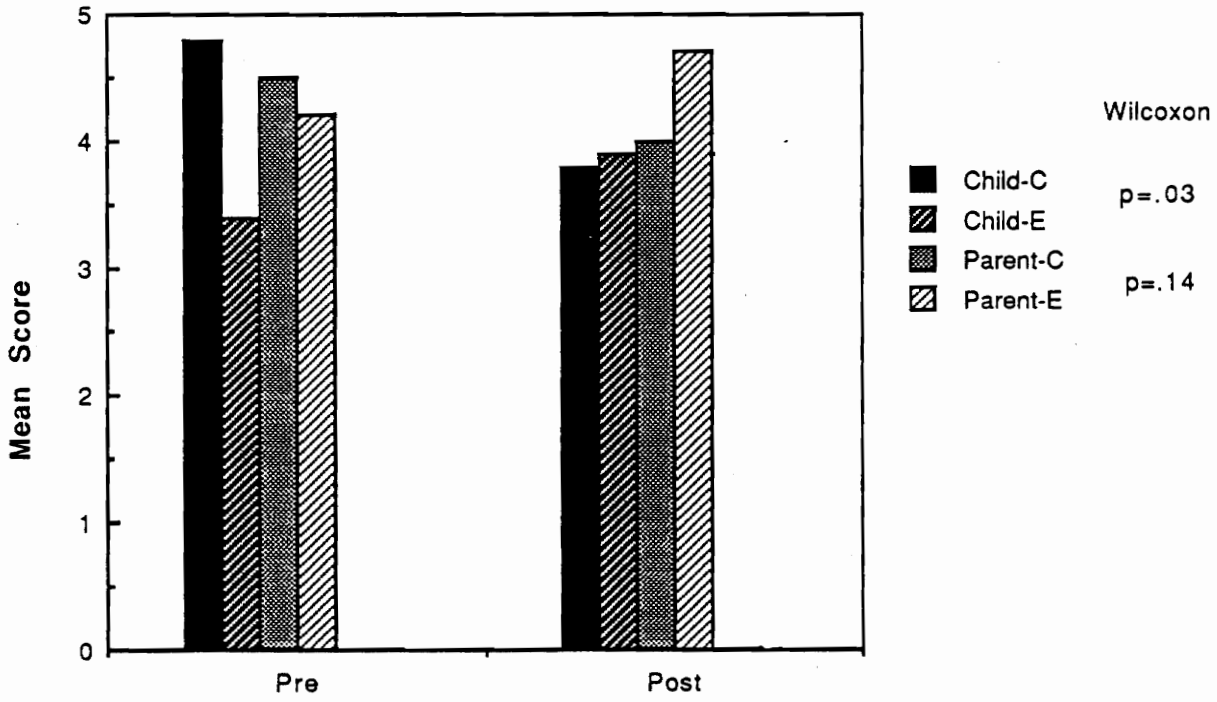

Figure 8b. Mean score on the Card Sorting Task for the Snack Category preference question

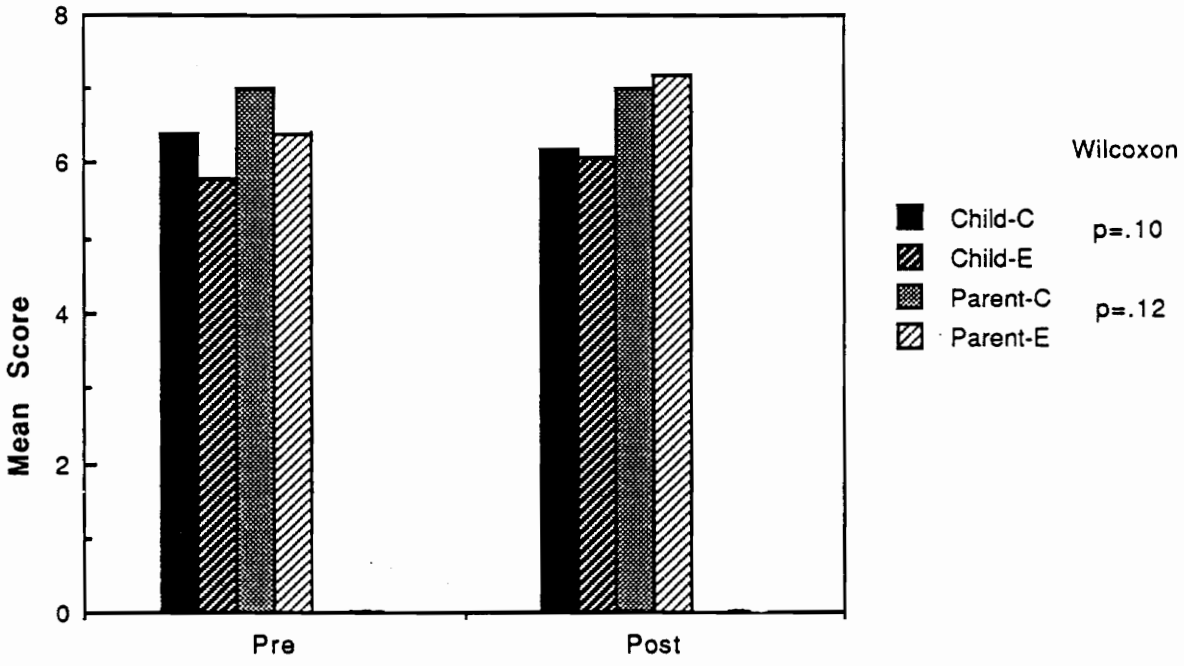

Figure 8c. Mean score on the Card Sorting Task for the Snack Category knowledge question

control group (see Table 16). Similar trends were seen for the parents. There were differences for parents in the experimental condition for behavior ($p<.15$), preference ($p<.15$), and knowledge ($p<.15$) compared to the control group (see Table 16). The means and standard deviations of the Snack category data are presented in Table 16. Analyses of the separate Snack categories (e.g., low-fat vs. high-fat snacks) indicated that generally parents and children in the experimental condition reported decreases in their consumption, preference, and knowledge of high-fat snack foods (see Table 17). In addition, children in the experimental condition reported significant increases in their preference for low-fat snacks compared to the control group ($p<.05$).

For the Entree category the results indicated participants increased their behavior, preference, and knowledge scores compared to the control group (see Figures 9a, 9b, & 9c); participants in the control group decreased their scores (see Table 16). There were significant differences for children in the experimental group for behavior ($p<.10$) and knowledge ($p<.15$). There were significant differences for parents in the experimental group for preference ($p<.01$) and knowledge ($p<.10$). Analyses of the separate Entree categories indicated that participants reported making changes in high-fat entrees

Table 16

Table of Means (and standard deviations) for CST categories which showed a trend toward significance

Question	Cond.	Group			
		Children		Parents	
		pre	post	pre	post
SNACKS					
Behavior	Ctrl.	4.2(1.7)	3.8(2.0)*	4.5(1.4)	4.4(1.8)*
	Expt.	3.4(1.2)	3.8(1.7)	3.9(1.6)	4.6(1.5)
Pref.	Ctrl.	4.8(1.2)	3.8(1.7)*	4.5(1.7)	4.0(1.2)*
	Expt.	3.4(2.2)	3.9(1.8)	4.2(1.6)	4.7(2.0)
Knowledge	Ctrl.	6.4(1.0)	6.2(1.0)*	7.0(1.0)	7.0(0.8)*
	Expt.	5.8(0.8)	6.1(0.8)	6.4(1.0)	7.2(0.8)
ENTREE					
Behavior	Ctrl.	4.2(1.3)	3.7(1.4)*	4.6(1.2)	4.9(1.3)
	Expt.	3.7(1.1)	4.4(1.1)	4.7(1.3)	5.2(1.0)
Pref.	Ctrl.	4.2(0.9)	4.2(1.4)	5.1(1.4)	4.4(1.4)*
	Expt.	3.8(1.3)	3.5(1.3)	4.5(1.2)	5.1(1.4)
Knowledge	Ctrl.	4.9(1.0)	5.5(1.3)*	6.4(1.3)	6.6(0.9)
	Expt.	4.5(1.4)	5.1(1.8)	6.1(1.1)	6.7(1.3)

Notes: * significant Wilcoxon difference ($p<.15$)

Table 17

Table of Means (and standard deviations) for CST categories which showed a trend toward significance

Question	Cond.	Group: Children pre	Children post	Parents pre	Parents post
LOW-FAT SNACKS					
Behavior	Ctrl.	2.0(1.0)	1.7(1.3)	2.0(0.8)	2.0(0.9)
	Expt.	1.6(0.8)	1.5(0.8)	1.9(1.1)	1.8(1.2)
Pref.	Ctrl.	2.8(0.7)	2.5(1.0)*	2.6(0.9)	2.5(0.9)
	Expt.	2.0(1.4)	2.6(1.3)	2.7(1.0)	2.6(1.1)
Knowledge	Ctrl.	2.0(1.0)	1.7(1.3)	2.0(1.0)	1.7(1.3)
	Expt.	1.6(0.8)	1.5(0.8)	1.6(0.8)	1.5(0.8)
HIGH-FAT SNACKS					
Behavior	Ctrl.	2.2(1.2)	2.1(1.2)*	2.6(1.1)	2.4(1.4)*
	Expt.	1.7(1.3)	2.4(1.0)	2.1(1.1)	2.8(1.1)
Pref.	Ctrl.	1.9(1.1)	1.2(1.3)	1.7(1.5)	1.5(1.1)*
	Expt.	1.4(1.3)	1.3(1.0)	1.7(1.5)	2.1(1.5)
Knowledge	Ctrl.	2.2(1.1)	2.1(1.2)*	2.2(1.2)	2.1(1.2)*
	Expt.	1.7(1.3)	2.4(1.0)	1.7(1.3)	1.5(0.8)
LOW-FAT ENTREES					
Behavior	Ctrl.	1.9(0.8)	1.8(1.2)	1.8(1.0)	2.1(0.9)
	Expt.	1.6(0.8)	1.6(0.8)	2.1(0.7)	2.4(0.8)
Pref.	Ctrl.	2.2(0.8)	2.1(1.0)	2.4(1.1)	2.3(0.8)*
	Expt.	2.2(1.2)	2.2(1.0)	2.5(0.8)	2.8(0.9)
Knowledge	Ctrl.	1.9(0.8)	1.8(1.2)	1.9(0.8)	1.8(1.2)
	Expt.	1.6(0.8)	1.6(0.8)	1.6(0.8)	1.6(0.8)
HIGH-FAT ENTREES					
Behavior	Ctrl.	2.3(1.3)	2.1(1.0)*	2.8(0.8)	2.8(0.8)
	Expt.	2.1(1.0)	2.6(1.4)	2.6(0.9)	2.8(0.8)
Pref.	Ctrl.	2.0(0.9)	2.2(0.9)	2.4(1.1)	2.1(1.1)*
	Expt.	1.6(1.0)	1.4(1.2)	2.0(1.1)	2.3(1.0)
Knowledge	Ctrl.	2.3(1.3)	2.1(1.0)*	2.3(1.3)	2.1(1.0)
	Expt.	2.1(1.0)	2.6(1.4)	2.1(1.0)	2.6(1.4)

Notes: + significant Wilcoxon difference ($p<.05$)
* Wilcoxon difference ($p<.25$)

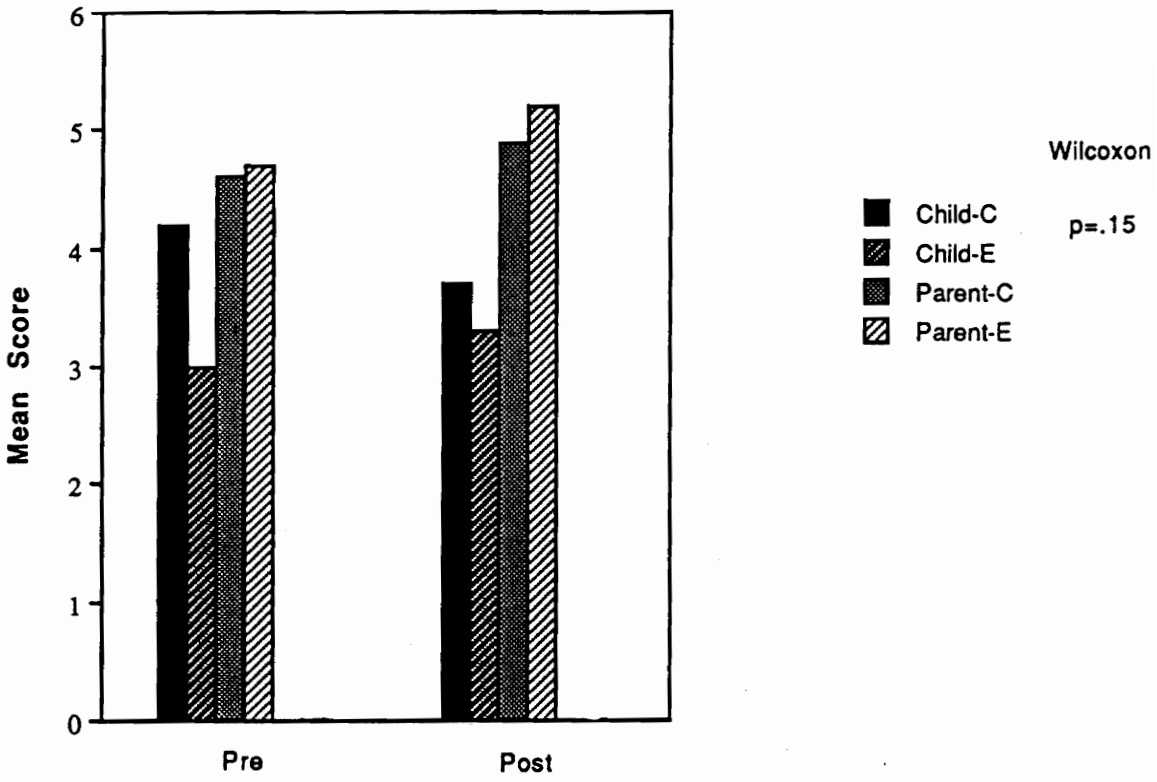

Figure 9a. Mean score on the Card Sorting Task for the Entree Category behavior question

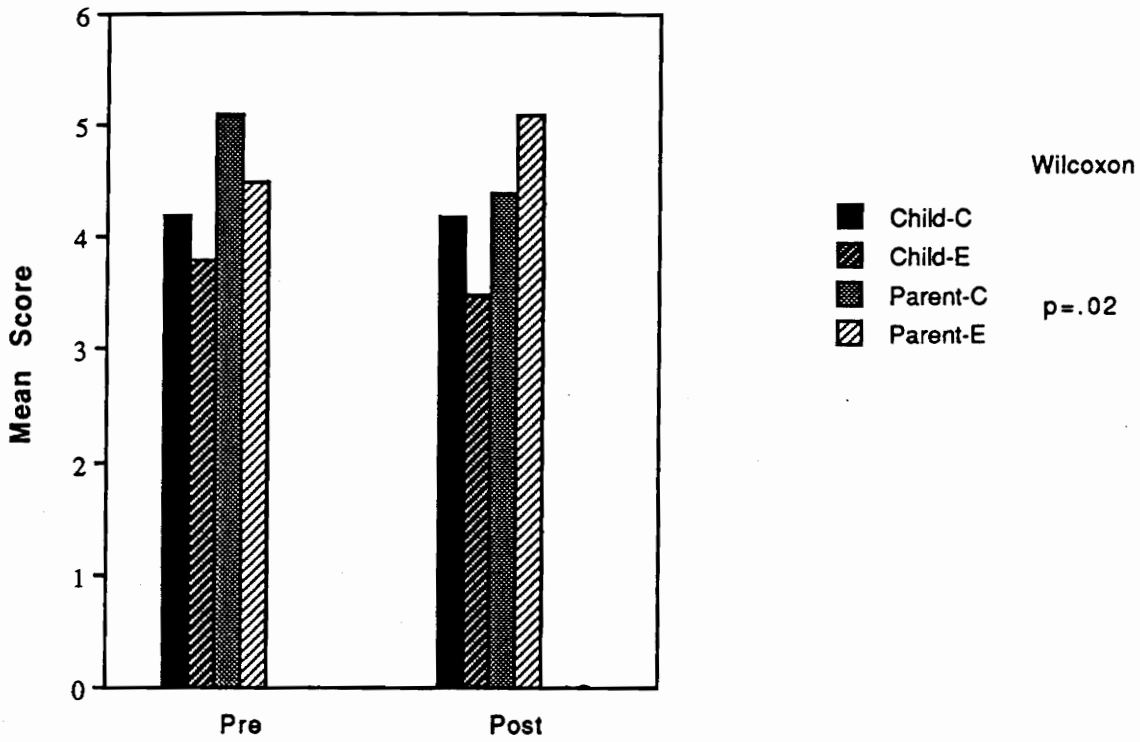

Figure 9b. Mean score on the Card Sorting Task for the Entree Category preference question

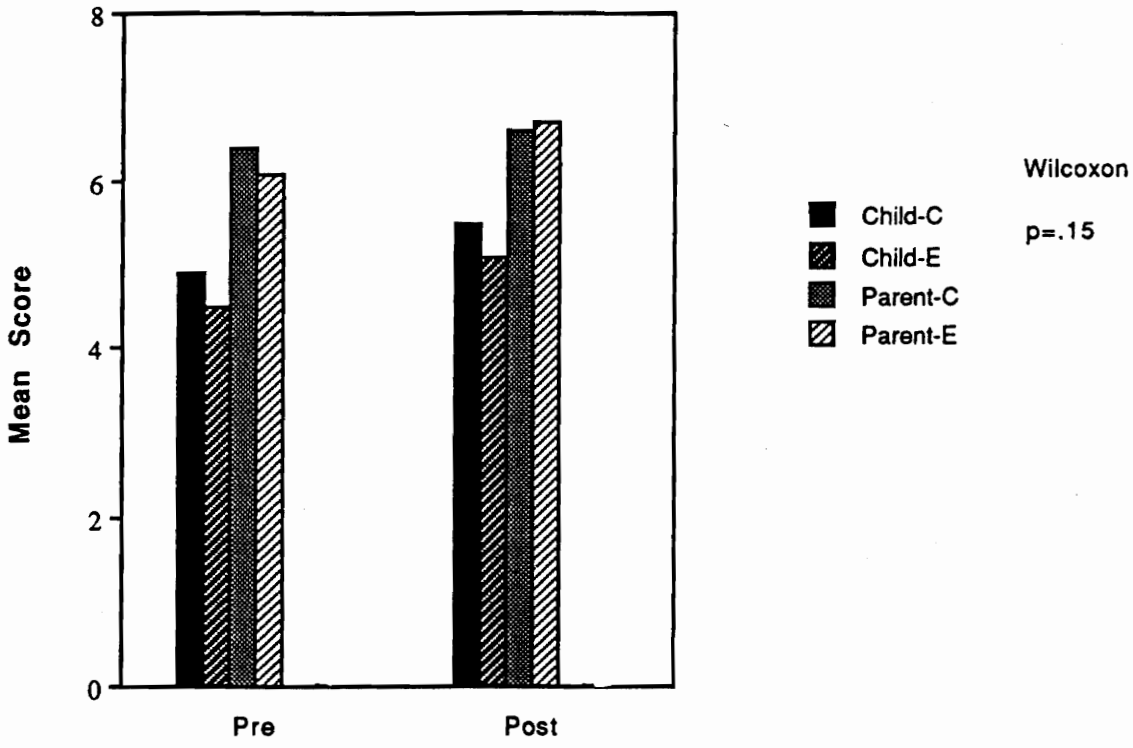

Figure 9c. Mean score on the Card Sorting Task for the Entree Category Knowledge question

(see Table 17). There was a significant effect for parent preference of these food choices ($p<.05$). Similar trends were seen for children's consumption and knowledge scores.

There were no other significant results for the CST. The CST data for all categories are displayed in Tables 18a, 18b, and 18c for children and parents. The results of the Wilcoxon tests are also displayed in these tables.

FHQ. Eleven FHQ categories were analyzed. ANOVAs were used to analyze baseline scores to determine if there were pre-experimental differences between control and experimental groups. There were no significant pre-experimental differences for the children. For the Parent group there were significant differences in two categories. The experimental group reported eating significantly more high-fat fish than the control group at pre-assessment ($p<.05$). The experimental group reported eating significantly more high-fiber grains than the control group at pre-assessment ($p<.05$).

Category data were analyzed with ANCOVA's using the prescore as the covariate. The results indicated an effect for the Fruit and Low-Fat Dairy categories (see Figures 10 & 11). Parents and children in the experimental condition reported an increase in their consumption of low-fat dairy and fruit items during intervention compared to control

Table 18a

Means (and standard deviations) for
CST Behavior Question

Category	n	Cond.	Time Pre	Time Post	WILCOXON (p<.15)
CHILDREN					
Snacks	13	Ctrl.	4.2 (1.7)	3.8 (2.0)	.10
	11	Expt.	3.4 (1.2)	3.8 (1.7)	
Grains	13	Ctrl.	3.3 (2.0)	3.5 (2.1)	
	11	Expt.	3.2 (1.9)	3.7 (1.4)	
Dairy	13	Ctrl.	3.0 (1.5)	3.4 (1.0)	
	11	Expt.	3.0 (0.8)	3.3 (1.0)	
Entrees	13	Ctrl.	4.2 (1.3)	3.7 (1.4)	.15
	11	Expt.	3.7 (1.1)	4.4 (1.1)	
Sides	13	Ctrl.	5.0 (1.7)	4.8 (1.6)	
	11	Expt.	4.3 (1.7)	4.5 (1.3)	
PARENTS					
Snacks	22	Ctrl.	4.5 (1.4)	4.4 (1.8)	.12
	19	Expt.	3.9 (1.6)	4.6 (1.5)	
Grains	22	Ctrl.	3.9 (1.4)	4.0 (1.2)	
	19	Expt.	4.3 (0.9)	4.3 (0.9)	
Dairy	22	Ctrl.	3.4 (1.1)	3.7 (1.2)	
	19	Expt.	3.4 (1.2)	3.5 (0.9)	
Entrees	22	Ctrl.	4.6 (1.2)	4.9 (1.3)	
	19	Expt.	4.7 (1.3)	5.2 (1.0)	
Sides	22	Ctrl.	6.0 (1.7)	6.5 (1.4)	
	19	Expt.	5.7 (1.2)	6.3 (1.3)	

Table 18b

Means (and standard deviations) for
CST Preference Question

Category	n	Cond.	Time Pre	Time Post	WILCOXON (p<.15)
CHILDREN					
Snacks	13	Ctrl.	4.8 (1.2)	3.8 (1.7)	.03
	11	Expt.	3.4 (2.2)	3.9 (1.8)	
Grains	13	Ctrl.	3.4 (1.8)	3.3 (1.8)	
	11	Expt.	3.5 (1.5)	3.4 (1.6)	
Dairy	13	Ctrl.	3.3 (1.3)	3.3 (0.9)	
	11	Expt.	2.7 (0.8)	3.0 (1.3)	
Entrees	13	Ctrl.	4.2 (0.9)	4.2 (1.4)	
	11	Expt.	3.8 (1.3)	3.5 (1.3)	
Sides	13	Ctrl.	4.1 (1.9)	4.0 (1.8)	
	11	Expt.	3.9 (2.0)	3.6 (1.0)	
PARENTS					
Snacks	22	Ctrl.	4.5 (1.7)	4.0 (1.2)	.14
	19	Expt.	4.2 (1.6)	4.7 (1.9)	
Grains	22	Ctrl.	4.3 (1.3)	4.1 (1.5)	
	19	Expt.	4.4 (0.9)	4.2 (1.3)	
Dairy	22	Ctrl.	3.2 (1.3)	3.0 (1.4)	
	19	Expt.	3.7 (1.6)	3.6 (1.0)	
Entrees	22	Ctrl.	5.1 (1.4)	4.4 (1.4)	.02
	19	Expt.	4.5 (1.2)	5.1 (1.4)	
Sides	22	Ctrl.	5.7 (1.5)	5.6 (1.8)	
	19	Expt.	5.4 (1.4)	5.9 (1.5)	

Table 18c

Means (and standard deviations) for
CST Knowledge Question

Category	n	Cond.	Time Pre	Time Post	WILCOXON (p<.15)
CHILDREN					
Snacks	13	Ctrl.	6.4 (1.0)	6.2 (0.9)	.10
	11	Expt.	5.8 (0.8)	6.1 (0.8)	
Grains	13	Ctrl.	4.8 (1.8)	5.3 (0.6)	
	11	Expt.	4.6 (1.6)	5.1 (0.9)	
Dairy	13	Ctrl.	3.8 (1.1)	3.8 (0.9)	
	11	Expt.	3.6 (0.7)	4.3 (1.1)	
Entrees	13	Ctrl.	4.9 (1.0)	5.5 (1.3)	.15
	11	Expt.	4.5 (1.4)	5.1 (1.8)	
Sides	13	Ctrl.	6.3 (1.2)	6.0 (1.2)	
	11	Expt.	6.6 (0.7)	6.2 (1.0)	
PARENTS					
Snacks	22	Ctrl.	7.0 (1.0)	7.0 (0.8)	.12
	19	Expt.	6.4 (1.0)	7.2 (0.8)	
Grains	22	Ctrl.	5.8 (0.4)	5.9 (0.5)	
	19	Expt.	5.7 (0.6)	5.6 (0.7)	
Dairy	22	Ctrl.	4.5 (1.8)	5.2 (0.9)	
	19	Expt.	5.2 (0.8)	5.6 (0.5)	
Entrees	22	Ctrl.	6.4 (1.3)	6.6 (0.9)	
	19	Expt.	6.1 (1.1)	6.7 (1.3)	
Sides	22	Ctrl.	7.1 (0.8)	7.3 (0.8)	
	19	Expt.	6.7 (0.9)	6.9 (0.9)	

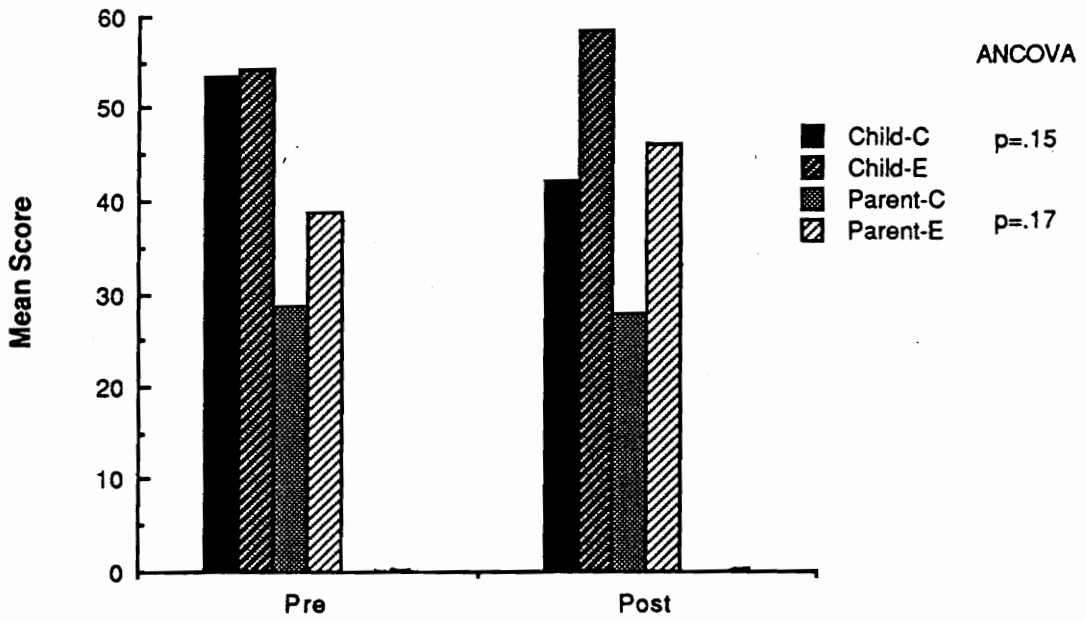

Figure 10. Mean score on the Food History Questionnaire for the low-fat dairy category

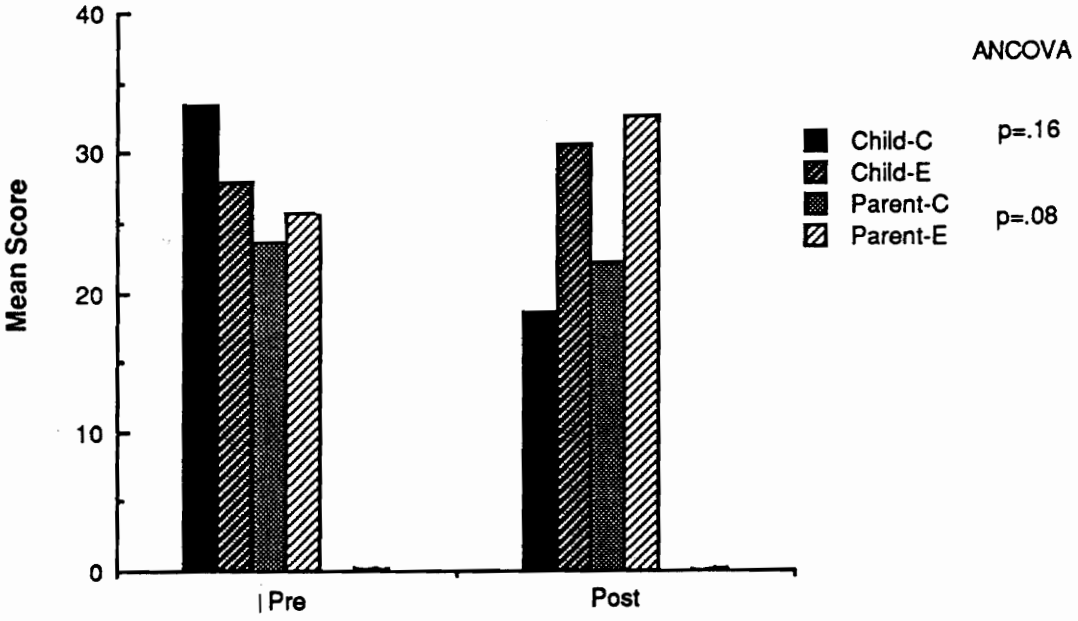

Figure 11. Mean score on the Food History Questionnaire for the low-fat fruit category

participants (see Table 19). Control participants reported a decrease in consumption (see Table 20 for means).

The results indicated that no other categories changed significantly. There were, however, trends toward significance for the High-Fiber Grains and Low-Fiber Grains categories. Children in the experimental group reported an increase in their consumption of High-Fiber Grains while the control scores decreased ($p<.10$). They also reported increases, not decreases, in their consumption of Low-Fiber Grains ($p<.11$).

A visual inspection of means indicated that the control group reported more shifts (i.e., increases and decreases) among the food categories. For example, the control group reported decreases in consumption of fruit and low-fiber grains, and increases in high-fat meat. The experimental group reported increases in several categories, but a decrease only in the high-fat vegetable category. The FHQ results for all categories are presented in Tables 21a & 21b. The means and standard deviations are presented in Tables 22a & 22b.

Difference scores of parents and children in the experimental condition were analyzed with Pearson correlations. Parents and children reported making similar changes in fruit consumption. The results indicated that

Table 19

FHQ ANCOVA results for categories which showed a trend toward significance

Category	Group	F	p
LOW-FAT DAIRY	Children	2.29	.15
	Parents	1.94	.17
FRUIT	Children	2.14	.16
	Parents	3.20	.08

Table 20

Means (and standard deviations) for FHQ Low-Fat Dairy and Fruit categories

Food Category	Cond.	Group: Children pre	Children post	Parents pre	Parents post
Low-Fat Dairy	Ctrl.	53.5(35.8)	42.2(19.1)	28.7(20.4)	27.9(14.1)
	Expt.	54.5(35.1)	58.7(31.3)	38.9(25.9)	46.2(39.4)
Fruit	Ctrl.	33.5(28.2)	18.5(11.5)	23.7(12.3)	22.1(11.3)
	Expt.	27.9(16.2)	30.6(39.6)	25.8(20.7)	32.7(26.9)

Table 21a

Analyses of Covariance of FHQ Category data for Children

Category	SS	MS	F	p
Items Expected to Increase:				
Fruit	1288.9	1288.9	2.14	.1594
Low-Fat Meat	154.2	154.2	0.46	.5074
Low-Fat Fish/Pltry	14.6	14.6	0.10	.7516
Low-Fat Vegetables	520.2	520.2	1.04	.3200
Low-Fat Dairy	1499.7	1499.7	2.29	.1459
High-Fiber Grains	4367.8	4367.8	3.13	.0922
Items Expected to Decrease:				
High-Fat Meat	39.0	39.0	0.04	.8512
High-Fat Fish/Pltry	8.3	8.3	0.42	.5224
High-Fat Vegetables	49.6	49.6	0.61	.4444
High-Fat Dairy	63.2	63.2	0.29	.5945
Low-Fiber Grains	1684.0	1684.0	2.03	.1693

Table 21b

Analyses of Covariance of FHQ Category data for Parents

Category	SS	MS	F	p
Items Expected to Increase:				
Fruit	834.1	834.1	3.20	.0815
Low-Fat Meat	1.0	1.0	0.19	.6679
Low-Fat Fish/Pltry	25.7	25.7	0.77	.3858
Low-Fat Vegetables	11.3	11.3	0.06	.8125
Low-Fat Dairy	1214.4	1214.4	1.94	.1716
High-Fiber Grains	248.7	248.7	0.83	.3683
Items Expected to Decrease:				
High-Fat Meat	35.2	35.2	0.21	.6461
High-Fat Fish/Pltry	2.4	2.4	0.96	.3323
High-Fat Vegetables	0.0	0.0	0.00	.9861
High-Fat Dairy	2.5	2.5	0.01	.9129
Low-Fiber Grains	145.4	145.4	0.68	.4156

Table 22a

Means (and standard deviations) of Children for FHQ Categories

Category	n	Cond.	Time Pre	Post
Items Expected to Increase				
Fruit	13	Ctrl.	33.5 (28.2)	18.5 (11.5)
	11	Expt.	27.9 (16.2)	30.6 (39.6)
Low-Fat Meat	13	Ctrl.	6.1 (05.9)	11.4 (24.0)
	11	Expt.	5.0 (02.5)	5.5 (03.4)
Low-Fat Fish/Pltry	13	Ctrl.	5.5 (06.3)	8.9 (16.0)
	11	Expt.	6.2 (04.5)	7.8 (06.0)
Low-Fat Vegetables	13	Ctrl.	47.8 (40.3)	36.0 (25.0)
	11	Expt.	47.5 (22.2)	46.5 (22.9)
Low-Fat Dairy	13	Ctrl.	53.5 (35.8)	42.2 (19.1)
	11	Expt.	54.5 (35.1)	58.7 (31.3)
High-Fiber Grains	13	Ctrl.	29.4 (29.1)	23.0 (21.5)
	11	Expt.	33.0 (27.5)	53.4 (52.3)
Items Expected to Decrease				
High-Fat Meat	13	Ctrl.	30.9 (21.1)	39.7 (30.0)
	11	Expt.	28.5 (19.8)	41.6 (37.5)
High-Fat Fish/Pltry	13	Ctrl.	3.5 (03.4)	3.8 (05.4)
	11	Expt.	3.3 (02.0)	4.9 (03.4)
High-Fat Vegetables	13	Ctrl.	14.6 (20.6)	12.9 (11.2)
	11	Expt.	17.3 (18.8)	10.6 (06.2)
High-Fat Dairy	13	Ctrl.	16.5 (17.2)	20.1 (13.0)
	11	Expt.	23.6 (16.1)	25.8 (17.2)
Low-Fiber Grains	13	Ctrl.	15.3 (15.0)	11.5 (13.8)
	11	Expt.	18.4 (10.7)	42.1 (45.8)

Table 22b

Means (and standard deviations) of Parents for FHQ Categories

Category	n	Cond.	Time Pre	Post
Items Expected to Increase				
Fruit	22	Ctrl.	23.7 (12.3)	22.1 (11.3)
	19	Expt.	25.8 (20.7)	32.7 (26.9)
Low-Fat Meat	22	Ctrl.	3.6 (03.0)	3.6 (02.6)
	19	Expt.	4.0 (02.7)	4.1 (02.5)
Low-Fat Fish/Pltry	22	Ctrl.	7.8 (04.3)	9.0 (06.3)
	19	Expt.	8.3 (05.3)	11.1 (07.1)
Low-Fat Vegetables	22	Ctrl.	50.1 (22.5)	53.8 (23.6)
	19	Expt.	49.4 (19.6)	52.2 (20.8)
Low-Fat Dairy	22	Ctrl.	28.7 (20.4)	27.9 (14.1)
	19	Expt.	38.9 (25.9)	46.2 (39.4)
High-Fiber Grains	22	Ctrl.	29.3 (21.7)	34.0 (22.4)
	19	Expt.	48.1 (37.3)	36.4 (19.0)
Items Expected to Decrease				
High-Fat Meat	22	Ctrl.	31.1 (15.0)	30.1 (19.7)
	19	Expt.	30.8 (19.7)	28.1 (18.8)
High-Fat Fish/Pltry	22	Ctrl.	2.3 (02.8)	2.3 (02.1)
	19	Expt.	4.2 (02.9)	2.6 (01.7)
High-Fat Vegetables	22	Ctrl.	9.3 (05.3)	9.5 (06.7)
	19	Expt.	7.6 (07.2)	8.3 (08.5)
High-Fat Dairy	22	Ctrl.	17.2 (10.4)	17.8 (17.5)
	19	Expt.	22.9 (15.2)	20.8 (12.1)
Low-Fiber Grains	22	Ctrl.	17.9 (16.9)	16.2 (20.7)
	19	Expt.	12.2 (14.6)	16.4 (13.6)

the reported change in consumption of fruit was positively correlated between parents and children ($r(19) = .54$, $p<.05$). However, the change in low-fat dairy consumption was not strongly correlated between parents and children. Table 23 presents the intercorrelations of other FHQ category difference scores which were significantly correlated between parents and their children in the experimental condition. Parent consumption of fruit was positively correlated with child consumption of low-fiber grains $r(19) = .47$, $p<.05$, and child consumption of fruit was positively correlated with parent consumption of low-fiber grains $r(19) = .55$, $p<.05$. Also, parent consumption of low-fat meat was positively correlated with children's consumption of low-fiber grain $r(19) = .57$, $p<.05$ and high-fat meat $r(19) = .59$, $p<.01$. The means for the difference scores of these categories are presented in Table 24.

Correlational analyses of the difference scores for the control group indicated that no category was reported to change similarly for parents and children. Table 25 presents the intercorrelations of FHQ category difference scores which were significiantly correlated between parents and their children. Only one correlation between parents and children's change scores was correlated in the correct direction (e.g., both parents and children decreased

Table 23

Intercorrelations of Difference Scores for Paren; and Child Scores (Experimental Participants) (n=19)

	Fruit Child	Low-Fiber Grains Child	High-Fat Meat Child	Low-Fat Dairy Child	Fruit Parent	Low-Fiber Grains Parent	High-Fiber Grains Parent	Low-Fat Meat Parent
Fruit, Child	-	.49	.19	.57	.54	.55	-.05	-.03
Low-Fiber Grain, Child		-	.69	.60	.47	.30	-.36	.57
High-Fat Meat, Child			-	.68	.18	.14	-.43	.59
Low-Fat Dairy, Child				-	.20	.26	-.44	.40
Fruit, Parent					-	.14	-.12	.02
Low-Fiber Grain, Parent						-	-.10	.33
High-Fiber Grain, Parent							-	-.40
Low-Fat Meat, Parent								-

Table 24

Means (and standard deviations) of Difference Scores for Parent and Child Scores - Experimental Participants Only

Food History Questionnaire Category	Child Mean (SD)	Parent Mean (SD)
Fruit	7.71 (33.13)	6.89 (20.24)
Low-Fiber Grain	23.29 (38.98)	4.16 (15.55)
High-Fat Meat	14.65 (37.34)	
Low-Fat Dairy	2.71 (49.40)	
High-Fiber Grain		-11.68 (31.05)
Low-Fat Meat		0.05 (02.76)

Table 25

Intercorrelations of Difference Scores for Parent and Child Scores (Control Participants) (n=22)

	High-Fat Dairy Child	Fruit Child	Low-Fiber Grains Child	High-Fat Fish Child	High-Fat Dairy Parent	High-Fat Fish Parent	Low-Fat Fish Parent
High-Fat Dairy, Child	-	.31	-.41	-.25	-.39	-.58	.63
Fruit, Child		-	-.52	-.34	-.51	-.27	.15
Low-Fiber Grains, Child			-	.55	.64	.21	-.08
High-Fat Fish, Child				-	.51	.18	.08
High-Fat Dairy, Parent					-	.21	-.09
High-Fat Fish, Parent						-	-.16
Low-Fat Fish, Parent							-

Table 26

Means (and standard deviations) of Difference Scores for Parent and Child Scores - Control Participants Only

Food History Questionnaire Category	Child Mean (SD)	Parent Mean (SD)
High-Fat Dairy	2.64 (13.21)	0.00 (13.78)
Fruit	-12.82 (17.24)	
Low-Fiber Grains	-1.41 (13.90)	
High-Fat Fish	-0.18 (04.16)	0.00 (01.93)
Low-Fat Fish		1.18 (05.62)

consumption of high-fat foods by similar amounts). Child consumption of high-fat fish was positively correlated with parent consumption of high-fat dairy products $r(22) = .51$, $p<.01$. Other significant correlations include: parent consumption of high-fat dairy with child consumption of low-fiber grains $p<.05$ $r(22) = .64$, $p<.001$ and fruit $r(22) = -.51$, $p<.05$; child consumption of high-fat dairy with parent consumption of high-fat fish $r(22) = -.58$, $p<.01$ and low-fat fish $r(22) = .63$, $p<.01$. The means for the difference scores of these categories are presented in Table 26.

Overall, the results of the FHQ analyses indicate that there was a significant change by experimental parents and target children for fruit and low-fat dairy products. Participants in the experimental condition reported an increase in their consumption of fruit and low-fat dairy products compared to the control group. This was seen for parents and children. In addition, there was a positive correlation between change in fruit consumption reported by both parents and children.

PRF & CRF. Linkage analysis was performed with the pre-intervention assessment data. The results of the linkage analysis for the PRF indicate that the questions grouped into four factors: availability, communication/knowledge, health beliefs, and child's preference (see Figure 12). The

Availability	Communication/ Knowledge	Child's Preference	Health Beliefs
parental influence & preference	child's knowl. television father's preference	child's acceptance child's age peers	food & health food & illness macronutrient information
Questions: 1,3,4,5,14d, 22d-e	11,12,22b, 22f,22i	2,6,7,22a, 22c,22g-h	8,9,10,14a-c, 14e-f

Figure 12 PRF Factors using Linkage Analysis

results of the linkage analysis for the CRF indicate that the three factors of health beliefs, discretion, and preference appear to be important to the relationship of these questions (see Figure 13).

The PRF availability factor includes questions about the parent's influence on the child's food choices. The communication/knowledge factor includes questions about the child's knowledge and preference and the influence of the husband and television on the child's choices. The child's preference factor includes questions about the child's acceptance of food, age, and choices of peers. The health belief factor includes questions about food choice and health/illness, as well as discussion of sugar, fat, and fiber content (see Table 10 above). Overall, the results indicated that parents reported a variety of factors were important to children's food choices, preference, and knowledge. Parents reported that their children's preferences influenced their own behavior with regard to food purchases and meal preparation.

The CRF discretion factor included questions about food taste and food choices of peers. The preference factor included questions about a child's confidence in making healthful choices and personal preference. The health belief factor included questions about food variety, food and illness, and food and health (see Table 11 above).

Health Beliefs	Discretion	Preference
variety	taste	self-efficacy
food & illness	peers	confidence
healthful food		preference
Questions:		
1a, 1d, 1f, 7	1b, 1c, 2, 9	1e, 3, 4, 5, 6, 8

Figure 13 CRF Factors using Linkage Analysis

Children reported that a variety of factors influence their food choice.

The linkage analysis results indicated a health belief factor is important for both parents and children. The health belief factors for parents and children included questions about food and sickness, and food and health. Similarly, analyses of the PRF and the CSI indicated items regarding children's preferences grouped together. These questions concern the foods children like to eat, the child's age, and the influence of the child on the parent. The factors of discretion (child), communication/knowledge (parent) and availability (parent) appeared to emphasize the influence of advertising, television, foods eaten by parents and other families, and cost.

There were no significant differences between groups for any of the questions from above. There were no significant differences between groups for the seven open-ended questions on the PRF.

NLS Study

Category data. Intended and actual purchases were analyzed using ANCOVAs, with the baseline score as the covariate. The ANCOVA summary tables are displayed in Tables 27 and 29. The means and standard deviations for all categories are displayed in Tables 28a and 28b (grams) and Tables 30a and 30b (frequency). ANCOVA's were used, despite the baseline differences, because the test was robust.

Table 27

ANCOVA's of Food Category Data (in grams)

Category	Type	DF	SS	MS	F	p
Low-Fat Meat	Intended	1	146202.63	146202.63	0.46	0.51
	Actual	1	36092.79	36092.79	0.42	0.52
High-Fat Meat	Intended	1	50478.06	50478.06	1.19	0.29
	Actual	1	2229725.94	2229725.94	3.77	0.07
Fruits/ Vegetables	Intended	1	2469700.19	2469700.19	1.05	0.32
	Actual	1	122414.73	122414.73	0.02	0.88
High-Fiber Grains	Intended	1	1733833.64	1733833.64	5.62	0.03* +
	Actual	1	1757689.99	1757689.99	3.48	0.08
Low-Fat Dairy	Intended	1	802894.55	802894.55	0.43	0.52 +
	Actual	1	14067.28	14067.28	0.00	0.95
High-Fat Dairy	Intended	1	942826.11	942826.11	2.39	0.14
	Actual	1	462244.45	462244.45	0.27	0.61
Low-Fat Fish/Pltry	Intended	1	908.97	908.97	0.00	0.97
	Actual	1	316.13	316.13	0.00	0.99

* $p<.05$ at Intervention + $p<.05$ at Follow-up

Table 28a

Means (and standard deviations) of Category Data (in grams) for Intended Data

Category	n	Condition	Time: Baseline	Time: Intervention
Low-Fat Meat	13	Control	293.4(228.1)	376.1(372.3)
	11	Expt	594.5(544.8)	587.3(714.1)
High-Fat Meat	13	Control	490.0(495.4)	488.4(339.8)
	11	Expt	482.9(436.4)	392.2(346.3)
Fruits/ Vegetables	13	Control	4113.5(2780.6)	3634.9(1693.1)
	11	Expt	4993.2(2731.0)	4715.9(2339.9)
High-Fiber Grains	13	Control	575.3(443.0)	423.8(396.5)
	11	Expt	1409.8(972.5)	1597.3(982.9)
Low-Fat Dairy	13	Control	4384.6(2824.1)	5048.4(3095.3)
	11	Expt	5658.0(4379.6)	5851.1(4113.1)
High-Fat Dairy	13	Control	1399.0(1172.8)	1492.7(703.4)
	11	Expt	1434.1(792.1)	1113.4(933.8)
Low-Fat Fish/Pltry	13	Control	446.3(546.0)	794.1(932.2)
	11	Expt	812.4(748.3)	1264.7(1413.0)

Table 28b

Means (and standard deviations) of Category Data (in grams) for Actual Data

Category	n	Condition	Time Baseline	Intervention	Follow-Up
Low-Fat Meat	13	Control	1147.2(1079.9)	1236.9(1121.0)	1522.1(1396.7)
	11	Expt	1433.5(1233.6)	1281.5(991.3)	1384.0(1155.6)
High-Fat Meat	13	Control	1042.7(789.6)	1716.7(993.0)	986.1(803.2)
	11	Expt	1439.6(933.6)	1332.1(821.4)	1004.0(855.6)
Fruits/ Vegetables	13	Control	5750.0(2577.3)	5806.5(3023.1)	4027.7(1785.5)
	11	Expt	8450.0(3791.6)	7192.0(2645.1)	5968.8(2663.8)
High-Fiber Grains	13	Control	476.3(452.6)	639.9(421.6)	372.7(368.5)
	11	Expt	1113.6(1136.5)	1723.8(1338.5)	1481.1(1050.7)
Low-Fat Dairy	13	Control	3411.3(2605.8)	4092.4(2190.8)	2706.4(1860.8)
	11	Expt	3501.2(2492.3)	4205.0(2944.8)	4523.8(1832.1)
High-Fat Dairy	13	Control	1884.8(935.8)	2160.0(1610.2)	1566.2(1005.9)
	11	Expt	2278.2(824.5)	2217.9(1366.1)	1804.2(1273.9)
Low-Fat Fish/Pltry	13	Control	886.7(1026.8)	1176.4(1119.1)	507.9(472.0)
	11	Expt	1583.8(1114.3)	1871.7(1697.6)	1243.0(1251.8)

Table 29

ANCOVA's of Food Category Data (in freq) for intervention

Category	Type	DF	SS	MS	F	p	
Low-Fat Meat	Intended	1	0.06	0.06	0.29	0.60	
	Actual	1	0.08	0.08	0.77	0.40	
High-Fat Meat	Intended	1	0.39	0.39	2.49	0.13	
	Actual	1	4.85	4.85	7.19	0.01	*
Fruits/ Vegetables	Intended	1	8.20	8.20	2.15	0.16	
	Actual	1	1.52	1.52	0.42	0.53	
High-Fiber Grains	Intended	1	4.75	4.75	10.05	0.01	*
	Actual	1	1.20	1.20	2.22	0.15	
Low-Fat Dairy	Intended	1	0.07	0.07	0.42	0.52	
	Actual	1	0.12	0.12	0.33	0.57	+
High-Fat Dairy	Intended	1	0.54	0.54	0.88	0.36	
	Actual	1	0.00	0.00	0.00	0.98	
Low-Fat Fish/Pltry	Intended	1	0.00	0.00	0.01	0.94	
	Actual	1	0.00	0 00	0.01	0.91	+

* p<.05 at Intervention + p<.05 at Follow-Up

Table 30a

Means (and standard deviations) of Category Data (frequency) for Intended Data

Category	n	Condition	Time: Baseline	Time: Intervention
Low-Fat Meat	13	Control	.49 (0.5)	.48 (0.4)
	11	Expt	.71 (0.6)	.65 (0.6)
High-Fat Meat	13	Control	.78 (0.8)	.95 (0.6)
	11	Expt	.72 (0.7)	.65 (0.7)
Fruits/ Vegetables	13	Control	5.63 (3.6)	5.10 (2.5)
	11	Expt	6.83 (3.0)	6.99 (3.0)
High-Fiber Grains	13	Control	1.03 (0.8)	.68 (0.6)
	11	Expt	1.61 (1.0)	1.94 (1.1)
Low-Fat Dairy	13	Control	1.80 (0.8)	1.99 (0.9)
	11	Expt	1.81 (0.8)	2.10 (0.8)
High-Fat Dairy	13	Control	1.32 (0.9)	1.60 (0.7)
	11	Expt	1.72 (0.6)	1.54 (1.1)
Low-Fat Fish/Pltry	13	Control	.77 (1.0)	1.01 (1.2)
	11	Expt	.95 (0.6)	1.21 (0.8)

Table 30b

Means (and standard deviations) of Category Data (in frequency) for Actual Data

Category	n	Condition	Time: Baseline	Time: Intervention	Time: Follow-Up
Low-Fat Meat	13	Control	.38 (0.3)	.36 (0.3)	.45 (0.5)
	11	Expt	.69 (0.4)	.41 (0.4)	.69 (0.5)
High-Fat Meat	13	Control	1.34 (0.9)	2.20 (1.0)	1.33 (0.8)
	11	Expt	1.53 (1.1)	1.39 (0.9)	1.19 (1.0)
Fruits/ Vegetables	13	Control	6.65 (3.0)	6.98 (2.6)	5.80 (2.3)
	11	Expt	8.18 (3.2)	8.57 (3.1)	7.25 (2.4)
High-Fiber Grains	13	Control	.65 (0.4)	.84 (0.5)	.64 (0.6)
	11	Expt	1.20 (0.9)	1.73 (1.2)	1.60 (0.9)
Low-Fat Dairy	13	Control	1.73 (0.8)	2.09 (0.7)	1.17 (0.7)
	11	Expt	1.90 (0.7)	2.05 (0.8)	1.88 (0.5)
High-Fat Dairy	13	Control	1.84 (0.8)	1.92 (0.7)	1.71 (0.8)
	11	Expt	2.30 (0.9)	2.18 (1.0)	1.88 (0.9)
Low-Fat Fish/Pltry	13	Control	.88 (0.8)	1.05 (0.8)	.52 (0.3)
	11	Expt	1.07 (0.6)	1.20 (0.7)	1.09 (0.6)

The results indicated that, during the intervention phase, significant differences favoring the experimental condition were found for the **intended** purchases of high-fiber grains (see Figures 14a & 14b). A similar trend was seen for the High-Fat Meat category (see Figures 15a & 15b). At follow-up, a significant difference was seen for the High-Fiber Grains category ($p<.05$). NLS participants in the experimental condition indicated that they intended to increase their purchase of high-fiber grains, and decrease their purchase of high-fat meat products during the intervention phase compared to the control group. At follow-up, significant differences between experimental and control groups were also seen for the Low-Fat Dairy category.

The results indicated that, during the intervention phase, trends toward significance favoring the experimental condition were found for the **actual** purchases of high-fiber grains (see Figures 14c & 14d). A significant difference was also found for the High-Fat Meat category (frequency data) (see Figure 15d). A similar trend was seen for the High-Fat Meat category (in grams) (see Figure 15c).

Macronutrient data. Intended and actual data were analyzed with ANCOVA's, using the baseline as the covariate (see Table 31). The means and standard deviations for the macronutrient data of intended and actual purchases are displayed in Table 32.

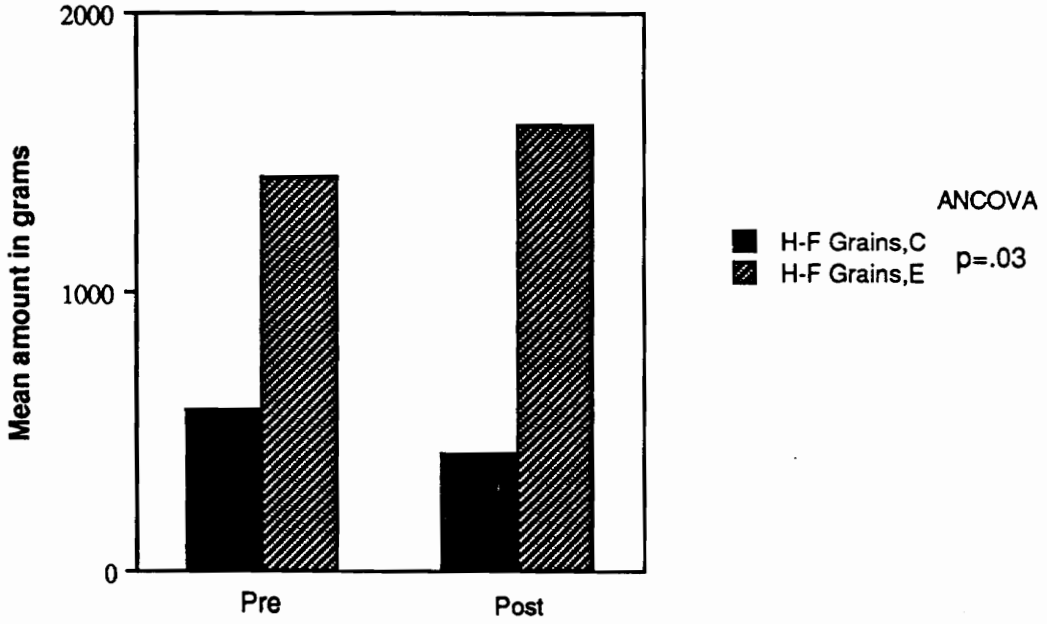

Figure 14a. High-Fiber Grains data, Intended

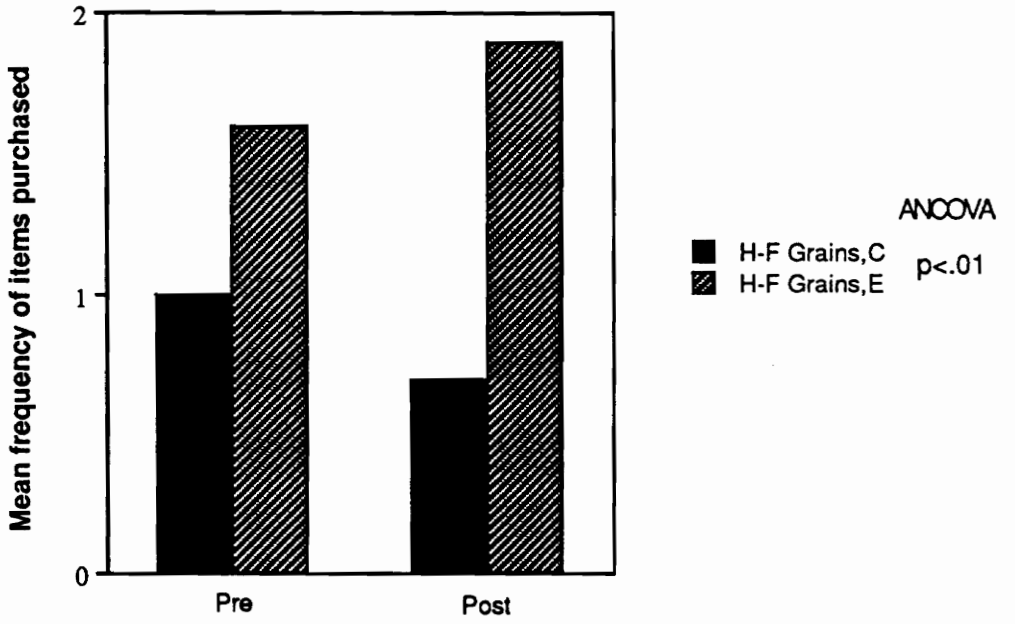

Figure 14b. High-Fiber Grains data, Intended

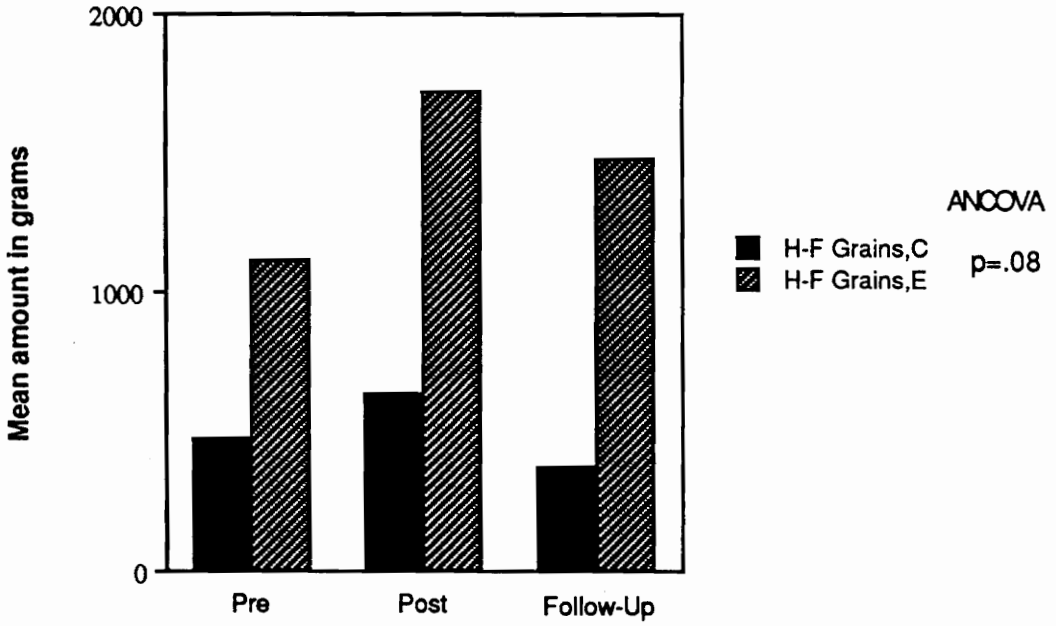

Figure 14c. High-Fiber Grains data, Actual

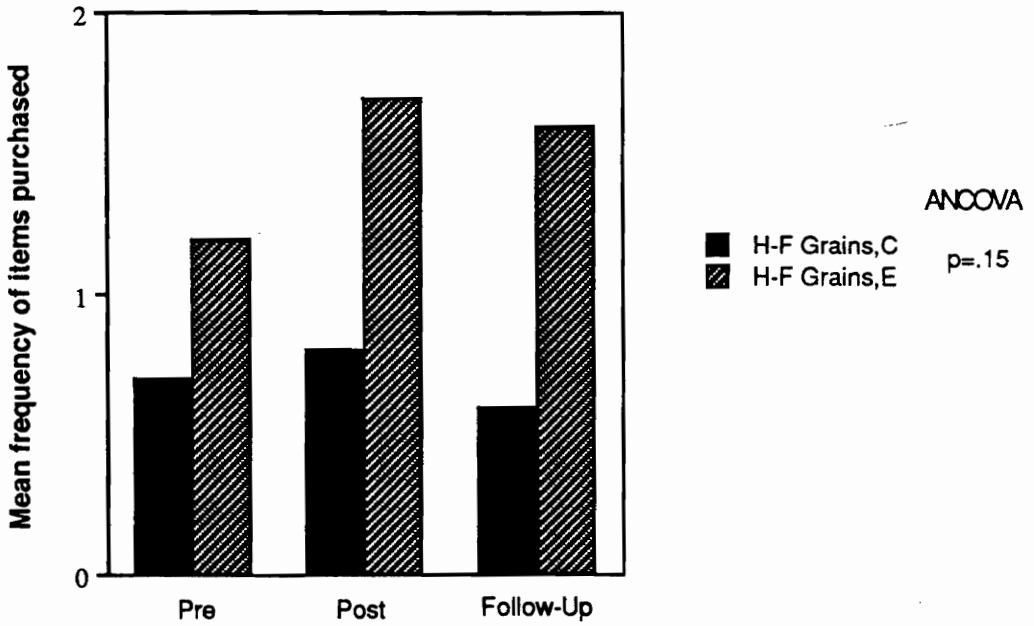

Figure 14d. High-Fiber Grains data, Actual

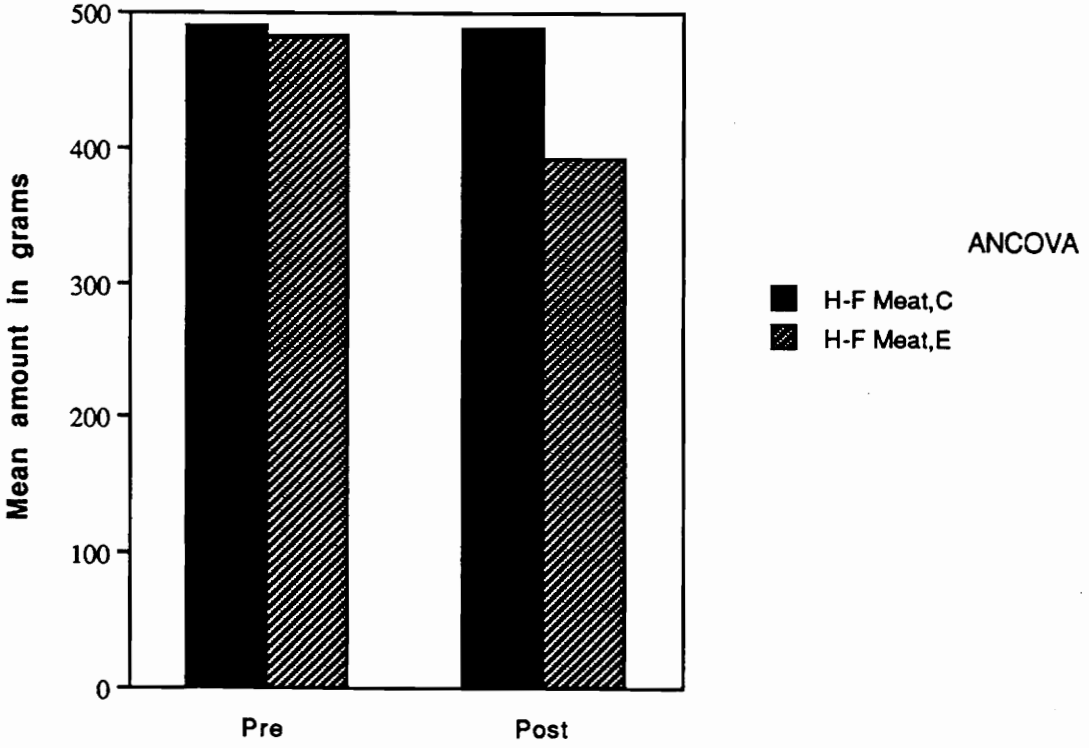

Figure 15a. High-Fat Meat data, Intended

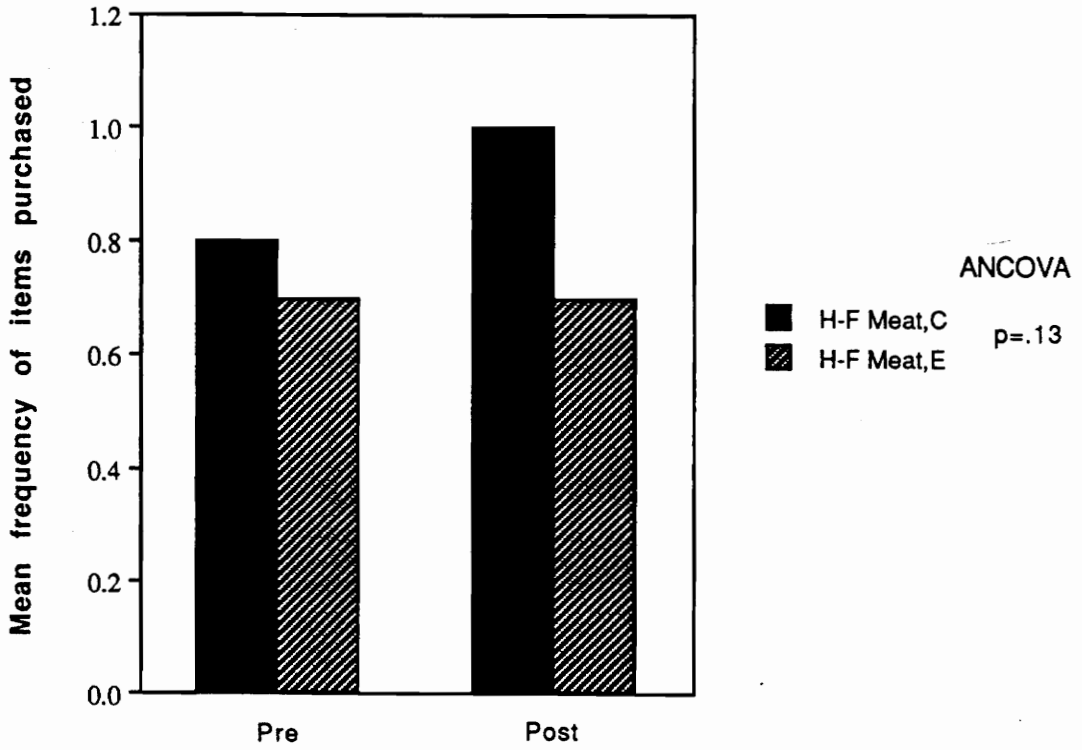

Figure 15b. NLS High-Fat Meat data, Intended

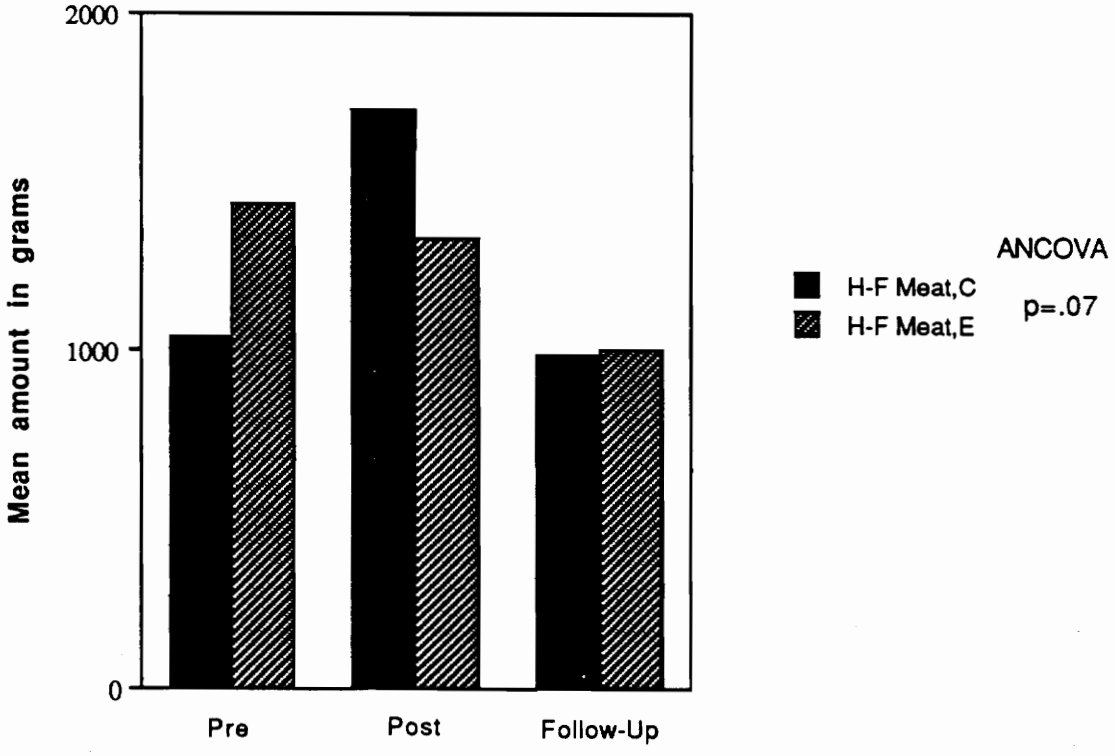

Figure 15c. High-Fat Meat data, Actual

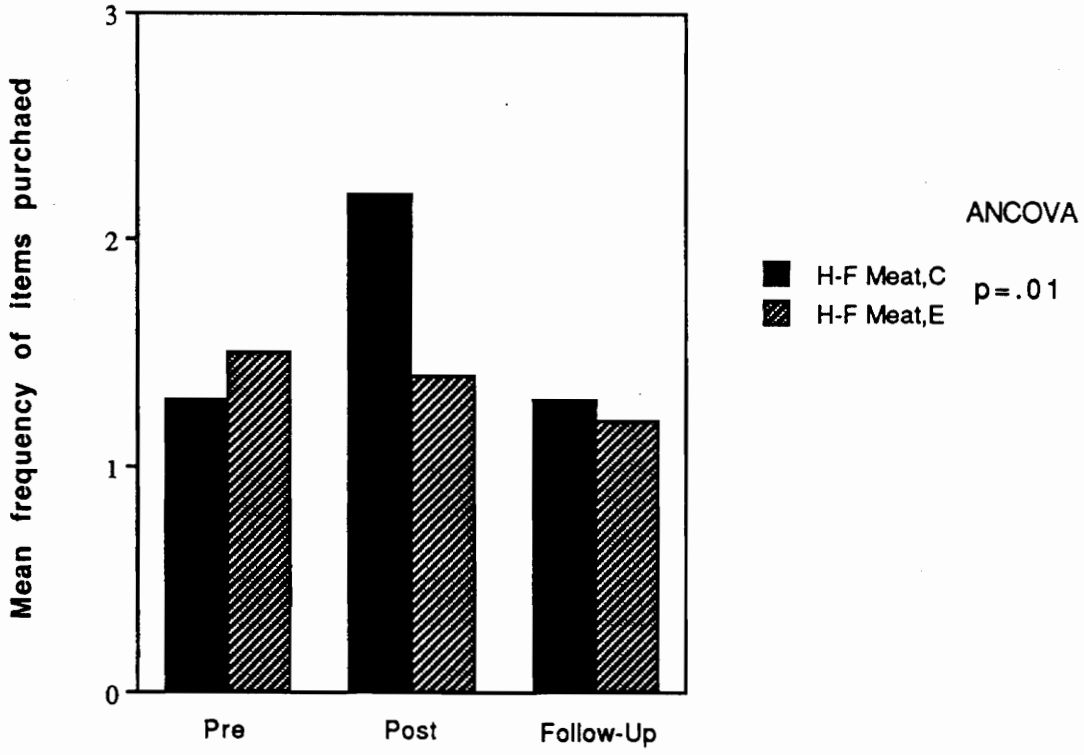

Figure 15d. High-Fat Meat data, Actual

Table 31

ANCOVA's of Macronutrient Data

Group	Type	n	df	SS	MS	F	p	p<.05
FAT								
Test for Intervention with Baseline as the covariate								
	Actual	24	1	3.00	3.00	0.06	.80	
	Intended	24	1	269.08	269.08	2.68	.12	
Test for Follow-up with Baseline as the covariate								
	Actual	20	1	3.90	3.90	0.08	.78	
FIBER								
Test for Intervention with Baseline as the covariate								
	Actual	24	1	21.28	21.28	0.32	.58	
	Intended	24	1	254.48	254.48	7.07	.02	*
Test for Follow-up with Baseline as the covariate								
	Actual	20	1	98.91	98.91	3.64	.07	

Table 32

Means (and standard deviations) of Macronutrient Data

Group	n	Condition	Baseline	Intervention	Follow-Up
FAT (percent)					
				Actual	
	13	Control	40.0 (7.9)	39.5 (7.3)	37.4 (10.0)
	11	Experimental	36.9 (4.3)	37.0 (7.9)	36.1 (5.1)
				Intended	
	13	Control	37.2 (7.1)	40.7(10.3)	
	11	Experimental	35.0 (5.8)	33.2 (9.7)	
FIBER (grams per person per day)					
				Actual	
	13	Control	15.8 (8.3)	16.8 (6.7)	13.5 (6.3)
	11	Experimental	24.6 (8.1)	24.7(12.2)	20.7 (5.2)
				Intended	
	13	Control	11.2 (7.5)	9.3 (4.4)	
	11	Experimental	16.7 (5.1)	18.5 (8.1)	

Participants in the experimental condition reported an increase in their **intended** purchases of grams of fiber per day per person, while participants in the control condition reported a decrease. A similar trend was found in the intended purchase data for the percent calories from fat. No significant differences were found for the **actual** purchases of grams of fiber or percent calories from fat during intervention. At follow-up there was a trend toward significance for fiber.

Discussion

The purposes of this study were to: (a) investigate the influence of a supermarket intervention on parent's food choices, and (b) assess how changes in parental food choices and preferences affected their children. Pre- and post-intervention measures were administered to parents and children who participated in the Nutrition for a Lifetime System studies (NLS-1 & NLS-2). The NLS was a prototype interactive information system located in a large supermarket which was designed to help users decrease purchases of high-fat foods and increase purchases of high-fiber foods. The NLS study provided information about intended and actual food purchases and changes in food purchases. The family study provided information about the self-report of consumption and preferences. It was hypothesized that parents in the experimental condition would make changes in food purchases to reduce fat and increase fiber, that such changes would be reflected on measures of reported consumption and preferences, and that the children of experimental parents would report similar changes in consumption and preferences.

The results of this study indicated that, overall, families in the NLS study made some changes in food purchases that followed National Cancer Institute (NCI)

guidelines for reducing fat and increasing fiber. Family participants in the experimental condition reported a significant increase in their intention to purchase high-fiber grains. A similar trend was seen for the High-Fat Meat category. Some changes were seen in grams of fiber and calories from fat for intended purchases. A significant difference was found for actual purchases of high-fat meat. A similar trend was seen for actual purchases of high-fiber grains. No significant differences were seen in grams of fiber or calories from fat for actual purchases.

The results of the family study analyses indicated that both parents and children in the experimental condition reported making similar changes in consumption of certain foods. Participants in the experimental condition reported an increase in their consumption of fruit and low-fat dairy foods, while participants in the control condition reported a decrease in their consumption of these foods. Thus, when experimental parents reported a change in consumption of certain food items, their children tended to report similar changes. This relationship was partially confirmed by correlational analyses of change scores for the experimental group. Difference scores for fruit consumption were strongly correlated between parents and their children. There were no significant correlations for change scores in consumption (in expected directions) between parents and

children in the control group. Patterns of changes for only the experimental parents and children were related to the intervention.

In addition, the results indicated that reported behavior, preference, and knowledge for snacks and entrees were apparently affected by the treatment. Both parents and children in the experimental group reported a decrease in their consumption of high-fat snack foods (e.g., cookies, peanuts) and high-fat entrees (e.g., fried chicken, fish sticks), while the control group reported the opposite. Similar results were shown for the preference and knowledge questions. Overall, the results provided some evidence that parents who are involved in a nutrition intervention also will influence their children's food choices. It should be noted that data from both parents (N=41) were analyzed, rather than target parents only (N=24).

This general conclusion was further supported by an examination of the different measures which showed some consistency in outcomes. A change in the consumption of high-fat entrees was consistent with a change in the intended purchase data for high-fat meat. A positive change in the Snack score was consistent with changes in the consumption of fruit on the FHQ. This pattern was also related to the general theme across all videodisc segments; beginning with the first week participants were encouraged to increase their consumption of fruits. Also, a repeated theme which began in week two was the idea to decrease

consumption of simple carbohydrates (i.e., common snack foods such as cookies, chips, and soft drinks). Increasing consumption of fruits and changing snack food items may have been the most consistent and salient messages of the intervention. It appears that these messages were "disseminated" to the children by the parents.

Additionally, a health beliefs factor was found for both parents and children. Questions about health and illness were strongly correlated within each group. This may suggest that parents and children have similar reasons for the making healthful changes. Parents reported that they believed their children influenced food purchases and meal preparation. A better understanding of these factors may lead to more successful intervention designs by the process of shaping messages to fit these beliefs.

However, it was unclear why more significant results were not seen in other categories. A larger sample size may have yielded more significant effects. Post-hoc calculations of power, following Lipsey (1990) and using a formula that corrects effect size for ANCOVA, indicated that a sample size of approximately 30 instead of 24 would have revealed significant differences for several categories (e.g., FHQ Low-Fat Dairy data for children). Additionally, measurement at the individual level may not have been sensitive enough to assess many differences for an

intervention that was designed to produce modest changes in many people, and where at this point, the intervention was in a prototype form. Greater attention to intervention strength, nature of the intervention, and N size is critical if applied research is to reduce the probability of Type II error.

Conclusion

The results of this study suggested that parents and their children may be positively influenced by a public-access interactive video information system directed to parent use. Such interventions may provide one way to reach a large number of individuals with the goal of potentially reducing coronary heart disease, atherosclerosis, various types of cancer, and obesity. This effect could be augmented by producing more specific videodisc segments for children to view either at the store or at home (i.e., via the VCR) and by further development of more effective programming.

Few studies have evaluated the influence of a nutrition intervention program on children and parents individually. This study provided some evidence for intra-family food choice changes. Using pictures to assess behavior, preference, and knowledge made it possible to evaluate children's responses via self-report rather than parent-report. The results provide some additional evidence for the positive effect of parent involvement or influence on children's food choices since relatively consistent changes were seen across measures of consumption, preference, and knowledge. Additionally, finer-grain measures of purchase and consumption patterns also may more clearly document

changes in food choices. Once such relationships and patterns are more fully understood, it may be possible to design more effective nutrition change programs for parents and children.

Research in the area of children's eating habits and food preferences should continue to investigate the variables which affect change, including health beliefs and motivation to change food choices. In addition, similar studies should be completed which evaluate the influence of children's age since age reflects parental and other environmental influences. The results of this study indicated that similar changes were seen between parents and younger adolescents. It is likely, though, that the effect of the intervention would be different for older adolescents. For example, older adolescents may be more likely to understand the differences between low- vs. high-fat foods, but may be more resistent to making changes with popular foods such as hamburgers.

This intervention appeared to be relatively successful for influencing changes in certain food categories, such as snacks. However, other food categories, such as low-fat vegetables were much less affected. This suggests that future interventions need to further investigate how to influence foods which appear difficult to change. Variables

relating to health beliefs, types of foods to change, meal preparations, family characteristics, and behavioral strategies all must be considered in future nutrition intervention programming.

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Appendices

Appendix A

COLLEGE OF ARTS AND SCIENCES

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Blacksburg, Virginia 24061-0436

CENTER FOR RESEARCH IN HEALTH BEHAVIOR
DEPARTMENT OF PSYCHOLOGY
(703) 231-6581

Dear _____ Family,

In addition to the Nutrition Project, a family study will be conducted. This study will fulfull the requirements of my dissertation. Families with children ages 8 to 15 are needed. The family will be paid an additional $20.00 to participate. The study involves two interviews, pre-intervention (June) and post-intervention (September).

The first interview will be conducted during the end of June. If you would like to participate, please complete this form and the enclosed informed consent, and return it in the envelope provided. We will contact you by phone.

Thank you for your attention to this matter.

Sincerely,

Jana L. Wagner, M.S.
Project Director

Phone: _____

Child's Name Age

_____

_____

_____

Please check available dates:

___ Week of June 26
___ Week of July 3
___ Week of July 10

VA. TECH
NATIONAL CANCER INSTITUTE
KROGER CO., INC.

Family Study - Informed Consent Form (Parent)

In addition to the Nutrition Project, a family study will be conducted by Jana Wagner. Families with children ages 8 - 16 are needed. Each family will be paid an additional $20.00 to participate. If you choose to participate, a graduate student will interview your family about food preferences and consumption on two occasions (at the beginning and end of the nutrition project). The total interview time should be no longer than 1 hour per session. All information will be treated confidentially. There are no risks involved with these interview procedures.

Participation is voluntary; you may withdraw your consent and discontinue participation at any time. If you choose to participate and allow your child(ren) to participate, please sign this informed consent form. Your child(ren) will also be asked to complete an informed consent form, and be told that s/he may choose to discontinue the interview at any time. This project has been approved by the Va. Tech. Human Subjects Research Committee and the Institutional Review Board. Any questions you have may be directed to Dr. Winett, at 231-6275.

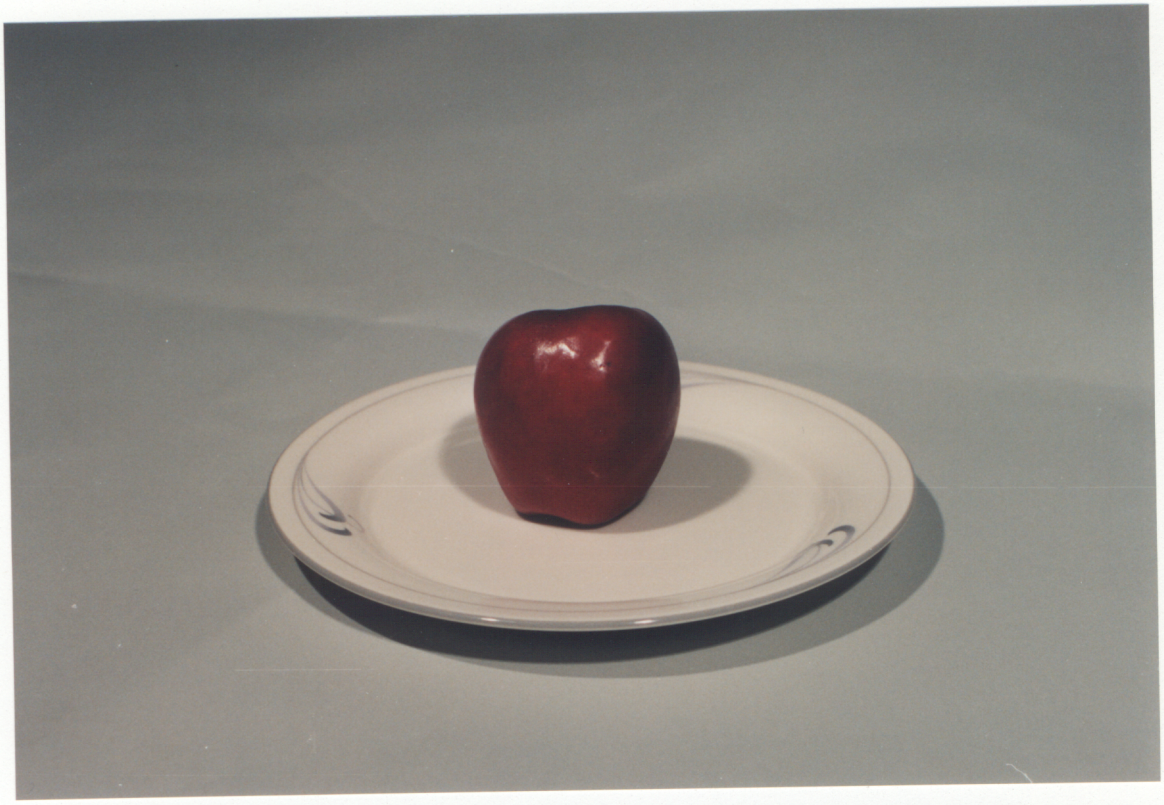
I hereby agree to voluntarily participate in the research project described above. I understand that our family will be paid an additional $20.00 to participate. I also understand that we are free to withdraw our consent and discontinue at any time.

Name: _____

I hereby agree to allow my child(ren) to participate in this study.

Name: _____

Appendix B



CARD SORT ANSWER SHEET

CARDS ARE SORTED INTO PILES FOR "A LITTLE" OR "A LOT"
(RECORD RESPONSES FROM "A LOT" PILE)

CATEGORY	QUESTION		
	1	2	3
	What do you eat?	What would you like to eat?	What should eat?
A	_____	_____	_____
B	_____	_____	_____
C	_____	_____	_____
D	_____	_____	_____
E	_____	_____	_____
F	_____	_____	_____

Appendix C

FOOD HISTORY QUESTIONNAIRE

The purpose of this questionnaire is to determine your usual eating habits. Please indicate how often you eat these foods by determining daily, weekly, or monthly consumption. Please place a number in the appropriate space to indicate the frequency with which you eat these foods. Think about what you have eaten only in the last four weeks. If you are not sure about an answer, please estimate. This questionnaire will take about 10 minutes to complete.

Name: _____

Date: _____

FRUITS & VEGETABLES	Medium Serving	Daily	Weekly	Monthly	Never
Apples	1				
Banana	1				
Oranges	1 med.				
Beans, such as baked, kidney, in chili	3/4 C				
Broccoli	1/2 C				
Cole slaw, Mac & cheese, Potato salad	1/2 C				
Carrots, or mixed vegetables w/ carrots	1/2 C				
Mixed green salad	1 med. bowl				
French fries and fried potatoes	3/4 C				
White potatoes, incl. baked, mashed	1 or 1/2 C				
Reg. Rice, incl. white, yellow, mixes	3/4 C				
Brown Rice	3/4 C				
Vegetables w/ cheese sauce	1/2 C				
MEAT, MIXED DISHES					
Hamburgers, meat loaf	1 med.				
Beef-roasts, steaks	4 oz.				
Beef stew or pot pies	1 C				
Pork, (chops, roast)	2 chops / 4 oz.				
Fried chicken	2 sm. or 1 lg. pc.				
Chicken or turkey, baked or broiled	2 sm. or 1 lg. pc.				
Fish sticks or fried fish	4 oz. or 1 sandwich				
Fish filet, plain or shellfish	4 oz.				
Pasta w/ meat sauce	1 C				
Pasta w/ tomato sauce	1 C				
Hot dogs	2 dogs				
Ham, lunch meats	2 slices				
Cheese Pizza	2 slices				
Soup	1 med. bowl				
Bacon	2 slices				
Sausage or pepperoni (incl. on pizza)	2 slices				

BREADS AND GRAINS	Medium Serving	Daily	Weekly	Monthly	Never
Regular bread or rolls, (white, rye, pumper.)	2 sl.				
Whole wheat bread or rolls	2 sl.				
Extra high fiber whole wheat bread	2 sl.				
Corn Bread, muffins, tortillas	1 med. pc.				
Cold cereals, regular (corn, "kids")	1 med. bowl				
High-fiber cereal (shredded wheat, bran, oat)	1 med. bowl				
Extra high-fiber cereal (all-bran type)	1 med. bowl				
Instant oatmeal from a packet	1 pkt.				
DAIRY					
Eggs	2				
Cheese and cheese spreads	4 oz.				
Cottage cheese	4 oz.				
Yogurt, regular	8 oz.				
Yogurt, Low-fat	8 oz.				
Skim milk	8 oz.				
2% milk	8 oz.				
Whole milk	8 oz.				
DESSERTS AND SNACK FOODS					
Crackers	2 handfuls				
Chips	2 handfuls				
Peanuts, Peanut butter	2 T				
Popcorn	2 handfuls				
Ice cream	6 oz.				
Ice milk	6 oz.				
Doughnuts, cookies, cakes	1, 1 med. piece				
Pies	1 med. piece				
Candy	2 oz.				
Toaster Pastries	2 pastries				
Pudding	4 oz.				

Name: _____ Date: _____

PARENT RATING FORM

		Not at All	A Little	A Fair Amount	A Lot
1.	How much do you influence the foods which your child(ren) eats?	1	2	3	4
2.	How much does your child(ren) influence what you eat?	1	2	3	4
3.	How likely is it that you could influence a change in your child(ren)'s breakfast food selection?	1	2	3	4
4.	How likely is it that you could influence a change in your child(ren)'s dinner food selection?	1	2	3	4
5.	How likely is it that you could influence a change in your child(ren)'s snack food?	1	2	3	4
6.	How likely is it that your child(ren) would accept a change in food you buy/offer?	1	2	3	4
7.	How likely is it that your child(ren) would continue to eat new foods which you buy, and accept these changes as permanent?	1	2	3	4
8.	How strong is the relationship between what your child eats and how well s/he feels on a daily basis?	1	2	3	4
9.	How likely is it that what your child eats is related to his/her health (for example, the number of colds per year)?	1	2	3	4
10.	How likely is it that your child will become ill now or in the future by not eating a nutritionally sound diet?	1	2	3	4
11.	How confident are you that your child(ren) can make healthy food choices for dinner?	1	2	3	4
12.	How confident are you that your child(ren) can make healthy food choices for snack?	1	2	3	4

13. Please estimate the number of meals your child eats at home per week during the school year:

*From Monday - Friday (possible 14 with breakfast & dinner)

Child A Child B Child C

*For Saturday and Sunday (possible 6)

Child A Child B Child C

14. During the last month, how often (0-10) did you discuss the following nutrition information?

Sugar content	0 1 2 3 4 5 6 7 8 9 10
Fat content	0 1 2 3 4 5 6 7 8 9 10
Fiber content	0 1 2 3 4 5 6 7 8 9 10
Advertising	0 1 2 3 4 5 6 7 8 9 10
Cost	0 1 2 3 4 5 6 7 8 9 10
Vitamin/mineral content	0 1 2 3 4 5 6 7 8 9 10

15. What foods do you buy and serve which are not eaten by your child(ren)?

16. What foods does your child like?

17. What foods does you child dislike?

18. What does your child eat for breakfast?

19. What does your child eat for snack?

20. What kind of breakfast cereals does your child eat?

21. What kind of bread does your child eat?

22. How much do the following things affect what your child eats?

	Not at All	A Little	A Fair Amount	A Lot
Child's age	1	2	3	4
What husband eats	1	2	3	4
Time (or lack of time)	1	2	3	4
Cost	1	2	3	4
Your food preferences	1	2	3	4
T.V.	1	2	3	4
Other children	1	2	3	4
Child's schedule (s/he is not with you)	1	2	3	4
Child's preferences	1	2	3	4

Name: _____ Date: _____

STRUCTURED INTERVIEW (CHILD)

		Not at All	A Little	A Fair Amount	A Lot
1.	Of the foods your mother (parent) serves you, how much:				
	Do they have variety	1	2	3	4
	Do they taste good	1	2	3	4
	Would other kids like to eat them	1	2	3	4
	Are they healthy	1	2	3	4
	Are they what you like	1	2	3	4
	Are they often the same	1	2	3	4
2.	How much is food your mother (parent) buys and serves like food other mothers serve their children?	1	2	3	4
3.	How much do you believe you could change the foods you eat for breakfast?	1	2	3	4
4.	How much do you believe you could change the foods you eat for dinner?	1	2	3	4
5.	How much do you believe you could change the foods you eat for snack?	1	2	3	4
6.	How much is what you eat related to how you feel each day?	1	2	3	4
7.	How much is what you eat related to how often you get sick?	1	2	3	4
8.	How confident are you that you can make healthy food choices for a snack?	1	2	3	4
9.	How much food do you buy on your own without your mother (parent), other than lunch at school?	1	2	3	4

10. What would you like for your mother (parent) to serve which is different from what is made now?

11. What would you like to cook?

FOOD OBSERVATION FORM

Family Name: _____ Date: _____

Report on the following foods:

Bread

Cereal

Milk

Pasta

Potato

Rice

Vegetable*

Fruit**

Report brand name and type (i.e., for milk: Kroger, 2%)

* (e.g., carrots, broccoli, lettuce)

**(e.g., apples, bananas, oranges)

Appendix D

FRUITS ...

Fruits (Misc & A-Bananas)
- * Canned Fruit, w/ light syrup (oz)
- Canned Fruit, w/ heavy syrup (oz)
- Pie filling (oz)
- Frozen Fruit (oz)
- Jams, Preserves & Jellies (oz)
- * Fresh Berries (Straw, Blue etc) (oz)
- * Apples [3 per lb] (lbs)
- * Applesauce (oz)
- * Apricots [13 per lb] (lbs)
- * Bananas [4 per lb] (lbs)

Fruits (Cantaloupe-Plum)
- * Cantaloupe & Melons (each)
- * Dates, Prunes & Raisins (oz)
- * Grapes (lbs)
- * Grapefruit (each)
- * Lemons [6 per lb] (lbs)
- * Fresh Oranges [4 per lb] (lbs)
- * Fresh Peaches [5 per lb] (lbs)
- * Fresh Pears [3 per lb] (lbs)
- * Fresh Pineapple (lbs)
- * Fresh Plums [7 per lb] (lbs)

NONFOODS, BABY/PET NEEDS ...

- Baby Food, Supplies
- Pet Food, Supplies
- Toilet Paper
- Paper Towels, Tissues
- Plastic, Aluminum Foil
- Cleaning/Laundry Needs
- Health/Beauty/Personal Hygiene
- Gift/Card/Magazine/Book
- Film/Battery/School Needs
- Housewares
- Misc. Household Items
- Seasonal Items (X-Mas, etc)

OTHER FOODS, SNACKS & DESSERTS ...

- Chips (oz)
- Doughnuts (each)
- Granola Bars (oz)
- Nuts (oz)
- Peanut Butter (oz)
- Pickles (oz)
- * Popcorn (oz)
- Pretzels (oz)
- Sunflower Seeds (oz)
- Olives (oz)
- Potato/Chicken Salad (oz)

Desserts & Candy
- Candy (oz)
- Chocolate (oz)
- Fruit Cookies (oz)
- Other Cookies (oz)
- Pudding or Tapioca (oz)
- Cakes (already made) (each)
- Pies (already made) (each)

PASTAS, BREADS & CEREALS ...

- * Pasta, whole wheat (oz)
- * Pasta, (macaroni, spag., etc) (oz)
- Ramen Noodles, Soup (oz)
- * Rice, whole grain/brown (oz)
- * Rice, white/rice mix (oz)
- Mexican Shells (tortilla) (oz)

Breads, Rolls & Bagels
- White Bread, Rye, other (loaf)
- Wheat Bread (loaf)
- * Whole Wheat Bread (loaf)
- * Extra High Fiber Bread (Branola)
- French Bread (loaf)
- Pita Bread, white (oz)
- * Pita Bread, whole wheat (oz)
- Hot Dog/Hamburger Buns (oz)
- Rolls & Bagels (lbs)

Biscuits, Muffins, Crackers & Pastries
- Biscuits, canned (oz)
- English Muffins (pkgs of 6)
- Cinnamon Rolls, Danishes (oz)
- * Bran Muffins (oz)
- Cornbread, Regular Muffins (oz)
- Muffin Mixes (oz)
- Saltines/Zwieback Crackers (oz)
- Other Crackers (Triscuit, Ritz)(oz)
- Graham Crackers (oz)
- Melba/Rice Cake/Crispbread (oz)
- Toaster Pastries (oz)
- Doughnuts (each)

Breakfast Cereals
- Instant Oatmeal, Grits (oz)
- "Sugar/Kid's" Cereal (oz)
- Corn or Rice Cereal (oz)
- Oat Bran, Oatmeal (oz)
- * "Some Fiber" Cereal (Cheerios, etc) (oz)
- * "Medium Fiber" Cereal (Bran Flakes, etc) (oz)
- * "High Fiber" Cereal (All Bran, etc) (oz)

Flour & Baking Supplies
- Flour, white (lbs)
- * Flour, whole wheat (lbs)
- Cornmeal (oz)
- Pancake or Waffle Mixes (oz)
- Sugar, white/brown/powder (lb)
- Spices, Herbs, Yeast, Soda
- Cookie Dough (oz)
- Cake Mixes (oz)
- Frosting or Icing, canned (oz)
- Cookie or Brownie Mixes (oz)
- Cake & Frosting Mixes (oz)
- Pie Crust (each)

VEGETABLES ...

Vegetables (Beans-Carrots)
- * Beans & Peas, split or dry (oz)
- * Beans, canned (kidney) (oz)
- Beans w/pork & sauce (oz)
- * Bean Sprouts (oz)
- * Blackeye Peas (oz)
- * Broccoli/Brussel Sprt, FRESH (lbs)
- * Broccoli/Brussel Sprt, FROZEN (oz)
- * Cabbage (heads)
- * Carrots [6 per lb] (lbs)

Vegetables (Cauliflower-Mushrooms)
- * Cauliflower/Asparagus, FRESH (oz)
- * Caulifl/Aspar FRZN/CANNED(oz)
- * Celery (lbs)
- * Corn [4 ear per lb], FRESH(lbs)
- * Corn, FROZEN/CANNED (oz)
- * Green Bean/Spin/Kale, FRESH(lbs)
- * Grn Bean/Spin/Kale, FRZ/CND (oz)
- * Lettuce (heads)
- * Mushrooms (oz)

Vegetables (Onions-Tomatoes)
- * Onions [4 per lb] (lbs)
- * Peas, green (oz)
- * Peppers [6 per lb] (lbs)
- * Potatoes, FRESH [2 per lb] (lbs)
- Potatoes (French Fries), FRZN(oz)
- * Squash/Zucchini (each)
- * Sweet Potatoes [3 per lb] (lbs)
- * Tomatoes [3 per lb], FRESH (lbs)
- * Tomatoes, CANNED (oz)

Misc. Vegetables
- Any FROZEN Veg w/ sauce (oz)
- * Misc PlainVeg., FROZEN(oz)
- * Misc Veg, CANNED (oz)
- * Misc Veg/Salad Bar, FRESH (oz)
- * Cucumbers [8 per lb] (lbs)
- * Lima Beans (oz)
- Potatoes, dehydrated (oz)
- Sauerkraut (oz)
- Tofu (oz)

* Recommended *NUTRITION FOR A LIFETIME* items.

NutriScan Page 1

PLEASE USE A #2 PENCIL

For Office Use Only 1 of 2

SCANTRON

FEED THIS DIRECTION

BEVERAGES							
BEER - Regular	6pk	½	1	2	3	4	
Light	6pk	½	1	2	3	4	
COFFEE/TEA	oz	8	10	12	16	24	
FRUIT JUICES - Apple (bot/cnd) ★	oz	16	20	24	32	64	
Cranberry (bot/cnd) ★	oz	16	20	24	32	64	
Grape (bot/cnd) ★	oz	16	20	24	32	64	
Grapefruit (bot/cnd) ★	oz	16	20	24	32	64	
Lemonade/Limeade (fzn con) ★	oz	6	8	12	16	24	
Orange (fzn conc) ★	oz	6	8	12	16	24	
-Bottled or Canned ★	oz	16	20	24	32	64	
Pineapple (bot/cnd) ★	oz	16	20	24	32	64	
SOFT DRINKS - Cola (2ltr/6pk)	#	½	1	2	3	4	
Diet (2ltr/6pk)	#	½	1	2	3	4	
Fruit Flavor/Hi C (2ltr/6pk)	#	½	1	2	3	4	
TANG	oz	6	8	12	16	24	
TOMATO/VEG JUICE (bot/cnd) ★	oz	12	15	20	24	32	
WINE (750 ml Bottle)	#	1	2	3	4	5	
DAIRY and EGGS							
CHEESE - Cream Cheese	oz	2	4	8	16	24	
Amer/Cheddar/Colby	oz	8	12	16	24	32	
Mozzarella	oz	8	12	16	24	32	
Jack/Prov/Rom/Swiss	oz	8	12	16	24	32	
Parmesan/Grated	oz	2	4	8	16	24	
COTTAGE CHEESE - Creamed	oz	8	12	16	24	32	
Uncreamed/Low-Fat ★	oz	8	12	16	24	32	
CREAM - Half & Half	pt/qt	½Pt	Pt	Qt	2Qt	4Qt	
Heavy	pt/qt	½Pt	Pt	Qt	2Qt	4Qt	
Light	pt/qt	½Pt	Pt	Qt	2Qt	4Qt	
Sour Cream	oz	8	12	16	24	32	
Whipped Topping	oz	8	12	16	24	32	
EGGS	doz	1	2	3	4	5	
ICE CREAM	pt/gl	Pt	Qt	2Qt	Gl	2Gl	
ICE MILK/SHERBET	pt/gl	Pt	Qt	2Qt	Gl	2Gl	
MILK - Buttermilk	pt/gl	Pt	Qt	2Qt	Gl	2Gl	
Condensed	oz	8	12	16	24	32	
Evaporated	oz	8	12	16	24	32	
Low-Fat (1% or 2%) ★	qt/gl	Qt	2Qt	Gl	2Gl	3Gl	
Skim ★	qt/gl	Qt	2Qt	Gl	2Gl	3Gl	
Whole	qt/gl	Qt	2Qt	Gl	2Gl	3Gl	
YOGURT - Fruit/Low-Fat ★	oz	6	8	12	16	24	
Plain/Low-Fat ★	oz	6	8	12	16	24	
Regular with Fruit	oz	6	8	12	16	24	
Frozen	qt/gl	½Qt	Qt	2Qt	3Qt	Gl	
FISH and SEAFOODS							
CANNED - Salmon	oz	6	8	12	16	24	
Sardines	oz	6	8	12	16	24	
Tuna (in Oil)	oz	6	8	12	16	24	
Tuna (in Water) ★	oz	6	8	12	16	24	
FISH FILET - Plain ★	oz	10	12	16	24	32	
Breaded/Fish Sticks	oz	10	12	16	24	32	
OYSTERS - Plain ★	oz	10	12	16	24	32	
Breaded	oz	10	12	16	24	32	
SHRIMP/SHELLFISH - Plain ★	oz	10	12	16	24	32	
Breaded	oz	10	12	16	24	32	

FRUITS							
APPLES (3 per lb) ★	lb	½	1	2	3	4	
Applesauce	oz	16	20	24	32	64	
APRICOTS (13 per lb) ★	lb	½	1	2	3	4	
BANANAS (4 per lb) ★	lb	½	1	2	3	4	
BERRIES - Fresh ★	oz	8	12	16	24	32	
CANNED FRUIT	oz	8	12	16	24	32	
CANTALOUPE/MELONS ★	#	1	2	3	4	5	
DATES/PRUNES/RAISINS ★	oz	10	12	16	24	32	
FROZEN FRUIT ★	oz	10	15	20	30	45	
GRAPES ★	lb	½	1	2	3	4	
GRAPEFRUIT ★	#	1	2	3	4	5	
JAMS/PRESERVES/JELLIES	oz	8	10	12	16	24	
LEMONS (6 per lb) ★	lb	½	1	2	3	4	
ORANGES (4 per lb) ★	lb	½	1	2	3	4	
PEACHES (5 per lb) ★	lb	½	1	2	3	4	
PEARS (3 per lb) ★	lb	½	1	2	3	4	
PINEAPPLE ★	lb	½	1	2	3	4	
PLUMS (7 per lb) ★	lb	½	1	2	3	4	
GRAINS and CEREALS							
BISCUITS (12 per lb)	lb	½	1	2	3	4	
BREAD - White/Other	loaf	1	2	3	4	5	
Whole Wheat ★	loaf	1	2	3	4	5	
Extra High Fiber ★	loaf	1	2	3	4	5	
BREAKFAST CEREALS							
(1) Kix, Capn Crunch, Cocoa Puff, Corn/Rice Chex, Corn Flakes, Special K, Frosted Flakes, Rice Krispies, 19, Fruit Loops, Quaker 100% Natural, Grits, Inst. Oatmeal	oz	12	15	20	24	32	
(2) Cracklin Oat Bran, Regular/Quick Oatmeal	oz	12	15	20	24	32	
(3) Wheaties, Cheerios, Grape Nuts, Wheat Chex, Just Right, Fruit Wheats, Nutri-Grain, Total, Raisin Nut Bran, Shredded Wheat, Wheat & Raisin, Frosted Mini-Wheats ★	oz	12	15	20	24	32	
	oz	12	15	20	24	32	
(4) Nutrific, Fruit & Fiber, Crunchy Corn Bran, Raisin Bran, Bran Flakes, Muesli ★	oz	12	15	20	24	32	
	oz	12	15	20	24	32	
(5) All-Bran ★	oz	12	15	20	24	32	
CORNMEAL	oz	8	10	12	16	24	
CRACKERS - Graham	lb	½	1	2	3	4	
Regular/Saltines	lb	½	1	2	3	4	
Whole Wheat ★	lb	½	1	2	3	4	
DOUGHNUTS - Plain	#	2	4	8	12	16	
Glazed	#	2	4	8	12	16	
FLOUR - Wheat/Regular	lb	5	10	15	20	25	
Whole Wheat ★	lb	5	10	15	20	25	
LASAGNA/RAVIOLI w/Meat	oz	10	12	16	24	32	
MEXICAN Shells (Tortilla, Etc)	oz	10	12	16	24	32	
MUFFINS - Bran ★	oz	10	12	16	24	32	
Corn Mix/Regular	oz	10	12	16	24	32	
PANCAKE/WAFFLE MIX - Reg	lb	1	2	3	4	5	
Buckwheat ★	lb	1	2	3	4	5	
PASTA/NOODLES - Reg ★	lb	1	2	3	4	5	
Whole Wheat ★	lb	1	2	3	4	5	
RICE - White/Regular ★	lb	1	2	3	4	5	
Whole Grain/Brown ★	lb	1	2	3	4	5	
ROLLS/BAGELS	lb	1	2	3	4	5	
Whole Wheat ★	lb	1	2	3	4	5	
Hot Dog/Hamburger/Regular	#	8	12	16	24	32	
TOASTER PASTRIES	#	6	8	12	16	24	

FEED THIS DIRECTION

For Office Use Only

* Recommended NUTRITION FOR A LIFETIME items.

NutriScan

PAGE 1

SCANTRON® FORM NO. 224 1171 VFN

FEED THIS DIRECTION

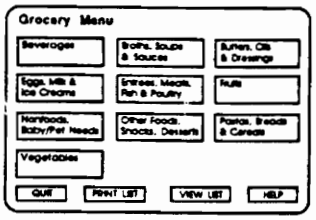
BEVERAGES							
BEER - Regular	6pk	½	1	2	3	4	
Light	6pk	½	1	2	3	4	
COFFEE/TEA	oz	8	10	12	16	24	
FRUIT JUICES - Apple (bot/cnd)	oz	16	20	24	32	64	
Cranberry (bot/cnd)	oz	16	20	24	32	64	
Grape (bot/cnd)	oz	16	20	24	32	64	
Grapefruit (bot/cnd)	oz	16	20	24	32	64	
Lemonade/Limeade (fzn con)	oz	6	8	12	16	24	
Orange (fzn conc)	oz	6	8	12	16	24	
-Bottled or Canned	oz	16	20	24	32	64	
Pineapple (bot/cnd)	oz	16	20	24	32	64	
SOFT DRINKS - Cola (2ltr/6pk)	#	½	1	2	3	4	
Diet (2ltr/6pk)	#	½	1	2	3	4	
Fruit Flavor/Hi C (2ltr/6pk)	#	½	1	2	3	4	
TANG	oz	6	8	12	16	24	
TOMATO/VEG JUICE (bot/cnd)	oz	12	15	20	24	32	
WINE (750 ml Bottle)	#	1	2	3	4	5	
DAIRY and EGGS							
CHEESE - Cream Cheese	oz	2	4	8	16	24	
Amer/Cheddar/Colby	oz	8	12	16	24	32	
Mozzarella	oz	8	12	16	24	32	
Jack/Prov/Rom/Swiss	oz	8	12	16	24	32	
Parmesan/Grated	oz	2	4	8	16	24	
COTTAGE CHEESE - Creamed	oz	8	12	16	24	32	
Uncreamed/Low-Fat	oz	8	12	16	24	32	
CREAM - Half & Half	pt/qt	½Pt	Pt	Qt	2Qt	3Qt	
Heavy	pt/qt	½Pt	Pt	Qt	2Qt	3Qt	
Light	pt/qt	½Pt	Pt	Qt	2Qt	3Qt	
Sour Cream	oz	8	12	16	24	32	
Whipped Topping	oz	8	12	16	24	32	
EGGS	doz	1	2	3	4	5	
ICE CREAM	pt/gl	Pt	Qt	2Qt	Gl	2Gl	
ICE MILK/SHERBET	pt/gl	Pt	Qt	2Qt	Gl	2Gl	
MILK - Buttermilk	pt/gl	Pt	Qt	2Qt	Gl	2Gl	
Condensed	oz	8	12	16	24	32	
Evaporated	oz	8	12	16	24	32	
Low-Fat (1% or 2%)	qt/gl	Qt	2Qt	Gl	2Gl	3Gl	
Skim	qt/gl	Qt	2Qt	Gl	2Gl	3Gl	
Whole	qt/gl	Qt	2Qt	Gl	2Gl	3Gl	
YOGURT - Fruit/Low-Fat	oz	6	8	12	16	24	
Plain/Low-Fat	oz	6	8	12	16	24	
Regular with Fruit	oz	6	8	12	16	24	
Frozen	qt/gl	½Qt	Qt	2Qt	3Qt	Gl	
FISH and SEAFOODS							
CANNED - Salmon	oz	6	8	12	16	24	
Sardines	oz	6	8	12	16	24	
Tuna (in Oil)	oz	6	8	12	16	24	
Tuna (in Water)	oz	6	8	12	16	24	
FISH FILET - Plain	oz	10	12	16	24	32	
Breaded/Fish Sticks	oz	10	12	16	24	32	
OYSTERS - Plain	oz	10	12	16	24	32	
Breaded	oz	10	12	16	24	32	
SHRIMP/SHELLFISH - Plain	oz	10	12	16	24	32	
Breaded	oz	10	12	16	24	32	

FRUITS							
APPLES (3 per lb)	lb	½	1	2	3	4	
Applesauce	oz	16	20	24	32	64	
APRICOTS (13 per lb)	lb	½	1	2	3	4	
BANANAS (4 per lb)	lb	½	1	2	3	4	
BERRIES - Fresh	oz	8	12	16	24	32	
CANNED FRUIT	oz	8	12	16	24	32	
CANTALOUPE/MELONS	#	1	2	3	4	5	
DATES/PRUNES/RAISINS	oz	10	12	16	24	32	
FROZEN FRUIT	oz	10	15	20	30	45	
GRAPES	lb	½	1	2	3	4	
GRAPEFRUIT	#	1	2	3	4	5	
JAMS/PRESERVES/JELLIES	oz	8	10	12	16	24	
LEMONS (6 per lb)	lb	½	1	2	3	4	
ORANGES (4 per lb)	lb	½	1	2	3	4	
PEACHES (5 per lb)	lb	½	1	2	3	4	
PEARS (3 per lb)	lb	½	1	2	3	4	
PINEAPPLE	lb	½	1	2	3	4	
PLUMS (7 per lb)	lb	½	1	2	3	4	
GRAINS and CEREALS							
BISCUITS (12 per lb)	lb	½	1	2	3	4	
BREAD - White/Other	loaf	1	2	3	4	5	
Whole Wheat	loaf	1	2	3	4	5	
Extra High Fiber	loaf	1	2	3	4	5	
BREAKFAST CEREALS							
(1) Kix, Cocoa Puffs, Corn Chex, Corn Flakes, Special K, Frosted Flakes, Rice Krispies, 19, Fruit Loops, Quaker 100% Natural, Grits, Inst. Oatmeal	oz	12	15	20	24	32	
(2) Cracklin Oat Bran, Regular/Quick Oatmeal	oz	12	15	20	24	32	
(3) Wheaties, Cheerios, Grape Nuts, Wheat Chex, Just Right, Fruit Wheats, Nutri-Grain, Total, Raisin Nut Bran, Shredded Wheat, Wheat & Raisin, Frosted Mini-Wheats	oz	12	15	20	24	32	
	oz	12	15	20	24	32	
(4) Nutrific, Fruit & Fiber, Crunchy Corn Bran, Raisin Bran, Bran Flakes, Mueslix	oz	12	15	20	24	32	
	oz	12	15	20	24	32	
(5) All-Bran	oz	12	15	20	24	32	
CORNMEAL	oz	8	10	12	16	24	
CRACKERS - Graham	lb	½	1	2	3	4	
Regular/Saltines	lb	½	1	2	3	4	
Whole Wheat	lb	½	1	2	3	4	
DOUGHNUTS - Plain	#	2	4	8	12	16	
Glazed	#	2	4	8	12	16	
FLOUR - Wheat/Regular	lb	5	10	15	20	25	
Whole Wheat	lb	5	10	15	20	25	
LASAGNA/RAVIOLI w/Meat	oz	10	12	16	24	32	
MEXICAN Shells (Tortilla, Etc)	oz	10	12	16	24	32	
MUFFINS - Bran	oz	10	12	16	24	32	
Corn Mix/Regular	oz	10	12	16	24	32	
PANCAKE/WAFFLE MIX - Reg	lb	1	2	3	4	5	
Buckwheat	lb	1	2	3	4	5	
PASTA/NOODLES - Reg	lb	1	2	3	4	5	
Whole Wheat	lb	1	2	3	4	5	
RICE - White/Regular	lb	1	2	3	4	5	
Whole Grain/Brown	lb	1	2	3	4	5	
ROLLS/BAGELS	lb	1	2	3	4	5	
Whole Wheat	lb	1	2	3	4	5	
Hot Dog/Hamburger/Regular	#	8	12	16	24	32	
TOASTER PASTRIES	#	6	8	12	16	24	

FEED THIS DIRECTION

Nutrition for a Lifetime Grocery List

Use this list to mark the kind and amount of food that you plan to buy this shopping trip.



BEVERAGES ...

- Beer, Wine
- Coffee & Tea
- Apple Juice
- Cranberry Juice
- Grapefruit Juice
- Grape Juice
- Lemonade/Limeade
- Orange Juice
- Pineapple Juice
- Soft Drinks, Colas
- Fruit Flavored, Hi C
- Tomato or Veg Juice

BROTHS, SOUPS & SAUCES ...

- Cheese Sauce (oz)
- Oriental Sauce (oz)
- Mexican Salsa (oz)
- Tomato Sauce (oz)
- Tomato Paste (oz)
- Spag Sauce, plain or w/ veg (oz)
- Spag Sauce w/ meat (oz)

Soups

- Beef Broth (each)
- Chicken Broth (each)
- Chicken Noodle (each)
- Clam Chowder (each)
- Crm of Chick/Mushroom (each)
- Crm of Aspar/Celery (each)
- Onion Soup (each)
- Oyster Stew (each)
- Split Pea Soup (each)
- Tomato Soup (each)
- Veg Beef Soup/Stew (each)
- Vegetable Soup (each)

BUTTERS, OILS, DRESSINGS & CONDIMENTS ...

- Butter, regular(lbs)
- Margarine (lbs)
- Mayonnaise (oz)
- Oil - Corn/Safflower (oz)
- Oil - Olive (oz)
- Oil - Vegetable (oz)
- Reg Salad Dressing (oz)
- Lo-cal Salad Dressing (oz)
- Shortening (lb)
- Mustard (oz)
- Ketchup (oz)
- Syrup/Honey/Molasses (oz)

EGGS, MILKS & ICE CREAMS ...

- Eggs (doz)

Milks & Creams

- Non-fat Dry Milk (oz)
- Skim Milk (gallon)
- 1% or Buttermilk (gallon)
- 2% Milk (gallon)
- Whole Milk (gallon)
- Chocolate Milk (gallon)
- Evaporated Milk (oz)
- Sweetenod, Condensed Milk (oz)
- Half & Half or Coffee Cream
- Heavy or Whipping Cream
- Sour Cream (oz)
- Light Sour Cream (oz)

Cheeses & Cottage Cheeses

- Mozzar., Roduced fat, Feta (oz)
- Mont Jack, Provolone, Swiss (oz)
- Cheddar, American, Colby (oz)
- Parmesan, Romano (oz)
- Cream Cheese (oz)
- Ricotta Cheese(oz)
- Cott. Cheese (lg/sm curd) (oz)
- Cott. Cheese (low-fat) (oz)

Yogurts and Ice Creams

- Fruit Yogurt, low-fat (oz)
- Plain Yogurt, low-fat (oz)
- Fruit Yogurt, regular (oz)
- Plain Yogurt, regular (oz)
- Non-Fat Yogurt (oz)
- Frozen Yogurt (gallon)
- Ice Milk (gallon)
- Ice Cream (gallon)
- Sherbet (gallon)
- Popsicles, Fruit Bars (oz)
- Fudgesicle, Ice Cream Sandwich (oz)
- Whipped Topping(frzn, pressur.) (oz)

ENTREES, MEATS, FISH & POULTRY ...

- Pizza, plain or w/vegetable (each)
- Pizza, w/ meat (each)
- Bologna, Sliced Meats (oz)
- Hot Dogs (lbs)

Beef

- Hamburger, lean (lbs)
- Hamburger, regular (lbs)
- Steak or Roast, lean (lbs)
- Steak or Roast, regular (lbs)

Chicken & Turkey

- Chicken/Turkey Breasts (lbs)
- Chicken/Turkey, whole or parts (lb)
- Sliced Chicken/Turkey (oz)
- Ground Turkey (lbs)

Ham, Pork, Lamb & Liver

- Ham (lbs)
- Pork Chop, Pork Loin (lbs)
- Bacon (lbs)
- Sausage (lbs)
- Lamb (lbs)
- Liver (lbs)

Fish & Seafood

- Canned Salmon (oz)
- Canned Sardines (oz)
- Tuna in OIL (oz)
- Tuna in WATER (oz)
- Plain Fish Filet (oz)
- Breaded Fish Filet (oz)
- Pln. Shrimp/Oyster/Shellfish(oz)
- Brd Shrimp/Oyster/Shellfish(oz)

Frozen Dinners & Pot Pies

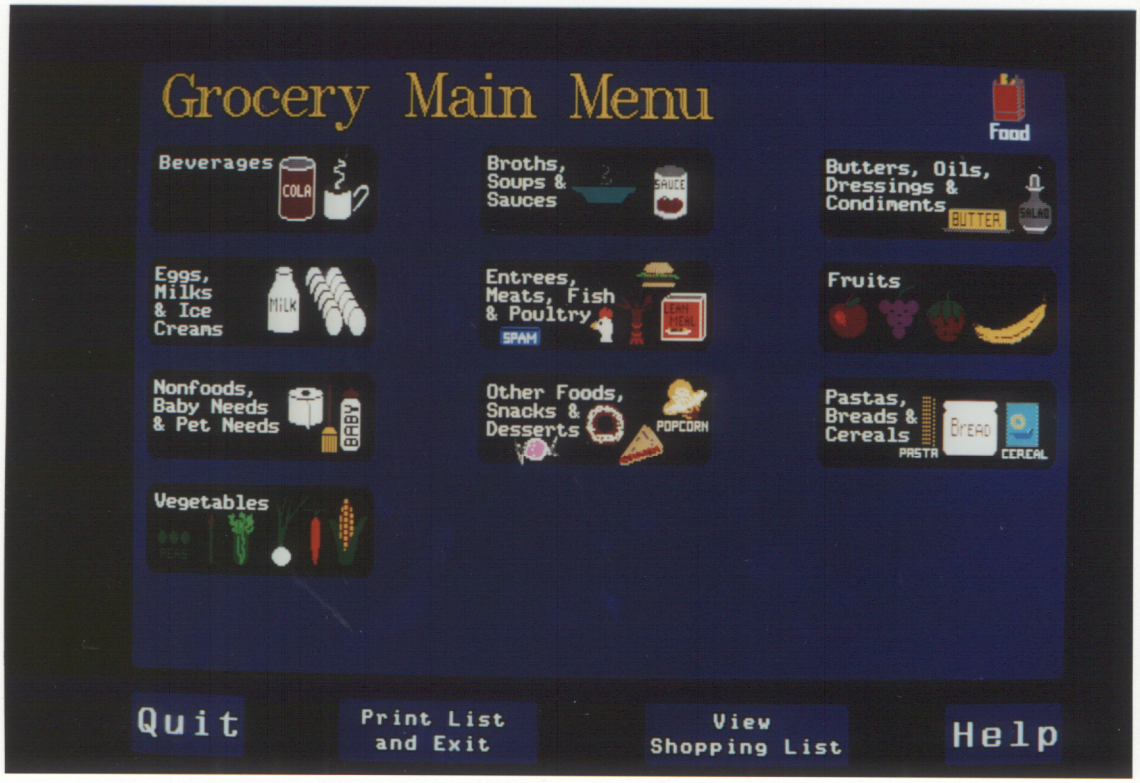
- Pot Pies, chicken/turkey (each)
- Pot Pies, meat (each)
- Frozen Dinner, poultry or Fish (oz)
- Frozen Dinners, meat (oz)
- Light Frozen Dinners (Lean Cuisine, etc) (oz)
- Frozen Ravioli, Lasagna (oz)

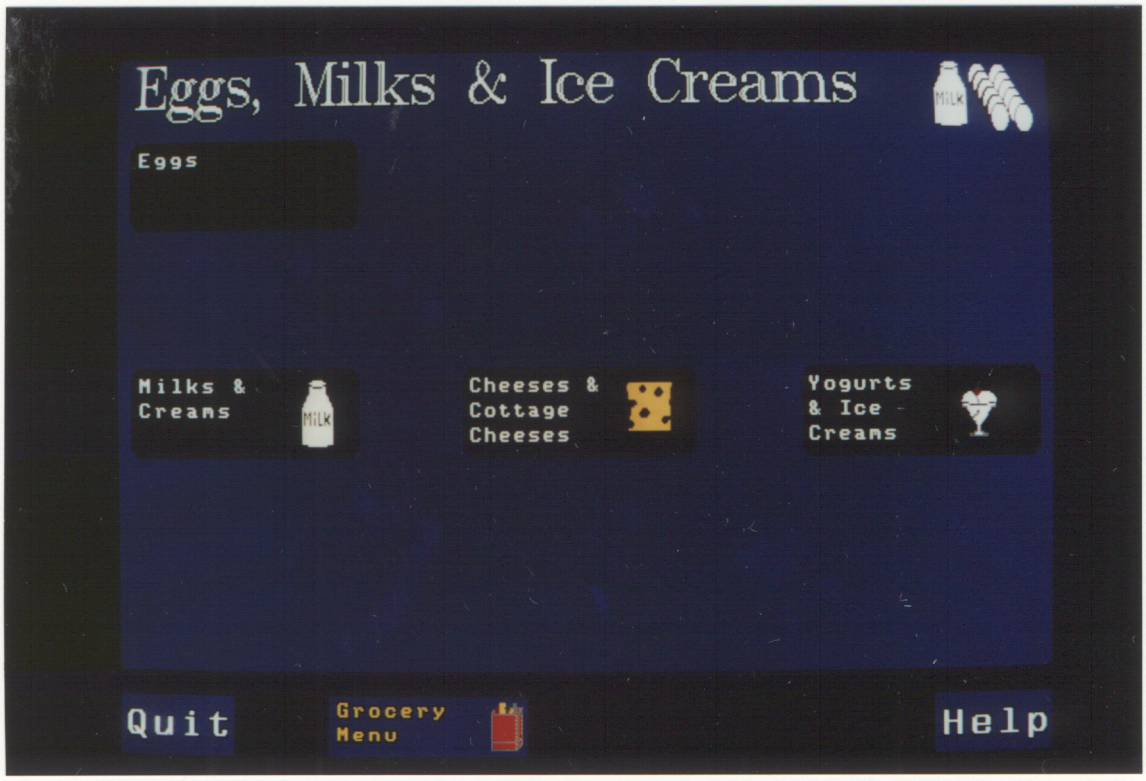
Canned Entrees & Meats

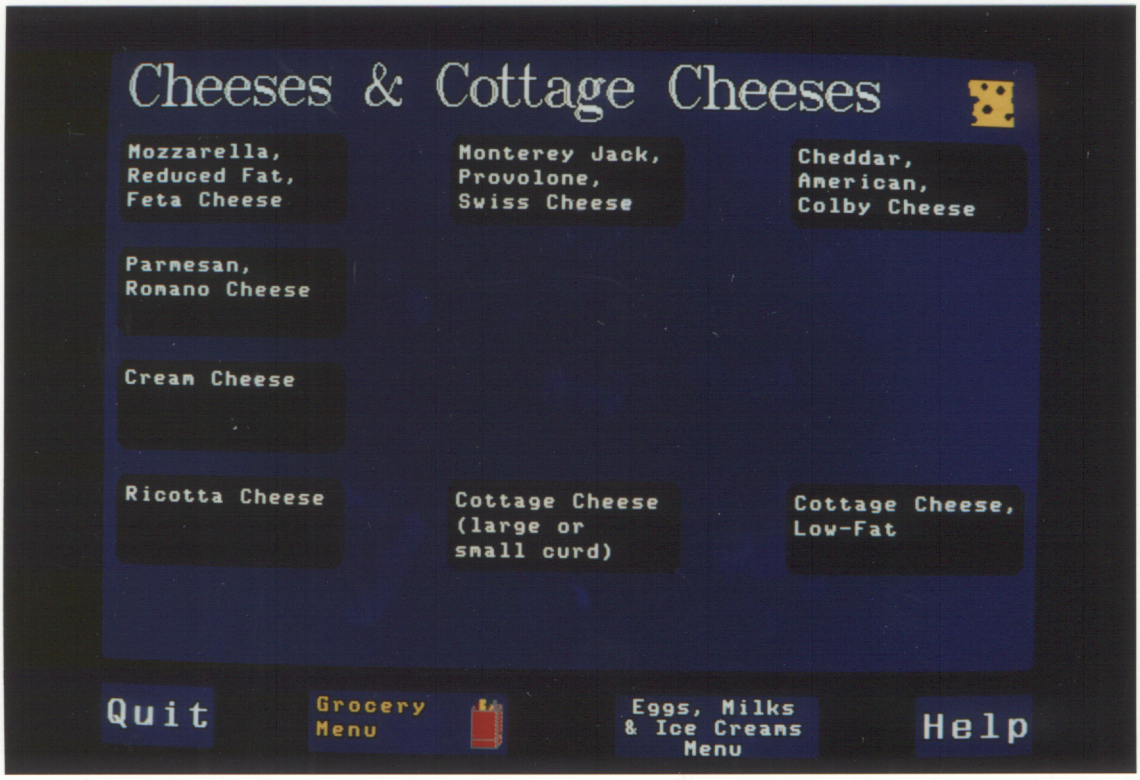
- Canned Ravioli/Spag w/meat (oz)
- Canned Ravioli/Spag, no meat(oz)
- Canned Chili w/meat (oz)
- Canned Chili, no meat (oz)
- Canned Lunch Meats (Spam) (oz)
- Beef Stew (oz)

Appendix E


NUTRITION
FOR A LIFETIME
USE THIS GROCERY
LIST TO HELP ENTER
YOUR SELECTIONS
KROGER
LOW PRICES
KROGER
LOW PRICES
2.79


Grocery Main Menu
Food
Beverages
COLA
Broths, Soups & Sauces
SAUCE
Butters, Oils, Dressings & Condiments
BUTTER
SALAD
Eggs, Milks & Ice Creans
MILK
Entrees, Meats, Fish & Poultry
SPAM
Fruits
Nonfoods, Baby Needs & Pet Needs
BABY
Other Foods, Snacks & Desserts
POPCORN
Pastas, Breads & Cereals
PASTA
BREAD
CEREAL
Vegetables
Quit
Print List and Exit
View Shopping List
Help


Eggs, Milks & Ice Creams
Eggs
Milks & Creams
Cheeses & Cottage Cheeses
Yogurts & Ice Creams
Quit
Grocery Menu
Help


Cheeses & Cottage Cheeses
Mozzarella, Reduced Fat, Feta Cheese
Monterey Jack, Provolone, Swiss Cheese
Cheddar, American, Colby Cheese
Parmesan, Romano Cheese
Cream Cheese
Ricotta Cheese
Cottage Cheese (large or small curd)
Cottage Cheese, Low-Fat
Quit
Grocery Menu
Eggs, Milks & Ice Creams Menu
Help

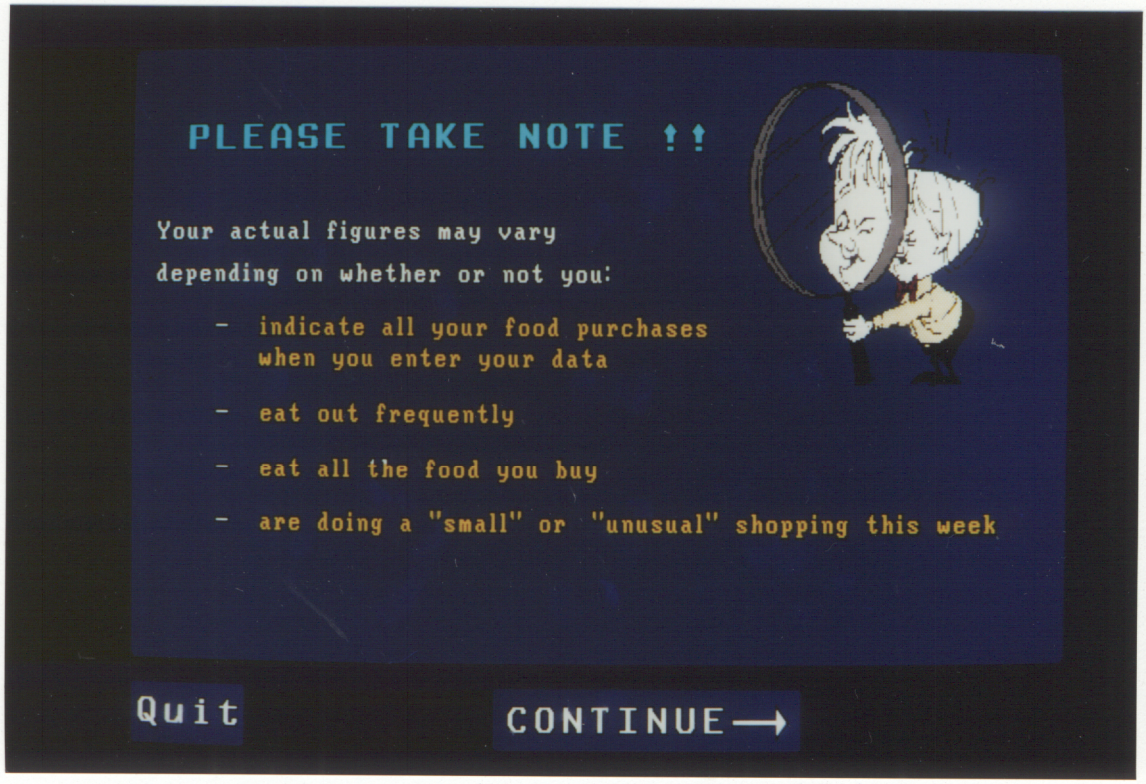
Appendix F

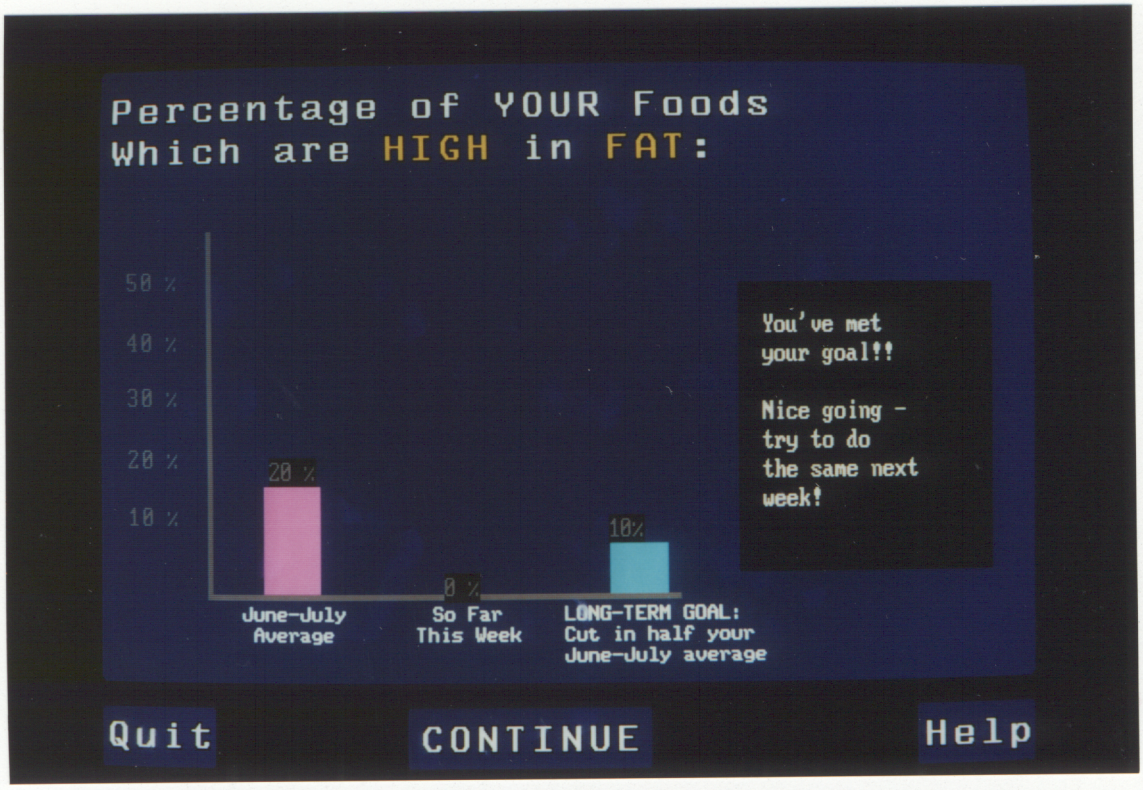
THANKS FOR SHOPPING
KROGER BLACKSBURG VA
STORE# -210 01/24/90

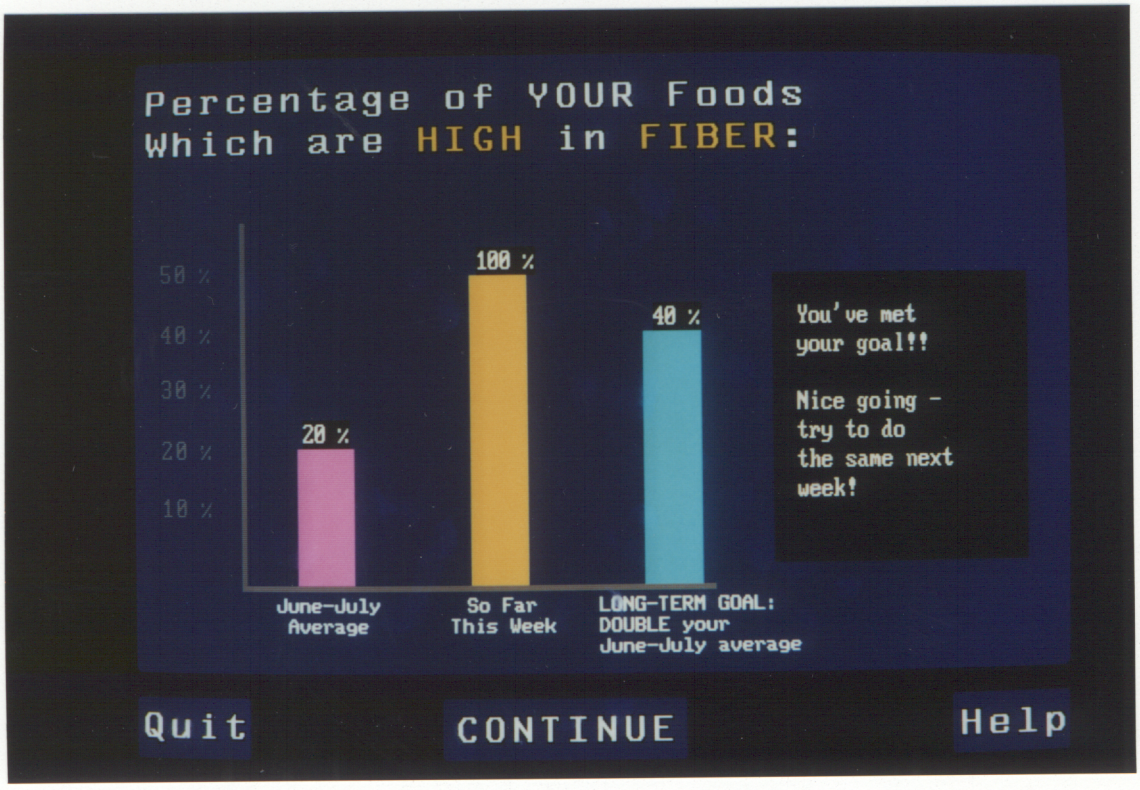
DANNON YOG	.67B
DANNON YOG	.67B
GLAD WRAP	1.49T
WH GFRT LGE	.89B
DELI sliced turkey	2.80B
MM APPLE JCE	3.19B
ARNOLD BREAD	1.79B
S M RAISINS	.99B
TAX	
TOTAL	
CHANGE	

2803 50 6 10.08PM

Appendix G


PLEASE TAKE NOTE !!
Your actual figures may vary
depending on whether or not you:
- indicate all your food purchases when you enter your data
- eat out frequently
- eat all the food you buy
- are doing a "small" or "unusual" shopping this week
Quit
CONTINUE


Percentage of YOUR Foods
Which are HIGH in FAT:
50 %
40 %
30 %
20 %
10 %
20 %
0 %
10%
June-July Average
So Far This Week
LONG-TERM GOAL:
Cut in half your June-July average
You've met your goal!!
Nice going - try to do the same next week!
Quit
CONTINUE
Help


Percentage of YOUR Foods
Which are HIGH in FIBER:
50 %
40 %
30 %
20 %
10 %
20 %
100 %
40 %
June-July Average
So Far This Week
LONG-TERM GOAL:
DOUBLE your June-July average
You've met your goal!!
Nice going - try to do the same next week!
Quit
CONTINUE
Help

V I T A
Jana Louise Wagner

PERSONAL DATA

Birthdate:	April 1, 1961
Birthplace:	Red Bank, New Jersey
Marital Status:	Married
School Address:	**Department of Psychology** Derring Hall Virginia Polytechnic Institute and State University Blacksburg, Virginia 24061
School Phone:	(703) 231-8746
Home Address:	36-D Terrace View Apartments Blacksburg, Virginia 24060
Home Phone:	(703) 552-6713

EDUCATION

September 1987-present	**Virginia Polytechnic Institute and State University** Blacksburg, Virginia Doctoral program Area of Specialization: Health Psychology
September 1985-June 1987	**Virginia Polytechnic Institute and State University** Blacksburg, Virginia M.S. awarded May 1987 Area of Specialization: Child Clinical
September 1979-May 1983	**Vanderbilt University** Nashville, Tennessee B.A. awarded May 1983 Major: Psychology Completed Honors Psychology Minor: General Biology

POSITIONS HELD

June 1989-present	Behavioral Medicine Clinician **Center for Behavioral Medicine** Pain Rehabilitation Program Radford, Virginia 24141 Supervisors: Richard Bindewald, Ph.D. W. Bruce Walker, Ph.D.

June 1989- present	Research Associate Nutrition Grant for the National Cancer Institute National Institute of Health **Center for Research in Health Behavior**, Blacksburg, Virginia Principal Investigator: Richard A. Winett, Ph.D.
September 1987- May 1989	Project Director and Assistant Videography Producer Nutrition Grant for the National Cancer Institute National Institute of Health **Center for Research in Health Behavior**, Blacksburg, Virginia
June 1987- August 1987	Mental Health Professional ADD Summer Treatment Program **Western Psychiatric Institute and Clinic** Pittsburgh, Pennsylvania Supervisor: William E. Pelham, Jr., Ph.D.
May 1986- August 1986	Family Therapist/ Probation Counselor **Department of Corrections** Juvenile and Domestic Relations Court Service Unit Christiansburg, Virginia Supervisor: Karen J. Mayhew
August 1983- August-1985	Pre-graduate Practicum in Clinical Psychology **Developmental Center** Tampa, Florida and London, England Supervisor: Mack R. Hicks, Ph.D.
August 1981- May 1983	Head Resident&Resident Counselor **Department of Residential and Judicial Affairs** Vanderbilt University Nashville, Tennessee

June-August 1980 — Clinic Coordinator for Neonatal Intensive Care Follow-up
Monmouth Medical Center Regional Newborn Extension Program
Long Branch, New Jersey

HONORS AND PROFESSIONAL AFFILIATIONS

American Psychological Association
Association for the Advancement of Behavior Therapy
The Society of Behavioral Medicine

VOLUNTEER PARTICIPATION

RAFT Community Crisis Center Blacksburg, Virginia

PUBLICATION

Wagner, J.L. and Winett, R.A. (1988). Prompting one low-fat, high-fiber choice in a fast-food restaurant. Journal of Applied Behavior Analysis, 21, 179-185.

SYMPOSIA

Modifying Nutrition-Related Behaviors: Public Health Perspectives, Joni A. Mayer, chair; Presented at the Association for Advancement of Behavior Therapy, Boston, Massachusetts (1987)

How to Survive Your Dissertation, Nason W. Russ, chair; Presented at the Southeastern Psychological Association Annual Convention, Atlanta, Georgia (1987)

PAPER PRESENTATION

Winett, R.A., Wagner, J.L., Moore, J.F., Walker, W.B., Hite, L.A., Leahy, M.R., Neubauer, T.E., Arbour, D.F. Walberg, J.L., Geller, E.S., Lombard, D., and Mundy, L. L. (1990). The Nutrition for a Lifetime System: Phase Two of a Public Access Information System for Supermarkets. Paper presented to The Society of Behavioral Medicine Annual Convention, Chicago

POSTER PRESENTATIONS

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THE RELATIONSHIP OF PARENT AND CHILD FOOD CHOICES: INFLUENCES OF A SUPERMARKET INTERVENTION

by

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(ABSTRACT)

This research project investigated the influences of a supermarket intervention on the food choices of parents and their children. Twenty-four families (11 experimental; 13 control) participated in this study. They used the NLS weekly when they completed their major shopping. The NLS was a public access, interactive information system located in the supermarket which provided users with information and feedback about how to decrease fat and increase fiber in their food purchases. During the intervention, participants in the experimental condition viewed a different videodisc program each week. In addition, they were able to enter their intended shopping purchases for each weekly shopping, and receive feedback about the items they intended to purchase. Control participants entered their intended purchases, but received no information or feedback. All participants sent in their detailed supermarket receipts. The NLS phases included baseline, intervention, and follow-up. Families with children ages 8-15 years were recruited for the family study. Participants were interviewed pre-

and post-assessment. One target child was selected from each family. The main family study measures were the Card Sorting Task (CST) and the Food History Questionnaire (FHQ). The CST used pictures of food items. The FHQ was used to evaluate the usual diet over one month. The CST task was analyzed with a Wilcoxon test; the FHQ task was analyzed with an ANCOVA, using the pre-assessment score as the covariate. The results indicated that experimental participants reported an increase in their consumption of low-fat dairy products and low-fat fruit (FHQ data). In addition, experimental participants reported a decrease in their behavior, preference and knowledge for high-fat snacks and and high-fat entrees (CST data). The results suggested that parents and their children may be positively affected by a public-access interactive videodisc information system directed to parent use. Overall, the results provided some evidence that parents who are involved in a nutrition intervention also will influence their children's food choices. Future research should further evaluate the effects of the intervention on different food categories and continue to investigate how changes in certain food choices affect other choices. Variables relating to health beliefs, types of foods to change, meal preparations, family characteristics, and behavior strategies all must be considered in future intervention programming.