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HEALTH LOCUS OF CONTROL, ATTITUDES AND INTENTION
TO
REDUCE CANCER RISK

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HEALTH LOCUS OF CONTROL, ATTITUDES AND INTENTION TO REDUCE CANCER RISK

By

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ABSTRACT

Health Locus of Control, Attitudes and Intention to Reduce Cancer Risk

By

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Health Locus of Control (HLC) and Health Value (HV) were compared to change in nutritional knowledge, attitude and behavioral intentions from 94 people enrolled in worksite wellness programs in Michigan before and after viewing a nutrition/cancer program. A nutrition/cancer knowledge test (NCKT) was developed, validated, and pilot tested for reliability (KR-20) and item analysis. Previously validated instruments were used to assess HLC, HV and control over eating habits. Intention to change behavior and attitude-toward-nutrition were assessed following the elements of the theory of reasoned action developed by Fishbein and Ajzen (1980). Correlational statistics revealed a significant increase in nutritional knowledge from pre- to post-test. No differences were found between internals and non-internals in knowledge gained or attitude change. A cancer-specific attitude scale accounted for more variation in behavioral intention than the MHLC or attitude-toward-nutrition in this study.

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INTRODUCTION

Research Rationale

A demonstrated need exists for increased public education on possible methods of cancer risk reduction. The 1984 Cancer Prevention Awareness Survey published by the National Institutes of Health (1984) documented the need for programs to increase public awareness about cancer prevention. About half of the 1,876 respondents to this survey believe that "there is not much a person can do to prevent cancer" and that "everything causes cancer". The obvious first step toward dietary change is increasing the awareness that dietary changes may decrease the risk of cancer, as well as increasing the awareness of specific changes needed.

The American Cancer Society's (ACS) "Taking Control" program (1985) is designed to inform people of cancer protective and risk factors. The cancer risks which might be lowered by a change in behavior are stressed in the "Taking Control" program. One of the goals of the ACS is to:

> provide an introduction to a healthy, enjoyable lifestyle that may reduce one's risk of developing

> cancer...The Taking Control program helps people think about health in terms of their overall lifestyles. Taking Control is positive, optimistic, and action oriented. (American Cancer Society, 1985)

Research on the factors associated with preventive health behavior has uncovered a variety of determinants of preventive health practices. These include social and demographic variables, previous use of health services, health attitudes and beliefs (McCusker, 1979). Findings from a wide range of studies suggest more adaptability in those persons who believe they have control over their own lives compared to those who believe they have little or no control over their lives. These findings have significant implications with respect to preventive health.

Objectives

The primary question investigated by this research was whether the health locus of control and health value of viewers of the "Taking Control" program influenced their acquisition of knowledge and change in attitude and/or intentions to adopt a healthier diet after participating in the program. The answer to this question will provide useful information from which to make recommendations for future program development and accurate targeting of health messages to specific groups within the general public.

There were three main objectives to this study: (1) to determine if there was an increase in viewers' nutrition/cancer knowledge following the "Taking Control" program; (2) to determine if the "Taking Control" program

(3) to determine if health locus of control and health value related to change in knowledge, attitudes or intention to change behavior prior to and upon completion of the "Taking Control" program.

PERTINENT LITERATURE AND THEORY

Nutrition and Cancer

The American Cancer Society's "Taking Control" program (1985) encourages Americans to eat less fat, more fiber, more fresh fruits and vegetables, more whole grains and cereals, less salt-cured, smoked and nitrite-cured foods, and to drink less alcohol than most Americans now do. The ACS also recommends two non-dietary guidelines: to stop cigarette smoking and to avoid over-exposure to the sun.

Research in cancer and nutrition suggests that populations which, relative to the U.S., eat less fatty foods, more fiber-rich foods and more vegetables and fruits tend to have lower rates of some of the more common cancers such as those of the colon, breast, prostrate and uterus (Lanza, 1987). Doll and Peto (1981) have estimated that diet is a contributing factor for 35% of cancers. Based on the bulk of research in the field, the National Cancer Institute (NCI) (Greenwald, 1986), the American Cancer Society (ACS) (1987) and the National Academy of Sciences (NAS) (1982) have all proposed public dietary recommendations. These have been summarized by Michael W. Pariza (1986) and are included in Appendix 1.

These recommendations are based on extensive research conducted in recent decades. While some scientists disagree with one or more of the recommendations, the quidelines reflect a general consensus in the nutrition community. Moreover, when the general healthy public follows the dietary recommendations, they do not experience any additional risk (Brown and Cooke, 1980).

Locus of Control Theory

Locus of control is derived from Rotter's Social Learning Theory (1954) which states that the potential of a specific behavior (behavior potential, BP) occurring in a given situation is a function of expectancy (E) that the behavior will lead to a particular reinforcement in that situation, and the value of that reinforcement (RV), e.g.

$$BP = f(E \ \& \ RV).$$

Of the components of this model, expectancy has been the subject of the most research. The concept of locus of control was developed because of the observation by Rotter et al (1975) that increases or decreases in expectancies following reinforcement appeared to vary systematically, depending on the situation and also as a consistent trait of the particular person who was receiving the reinforcement. Locus of control evolved as a variable that might correct or refine the social learning theory prediction of how reinforcements change expectancies. In locus-of-control terms, those individuals who believe that their health is influenced mainly by their own behavior

are "internals", with "externals" being those who believe that their health is determined largely by fate, chance, other people or events beyond their control.

These beliefs might influence the outcome of health intervention programs such as smoking cessation and weight control. In general, people with high scores on internality appear likely to adopt behaviors that improve their physical health. For example, studies using Rotter's Internal/External Scale have shown that nonsmokers are more likely to be internals than smokers (Straits and Sechrest, 1963; James, Woodruff and Werner, 1965). Straits and Sechrest (1963) found from internal-external questionnaires given to male college students that smokers were more "chance-oriented" ($p<.10$) than non-smokers. James, Woodruff and Werner (1965) found in a study with undergraduate students that both male and female smokers scored significantly higher in externality than nonsmokers. They found that male smokers who reported that they had stopped smoking following the Surgeon General's report were significantly less external than those who continued smoking. There was no difference between females who continued and those who stopped smoking.

Other studies suggest that individuals who were not smokers or individuals who were able to stop smoking were more internal than individuals who smoked (Coan, 1973; Williams, 1973). These results have not always been replicated (Danahar, 1977) and are only correlational;

there has been no proven cause and effect relationship.

O'Bryan (1972) studied locus of control and weight loss, and found that overweight people were significantly more external than those of normal weight. In a study of negative versus positive covert reinforcement, Manno and Marston (1972) found that Rotter's Internal-External Scale (I-E scale) scores were correlated with weight loss at follow-up ($r = -0.57$, $p<.05$) in their control group. The weight of controls before treatment correlated negatively ($r=-0.39$, $p<.05$) with internality on Rotter's I-E scale. Manno and Marston found that externally oriented subjects weighed more at pre-treatment, yet lost less at follow-up. No relation was found between I-E scores and weight loss in the experimental groups (those receiving various forms of reinforcment for weight reduction). Balch and Ross (1975) found significant correlations between internal Rotter I-E scores and both completion and success in a weight loss program.

There are several factors to be considered when reviewing the locus of control literature. Rotter (1975) warns against assuming that it is "good" to be internal and "bad" to be external, a concept which could easily be interpreted from the studies cited above. It may be better for people who are trying to cope with weakening abilities, such as the aged (Rodin, 1986) or cancer patients (Marks, Richardson, Graham and Levine, 1986) to

have a feeling that they can control what happens to them, but there must be a limit on personal control. Rotter's (1975) early hypothesis was that locus of control would have a curvilinear relationship to adjustment.

Rotter (1975) has emphasized the fact that locus of control is just one component of a complex combination of factors used to predict behavior. Locus of control relates to expectancy of reinforcement, and Rotter's social learning theory equally emphasizes the situation in which the reinforcement occurs as well as the value of the reinforcement. Rotter (1975) urged researchers to include a measure of the value of the reinforcement as well as a situation-specific measure of locus of control. The studies mentioned above (James et al, 1965; Coan, 1973; Williams, 1973; O'Bryan, 1972; Manno and Marston, 1972; Balch and Ross, 1975) have used Rotter's general I-E Scale without a locus of control scale specific to the situation being researched.

With health-related measures of value of reinforcement and expectancy, the theory has been that an individual's health behavior could be explained by the interaction of these two constructs (Wallston and Wallston, 1981). The locus of control theory would predict that those subjects who value their health highly AND expect their behavior to enhance their health would be more likely to adopt healthy behaviors (Wallston and Wallston, 1981). In studies of health value in relation to health behavior, Kristiansen (1985) has shown that health

value, as measured by Rokeach's (1973) value survey with the additional value of health (Wallston, 1976), is related to healthy preventive actions of adults.

Multidimensional Health Locus of Control Scale

Rotter (1975) recommended that specific measures of locus of control be developed for specific applications. One such scale is the Multidimensional Health Locus of Control (MHLC) Scale developed by Wallston, Wallston, Kaplan and Maides (1976). In the MHLC, health locus of control (HLC) is divided into three dimensions: internal health locus of control (IHLC), powerful others health locus of control (PHLC) and chance health locus of control (CHLC). Those individuals with an IHLC tend to feel responsible for their own health. Those with a PHLC tend to feel that their health is in the hands of other people such as their physician, allied health professionals, or family member(s). Those with CHLC tend to feel that no matter what they or others do, their health is influenced largely by chance or accident. Individuals can also have various combinations of high/low scores on the three dimensions, for example one could obtain a high score on internal and powerful others, with a low score on chance.

The extensive testing of the MHLC for reliability has been summarized by Wallston and Wallston (1984) from several studies of college students and adults (Table 1). In addition, normative data on the MHLC has been collected and summarized by Wallston and Wallston (1984) (Table 2).

Table 1. *Alpha Reliabilities of Multidimensional Health Locus of Control (MHLC) Scales* (from Wallston 1984)

	N	Form of scales	Reliabilities		
			Internal (IHLC)	Chance (CHLC)	Powerful Others (PHLC)
College samples	86	A	.66	.74	.64
		B	.66	.83	.75
		A & B	.82	.87	.83
	85	A	.72	.70	.56
		B	.80	.70	.73
		A & B	.86	.84	.79
	112	A	.61	.55	.56
		B	.75	.68	.73
		A & B	.83	.77	.77
Persons attending health fair	82	A	.66	.65	.56
	89	B	.61	.67	.69

Table 2. Mean scores for MHLC scales summarized across types of subjects.*

Sample	N	Mean Scores		
		Internal (IHLC)	Chance (CHLC)	Powerful Others (PHLC)
Chronic patients	609	25.78	17.64	22.54
College students	749	26.68	16.72	17.87
Healthy adults	1287	25.55	16.21	19.16
Persons engaged in preventive health behaviors	720	27.38	15.52	18.44

* from Wallston and Wallston (1981).

The work of several investigators on the MHLC deserves special mention here. Winefield (1982) found the internal and powerful others subscales to be reliable over 7 months. The chance subscale had little stability over time in her study. In addition, Winefield found that the powerful others subscale rose with age, decreasing social status and acute illness. O'Looney and Barrett (1983) found a sex difference in the factor structure of the MHLC in a group of British university students. In their study, the male sample yielded only two factors while the female samples yielded the expected three scale factors. The male factors were defined by a) the internal and chance scale items together and b) by the powerful others scale items. Jordan-Marsh and Neutra (1985) found a change in HLC from admission to discharge from a residential lifestyle change program. Scores tended more towards internality following the program. There were no significant correlations between HLC scores and changes in physical parameters such as weight, blood pressure, low density lipoproteins, or triglycerides.

The differences in locus of control due to sex, social status, and program participation are not present in every study. Wallston and Wallston (1984) encourage researchers to view the health locus of control construct not as an unchanging personality variable, but more as a characteristic of an individual at a given point in time.

Research with the MHLC has shown that maintenance of smoking cessation was enhanced by an internal locus of

control (Kaplan and Cowles, 1978; Shipley, 1981; Horowitz, et al, 1985). Research by Kaplan and Cowles (1978) indicated that those subjects with internal HLC and a high value of health smoked significantly fewer cigarettes ($p<.05$) following a smoking cessation program than those subjects with internal HLC-low health value, external HLC-high health value, and external HLC-low health value. Shipley (1981) found subjects who scored highly on the MHLC were more often abstinent following smoking cessation treatment than those subjects with low scores on internality (47% vs. 17% at 3 months, $p<.05$; 40% vs. 13% at 6 months, $p<.10$). Likewise, subjects with low scores on chance MHLC were more often abstinent than high scorers (47% vs. 17% at 3 months, $p<.10$; 45% vw. 9% at 6 months, $p<.05$). In a study of ex-smokers, recidivists and continuing smokers, Horowitz et al (1985) found recidivists to be significantly ($p<.05$) less internal than the other groups and had become less internally controlled between the treatment and a one-year follow-up ($t(53) = 3.93$, $p<.001$). Although the powerful others scale did not show significant differences for the group ($F(2,152) = 2.17$, $p<.12$), a trend was seen for recidivists to have decreased scores on the powerful others MHLC ($t(53) = 1.85$, $p<.10$) between treatment and follow-up. Coelho (1985) examined the psychometric properties of the MHLC with cigarette smokers and determined that cigarette smokers were more appropriately divided into a

bidimensional scale of IHLC and PHLC measures, since the CHLC dimension was absent in his study.

Audience Segmention

Research into audience knowledge and attitudes has helped increase the efficiency of public education programs on nutrition (Brown and Cooke, 1980) and cancer risk reduction (Novelli and Novelli, 1984). Audience segmentation is based on the idea that health consumers have important, measurable differences related to health behavior (Novelli and Novelli, 1984).

A study by Wallston et al (1976) with overweight subjects found that the external HLC group lost more weight in an externally oriented, group program and the internal HLC group lost more weight in an internally oriented, self-directed program. Those matched with the appropriate program reported greater satisfaction than those who were not. In general, internals are more successful in treatments using a self-reward or self-motivation approach. Externals are more successful in programs with reinforcements from an outside source, such as social reinforcement in the form of verbal feedback from program presenters (Wallston et al, 1976).

Fishbein's Theory of Reasoned Action

The theory of reasoned action developed by Ajzen and Fishbein (1980) is based on the assumption that humans are rational and they behave according to a systematic use of the information available to them (Figure 1). According to the theory, a person's behavioral intention is a

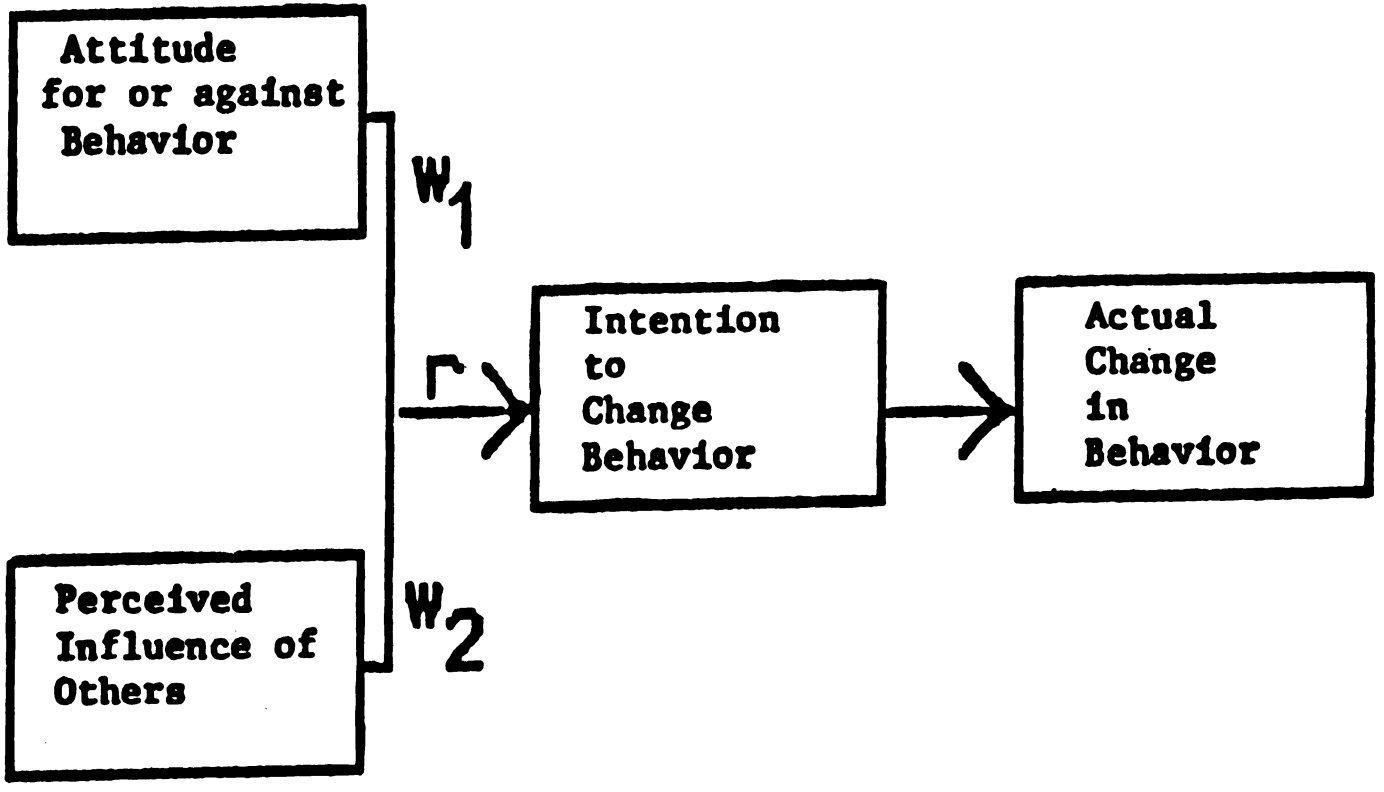


Figure 1. Elements of Ajzen and Fishbein's theory.

function of two basic factors, their personal attitude toward the behavior and the subjective norm. An attitude toward a behavior is a function of the individual's perception and evaluation of the consequences of performing a certain behavior. The subjective norm is how a person perceives the social pressures to perform or not perform certain behaviors. Social pressures are the individual's perception of how most people who are important to him or her think that the individual should behave. Fishbein's theory can be written as:

$$BI = (A_B)w_1 + (SN)w_2$$

where BI is the intention to perform behavior B; A_B is the attitude toward performing the behavior; SN is the subjective norm; and w_1 and w_2 are empirical weights measuring the relative importance of the attitude and subjective norm components in affecting behavioral intention. The relative importance of these components will vary according to the individual, the situation, and the behavior of interest. According to Ajzen and Fishbein (1980) factors such as personality traits or demographic variables which are related to behavior are considered "external factors" and do not make up an integral part of their theory. Ajzen and Fishbein recognize the importance of these external variables, but believe that an external variable will influence behavior only to the extent that it influences the beliefs a person holds or the relative

importance he or she attaches to attitudes or social norms.

Exposure to new information (change in knowledge) is an important base on which to alter attitudes or beliefs and ultimately to influence behavior (Fishbein and Ajzen, 1975). However, knowledge alone is not necessarily sufficient to illicit a change in behavior (Sims, 1981). In a review of attitude assessment in nutrition research, Sims (1981) summarizes this idea:

> Most of us are equally convinced that knowledge alone ...probably is not enough to change behavior. Several people have reasoned that attitude change must mediate the process, i.e., a person not only must have knowledge of certain information, but also must feel it is important (attitude) and probable (belief).

In research using the Fishbein Theory of Reasoned Action, Shepherd and Stockley (1987) found that personal attitudes were good predictors of fat consumption ($r = 0.68$, $p<.001$) and more important than perceived social pressure from other persons. Nutrition knowledge was not found to relate to attitudes or to consumption of high fat foods.

Dalton, Linke and Simko (1986) used the Fishbein Model to investigate intended versus actual worksite food choices. They found a strong association between consistency of food choice (choosing the food the subject intended to choose) and positive attitudes toward the choice, as measured by sensory appeal, health value, and expediency. Subjects with less positive attitudes were less likely to make choices consistent with their intended food choice. Others' influence (perceived social norm)

was also associated with consistent food choice ($F=61.01$ $p<.01$).

Pender and Pender (1986) used the theory of reasoned action to study the relationships among attitudes, subjective norms and intentions to engage in healthy behaviors. Study results showed that attitudes were useful in explaining intentions to exercise regularly, maintain recommended weight and avoid stressful life situations. Social norms influenced only the intention to engage in regular exercise.

Godin, Cox and Shephard (1983) found that attitude was correlated with intentions to exercise regularly, but subjective norm was not. In their study, 35% of the variance in intentions to exercise was explained by a combination of two variables: the two components of the Fishbein model (attitude and social norm) and an index of current physical activity.

Integration of Locus of Control and Reasoned Action

Research with the MHLC shows that by itself the MHLC may not be a good predictor of preventive health behaviors (McCusker and Morrow, 1979; Winefield, 1982). In a review of several surveys with different samples of individuals Wallston and Wallston (1982) report that all failed to find significant correlations between health locus of control and a wide range of health behaviors. They provided several explanations for the inability of the MHLC Scale to predict preventive health behaviors. First,

they suggested that preventive behaviors are multidetermined, and that it is simplistic to expect that a single construct will predict much of the variance in individual health behaviors (Wallston and Wallston, 1981). They suggested that other variables, such as specific beliefs about the the behavior in question, may be equally or more important in predicting behavior.

In a study incorporating both the locus of control and Fishbein theories, Saltzer (1978) found that for subjects who valued health and/or physical appearance highly and were described as internal or external using a locus of control scale specific to weight loss, personal attitude was the stronger component of behavior intentions for the internals ($p<.005$), and the subjective norm was the stronger component for externals ($p<.005$). However, Saltzer (1981) was unable to replicate her initial findings. Possible explanantions given for the inablility to replicate her initial studies included a) attitudes, normative beliefs and intentions to lose weight were not measured at equal levels of measurement specificity or b) low multiple correlations were obtained between attitudes, normative beliefs and behavioral intentions.

Kristiansen and Eiser (1986) attempted to replicate Saltzer's findings while controlling two additional sources of error from Saltzer's (1981) study. The first was that Saltzer (1981) did not use the appropriate sample to identify the beliefs which were used to measure attitudes and normative beliefs. While her major study was with

adults attending a weight loss clinc, her pilot subjects were college students. Second, social desirability, a possible confounder, was not evaluated in Saltzer's 1978 study. Kristiansen and Eiser also were unable to replicate Saltzer's 1978 study. Results of Kristiansen and Eiser's study suggest that constructs other than locus of control, values and social desirability may play a more important role in the relationship between attitudes, subjective norm and behavioral intentions. They encourage future research on whether:

> perceived relevance of values and attitudes to various behaviours affects the influence which locus of control and values have upon the extent to which attitudes, as opposed to normative beliefs, predict behavioural intentions and overt behaviour (1986).

Kristiansen and Eiser submitted that locus of control and values might be especially important variables since Saltzer's (1981) data suggest that these variables influence the degree to which intentions are transformed into overt behavior.

Conceptual Research Model

The theoretical construct for this research is based on elements of both Rotter's Social Learning Theory and Ajzen and Fishbein's Theory of Reasoned Action. In a recent review of social psychological models of health behavior, Wallston and Wallston (1984) recommend using an integration of these models for best application of the results and for suggesting future tailoring of interventions to groups of people. The paradigm shown in

Figure 2 summarizes the integration of these models.

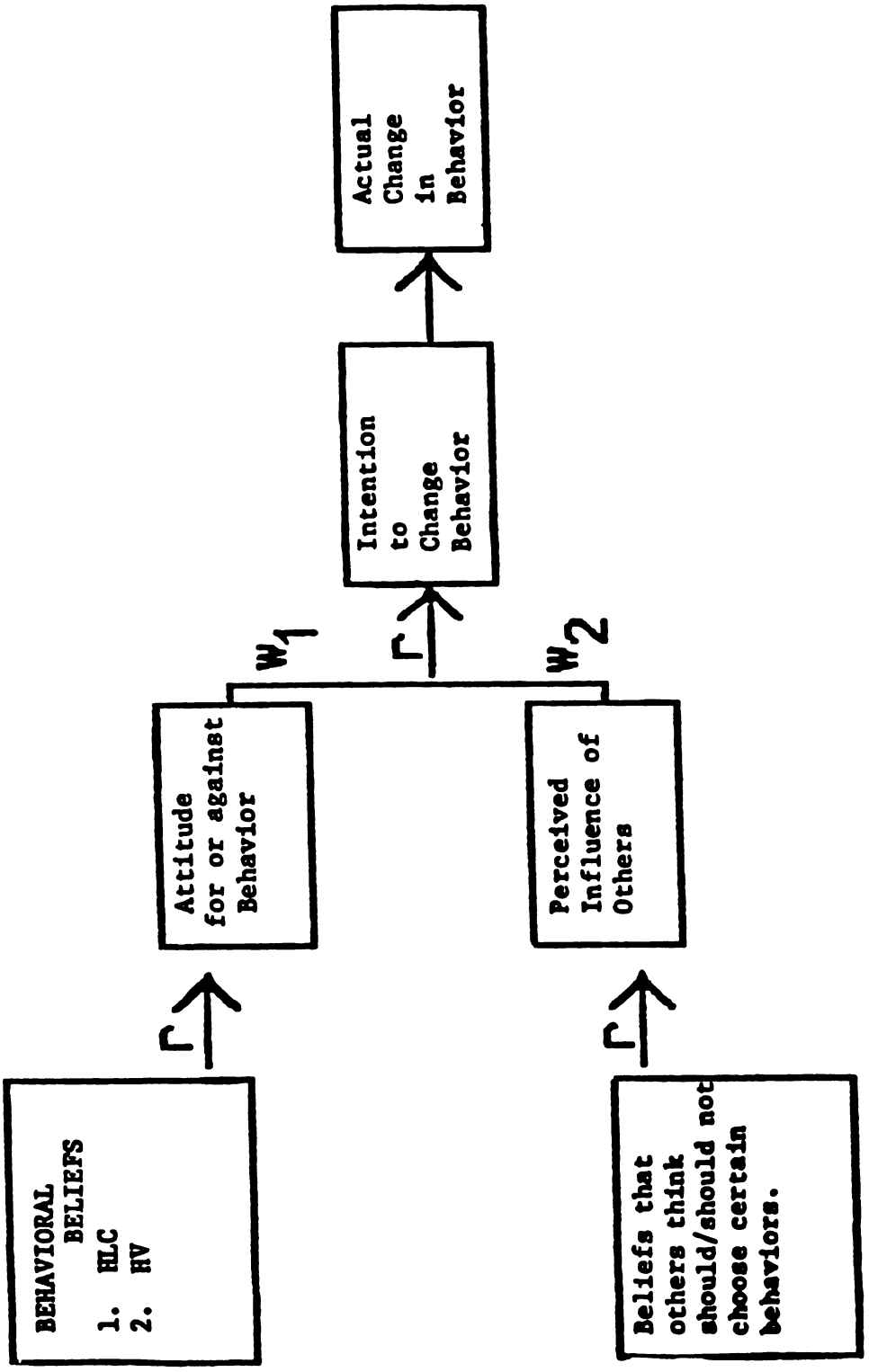


Figure 2. Model showing the integration of Fishbein and Rotter theories.

Hypothesis

This study was designed to assess whether locus of control influences behavioral intentions indirectly by altering the relative importance of the attitude component of Fishbein's model of behavior intentions. More specifically, when compared to non-internals, it was predicted that for individuals who have an internal locus of control orientation and a high value of health, personal attitude toward the behavior will be a stronger predictor of behavioral intentions than social norm. In the "Taking Control" program people are encouraged to change their behavior to obtain improved health and reduced cancer risk. Because the program encourages people to "take control" of their health, it was predicted that those individuals with an internal locus of control would be more likely to respond to the program than those subjects with a non-internal locus of control. Specifically, it was hypothesized that the internal/high health value subjects would have greater change in knowledge, attitude and intention to change behavior following the "Taking Control" program than non-internal subjects with high or low value of health.

The null hypotheses for this research are:

1a. There is no difference in nutrition knowledge scores between subjects who have seen the "Taking Control" program (group 1) and those who have not (group 2).

1b. There are no differences in attitude between group 1 and group 2.

2a. There is no difference between nutrition/cancer knowledge test (NCKT) scores of the internal and non-internal subjects.

2b. There is no difference in attitude scores between the internal and non-internal subjects.

3a. In internal/high health value subjects, attitude does not account for more of the variation in intent to change dietary behavior than does social norm.

3b. In internal/low health value and non-internal subjects, more of the variation in intent to change dietary behavior is not explained by social norm than by attitude.

METHODS

Human Use Approval

Prior to beginning this study, a copy of the proposal was submitted for review to the University Committee for Research Involving Human Subjects. The nature of the project allowed for exemption from full committee review, and the proposal and consent form were approved (Appendix B). A subject's signature on the consent form was understood as his or her written agreement to participate in the study.

Subjects

The subjects in this study consisted of 94 men and women between the ages of 20 and 60 from worksite wellness programs. While this was the target age group, no person interested in participating was turned down. Subjects in apparent ill health were not part of the evaluation.

The worksites used in this study were recruited either by the local ACS county office or by the program presenter in a way that is similar to the usual operating procedure of ACS. Potential subjects were informed about the project. If interested in participating, they were given a written consent form with a verbal explanation. Subjects were informed that participation was totally

voluntary, that they could discontinue the experiment at any time without recrimination, and that all results would be anonymous.

Instrumentation

Nutrition/Cancer Knowledge Test

Before attempting to devise the Nutrition Cancer Knowledge Test (NCKT), a sampling of available knowledge tests was collected. There are many tests designed to evaluate nutrition knowledge (e.g. Kolasa, et.al., 1979), but relatively few have been validated to test the concepts of nutrition that relate to cancer risk. Since the objective was to evaluate the nutrition concepts specific to the Taking Control program of the American Cancer Society, an original test was developed (Appendix C).

Test Development. The first phase of test development was the writing, review, and revision of the test objectives (Figure 3). These objectives were adapted from the program outline in the Taking Control Facilitators Guide (see Appendix D). ACS volunteers who were familiar with the Taking Control program were given these adapted objectives to review for accurate representation of the program (Appendix E). The objectives were found to be clearly stated and closely matched to the program's outline, so few revisions were required.

To assure a balanced sampling of content, a two-way table of test specifications was developed based on the

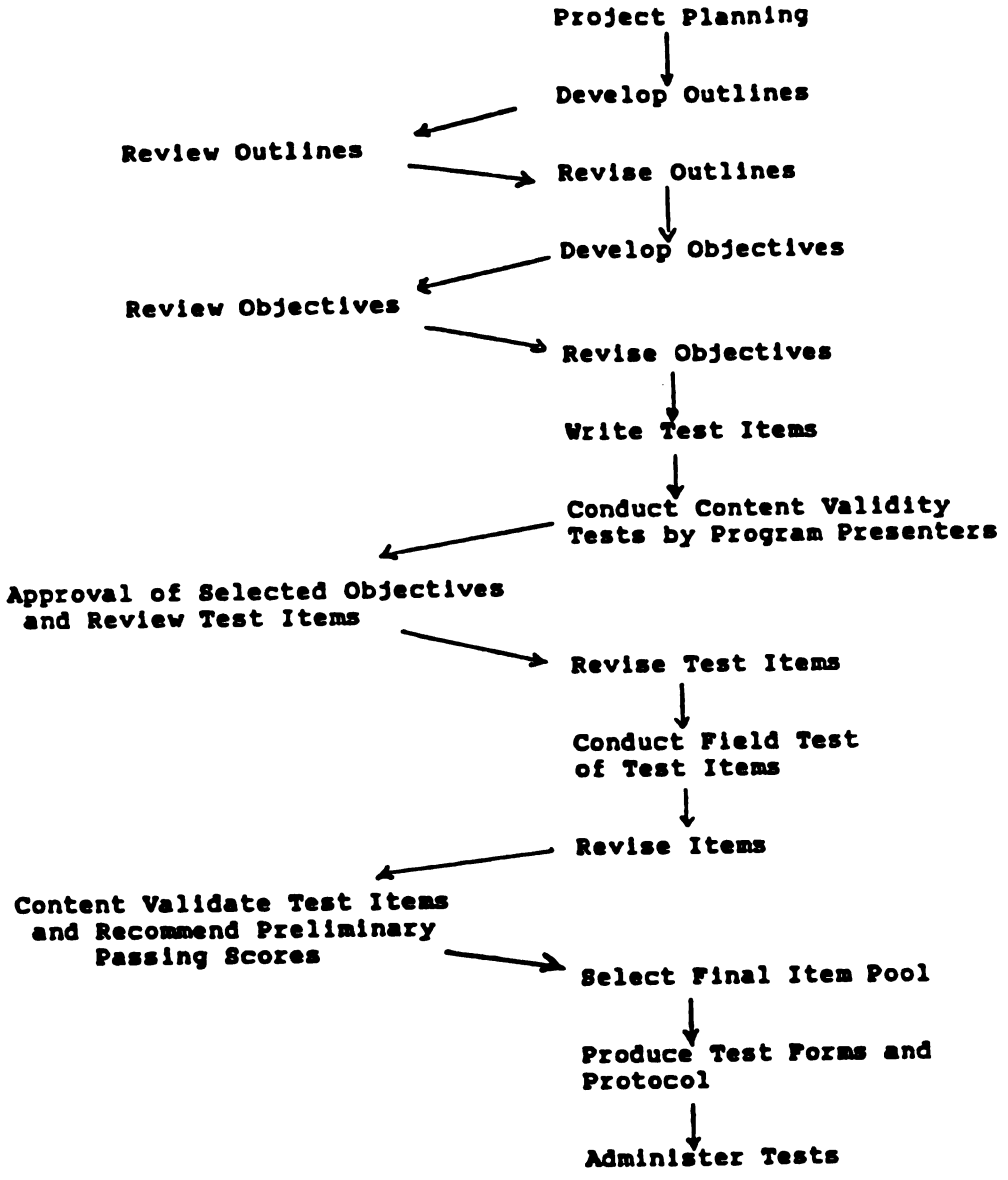


Figure 3. Steps for test development. (Adapted from Mehrens, 1985).

Table 3. Test Specifications

		Recognition of Sources (R)	Understanding of Benefit/Risk (U)
PROTECTIVE FACTORS			
1.*	Cabbage family vegetables	4	7 **
2.	Fiber	3	8 **
3.	Vitamin A	5 6 ***	2 14
4.	Vitamin C	9	--
5.	Weight control	--	10 17
RISK FACTORS			
6.	High-fat diets	NA	12
7.	Salt-cured, smoked and nitrite-cured foods	NA	15
8.	Tobacco	NA	1 11
9.	Alcohol	NA	16
10.	Excessive Sun Exposure	NA	13

Key: Circled numbers correspond to item number on test.
NA = Not Applicable
"--" = no test item developed

* Numbers in the left column are used to code test items to the Table of Specifications. For example, item number 2 is intended to measure understanding of subject area three and is coded as U3. (See Appendix 3).

** Items numbered 7 and 8 were omitted from final analysis due to low discrimination.

*** Item six spanned two subject areas.

objectives. As shown in Table 3, the general subject matter of the test is described down one side, with the level of learning outcomes across the top. More questions were developed for those sections of Taking Control that were emphasized. For example, more time is spent on the smoking section of Taking Control than the other risk factors, and two questions on the NCKT relate to smoking. Other risk factors are addressed in one question each.

The shortness of the Taking Control program and the logistics of presenting the program to a worksite wellness population restricted both the level of learning which could be achieved and the length of time available to administer the test. For these reasons, only basic knowledge was tested, and the levels of learning outcomes were limited to recognition and understanding, with no attempt to ascertain application of the concepts. A five-option multiple choice test was used to minimize the effect of guessing. The table of specifications shows that there were several areas where recognition was "not applicable". The "tobacco", "alcohol" and "excessive sun exposure" items were considered to have obvious sources. For the "nitrite-cured foods", sources were given in the stem of item 15. The sources of foods high in fat were not stressed in the Taking Control program and were not represented in the test.

Test items were writen, reviewed and revised based on the specifications outlined in Table 3. Test item construction followed accepted quidelines on test

construction (Gronlund, 1977; Morris & Fitz-Gibbon, 1978; Ebel & Frisbie, 1986) (Appendix F). The final draft of the NCKT is included in Appendix C. Test item review and revision is discussed below.

The NCKT was reviewed by the nutrition faculty in the Department of Food Science and Human Nutrition at Michigan State University (Appendix G). Suggestions from the faculty were incorporated into the revised version of the NCKT.

Pilot Studies. The NCKT went through two pilot tests. The first pilot consisted of 33 subjects, the second had 40 subjects. The pilot sample populations were obtained from worksite presentations of the Taking Control program. The pilot subjects had the following similarities to the study population: same age range (30-60 years), consent to participate in a worksite program on nutrition and cancer risk reduction, and inclusion of both men and women in apparent good health. Worksite populations were chosen for this study because ACS programs are usually presented to this type of group (as opposed to a group of college students, for example). By choosing a similar population, the information obtained from administration of the NCKT is likely to show whether the Taking Control program is a useful educational tool for the ACS.

Item Analysis. All test items underwent item analysis including measures of difficulty and discrimination using the data obtained from the pilot studies. Item analysis

was performed by the MSU Scoring Office. In the first pilot test, the term "difficulty" was used (and reported in Appendix H) as the percentage of a group of examinees who answered a test item **correctly**. As can be seen in Appendix H, the first pilot test revealed that the test had high difficulty scores (meaning that many subjects answered the question correctly). A medium range of difficulty was sought to contribute to maximum discrimination (Allen and Yen, 1979, p.121). Because the test reliability was relatively low, further test revision was undertaken. Distractors on this version of the NCKT that were not attractive enough for individuals to choose as possible answers were discarded and new distractors were written. The new distractors were then pilot tested.

In the second pilot test (Appendix I), difficulty was defined as those subjects who did **not** answer a question correctly. The medium range of difficulties (ranging from .20 to .60) (Lord, 1953) was achieved. Likewise the discrimination was higher and reliability increased. Prior to pilot testing, it was decided that items with discrimination indices less than .30 were to be eliminated or modified to increase discrimination because items with high discrimination contribute most to test reliability (Ebel, 1986). However, after the second pilot test, two items with a discrimination index of .20 were retained in the final version of the NCKT due to the satisfactory overall test reliability obtained. Items number 7 and 8 were eliminated from the final analysis due to low

discrimination. Despite the omissions and alterations due to pilot testing, the table of specifications (Table 3) shows that there is a representative sampling of the different subject areas of the Taking Control program tested by the NCKT.

Reliability and Validity. Reliability was determined from information obtained from pilot studies. Internal-consistency reliability was measured by the Kuder-Richardson formula 20 (KR20) (Allen and Yen, 1979). Before pilot testing, a reliability coefficient of .70 was considered acceptable (Ebel, 1979). The second NCKT pilot test achieved a reliability coefficient of .67.

Two types of content validity were determined for the NCKT. The review of the NCKT items by volunteer program presenters of the ACS constitutes one method of determining its content validity. These volunteers were familiar with the "Taking Control" program and evaluated the test in terms of appropriateness of questions, relevancy of the test to objectives and relevancy of the objectives to the "Taking Control" program (Appendix E). In cases where the reviewers were not in agreement with the questions or objectives, the item was either modified or deleted.

Another type of content validity was determined by requesting input from MSU faculty members who are knowledgeable in the cancer/nutrition field (Appendix G). They were asked to judge the information in the "Taking

Control" program in regard to the accuracy of the message based on current research. Comments and suggestions received by the faculty were taken into account in the revision of the NCKT.

Multidimensional Health Locus of Control Scale

The Multidimensional Health Locus of Control Scale developed by Wallston, Wallston and Devellis (1978) was used to assess the HLC of the subjects (Appendix J).

Cancer Locus of Control Test

A 6-item Cancer Locus of Control scale (CALC) adapted from the Weight Locus of Control scale by Saltzer (1978) by changing the word "weight" to "cancer" or "getting cancer". This scale was developed as a more specific scale than the MHLC for this application. The CALC has three internally worded items and three externally worded items. It has a 6-point Likert-type format and is scored in the internal direction (Appendix J).

Health Value Survey

Health Value was measured with a version of Rokeach's (1973) value survey as modified by Wallston (1976). Wallston used nine of Rokeach's values with an added tenth value of health. Subjects were asked to rank order the values in order of importance to them. "High" or "Low" health value was determined by a median split of the rank order scores on the survey (Appendix K).

Intention to Change Behavior Questions

Intention to change behavior was assessed using

fixed alternative measures designed to use the elements of the Theory of Reasoned Action developed by Fishbein and Ajzen (1980). Questions were developed following the procedures suggested by Saltzer (1978) (Appendix K). The dependent variable was the response to the question "I intend to start eating a more healthy diet in the near future". The cancer-specific intent question was "It is very likely that I will start eating a diet aimed at lowering my risk of getting cancer". These questions were rated on a 6-point Likert-type scale ranging from Strongly Agree (scored as a 6) to Strongly Disagree (scored as a 1). This method was chosen to differentiate among several levels of feelings about the issue.

Attitude Toward Nutrition Questions

The personal attitude component of the Fishbein model was adapted from an attitude toward personal control over eating habits scale developed by Rosander and Sims (1981) (Appendix K). In addition, subjects' attitudes toward changing nutrition behaviors was assessed by scores on questions taken from an attitude scale developed by Boren et al (1983). Those questions from Boren's scale which loaded highly in factor analysis were chosen for use in this study.

Subjective Norm Questions

The subjective norm component of the model was assessed with regard to four referents: a) doctor b) parents c) spouse, fiance, boyfriend or girlfriend; and

d) close friends. The questions were adapted from the format used by Saltzer (1978) changing the word "weight" for the word "cancer", and were rated on a 6-point Likert scale ranging from strongly agree to strongly disagree. All of the social norm, attitude and intention questions were combined into one questionnaire (Appendix K).

Data Collection

At an informational meeting, subjects were given the HLC test, accompanied by the CALC and demographic questionnaires. The questionnaires were evaluated during the following week to determine the level of internality of each subject by adding up the values for the internally worded questions. Scores on the internal health locus of control questions were then randomly distributed into two groups (group 1 and group 2) such that each group had an equal number of internal and non-internal health locus of control subjects. This was to assure proper respresentation of locus of control in each group.

Randomization was accomplished in the following manner: A cut-off score of 26 on internality was used for separating the internals from the non-internals. This value was determined by weighting and pooling the normative data from previous studies (Table 2) (Wallston and Wallston, 1981). This method provided a standard cut-off score to be used with groups from several different worksites. On the internal questions of the MHLC scale, subjects scoring less than or equal to 26 were classified as internals (group A) and subjects with scores above 26

were classified as non-internals (group B). Prior to the day of intervention, all A subjects were assigned to group 1 or 2 according to a number drawn from a box containing equal sets of paper labeled 1 or 2 . The same was done for B's. Those assigned a 1 were in group 1 and received a packet upon entering the room the day of intervention which contained the test of health behavior intentions, attitudes and health value to be completed first. The test of nutrition/cancer risk knowledge was included in the second portion of the packet, to be completed after the "Taking Control" program. Those assigned a 2 were in group 2 and received a packet with the nutrition/cancer risk knowledge test first; with the intentions, attitudes and health value in the latter portion. All tests were color coded so that the first test for both groups was blue, and the last test was a buff color.

Both groups 1 and 2 viewed the "Taking Control" program and participated in a question/answer session with a set list of answers to commonly asked questions. All subjects in the study had the same program presenter, and the same protocol was followed for each presentation of the program.

The design of this study controlled for possible pre-test learning effects and was a modified version of the "separate-sample pretest-posttest design" (quasi-experimental design #12) described by Campbell and Stanley (1963). Because both groups received the exact same

program at the same time, differences in presentation of the program and outside events which might affect responses were controlled. Randomizing between groups made possible comparing the pre-test of group 1 to the post-test of group 2 (and vice versa). See the experimental design outline in Figure 4.

Data Analysis

All data were analyzed using the Statistical Package for the Social Sciences (SPSS/PC) (Norusis, 1984) on an IBM Personal Computer (IBM PC/XT). Subject response to the questionnaires and Knowledge Test was scored by computer scanning at the MSU Scoring Office.

The reliability of the attitude and social norm scales were determined by Cronbach's alpha coefficient (Ebel and Frisbee, 1986). Coefficient alpha is the appropriate reliability estimate for scales composed of items scored with values other than 0 and 1 (i.e. non-dichotomously scored data such as the Likert scale).

Locus of Control and Health Value. Based on the scores of internality and non-internality, the data were analyzed factorially by crossing the HLC category with health value, using a median split of health value based on sample rank frequencies. An analysis of variance (ANOVA) was computed to determine if these groups differed significantly in their attitudes toward the belief that one can change behavior to reduce cancer risk, and in their intention to change cancer-risk behavior. The F-ratio obtained from an ANOVA is a fraction in which the

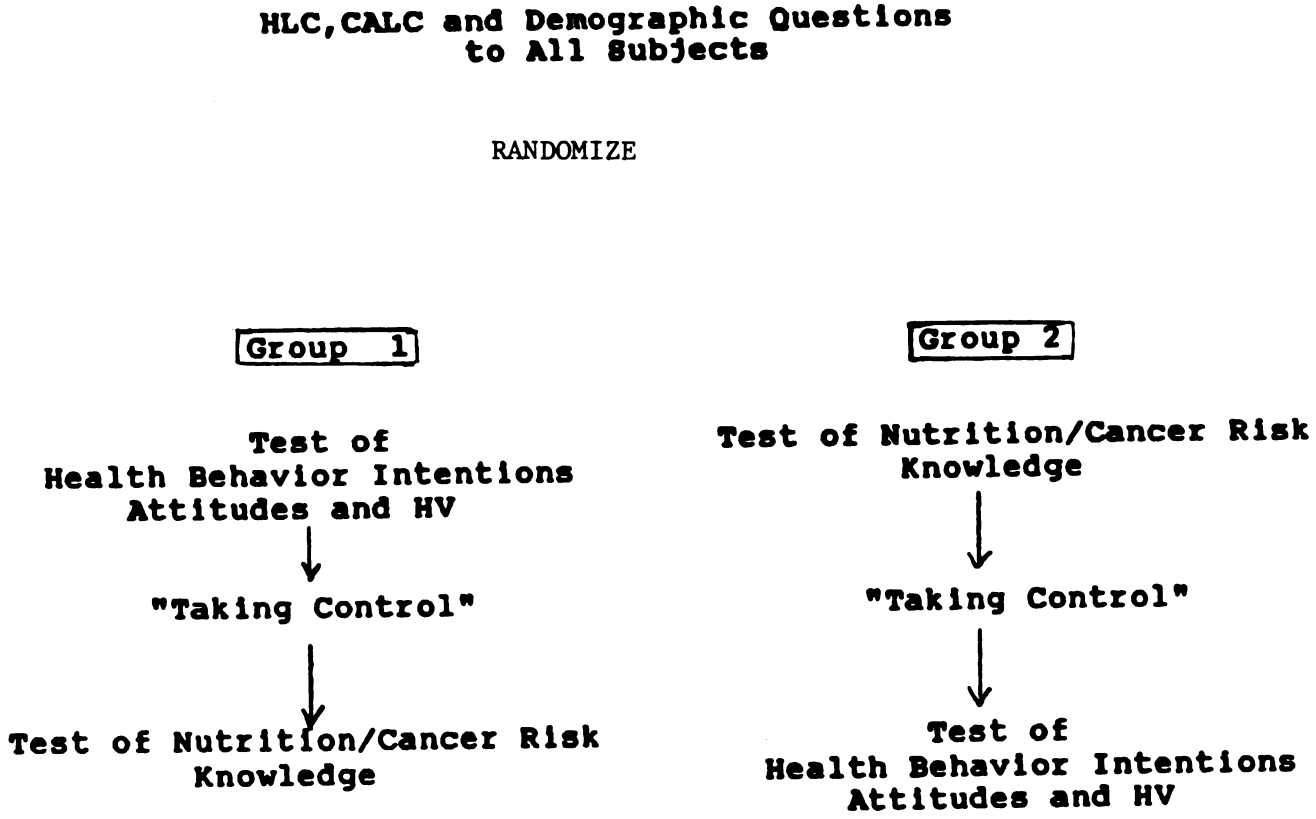


Figure 4. Experimental design.

numerator is the group (between group) mean square, and the denominator is the residual (within group) mean square (Iverson and Norpoth, 1987, p.37). The more significantly different two groups are, the larger the F-ratio. When the dependent variable is metric (interval) and the independent variables are categorical, ANOVA is the appropriate method of analysis (Iverson and Norpoth, 1987). A 0.05 level was the pre-determined criterion for significance.

Elements of Theory of Reasoned Action. The personal attitude component of the Fishbein model was assessed by scores obtained on the attitude toward changing nutrition behaviors scale adapted from Boren, Dixon and Reed (1983) and from the personal-control-over-eating-habits scale developed by Rosander and Sims (1981). Social norm was assessed by questions developed according to the method described by Saltzer (1978). In the Fishbein equation, attitudinal and normative components are given empirical weights according to their relative importance in the prediction of behavior intentions (Ajzen and Fishbein, 1980). The weights are determined by a multiple regression equation where attitude toward the behavior and subjective norms are the two independent variables and the behavioral intention is the dependent variable. The empirical weights can be expressed as standardized regression coefficients, or beta weights (Saltzer, 1978).

In the stepwise multiple regression analysis used here, the multiple correlation coefficient R is computed.

R-Squared is an estimate of the "proportion of the variation in the dependent variable 'explained' by the model" (Norusis, 1984, p. B-181). The "adjusted" R-squared attempts to correct R-squared to more closely reflect the goodness of fit of the model in the population (Norusis, 1984, pB-180). At each phase of the stepwise procedure, the variables are entered into the equation according to how well they fit the linear model. The standardized beta weights used to express the empirical weights of the Fishbein equation are the coefficients of the independent variables expressed in standardized (Z-score) form (Norusis, 1984, pB-197). The values of the standardized beta coefficients are contingent on the other independent variables in the regression equation. When there are correlations among the independent variables, the unique contribution of each beta coefficient is difficult to assess.

RESULTS

In this section, distribution and significance of differences in demographic and background variables between group 1 (pre-attitude, post-NCKT) and group 2 (pre-NCKT, post-attitude), between internals and non-internals and between worksites are given first. The significance of differences in the distribution of these variables was determined by the SPSS/PC crosstabs procedure (Norusis, 1984) using the Chi-Square test of independence. A significance level of $p<.05$ was predetermined as the criteria for true differences. Variable interactions, as assessed by analysis of variance (ANOVA), and multiple regression follow.

Population Characteristics

A total of 94 subjects, 70 women and 24 men between the ages of 20 and 70, were included in this study. Subjects participated in the study through seven Michigan worksite wellness programs:

Worksite One	19 subjects
Worksite Two	7 subjects
Worksite Three	10 subjects
Worksite Four	12 subjects
Worksite Five	14 subjects
Worksite Six	12 subjects
Worksite Seven	20 subjects

Tables 4 and 5 give a summary of the descriptive

Table 4. Summary of demographic variables for total sample.

Sex	
Female	70
Male	24
Age (years)	
20-29	17
30-39	34
40-49	26
50-59	12
60-69	5
Education	
High School	33
HS + some college	11
Associate's Degree	6
Bachelor's Degree	31
Graduate Degree	12
Not Given	2
Occupation	
Clerical	29
Technical	8
Sales/Accounting	20
Managerial or Supervisory	16
Health Aide	8
Professional:	
Non-Health	4
Health	5
Not Given	4

Table 5. Summary of background variables for total sample.

Subject has Cancer:	
Yes	0
No	86
Don't know	8
Family Member has Cancer	
Yes	29
No	59
Doesn't know	3
ACS Program in Past	
Yes/Nutrition Related	3
No	6
Yes/Not Nutrition	85
Dietary Change Last Two Years	
Weight/Cholesterol	74
Cancer-Related	4
Other	6
None	10

statistics for the entire sample.

Group 1 and 2 Characteristics

Before the null hypotheses were tested, descriptive data was analyzed for the two experimental groups (Group 1 = attitude pre-test, NCKT post-test; Group 2 = NCKT pre-test, attitude post-test) to verify that the two groups were alike in demographic and background variables. No significant differences were found between Group 1 and Group 2 for any demographic or nutrition/cancer background variable measured ($p > .05$) .

Group 1 had 32 (70%) females and 14 (30%) males (Table 6). Group 2 had 38 (79%) females and 10 (21%) males. All subjects were between the ages of 20 and 60 years. Five subjects (11%) in group 1 were between 20 and 29 years old, 18 (39%) were between 30 and 39 years, 13 (28%) were between 40 and 49 years, 9 (20%) were between 50 and 59 years, and 1 (3%) was between 60 and 69 years old. Twelve subjects (25%) in group 2 were between 20 and 29 years old, 16 (33%) were between 30 and 39 years, 13 (27%) were between 40 and 49 years, 3 (6%) were between 50 and 59 years, and 4 (8%) were between 60 and 69 years old (Table 6).

All subjects had received at least a high school education. In group 1, 18 (40%) were high school graduates, 2 (4%) had gone through high school plus some college, 3 (7%) had an associate's degree, 17 (38%) had a bachelor's degree and 5 (11%) had earned a graduate

Table 6. Summary of Demographic Variables for Groups 1 and 2. *

	Group 1 (post-NCKT)	Group2 (pre-NCKT)
Sex		
Female	33 (70%)	38 (79%)
Male	14 (31%)	10 (21%)
Age (years)		
20-29	5 (10%)	12 (25%)
30-39	18 (38%)	16 (33%)
40-49	14 (30%)	13 (27%)
50-59	9 (19%)	3 (6%)
60-69	1 (2%)	4 (8%)
Education		
High School	19 (40%)	15 (31%)
HS + some college	2 (4%)	9 (19%)
Associate's Degree	3 (6%)	2 (4%)
Bachelor's Degree	17 (36%)	14 (29%)
Graduate Degree	5 (11%)	7 (15%)
Other	1 (2%)	1 (2%)
Occupation		
Clerical	13 (28%)	16 (33%)
Technical	1 (2%)	6 (13%)
Sales/Accounting	13 (28%)	7 (15%)
Managerial or Supervisory	6 (13%)	10 (21%)
Health Aide	5 (11%)	3 (6%)
Professional:		
Non-Health	2 (4%)	2 (4%)
Health	2 (4%)	3 (6%)
Other	5(11%)	1 (2%)

*No significant differences on any characteristic (Chi Square, $p>0.05$).

degree. In group 2, 15 (31%) were high school graduates, 9 (19%) had gone through high school plus some college, 3 (6%) had an associate's degree, 14 (29%) had a bachelor's degree and 7 (15%) had earned a graduate degree (Table 6).

Thirteen subjects (31%) in group 1 were employed in clerical or word processor positions, 1 (2%) was in a technical or computer-related field, 13 (31%) were accountants or salespeople, 6 (14%) held managerial or supervisory positions, 5 (12%) were health aides, 2 (5%) were non-health professionals, 2 (5%) were health professionals and 5 (11%) subjects did not state their occupation (Table 6). Sixteen subjects (33%) in group 2 were employed in clerical or word processor positions, 6 (13%) were in technical or computer-related fields, 7 (15%) were accountants or salespeople, 10 (21%) held managerial or supervisory positions, 3 (6%) were health aides, 2 (4%) were non-health professionals, 3 (6%) were health professionals, and 1 (2%) was a non-health professional.

As outlined in the methods section, subjects with cancer were excluded from data analysis. Thus, no subjects had cancer (Table 7). In group 1, 41 (89%) did not have cancer, and 5 (11%) did not know if they had cancer. Eleven (24%) had a family member with cancer. Thirty-one (67%) did not have a family member with cancer and 4 (9%) did not know. In group 2, forty-five (94%) did not have cancer and 3 (6%) did not know if they had

Table 7. Background Variables for Groups 1 and 2.

	Group 1	Group 2
Family Cancer		
yes	11 (24%)	18 (38%)
no	31 (67%)	28 (58%)
don't know	4 (9%)	2 (4%)
ACS Program in Past		
Yes/Nutrition	0	3 (6%)
No	5 (13%)	1 (2%)
Yes/Not Nutrition	41 (87%)	44 (92%)
Dietary Change		
Weight/Cholesterol	34 (74%)	40 (83%)
Cancer-Related	2 (4%)	2 (4%)
Other	2 (4%)	4 (8%)
None	8 (17%)	2 (4%)

cancer. Eighteen (38%) had a family member with cancer, 28 (58%) did not have a family member with cancer and 2 (4%) did not know if they had a family member with cancer (Table 7).

Most subjects had previously seen a program by the American Cancer Society (ACS). In group 1, 41 (87%) had seen an ACS program before, but the program was not related to nutrition and cancer. Forty-four subjects in group 2 (92%) had seen an ACS program, but only 3 (6%) had seen a program related to nutrition and cancer (Table 7).

Most of the subjects had tried some type of dietary change within the past two years (Table 7). Thirty-four (74%) of the subjects in group 1 had attempted a weight reduction diet and/or a diet low in cholesterol, 2 subjects (4%) had tried a diet change that was cancer related (for example, increase fiber, eat more fruits and vegetables), 2 (4%) had tried an other diet, such as a low salt diet and 8 (17%) of the subjects had not tried to change their diets in the past two years. For group 2, 40 (83%) had attempted a weight reduction or low cholesterol diet, 2 (4%) had tried a diet change that was cancer related, 4 subjects (8%) had tried an "other diet" and 2 subjects (4%) had not tried to change their diets.

Due to the block randomization design of the study, the two groups had a nearly equal distribution of internal and non-internal subjects. Group 1 had 31 internal subjects (67%) and 15 non-internal subjects

(33%). Group 2 had 33 internal subjects (68%) and 15 non-internals (31%) (Table 8). The distribution of high and low value of health was not significantly different between the two groups ($p>.05$). Group 1 had 33 subjects (72%) who ranked health highly and 13 (30%) who ranked it relatively low on the value survey. Thirty-eight subjects (79%) in group 2 gave health a high rank and the remaining 10 subjects (21%) rated health as a relatively lower value.

Table 8. Distribution of internality and health value between groups.

	Group 1 (post-NCKT)*	Group 2 (Pre-NCKT)
Internals	31 (67%)	33 (68%)
Non-Internals	15 (33%)	15 (31%)
High HV**	33 (72%)	38 (79%)
Low HV	13 (30%)	10 (21%)

*NCKT = Nutrition Cancer Knowledge Test
**HV= Health Value

Internal versus Non-Internal Sample Characteristics

There were more subjects with an internal score on the MHLC (67%) than those with a non-internal score on the MHLC (33%). The distribution of health value was significantly different between the internals and non-internals ($p=.02$). Fifty-three (83%) of the internals gave health a relatively high rank compared to 18 (58%) of the non-internals.

No differences existed between internals and non-internals on demographic characteristics (Table 9). Fifty

Table 9. Demographic variables for internals and non-internals.*

	Internal	Non-Internals
Sex		
Female	50(78%)	20(67%)
Male	14(22%)	10(33%)
Age (years)		
20-29	11(17%)	6(20%)
30-39	25(39%)	9(30%)
40-49	20(31%)	6(20%)
50-59	5(8%)	7(23%)
60-69	3(5%)	2(7%)
Education		
High School	25(39%)	8(27%)
HS + some col	10(16%)	1(3%)
Associate's	3(5%)	2(7%)
Bachelor's	17(27%)	14(47%)
Graduate	7(11%)	5(17%)
Other	2(3%)	0
Occupation		
Clerical	21(33%)	8(27%)
Technical	5(8%)	2(6%)
Sales/Account	11(17%)	9(30%)
Managerial or Supervisory	11(17%)	5(17%)
Health Aide	7(11%)	1(3%)
Professional:		
Non-Health	3(5%)	1(3%)
Health	5(8%)	0
Other	1(2%)	4(13%)

*No significant differences on any characteristic (Chi Square, $p>0.05$).

(78%) of the internals were female, 14 (22%) were male. The non-internal subjects were comprised of 20 (67%) females and 10 (30%) males. Of the internal subjects, 11 (17%) were between 20 and 29 years old, 25 (39%) were between 30 and 39 years, 20 (31%) were between 40 and 49 years, 5 (8%) were between 50 and 59 years, and 3 (5%) were between 60 and 69 years old. Six (20%) of the non-internals were between 20 and 29 years old, 9 (30%) were between 30 and 39 years, 6 (20%) were between 40 and 49 years, 7 (23%) were between 50 and 59 years, and 2 (7%) were between 60 and 69 years old.

Twenty-five (39%) of the internal subjects were high school graduates, 10 (16%) had gone through high school plus some college, 3 (5%) had an associate's degree, 17 (27%) had a bachelor's degree and 7 (11%) had earned a graduate degree (Table 9). For non-internals, 8 (27%) were high school graduates, 1 (3%) had gone through high school plus some college, 2 (7%) had an associate's degree, 14 (47%) had a bachelor's degree and 5 (17%) had earned a graduate degree.

Twenty-one (33%) of the internal subjects were employed in clerical or word processor positions, 5 (8%) were in technical or computer-related fields, 11 (17%) were accountants or salespeople, 11 (17%) held managerial or supervisory positions, 7 (11%) were health aides, 3 (5%) were non-health professionals, and 5 (8%) were health professionals and 1 (2%) did not provide occpational information. Eight (27%) of non-internal subjects were

employed in clerical or word processor positions, 2 (7%) were in technical or computer-related fields, 9 (30%) were accountants or salespeople, 5 (17%) held managerial or supervisory positions, 1 (3%) was a health aide, 1 (3%) was a non-health professional, none were health professionals and 4 (13%) did not give their occupation (Table 9).

Of the total sample, some people had cancer. They were omitted from the data analysis. Of the remaining 94 subjects, 5 (8%) of the internals and 3 (10%) of the non-internals did not know if they had cancer. Twenty-one internal subjects (33%) had a family member with cancer. Thirty-eight (59%) did not have a family member with cancer and 5 (8%) did not know. Eight (27%) of the non-internals had a family member with cancer. Twenty-one (70%) did not have a family member with cancer and 1 (3%) did not know.

Of the internal subjects, 57 subjects (89%) had seen an ACS program before. However, only 1 (2%) had seen an ACS program related to nutrition and cancer. Twenty-eight (90%) of the non-internal subjects had seen an ACS program, but only 2 (10%) had seen a program related to nutrition and cancer (Table 10).

Fifty (93%) of the internal subjects had attempted a weight reduction diet and/or a diet low in cholesterol, 4 subjects (6%) had tried a diet change that was cancer related 7 (11%) had tried an "other diet" and 8 (13%) had

Table 10. Background variables for internals and non-internal subjects.*

	Internals	Non-internals
Family Cancer		
yes	21(33%)	8(27%)
no	38(59%)	21(70%)
don't know	5(8%)	1(3%)
ACS Program in Past		
Yes/Nutrition	1(2%)	2(7%)
No	6(9%)	0
Yes/ Not Nutrition	57(89%)	28(93%)
Dietary Change		
Weight/Cholesterol	50(78%)	24(80%)
Cancer-Related	4(6%)	0
Other	2(3%)	2(6%)
None	8(13%)	4(13%)

*No significant differences on any characteristic (Chi Square, $p>0.05$).

not tried to change their diets in the past two years. For non-internals, 24 (80%) had attempted a weight reduction or low cholesterol diet, none had tried a diet change that was cancer-related, 3 (10%) had tried an other diet such as low sodium, and 3 (10%) had not tried to change their diets.

Worksite Characteristics

Several worksites participated in this study, as indicated in the beginning of this section. Statistical analysis revealed differences between worksites and these were significant at the .05 level. Differences were found in the distribution of sex, educational level, age and occupation between different worksites. The sampling technique used in this study controlled for worksite differences by dividing each worksite sample into groups 1 and 2 as described in the methods section. Thus the differences between these sites were equally distributed between the two groups: pre- and post-test. That the pre- and post-test groups were the same was verified by the descriptive statistics above.

The remaining demographic and background variables of cancer incidence, cancer of a family member, previous ACS program participation, dietary changes, distribution of internal and non-internal subjects, or distribution of health value were not significantly different between worksites ($p>.05$) (Table 11).

Table 11. Worksite characteristics.*

Worksite#:	One	Two	Three	Four
Family Cancer				
yes	3(16%)	3(43%)	4(40%)	3(25%)
no	14(74%)	4(57%)	6(60%)	9(75%)
don't know	2(11%)	0	0	0
Dietary Change				
Weight/Cholesterol	17(89%)	6(86%)	8(80%)	8(67%)
Cancer-Related	1(5%)	0	0	1(8%)
Other	1(5%)	0	0	1(8%)
None	0	1(14%)	2(20%)	2(16%)

Table 11 (cont).

Worksite#:	Five	Six	Seven
Family Cancer			
yes	3(21%)	4(33%)	9(45%)
no	11(79%)	5(42%)	10(50%)
don't know	0	3(25%)	1(5%)
Dietary Change			
Weight/Cholesterol	9(64%)	10(83%)	16(80%)
Cancer-Related	1(7%)	1(8%)	0
Other (eg low Na)	2(14%)	1(8%)	1(5%)
None	2(14%)	0	3(15%)

*No significant differences on any characteristic (Chi-Square, $p>0.05$ with similar worksites collapsed to keep cells with expected frequencies of <5 to a minimum).

Reliability and Distribution of Scores

Nutrition/Cancer Knowledge Test (NCKT)

The mean score on the NCKT was 8.1 (SD = 3.3, variance = 10.9) (Appendix M). The final reliability (KR-20) was 0.73. The mean item difficulty (based on incorrect responses) was 46 and mean item discrimination was 54. These values met the criteria set forth in the methods section.

Multidimensional Health Locus of Control Test (MHLC)

The mean scores and standard deviations for the MHLC are given in Table 12.

Table 12. Mean scores and standard deviations for MHLC.

	Mean	Std. Dev.
Internal HLC	28.15	3.67
Chance HLC	15.39	5.67
Powerful HLC	16.66	5.56

Cancer Locus of Control Scale (CALC)

The mean and standard deviations for the CALC are given in Table 13.

Table 13. Mean scores and standard deviations for CALC.

	Mean	Std. Dev.
Internal CALC	10.31	3.29
External CALC	8.83	3.73

Attitude Scales A mean score of 19.5 (SD = 3.1) was obtained on the Sims personal-control-over-eating-habits scale. The Cronbach's alpha for this scale was 0.45.

On the attitude questions from Boren, the mean score was 15.2 (SD = 2.1). Cronbach's alpha for this scale was -0.74. The cancer attitude questions had a coefficient alpha of 0.34.

Social Norm and Intent The social norm score was 17.53. The coefficient alpha for this scale was 0.39. The average score on the intent question was 1.81 (SD = 1.1). The mean for the cancer behavior intent (cbi) question was 2.0 (SD = 1.1).

Correlations Between Scales

MHLC and CALC

On the MHLC scale, PHLC correlated positively and significantly with the CHLC (Table 14). The internal cancer locus of control (ICALC) scale correlated positively and significantly with the internal health locus of control (IHLC) scale. The external cancer locus of control (ECALC) correlated positively and significantly ($p<.05$) with both the chance (CHLC) and powerful others (PHLC) health locus of control scales.

Table 14. Correlations between the MHLC and CALC.

Correlations:	IHLC	CHLC	PHLC	ICALC	ECALC
IHLC	1.0000	-.1325	-.0702	.3880**	-.1115
CHLC		1.0000	.5032**	-.0919	.5050**
PHLC			1.0000	.1269	.2678*
ICALC				1.0000	-.2038

N of cases = 94
* = p<.01
** = p<.001

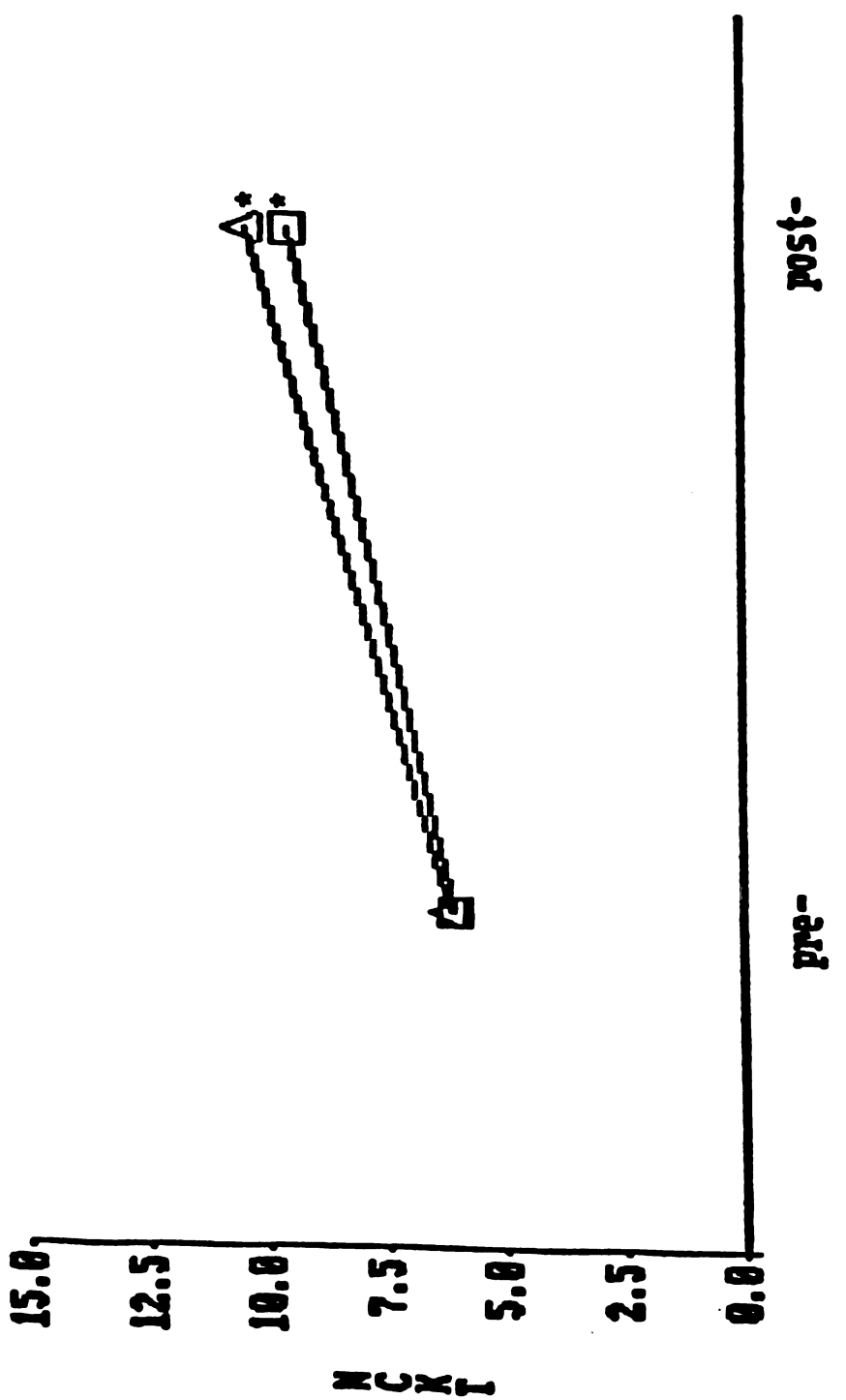
Relationships Between Variables

Effect of Variables on NCKT Scores A two-way ANOVA with NCKT as the dependent variable and group and internality as the independent variables, revealed that both internals and non-internals taking the NCKT after the "Taking Control" program had significantly (p<.0001) higher scores than those taking the NCKT prior to the program (Table 15). There were no significant differences in NCKT scores between internal and non-internal subjects (Figure 5).

Table 15. Two-way ANOVA of NCKT to test for the effects of group and internality.

Sources of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Value	p Value
Main Effects	2	292.830	146.415	17.953	<.0001**
Group*	1	286.629	286.629	35.145	<.0001**
Internality	1	4.463	4.463	.547	.461
Interaction Effect Group by Internality	1	4.252	4.252	.521	.472
Explained	3	297.082	99.027	12.142	.0001**
Residual	89	725.842	8.156		
Total	92	1022.925	11.119		

* Group = Pre- or post-test
**p <.001



* Significant ($p < .05$) Change in Knowledge from pre- to post-test for both Internal and Non-Internal.

Figure 5. NCKT by group.

A one-way analysis of variance with NCKT as the dependent variable and groups of subjects classified as either high health value internals (N=53), or low health value internals and non-internals (N=41) was done to determine whether internal subjects with high health value performed differently on the NCKT than other subjects. The results of this analysis revealed no significant differences as shown in Table 16.

Table 16. Oneway ANOVA of NCKT by Internals with High HV versus Others.

Sources of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	p Value
Between Groups	1	21.528	21.52	1.88	.1732
Within Groups	92	1051.376	11.43		
Total	93	1072.904			

*p <.05 **p <.001

When these groups of subjects were divided into groups according to whether they were pre- or post-NCKT tests, there were significant differences between the four groups formed (i.e. high HV/internal post-NCKT, n=24; high HV/internal pre-NCKT, n=28; low HV/internal+non-internals post-NCKT, n=21; and low HV/internal+non-internals pre-NCKT, n=20). The results of a one-way ANOVA with Fisher's Least Significant Difference Test for multiple comparisons between means (SPSS Ranges subcommand, Norusis, 1984) are summarized in Table 17 and Figure 6. The pre- to post-test scores on the NCKT were the only significant

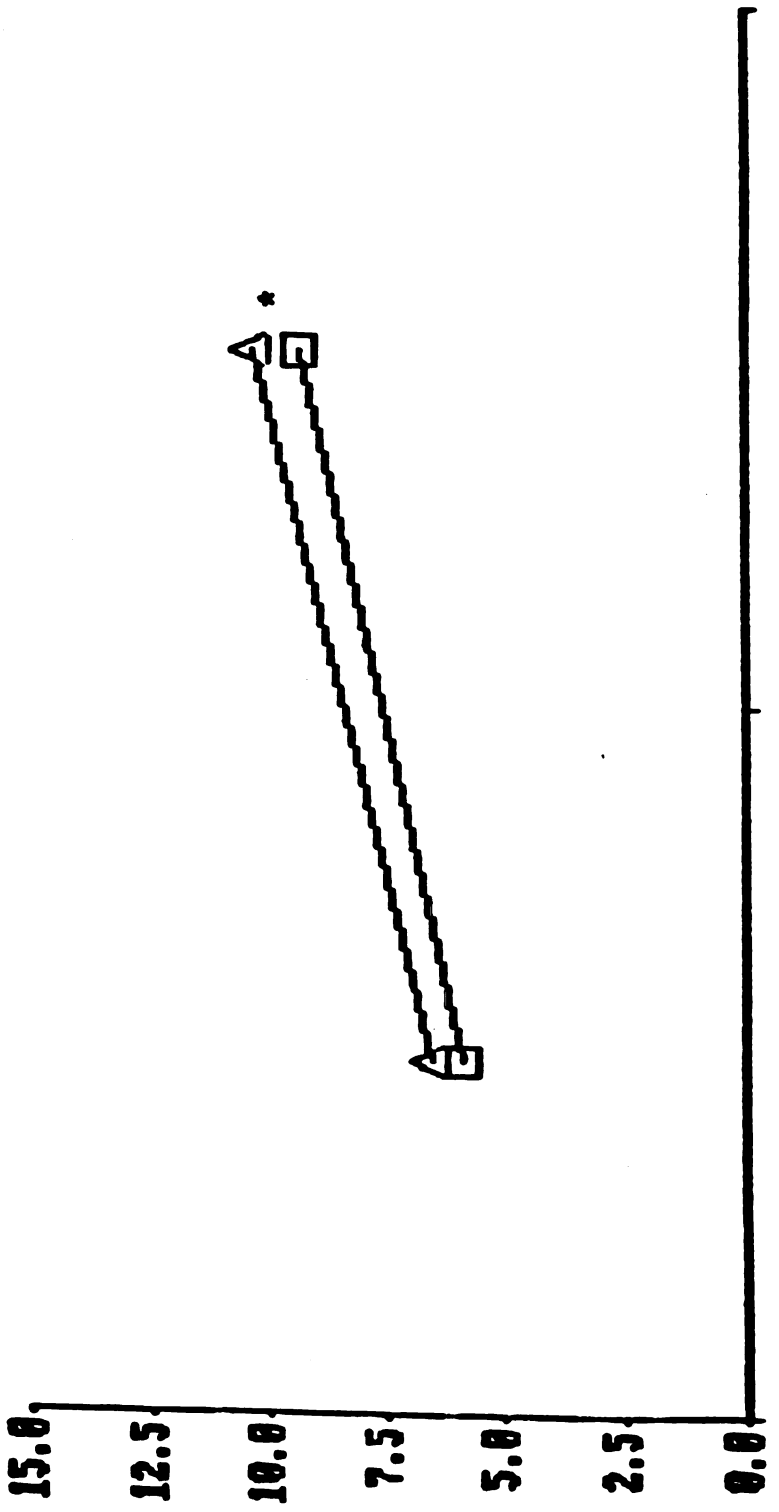


Figure 6. NCKT Scores by group for internals with high health value (squares) versus Internals with low health value and non-internals (triangles)

* significant differences ($p > .05$) from pre to post both groups.
No differences between groups.

differences found. No differences in the four means were attributable to internality/HV.

Table 17. Oneway ANOVA of NCKT by Internals with High HV versus Others, Pre- and Post-Test.

Sources of Variation	Degrees of Freedom	Sum of Squares	Mean Squares	F Ratio	p Value
Between Groups	3	327.385	109.1282	13.174	.0000**
Within Groups	90	745.520	8.2836		
Total	93	1072.904			

*p <.05 **p <.001

Effect of Variables on Attitudes A two-way ANOVA revealed that there were no significant differences in attitude between the two experimental groups or between internals and non-internals as measured by either the personal-control-over-eating-habits scale of Rosander and Sims, by the attitude scale adapted from Boren et al. or by the two scales combined.

One-way ANOVAs with NCKT as the dependent variable and groups of subjects classified as either high health value internals or low health value internals and non-internals were done to determine whether internal subjects with high health value performed differently on the attitude scales. There were no significant differences between internals and non-internals even when health value was taken into account, on either the Sims scale or the Boren scale.

When these groups of subjects were divided into

groups according to whether they were pre- or post-attitude tests, there were no significant differences between the four groups.

Effect of Variables on Social Norm ANOVAs revealed no significant differences in social norm scores between groups 1 and 2 (pre- and post-), between internal and non-internal subjects, or between internal subjects with a high health value and the remaining subjects.

When these groups of subjects were divided into groups according to whether they were pre- or post-attitude tests, there were no significant differences between the four groups.

Effect of Variables on Intent ANOVA showed that there were no significant differences in the variation in intent scores of internal subjects with high health value versus internal subjects with low health value and non-internal subjects in either group (pre- or post-test).

Regression analysis revealed that the Roasander and Sims personal-control-over-eating-habits attitude scale and social norm both accounted for significant amounts of the variation in intent to change dietary behavior. These results are shown in Table 18. The scores on the Boren attitude-toward-nutrition scale did not reach the significance level required for entry into the equation.

Table 18. Results of regression analysis of the dependent variable: intent to change diet.

Step/ Variable	Multiple R	Adjusted R-squared	F Value	Sig. of F	Beta
1.Score on Sims	.2777	.06599	6.935	.0101	-.2777
2.Social Norm	.3965	.13665	7.648	.0009	.3038

For the internals with high health value, stepwise regression analysis of the independent variables Boren-attitude-scale scores, Sims-attitude-scale scores, and social norm scores revealed no significant differences in the amount of variablility in the intention to change dietary behavior explained by these independent variables.

Stepwise regression analysis of the independent variables Boren attitude scale scores, Sims attitude scale scores, and social norm scores on the dependent variable intent to change dietary behavior was also done for the internals with low health value and non-internal subjects. In these subjects, scores on the Sims scale accounted for a significant amount of the variation in intent (Table 19). The other independent variables in the regression, scores on the social norm and Boren scales, did not reach the required significance level ($p<.05$) to enter into the regression equation. Thus these variables did not account for significant variation in dietary behavior change intention in low health value internals and non-internals.

Table 19. Results of regression analysis of the dependent variable intent to change diet for internal with low health value and non-internal subjects.

Step/ Variable	Multiple R	Adjusted R-squared	F Value	Sig. of F	Beta
Score on Sims	.3979	.1343	6.58	.015	-.3979

The low health value internals and non-internals were divided into groups according to whether they were pre- or post-attitude tests (i.e. high HV/internal pre-attitude test, high HV/internal post-attitude, low HV/internal+non-internals pre-attitude, and low HV/internal+non-internals post-attitude). Regression analysis of intent by social norm, the Sims scale and the Boren scale for each of these four groups showed that only the low HV/internal+non-internals pre-attitude group had an independent variable (score on the Sims scale) which achieved the required significance level to enter the stepwise regression equation. These results from this group are shown in Table 20. The independent variables social norm and score on the Boren scale did not enter into the stepwise equation.

Table 20. Results of regression analysis of the dependent variable intent to change diet for internal subjects with low health value and non-internal subjects taking the pre-attitude test (N=22).

Step/ Variable	Multiple R	Adjusted R-squared	F Value	Sig. of F	Beta
Score on Sims	.7178	.4898	20.20	.0002	-.7178

Effect of Variables on Cancer Behavior Intent

A cancer-specific attitude scale was used in conjunction with social norm and Sims as the independent variables, and intention to change dietary behavior related to cancer as the dependent variable, to determine if a scale more specific to cancer issues than Boren would account for variation in cancer behavior intention (CBI). The results of stepwise regression analysis of these variables in internal subjects with high health value are summarized in Table 21. Social norm and the score on Sims did not reach the required significance level for entry into the equation, although social norm was close (p=.062, Beta=.2445)

Table 21. Results of regression analysis on CBI in internal subjects with high HV (N=49).

Step/ Variable	Multiple R	Adjusted R-squared	F Value	Sig. of F	Beta
Cancer Attitude	.4427	.1789	11.46	.0014	.4427

The same regression as described above was run on the scores from internal subjects with low health value and non-internal subjects. In these subjects, social norm and the Sims scale were significant components of the variation in intent to change dietary behavior related to cancer. These results are summarized in Table 22. The cancer-specific attitude scale (p=.1311) did not reach the .05 significance level required for entry into the regression equation.

Table 22. Regression analysis on CBI in internal subjects with low HV and non-internals.

Step/ Variable	Multiple R	Adjusted R-squared	F Value	Sig. of F	Beta
1.Social Norm	.4925	.2209	11.21	.002	.4925
2.Sims Score	.5931	.3136	9.22	.001	-.3306

When the internals with high HV versus internals with low HV and non-internals were divided into groups according to whether they were pre- or post-attitude tested, all four groups had components which reached the required significance level for entry into the regression equation. These results are summarized in Tables 23 to 26. Neither the Sims nor the social norm scale reached the required significance level for entry into the equation to account for variation in cancer behavior intent.

Table 23. Regression analysis of CBI in internal subjects with high health value who took the pre-attitude test.

Step/ Variable	Multiple R	Adjusted R-squared	F Value	Sig. of F	Beta
Cancer Attitude	.4776	.1930	6.50	.018	.4776

Table 24. Regression analysis of CBI in internal subjects with high health value who took the post-attitude test.

Step/ Variable	Multiple R	Adjusted R-squared	F Value	Sig. of F	Beta
1. Social Norm	.4658	.1829	6.3730	.0189	.4658
2. Sims	.6450	.3629	7.8345	.0027	-.4966

Cancer attitude scores did not reach the required significance level for entry into the stepwise equation to account for variation in CBI.

Table 25. Regression analysis of CBI in internal subjects with low health value and non-internals who took the pre-attitude test.

Step/ Variable	Multiple R	Adjusted R-squared	F Value	Sig. of F	Beta
1. Sims	.5492	.2628	7.7735	.0121	-.5492
2. Social Norm	.7413	.4966	10.3696	.0011	.4982

Cancer attitude scores did not reach the required significance level for entry into the equation to account for variation in CBI.

Table 26. Regression analysis of CBI in internal subjects with low health value and non-internals who took the post-attitude test.

Step/ Variable	Multiple R	Adjusted R-squared	F Value	Sig. of F	Beta
Cancer Attitude	.6163	.3355	8.5725	.0110	.6163

Neither scores on the Sims scale (p=.7558) nor the social norm (p=.2447) met the required significance level for entry into the equation to account for variation in CBI.

Summary of Results

The results of regression analyses with intent to change diet as the dependent variable and scores on the Sims and social norm scales as the independent variables are summarized in Table 27. A summary of the regression analyses with intent to change diet specific to cancer as the dependent variable and scores on the Sims, cancer attitude and social norm scales as independent variables is given in Table 28. With the Sims scale, all significant results (denoted by a "+") are based on negative correlations (i.e. negative standardized betas were obtained). These results are discussed in the next section.

Table 27. Summary of effects on intent to change diet.

	Sims' Attitude	Social Norm
Internal/High HV		
- overall	-	-
- pre-test	-	-
- post-test	-	-
Internal/Low HV & Non-internal		
- overall	+	-
- pre-test	+	-
- post-test	-	-

- = no significant effect
+ = significant effect ($p<.05$).

Table 28. Summary of effects on intent to change dietary behavior related to cancer.

	Sims'	CA*	Social Norm
Internal/High HV			
- overall	-	+	-
- pre-test	-	+	-
- post-test	+	-	+
Internal/Low HV & Non-internal			
- overall	+	-	+
- pre-test	+	-	+
- post-test	-	+	-

* CA = Cancer Attitude
- = no significant effect
+ = significant effect ($p<.05$).

DISCUSSION

Introduction

In this chapter, the effect of demographic variables is considered first, followed by a look at the interactions of variables and support or rejection of the null hypotheses set forth previously. Strengths and limitations of the study are discussed at the end.

The primary question investigated by this research was whether the health locus of control and health value of viewers of the "Taking Control" program influenced their acquisition of knowledge, change in attitude and/or intentions to adopt a healthier diet after participating in the program. The answer to this question will provide useful information from which to make recommendations for future program development and to provide more careful targeting of health messages to specific groups within the general public.

Because the demographic variables were not significantly different between internals/non-internals and between groups 1 and 2, it is assumed that the worksite differences were randomly distributed between experimental groups and therefore considered to have a negligible effect on outcomes. In addition, the study

design controlled for worksite differences by dividing subjects at each worksite into groups 1 and 2.

Nutrition/Cancer Knowledge Test (NCKT) Scores in Pre- versus Post-test Groups

HYPOTHESIS 1a: There is no difference in nutrition knowledge scores between subjects who have seen the "Taking Control" program (group 1) and those who have not (group 2).

The consistently significant results of higher post- than pre-test scores on the NCKT indicates that a significant amount of the variation between scores on the NCKT can be attributed to program participation. Based on the results of the ANOVA, hypothesis 1a can be rejected.

Effect of Program and Internality on Attitude

HYPOTHESIS 1b. There are no differences in attitude between group 1 and group 2.

HYPOTHESIS 2b. There is no difference in attitude scores between the internal and non-internal subjects.

Due to the lack of significant differences in attitude for groups 1 and 2, hypothesis 1b cannot be rejected. Likewise the internal and non-internal subjects had no differences in attitude scores, and hypothesis 2b was not rejected.

Effect of Internality on NCKT Scores

HYPOTHESIS 2a: There is no difference between NCKT scores of the internal and non-internal subjects.

ANOVA was employed to test the second null hypothesis. The lack of significant differences in NCKT scores between internal and non-internal subjects suggests that internality was not a factor in knowledge acquisition

in this study. Therefore hypothesis 2a cannot be rejected. A possible explanation for the lack of an effect of internality on NCKT outcomes may be because the program influenced the internality of the subject. This is discussed in more detail in the Strengths and Limitations section below.

Effects of the Elements of the Fishbein Equation on Intention to Change Dietary Behavior

HYPOTHESIS 3a. In internal/high health value subjects, attitude does NOT account for more of the variation in intent to change dietary behavior than does social norm.

3b. In internal/low health value and non-internal subjects, more of the variation in intent to change dietary behavior is NOT explained by social norm than by attitude.

To test the third hypotheses, the analysis technique used by Saltzer (1978) was employed. The standardized beta weights obtained from multiple regression analysis were used as weights in the Fishbein equation. Using this method, data analysis suggests that when a cancer-specific attitude scale was used to assess intention to change dietary behavior to lower cancer risk, in internal/high health value subjects, attitude toward cancer was the dominant component of the variation in intention, when compared to social norm. In internal/low health value and non-internal subjects, social norm was the dominant component of the variation in intention to change dietary behavior to lower cancer risk. The finding that attitude was more important than social norm for internal subjects,

and that social norm was more important for non-internal supports the rejection of null hypotheses 3a and 3b.

The results from the general attitude and intention scales are more difficult to interpret. The analysis of the internal/high health value data are not significant and do not support rejection of hypothesis 3a. However, the results of the analysis of the internal/low health value and non-internals suggest that attitude accounts for more variation in intent to change dietary behavior than does social norm. This finding does not support rejection of hypotheses 3b, and even implies the opposite relationship. This may have been due to the high health value-internals' perception that their diets were already nutritionally sound, and therefore did not intend to change them, whereas internal subjects with low health value and non-internals may have felt their diets needed to be changed.

From the results of regression analyses, it appears that the cancer-specific attitude and intention questions formed a better "fit" to the linear model representing the Fishbein equation. This is similar to Saltzer's findings (1978). The elements of the Fishbein equation were not significant predictors of intention to lose weight when subjects were classified by the MHLC in her study. When she classified subjects according to a specific weight locus of control scale, she found the attitude and social norm elements to predict intention to lose weight.

A possible explanation of the results summarized in Tables 27 and 28 is that the internal subjects with high health value may have been concerned about cancer risk prior to participation in the "Taking Control" program. After viewing the program, they may have been less concerned about cancer because they felt that their diets already posed little risk. Conversely, the internal subjects with low health value and non-internals may not have been too concerned with cancer risk prior to the program, but after learning of the cancer risks, they may have become more concerned about their cancer risk due to diet.

Strengths and Limitations of the Study

Before accurate conclusions can be drawn from any survey method of research the question of instrument reliability and validity must be addressed.

Instrument Reliability and Validity

A strong point of this study was that appropriate measures were taken in the preparatory stages to insure that the NCKT and MHLC instruments were valid and reliable. A limitation of this study is that the scales used for assessing health value and attitudes were less clearly validated. While factor analysis had been done on the Boren scale, not all of the questions given on Boren's scale were included. This compromised the validity of the scale. However, those items from Boren's scale with the highest factor loading were the ones chosen for use in

this study. Limited validation and factor analysis had been previously performed with the personal-control-over-eating-habits scale by Sims. The health value survey adapted from Rokeach by Wallston was the least validated of the scales used in this study. Wallston (1978) has used it in conjunction with the MHLC, but little reliability and validity of the modified version has been determined. Because the value survey asks subjects to give the relative value of health in comparison to other values, a "low" score of health should be viewed as only relative since everyone in our society values health rather highly (Wallston, 1978).

Although the general dietary intention scale revealed few significant results, the cancer specific scales did provide a possible explanation of variance in intent to change dietary behavior related to cancer. The ability of these scales to provide significant results despite their low reliability suggests that the magnitude of the trends observed must be so great as to be detected despite the unrefined tools employed. The lack of detection of significant results with the general dietary scale may have been due to the inability of the low reliability scales to uncover the trends.

Internal Validity Issues

Cook and Campbell (1979) define internal validity as:

> the validity with which statements can be made about whether there is a causal relationship from one variable to another in the form in which the variables were manipulated or

measured. (Campbell and Cook, 1979, p.38)

Possible threats to internal validity described by Cook and Campbell which are relevant to the study include history (or previous experiences of the subject), maturation (how the subject might change during the time of the study), testing (effects of test taking on the subject), selection (how the subjects are chosen for participation in the study), and diffusion of treatments (when subjects in one group learn about the program from subjects in another group). Each of these will be discussed below.

History. Cook and Campbell (1979) describe history as a threat when an observed effect might be due to an event other than the treatment which takes place between the pre- and post-test. For example, when programs take place over extended periods of time, subjects might learn about topics covered by the program when they go home and read the evening paper. In this study, the effect of history was minimized by (1) scheduling the post-test immediately after the program, (2) having both groups in the same room at the same time for the same program (3) randomly allocating subjects to group 1 or 2 so that previous knowledge should be randomly distributed between the pre- and post-test groups.

A possible effect of history on the internal validity of this study concerns the attribution of performance on the NCKT to the "Taking Control" program. In comparing group 2's pre-test of NCKT to group 1's post-test of NCKT,

the difference between these two groups is used to explain the effects of the treatment (viewing the "Taking Control" program) on NCKT scores. However, group 1 had not only received the treatment, but had also taken the attitude questionnaire and health value survey. In a sense, the treatment and attitude are confounded in this study.

The design of this study did not allow for the determination of the unique contributions of the attitude scale or the treatment. However, the fact that there were no differences in attitude between group 1 and 2 (unable to reject hypothesis 1b) suggests that taking the attitude test had negligible effects on the NCKT scores.

Maturation. The threat of maturation is minimized by the shortness of the intervention in this study. The entire program including the pre- and post-tests took approximately one hour.

However, one concern with the study was the possibility that the HLC of the subjects may have been changed by the "Taking Control" program. The program strongly encourages people to understand that they do have some control over their health. To test whether the HLC of subjects was changed by participation in "Taking Control", the MHLC was given to a separate group of subjects who were members of a civic club. Half of these subjects took the MHLC prior to seeing "Taking Control" and the other half took the MHLC after the program. This

population was significantly different from the worksites in sex (mostly male) and age (older population), but the information on the effect of "Taking Control" on HLC was still of interest. Analysis of this data revealed no differences in internality on the MHLC or Cancer locus-of-control scales from pre- to post-test. Wallston and Wallston (1984) encourage researchers to view the health locus of control construct not as an unchanging personality variable, but more as a charactersistic of an individual at a given point in time.

Testing. The design of this study controlled for the effects of test-taking. Because each test was given only once, there was no chance of enhancement of performance due to increased familiarity with the test after multiple testing situations.

Selection. One of the limitations of this study is that subjects were self-selected into the program. "Taking Control" was offered to all employees at each site, however many factors could be involved in the subjects' self-selection into the program. For example, internal subjects may be more likely than non-internals to attend a program that emphasizes personal control over cancer risk. On the other hand, internals may feel like they already have control over their cancer risk and therefore are not in need of a such a program.

To examine the differences between self-selected participants in this study and non-participating employees, the MHLC and demographic information was

collected from employees who did not attend at three worksites (N=40). Chi-square analysis of these data showed that the distribution of internal scores was not significantly different between those subjects who participated and this sample of non-participants. There were no significant differences ($p>.05$) for any other demographic or background variables except occupation. This difference in occupation may have been due to the three worksites from which this comparative data was collected, because these subjects were all government employees.

Diffusion of Treatments. Because all subjects in each worksite viewed the program at the same time, diffusion of the information in the program was controlled.

External Validity Issues

Campbell and Cook (1979) describe external validity as:

> the approximate validity with which conclusions are drawn about the generalizability of a causal relationship to and across populations of persons, settings, and times. (Cook and Campbell, 1979, p.39).

Potential sources of threats to external validity relevant to this study include: a) the interaction of subject selection and treatment; b) interaction of treatment setting and treatment; and c) the interaction of subjects' history and treatment.

Interaction of Selection and Treatment. In many of the

studies in the health locus of control area college students have been selected as subjects. Because college students score slightly higher than healthy adults (Wallston, 1982) on the MHLC it is difficult to draw relevant conclusions from previous studies to the general public. In addition, college students are likely to have good health and to be well-educated, they may not value health as highly as older people. It is therefore difficult to draw relevant conclusions from these studies in comparison to the general public. This study differed from most in that the observed population was comprised of worksite wellness program participants. The results can be more easily generalized to adult populations pertinent to the ACS than can results from studies on college students.

Because the audience in this study is similar to ACS's usual target audience, the information on the "Taking Control" program should be useful to the ACS for evaluative purposes.

Another strength of this study is that the MHLC was combined with a measure of health value as Rotter (1975) recommends. Locus of control relates to expectancy of reinforcement, and Rotter's social learning theory equally emphasizes the situation in which the reinforcement occurs as well as the value of the reinforcement. It is for this reason that Rotter (1975) urges researchers to include a measure of the value of the reinforcement as well as a

situation-specific measure of locus of control. In this study, the MHLC scale specific to health issues was used rather than the generalized I-E locus of control scales. In addition, a scale was developed to measure the cancer-specific construct of locus of control. Rotter has recommended that specific measures of locus of control be developed for specific applications.

Interaction of History and Treatment. This threat to external validity is difficult to distinquish in this study. Because all of the different worksites participated in the program on different days, spanning a time period of several months, it was assumed that any causal effect on outcomes due to special days of the year or special conditions of the day of presentation were cancelled. In addition, the subjects were randomly distributed into the two groups at each worksite, which should also have served to control for any special conditions of a particular presentation day.

SUMMARY AND IMPLICATIONS

The results of this study suggest that the "Taking Control" program effectively conveys nutritional information to worksite wellness program participants. The locus of control of subjects did not influence the amount of knowledge gained from participation in "Taking Control".

Intent to change dietary behavior was significantly greater in internals with low health value and non-internals than in internal subjects with high health value in this study. As discussed previously, this may have been due to the high health value-internals' perception that their diets were already nutritionally sound, and therefore did not intend to change them, whereas internal subjects with low health value and non-internals may have felt their diets needed to be changed.

In the internal subjects with high health value, the scores on scales used to measure attitudes and social norms did not account for variation in intent to change behavior. With intent to change dietary behavior related to cancer, attitude toward cancer was important in the pre-attitude test sample; social norm and attitude toward personal-control-over-eating-habits (Sims' scale) were

significant components of variation in the post-test sample.

In the internal subjects with low health value and non-internal subjects, scores on the Sims' scale was a significant component of the variance in intent to change dietary behavior. In the pre-attitude test group, the same results were found. In the post-test sample, none of the scores on these scales were significant components of variance in intent to change dietary behavior.

Social norm and scores on the Sims' scale were significant components in intention to change dietary behavior relative to cancer in these subjects. In the pre-attitude test sample, social norm and the Sims' scale were the only significant components of the variation in intention to change behavior in internals with low health value and non-internals. In the post-test group of these subjects, cancer attitude was the significant component of variation in intent to change cancer behaviors.

A possible explanation of these results is that the internal subjects with high health value may have been concerned about cancer risk prior to participation in the "Taking Control" program. After viewing the program, they may have been less concerned about cancer because they felt that their diets already posed little risk. Conversely, the internal subjects with low health value and non-internals may not have been too concerned with cancer risk prior to the program, but after learning of

the cancer risks, they may have become more concerned about their cancer risk due to diet.

If the relationship between attitudes and social norm to health behavior intention is to be fully recognized, reliable scales need to be developed and validated for the measurement of these constructs. Future research also needs to study the relationship between behavior intention and overt behavior with respect to these variables.

The results of the NCKT suggest that the "Taking Control" video of the American Cancer Society provides an effective method of public education in a worksite setting. "Taking Control" is recommended as a prototype for future ACS programming.

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APPENDICES

APPENDIX A

DIETARY RECOMMENDATIONS TO AMERICANS ON DIET/NUTRITION/CANCER 1980 - 1985

APPENDIX A

Dietary Recommendations to Americans on Diet/Nutrition/Cancer--1980-1985 (Pariza, 1986).

Source of dietary guidance	Type of guidance	Limit/Eat less total fat (% kcal)	Eat more complex carbohydrates	Eat more fiber	Limit sodium	Alcohol in moderation only	Maintain body weight; exercise	Additional Recommendations
American Cancer Society 1984	cancer	yes	Eat more fruits & vegs. rich in vitamins A, C; cabbage-type vegs.	yes	NR[1]	yes	yes, avoid obesity	Avoid high dosage supplements. Moderation in salt-pickled/ cured, smoked & nutrite-cured foods.
National Cancer Institute 1984	cancer	yes	Include fresh vegs., fruits, whole grain cereals	yes	Nk	yes	yes, stay in trim	Eat a variety of foods. Eat more vegs., fruits rich in vitamins A, C.
American Institute for Cancer Research 1982	cancer guidelines	30%	Eat more fruits, vegetables, whole grain cereals	yes	NR	yes	NR	Moderation in salt-cured, smoked or charcoal broiled foods.
NAS-DNC[2] 1982	cancer	30%	Eat daily fruits, vegetables, whole grain cereals	NR	NR	yes	NR	Avoid high dosage supplements. Minimize salt-cured/pickled & smoked foods.
NAS-FNB[3] 1980	healthful diets	NR	NR	NR	Ye 3-8 g a day	NR	Yes/eat less: fats, oils, sugars, alcohol	Select a nutritionally adequate diet. Eat a variety of foods.
American Council on Science & Health 1985	diet/ cancer	NR	NR	NR	NR	NR	yes	Select an adequate diet. Eat in moderation.
American Broadcastg. Co. – 20/20 TV Program, 7/19/85	diet/ cancer	NR	NR	NR	NR	NR	NR	Insufficient basis for dietary recommendations to public to reduce cancer risk.
USDA-DHHS[4] 1985 Rev. Dietary Guidelines	general	yes	More wh. grains, starches, fruits, vegetables, legumes	yes	yes	yes	yes	Eat a variety of foods. No specific recommendations for reducing cancer risk.

1. No recommendation
2. Natl Acad Sciences, Committee on Diet, Nutrition, and Cancer, Assembly of Life Sciences, Natl Research Council,
3. Natl Acad Sciences, Natl Research Council, Food and Nutrition Bd, Div Biological Sciences
4. U.S. Dept Agriculture — U.S. Dept Health and Human Services

APPENDIX B

CONSENT FORM

APPENDIX B

Department of Food Science and Human Nutrition
MICHIGAN STATE UNIVERSITY
East Lansing, Michigan 48824

Informed Consent

The purpose of this research project is to find out: (1) Can the "Taking Control" program developed by the American Cancer Society effectively teach people about reducing risk of cancer? (2) Does a person's ideas about whether they can control their health influence what they learn about cancer risk?

People who agree to take part in this project will learn about nutrition and cancer risk. They will:

(1) Answer a set of questions about their feelings about health just after this meeting today.

(2) Attend a one- to two- hour program next week which will include slides, a talk and time for questions.

(3) Fill out two (2) short sets of questions - one just before the slide show and one after the question period.

Your participation in this project is completely voluntary and will not affect the services you obtain from the American Cancer Society or your position at work. This research program cannot give you the promise of avoiding cancer. This program involves no risk.

I,_____, agree to take part in this project to test the "Taking Control" program. I understand that participating does not promise me the possibility of avoiding cancer. I was allowed to ask questions about the program and the two sets of questions I will answer. I have been told that I may stop participating at any time without penalty.

I understand that the study results will not in any way affect me as an individual. The data from individuals will be treated with strict confidence and my anonymity will be preserved. At the end of the study, I may ask for a copy of the summarized results if I want to.

_____	_____
Investigator Signature	Participant Signature
_____	_____
Date	Date

8/87/SRA

APPENDIX C

FINAL VERSION NCKT

APPENDIX C

FINAL VERSION NCKT

QUESTIONNAIRE OF NUTRITION KNOWLEDGE

DIRECTIONS:

Choose the one answer which best completes the question. Then, with a No. 2 pencil, blacken the circle on your answer-sheet which corresponds to your answer. PLEASE DO NOT USE ink, ballpoint, or felt-tip pens.

IT IS IMPORTANT TO GIVE ONE ANSWER TO EACH QUESTION.

THANK YOU FOR YOUR HELP IN OUR STUDY!

1. Which one of the following statements is true ?

   a. It has NOT been proven that cigarette smoking is the main cause of lung cancer.
   b. For American women, lung cancer has overtaken breast cancer as the number one cause of cancer death.
   c. Ninety percent of all cancer is smoking related.
   d. In the United States, the rate of cigarette smoking in adults has been steadily rising.
   e. Compared to pregnant women who don't smoke, pregnant women who smoke are more likely to have babies who will grow up to get cancer.

2. One advantage to eating foods like broccoli and sweet potatoes is that they are:

   a. a concentrated source of calories for energy.
   b. high in beta carotene, a form of vitamin A.
   c. able to protect you from skin cancer.
   d. able to lower your risk of leukemia.
   e. cruciferous (cabbage-family) vegetables.

3. Which one of the following foods is a poor source of fiber?

   a. fish
   b. tomatoes
   c. potatoes
   d. beans
   e. oatmeal

4. Which one of the following is a cabbage-family (cruciferous) vegetable?

   a. spinach
   b. parsley
   c. cauliflower
   d. lettuce
   e. green pepper

5. Which one of the following foods is LOW in beta carotene?

   a. apricots
   b. broccoli
   c. peaches
   d. squash
   e. oranges

6. Of the following foods, which one is the best source of both vitamins A and C?

   a. orange
   b. apricot
   c. broccoli
   d. carrot
   e. cauliflower

7. Eating vegetables from the cabbage (cruciferous) family is important because eating these vegetables may:

   a. reduce the risk of cancer of the colon and stomach.
   b. reduce the risk of breast cancer.
   c. increase the amount of iron absorbed from the diet.
   d. be the best source of herbicide and pesticide free vegetables.
   e. control the amount of toxins one's body produces.

8. Eating foods which are high in fiber is important because dietary fiber:

   a. may decrease your risk of getting cancer of the colon.
   b. may decrease your risk of getting cancer of the lungs and larynx.
   c. is one of the highest quality, naturally potent and balanced food components available today.
   d. is an essential nutrient.
   e. contains live enzymes necessary to trigger bodily functions which protect you from cancer.

9. Which one of the following foods is a poor source of vitamin C?

   a. oranges
   b. tomatoes
   c. broccoli
   d. green peppers
   e. apples

10. An increased risk of cancer of the breast and colon is linked to:

    a. being overweight.
    b. high dietary cholesterol levels.
    c. being "out of control" of yourself.
    d. low triglyceride levels in the blood.
    e. over-consumption of sugar.

11. Of the possible cancer risk factors that can be controlled by an individual, the most harmful one is:

    a. excessive sun exposure.
    b. eating too much fat.
    c. smoking tobacco.
    d. eating nitrite-cured foods.
    e. all risk factors are equal.

12. Which one of the following statements is true?

    a. A high intake of fat has been linked with increased risk of lung cancer.
    b. A high intake of fat has been linked with increased risk of colon cancer.
    c. Americans get about 20 percent of their calories from fat, whereas a healthy diet would include a maximum of no more than 10 percent fat.
    d. Being underweight increases your risk of getting cancer.
    e. Eating more saturated fats than unsaturated fats increases your risk of getting cancer.

13. Which one of the following statements is true?

    a. The sun's rays are most damaging in the late afternoon.
    b. The only way to lower your risk of getting skin cancer is to stay out of the sun.
    c. People who tan easily do not get skin cancer.
    d. A sunscreen with an SPF of 8 is best for protection from the sun's harmful rays.
    e. Some exposure to sunlight is necessary for good health.

14. Which one of the following would most likely decrease your risk of getting cancers of the esophagus, larynx and lung ?

    a. Jog three miles every day.
    b. Eat plenty of whole-grain, high-fiber foods.
    c. Eat plenty of foods containing beta carotene.
    d. Avoid over-exposure to the sun.
    e. Abstain from alcohol.

15. The American Cancer Society recommends that one restrict consumption of smoked, salt-cured, and nitrite-cured foods (such as bacon, ham and hotdogs) because they are

    a. responsible for most of the fat in the American diet.
    b. used as preservatives at an alarmingly high rate in the United States.
    c. associated with an increased risk of lung cancer.
    d. associated with an increased risk of stomach and esophageal cancer.
    e. high in salt.

16. Which one of the following statements is true for alcohol?

    a. To avoid getting cancer of the liver, alcohol must be removed from the diet.
    b. Drinking alcohol and smoking cigarettes is worse when one does both than either one alone.
    c. Moderate drinking of alcohol lowers your risk of getting cancer of the liver and pancreas.
    d. Drinking alcohol is the single most preventable cause of cancer in the United States today.
    e. Alcohol is linked to more than 30% of cancer in Americans.

17. Which one of the following risk factors has been associated with an increased risk of cancers of the uterus, gall bladder and colon?

    a. Not eating enough foods high in beta carotene.
    b. Consumption of alcohol.
    c. Eating to many foods high in nitrates.
    d. Over-exposure to the sun.
    e. Being obese.

APPENDIX D

FACILITATOR'S GUIDE OF THE AMERICAN CANCER SOCIETY TAKING CONTROL PROGRAM

APPENDIX D

Facilitator's Guide of the American Cancer Society Taking Control Program

PURPOSE

The purpose of the American Cancer Society's *TAKING CONTROL* program is to provide an introduction to a healthy, enjoyable lifestyle that may reduce one's risk of developing cancer. The program gives an overview of five "protective factors" against cancer and five preventable "risk factors" as well.

A cancer risk factor is anything that makes it more likely one may develop cancer. A protective factor, on the other hand, is anything known to lessen the likelihood of developing the disease.

The *TAKING CONTROL* program helps people think about health in terms of their overall lifestyles. *TAKING CONTROL* is positive, optimistic and action-oriented.

CONTENT

TAKING CONTROL goes on record with the good news that scientists now believe most cancers may be related to lifestyle and environment. The *TAKING CONTROL* program aims also to debunk the myth that "everything causes cancer."

TAKING CONTROL specifically addresses five protective factors:

- Cabbage-family vegetables (cruciferous)
- Fiber
- Vitamin A
- Vitamin C
- Weight control

and five risk factors:

- High-fat diets
- Salt-cured, smoked and nitrite-cured foods
- Tobacco
- Alcohol
- Excessive sun exposure

The program also covers other cancer-related factors, including excessive exposure to X rays, estrogens and known carcinogens in the workplace.

The concept of risk-factor reduction takes into consideration the following:

- Not all cancer risk factors are equal in importance.
- Some risk factors make each other worse when combined.
- There are certain risk factors you cannot control, such as family history, prior history of cancer, etc.

Program participants are encouraged to take control by adding to their everyday lifestyles the protective habits, and eliminating the other habits that increase their risk of developing certain forms of cancer. They are reminded of the importance of being more aware of their bodies and having regular cancer-related checkups for early detection of the disease.

The *TAKING CONTROL* coordinated package of materials includes:

- Film
- Videotape (½- and ¾-inch)
- Slide-tape presentation
- Flip chart
- Self-help booklet
- Poster
- Take-home folder
- Administrator's guide

From: Taking Control - Public Education Program on Cancer Prevention-Risk Reduction, Facilitator's Guide. American Cancer Society, Inc. NY, 1985.

APPENDIX E

CONTENT REVIEW - ACS VOLUNTEERS

APPENDIX E

CONTENT REVIEW - ACS VOLUNTEERS

August 12, 1987

Dear American Cancer Society Program Presenter,

Your name was given to me as someone who is familiar with the "Taking Control" program of the American Cancer Society (ACS). I am doing an evaluation of this program for my thesis research at Michigan State University. As part of this evaluation, I have developed a questionnaire to give to people who have seen "Taking Control". As a part of the testing of this questionnaire, I need to get input from presenters like you who have experience with the program. Could you please take a few moments to look over the questionnaire? I've included a list of things to think about while you're reviewing the questions.

Thank you for your help. Your assistance in the test development process will improve the evaluation of the "Taking Control" program. With the information that we obtain from this evaluation we hope to continue to improve the programs provided by ACS.

Sincerely,

Sally R. Anger, ACS program presenter
and MSU graduate assistant

PLEASE RETURN QUESTIONNAIRES TO:

JANET FABIANO
C/O THE AMERICAN CANCER SOCIETY
INGHAM COUNTY UNIT
SUITE 104
416 FRANDOR
EAST LANSING, MI 48912

OBJECTIVES

Please match each question on the questionnaire with the objective you feel best matches it from the list below.

1. To test the recognition of food sources of the following protective factors:

   a. cabbage-family vegetables
   b. fiber
   c. vitamin A
   d. vitamin C

2. To test the understanding of the reasons why the following protective factors are important:

   a. cabbage-family vegetables
   b. fiber
   c. vitamin A
   d. vitamin C
   e. weight control

3. To test the recognition of the following risk factors:

   a. high-fat diets
   b. salt-cured, smoked and nitrite-cured foods
   c. tobacco
   d. alcohol
   e. excessive sun exposure

4. To test understanding of the reasons why the following risk factors are important:

   a. high-fat diets
   b. salt-cured, smoked and nitrite-cured foods
   c. tobacco
   d. alcohol
   e. excessive sun exposure

5. To test the awareness of the 7 warning signs of cancer (from the Cancer Related Checkups brochure used in conjunction with the "Taking Control" program).

GUIDELINES FOR TESTING THE QUESTIONNAIRE

(1) Do the questions adequately test the concepts presented in the "Taking Control" program?

(2) Does the test cover information actually contained in the program? _____If so, do you agree with the emphasis placed on the concepts presented? (Please explain).

(3) Does the test cover all of the concepts you feel are important?_____If no, which concept(s) do you feel was not adequately represented?

Were any concepts over-tested?

(4) Please match each question to the objective you think it is trying to measure. (See attached list of objectives). Do you think these objectives correctly represent the "Taking Control" program?

Please feel free to give any additional comments:

APPENDIX F

CHECKLIST FOR MULTIPLE CHOICE ITEMS

APPENDIX F

CHECKLIST FOR MULTIPLE CHOICE ITEMS

Questions Concerning Multiple Choice Items

- Is a multiple choice format inappropriate to the type of information desired?
- Is the language of the item complex or unclear, perhaps containing unfamiliar vocabulary?
- Do items have more than one correct answer?
- Do items concern several central issues at once rather than a single one?
- Does the stem contain negative statements which have not been emphasized?
- Do responses or choices come at the beginning or the middle of the stem rather than at the end where they belong?
- Are response alternatives grammatically inconsistent with *the stem*?
- Are response alternatives inconsistent with *one another*?
- Are some response alternatives implausible or easily eliminated by students who lack the information tested by the item?
- Are the response alternatives arranged in an illogical or confusing order?
- Are the response alternatives interdependent or logically overlapping?
- Do the response alternatives include extraneous clues due to grammatical inconsistencies or length of response? Are the correct answers, for instance, generally longer than the incorrect ones?
- Is the *none of these* option used inappropriately?
- Across items, is the correct answer among alternatives likely to be found in the same position much of the time? For instance, is the correct alternative nearly always in the middle position?

From: How to Measure Achievement, by Lynn Lyons Morris and Carol Taylor Fitz-Gibbon, Sage Publications, Beverly Hills/London 1978, p. 154.

APPENDIX G

CONTENT REVIEW - MSU NUTRITION FACULTY

APPENDIX G

CONTENT REVIEW - MSU NUTRITION FACULTY

MICHIGAN STATE UNIVERSITY

DEPARTMENT OF FOOD SCIENCE AND HUMAN NUTRITION EAST LANSING • MICHIGAN • 48824-1224

November 20, 1987

MEMORANDUM

TO: Nutrition Faculty

FROM: Sally Anger

RE: Nutrition/Cancer Test Validation

As most of you know, I am still in the stages of validating a nutrition/cancer risk reduction test that I have developed to measure the change in knowledge of subjects in my thesis study. I have enclosed a copy of the most recent draft, along with a brochure from the "Taking Control" program which describes most of the concepts put forth in the program. The recommendations listed in the enclosed brochure will be provided to subjects during a slide/tape presentation and question/answer session.

I am asking you to give me feedback as to whether you feel the questions will adequately assess knowledge of nutrition's role in cancer. In other words, are the questions valid as pertains to this program? Does the test actually test these concepts?

Any comments or suggestions you may have would be greatly appreciated. Thank you for your help.

Draft of NCKT accompanying Faculty Letter (prior to first pilot test) and accompanying letter to the ACS volunteers.

QUESTIONNAIRE OF KNOWLEDGE OF NUTRITION/CANCER RISK REDUCTION

DIRECTIONS:

Choose the one answer which best completes the question. Then, with a No. 2 pencil, blacken the circle on your answer-sheet which corresponds to your answer. DO NOT USE ink, ballpoint, or felt-tip pens.

IT IS IMPORTANT THAT YOU ANSWER ALL QUESTIONS.

THANK YOU FOR YOUR HELP IN OUR STUDY!

1. Which of the following is thought to INCREASE one's chance of getting cancer?

   a. vitamin A
   b. salty diets
   c. diets high in refined sugar
* d. high-fat diets
   e. low-fat diets

2. What is one advantage to eating foods like carrots and sweet potatoes?

   a. they are low in dietary fiber and therefore protect you from cancer.
* b. they are high in beta carotene.
   c. they help you to tan and therefore protect you from skin cancer.
   d. they are cruciferous vegetables.
   e. they are good sources of energy.

3. Which of the following foods are good sources of fiber?

* a. vegetables.
   b. fish and poultry.
   c. lowfat dairy products.
   d. red meats.
   e. vegetable oils.

4. Which of the following vegetables belong to the cabbage-family (cruciferous) vegetables?

   a. spinach
   b. parsley
* c. cauliflower
   d. lettuce
   e. all of the above.

5. Which of the following foods (is/are) high in beta carotene?

a. apricots
b. broccoli
c. peaches
d. squash
* e. All of the above.

6. Of the following foods, which is a the best source of both vitamin A and vitamin C?

a. orange
b. apricot
* c. broccoli
d. carrot
e. cauliflower

7. Eating vegetables from the cabbage (cruciferous) family is important because eating these vegetables may:

* a. reduce the risk of cancer.
b. contain substances which help you "burn off" fat.
c. increase the amount of iron absorbed from the diet.
d. increase the amount of protein available from the diet.
e. all of the above.

8. Whole grain breads, whole grain flours and cereals, dried peas, beans and most fruits and vegetables are all good sources of:

* a. fiber
b. beta carotene
c. ascorbic acid
d. vitamin A
e. protein

9. Which of the following foods (is/are) a good source of vitamin C ?

a. oranges
b. tomatoes
c. broccoli
d. green peppers
* e. all of the above

10. An increased risk of cancer of the breast and colon is linked to:

* a. being overweight.
b. a hectic lifestyle.
c. being "out of control" of yourself.
d. emotional stress.
e. high blood pressure.

11. Of the possible cancer risk factors that can be controlled by an individual, the most harmful one is:

a. excessive sun exposure.
b. eating too much fat.
* c. smoking tobacco.
d. eating nitrite-cured foods.
e. all risk factors are equal.

12. Which of the following statements is true?

a. a low-fat diet increases your chances of getting cancer.
* b. the most common sources of fat in the American diet are meat, dairy products, pastry and chocolate.
c. Americans get about 30 percent of their calories from fat, whereas a healthy diet would include a maximum of no more than 10 percent fat.
d. being underweight increases your risk of getting cancer.

13. Which of the following statements is true?

a. Excess sun exposure rarely causes skin cancer.
b. Indoor sunlamps and tanning parlors are much less harmful to the skin than the sun.
* c. If you see changes in a mole or a sore that does not heal, it may be a sign of skin cancer.
d. A sunscreen with an SPF of 8 is best for protection from the sun's harmful rays.
e. People who tan easily are at no risk of skin cancer.

14. It is recommended that you eat LESS smoked, salt-cured, and nitrite-cured foods because

a. their high sodium content is a risk factor for most cancers.
b. Americans consume too much of them.
c. they are foods which are usually eaten by overweight people.
* d. they are foods which are associated with an increased risk of cancer.
e. they lower your resistance to infection.

15. Approximately 30% of all cancer is related to:

a. low fiber intake.
b. bumps and bruises
* c. cigarette smoking.
d. obesity.
e. excessive nitrate consumption.

16. Compared to pregnant women who don't smoke, pregnant women who smoke are:

a. more able to keep their weight down to a reasonable level.
* b. more prone to miscarriages and their babies are more likely to have birth defects.
c. more likely to die at time of delivery than are nonsmokers.
d. greatly protected by using cigarettes with filter tips.
e. more likely to have twins.

17. If you are a smoker, a major health priority should be to:

* a. stop smoking.
b. increase your consumption of foods high in vitamins A and C to help protect against the effects of smoking on your lungs.
c. look for signs of cancer to detect it early.
d. strictly control other cancer risk factors.
e. control your weight.

18. Which of the following statements is true for alcohol?

a. To avoid getting cancer of the liver, alcohol must be removed from the diet.
* b. Drinking alcohol and smoking cigarettes is worse when combined than either is by itself.
c. Moderate drinking lowers your risk of getting cancer of the liver and pancreas.
d. Drinking alot of water after a night of heavy drinking will greatly decrease your risk of getting liver cancer.
e. None of the above statements are true.

APPENDIX H

SCORING OFFICE RESULTS - FIRST PILOT TEST

APPENDIX H

SCORING OFFICE RESULTS - FIRST PILOT TEST

ITEM RESPONSE SUMMARY DATA

DISTRIBUTION OF ITEM DIFFICULTY INDICES

NUMBER OF ITEMS	PERCENTAGE
90 - 100	4
81 - 90	3
71 - 80	2
61 - 70	2
51 - 60	3
41 - 50	1
31 - 40	0
21 - 30	2
11 - 20	0
00 - 10	0

90 - 100	24
81 - 90	18
71 - 80	12
61 - 70	12
51 - 60	18
41 - 50	6
31 - 40	0
21 - 30	12
11 - 20	0
00 - 10	0

DISTRIBUTION OF DISCRIMINATION INDICES

NUMBER OF ITEMS	PERCENTAGE
90 - 100	0
81 - 90	0
71 - 80	6
61 - 70	6
51 - 60	0
41 - 50	6
31 - 40	35
21 - 30	18
11 - 20	24
00 - 10	6
LESS THAN 00	0

MEAN ITEM DIFFICULTY 70

MEAN ITEM DISCRIMINATION 31

KUDER RICHARDSON RELIABILITY #20 .4105

STANDARD ERROR OF MEASUREMENT 1.6045

STANDARD FORM — 17 ITEMS — PERCENTAGES — UPPER 27% — MIDDLE 46% — LOWER 27% — 33 STUDENTS

STUDENTS PER GROUP: 9 / 17 / 8

ITEM	KEY	1 U	1 M	1 L	2 U	2 M	2 L	3 U	3 M	3 L	4 U	4 M	4 L	5 U	5 M	5 L	OMIT U	OMIT M	OMIT L	ERROR U	ERROR M	ERROR L	DIFF	DISC
1	4	0	0	13	0	6	25	0	18	0	100	76	63	0	0	0	0	0	0	0	0	0	79	37
2	2	0	0	0	100	88	63	0	0	0	0	6	25	0	6	13	0	0	0	0	0	0	85	37
3	1	100	82	88	0	6	0	0	12	13	0	0	0	0	0	0	0	0	0	0	0	0	88	12
4	3	25	0	25	0	0	13	63	76	38	13	12	25	0	0	0	0	12	0	0	0	0	64	25
5	5	0	6	25	25	35	25	0	0	0	0	12	38	75	47	13	0	0	0	0	0	0	45	62
6	3	25	41	63	13	12	13	50	24	13	0	18	13	13	6	0	0	0	0	0	0	0	27	37
7	1	100	94	50	0	0	13	0	6	13	0	0	0	0	0	25	0	0	0	0	0	0	85	50
8	1	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0
9	5	0	0	0	0	24	25	38	12	0	25	41	50	38	24	25	0	0	0	0	0	0	27	13
10	1	75	53	38	13	47	50	13	0	13	0	0	0	0	0	0	0	0	0	0	0	0	55	37
11	3	0	0	13	0	0	0	100	71	25	0	0	0	0	29	63	0	0	0	0	0	0	67	75
12	2	0	0	0	88	41	63	13	53	13	0	6	25	0	0	0	0	0	0	0	0	0	58	25
13	3	0	0	0	0	6	0	100	94	88	0	0	13	0	0	0	0	0	0	0	0	0	94	12
14	4	0	0	0	0	12	38	0	6	0	100	76	63	0	6	0	0	0	0	0	0	0	79	37
15	2	0	24	13	88	35	50	13	0	0	0	0	0	0	41	38	0	0	0	0	0	0	52	38
16	2	0	0	0	100	100	75	0	0	0	0	0	0	0	0	25	0	0	0	0	0	0	94	25
17	1	100	100	88	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	97	12

Draft of NCKT used for first pilot study.

QUESTIONNAIRE OF NUTRITION KNOWLEDGE

DIRECTIONS:
Choose the one answer which best completes the question. Then, with a No. 2 pencil, blacken the circle on your answer-sheet which corresponds to your answer. DO NOT USE ink, ballpoint, or felt-tip pens.
IT IS IMPORTANT THAT YOU ANSWER ALL QUESTIONS.

THANK YOU FOR YOUR HELP IN OUR STUDY!

1. Which of the following is thought to INCREASE one's chance of getting cancer?

   a. vitamin A
   b. salty diets
   c. diets high in refined sugar
   d. high-fat diets
   e. low-fat diets

2. One advantage to eating foods like carrots and sweet potatoes is that they are:

   a. low in dietary fiber.
   b. high in beta carotene.
   c. able to protect you from skin cancer.
   d. cruciferous vegetables.
   e. good sources of energy.

3. Which of the following foods is a good source of fiber?

   a. vegetables.
   b. fish and poultry.
   c. low-fat dairy products.
   d. red meats.
   e. vegetable oils.

4. Which of the following are cabbage-family (cruciferous) vegetables?

   a. spinach
   b. parsley
   c. cauliflower
   d. lettuce
   e. green peppers

5. Which of the following foods is LOW in beta carotene?

   a. apricots
   b. broccoli
   c. peaches
   d. squash
   e. oranges

6. Of the following foods, which is the best source of both vitamins A and C?

   a. orange
   b. apricot
   c. broccoli
   d. carrot
   e. cauliflower

7. Eating vegetables from the cabbage (cruciferous) family is important because eating these vegetables may:

   a. reduce the risk of cancer.
   b. help one to "burn off" fat due to compounds they contain.
   c. increase the amount of iron absorbed from the diet.
   d. increase the amount of protein available from the diet.
   e. control the amount of toxins one's body produces.

8. Whole grain breads, whole grain flours and cereals, dried peas, beans and most fruits and vegetables are all good sources of:

   a. fiber
   b. beta carotene
   c. ascorbic acid
   d. vitamin A
   e. protein

9. Which of the following foods is a poor source of vitamin C ?

   a. oranges
   b. tomatoes
   c. broccoli
   d. green peppers
   e. apples

10. An increased risk of cancer of the breast and colon is linked to:

    a. being overweight.
    b. high dietary cholesterol levels.
    c. being "out of control" of yourself.
    d. low iron levels in the blood.
    e. high blood pressure.

11. Of the possible cancer risk factors that can be controlled by an individual, the most harmful one is:

    a. excessive sun exposure.
    b. eating too much fat.
    c. smoking tobacco.
    d. eating nitrite-cured foods.
    e. all risk factors are equal.

12. Which of the following statements is true?

    a. a low-fat diet increases your chances of getting cancer.
    b. the most common sources of fat in the American diet are meat, dairy products, pastry and chocolate.
    c. Americans get about 30 percent of their calories from fat, whereas a healthy diet would include a maximum of no more than 10 percent fat.
    d. being underweight increases your risk of getting cancer.

13. Which of the following statements is true?

    a. Excess sun exposure rarely causes skin cancer.
    b. Indoor sunlamps and tanning parlors are much less harmful to the skin than the sun.
    c. If you see changes in a mole or a sore that does not heal, it may be a sign of skin cancer.
    d. A sunscreen with an SPF of 8 is best for protection from the sun's harmful rays.
    e. People who tan easily are at little risk of skin cancer.

14. The American Cancer Society recommendeds that one restrict consumption of smoked, salt-cured, and nitrite-cured foods (such as bacon, ham and hotdogs) because they are

    a. low in fiber.
    b. responsible for most of the fat in the American diet.
    c. usually eaten by unhealthy people.
    d. associated with an increased risk of cancer.
    e. believed to lower one's resistance to infection.

15. Which of the following statements is true for alcohol?

a. To avoid getting cancer of the liver, alcohol must be removed from the diet.
b. Drinking alcohol and smoking cigarettes is worse when one does both than either one alone.
c. Moderate drinking lowers your risk of getting cancer of the liver and pancreas.
d. Drinking alot of water after a night of heavy drinking will greatly decrease your risk of getting liver cancer.
e. Alcohol is linked to more than 30% of cancer in Americans.

16. Compared to pregnant women who don't smoke, pregnant women who smoke are:

a. better able to keep their weight down to a reasonable level.
b. more prone to miscarriages and their babies are more likely to have birth defects.
c. more likely to die at time of delivery.
d. greatly protected by using cigarettes with filter tips.
e. more likely to have babies who will grow up to get cancer.

17. If you are a smoker, a major health priority should be to:

a. stop smoking.
b. increase your consumption of foods high in vitamins A and C to help protect against the effects of smoking on your lungs.
c. look for signs of cancer to detect it early.
d. strictly control dietary cancer risk factors.
e. control your weight.

Please STOP here. Do NOT continue with the second half of the questionnaire until instructed; after today's presentation.

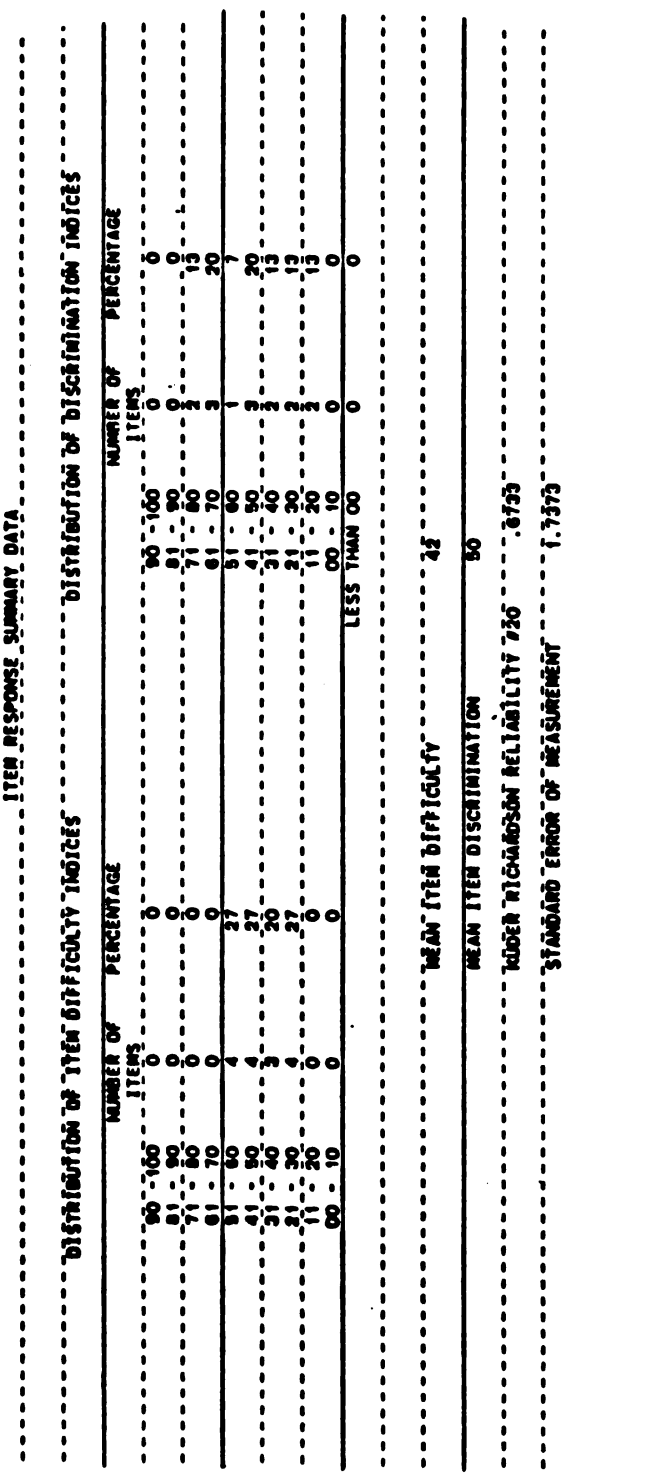
It is very important that you NOT look at the next section.
Thank you for your cooperation!

APPENDIX I

SCORING OFFICE RESULTS - SECOND PILOT TEST

APPENDIX I

SCORING OFFICE RESULTS - SECOND PILOT TEST



STANDARD FORM — 17 ITEMS — PERCENTAGES — UPPER 27% — MIDDLE 46% — LOWER 27% — 40 STUDENTS

STUDENTS PER GROUP: UPPER 10 — MIDDLE 20 — LOWER 10

ITEM	KEY	1 U	1 M	1 L	2 U	2 M	2 L	3 U	3 M	3 L	4 U	4 M	4 L	5 U	5 M	5 L	OMIT U	OMIT M	OMIT L	ERROR U	ERROR M	ERROR L	DIFF	DISC
1	2	10	5	20	90	50	50	0	25	10	0	10	0	0	5	20	0	5	0	0	0	0	40	40
2	2	0	0	20	90	80	50	0	0	0	0	0	0	10	20	30	0	0	0	0	0	0	25	40
3	1	100	70	70	0	20	0	0	5	10	0	0	20	0	5	0	0	0	0	0	0	0	23	30
4	3	10	10	0	0	0	0	70	85	50	20	5	40	0	0	10	0	0	0	0	0	0	28	20
5	5	0	0	10	0	20	40	0	15	10	0	15	10	100	50	30	0	0	0	0	0	0	43	70
6	3	0	40	50	20	5	10	80	45	30	0	0	10	0	10	0	0	0	0	0	0	0	50	50
7	OMIT	90	95	80	0	0	0	0	5	20	0	0	0	10	0	0	0	0	0	0	0	0	UNDEFINED	
8	OMIT	80	100	80	0	0	0	0	0	0	10	0	10	10	0	10	0	0	0	0	0	0	UNDEFINED	
9	5	10	0	0	0	5	20	10	10	0	20	40	50	60	45	30	0	0	0	0	0	0	55	30
10	1	90	45	10	0	35	60	0	5	20	0	15	0	10	0	0	0	0	10	0	0	0	53	80
11	3	0	0	0	0	0	20	90	70	30	0	0	0	10	30	50	0	0	0	0	0	0	35	60
12	2	0	10	0	80	45	10	0	25	40	0	0	0	20	20	40	0	0	10	0	0	0	55	70
13	5	0	15	30	20	20	10	0	0	0	10	5	40	70	60	20	0	0	0	0	0	0	48	50
14	2	0	10	10	10	5	40	90	55	40	0	0	0	30	30	0	0	0	10	0	0	0	48	20
15	4	0	5	0	0	10	10	0	0	0	100	70	20	0	15	50	0	0	20	0	0	0	35	80
16	2	0	10	10	100	65	50	0	5	10	0	0	0	0	20	20	0	0	10	0	0	0	30	50
17	5	10	5	60	0	20	10	20	30	10	0	0	0	70	45	0	0	0	20	0	0	0	60	70

Draft of NCKT (used in pilot test 2).

QUESTIONNAIRE OF NUTRITION KNOWLEDGE

DIRECTIONS:

Choose the one answer which best completes the question. Then, with a No. 2 pencil, blacken the circle on your answer-sheet which corresponds to your answer. PLEASE DO NOT USE ink, ballpoint, or felt-tip pens.

IT IS IMPORTANT TO GIVE ONE ANSWER TO EACH QUESTION.

THANK YOU FOR YOUR HELP IN OUR STUDY!

1. Which one of the following statements is true ?

(U8) *

a. It has NOT been proven that cigarette smoking is the main cause of lung cancer.
b. For American women, lung cancer has overtaken breast cancer as the number one cause of cancer death.
c. Ninety percent of all cancer is smoking related.
d. In the United States, the rate of cigarette smoking in adults has been steadily rising.
e. Compared to pregnant women who don't smoke, pregnant women who smoke are more likely to have babies who will grow up to get cancer.

2. One advantage to eating foods like broccoli and sweet potatoes is that they are:

(U3)

a. a concentrated source of calories for energy.
b. high in beta carotene, a form of vitamin A.
c. able to protect you from skin cancer.
d. able to lower your risk of leukemia.
e. cruciferous (cabbage-family) vegetables.

3. Which one of the following foods is a poor source of fiber?

(R2)

a. fish
b. tomatoes
c. potatoes
d. beans
e. oatmeal

4. Which one of the following is a cabbage-family (cruciferous) vegetable?

(R1)

a. spinach
b. parsley
c. cauliflower
d. lettuce
e. green pepper

* Table of Specifications Code (please see Table 3 for explanation).

5. Which one of the following foods is LOW in beta carotene?

R3

a. apricots
b. broccoli
c. peaches
d. squash
e. oranges

6. Of the following foods, which one is the best source of both vitamins A and C?

R3
R4

a. orange
b. apricot
c. broccoli
d. carrot
e. cauliflower

7. Eating vegetables from the cabbage (cruciferous) family is important because eating these vegetables may:

U1

a. reduce the risk of cancer of the colon and stomach.
b. reduce the risk of breast cancer.
c. increase the amount of iron absorbed from the diet.
d. be the best source of herbicide and pesticide free vegetables.
e. control the amount of toxins one's body produces.

8. Eating foods which are high in fiber is important because dietary fiber:

U2

a. may decrease your risk of getting cancer of the colon.
b. may decrease your risk of getting cancer of the lungs and larynx.
c. is one of the highest quality, naturally potent and balanced food components available today.
d. is an essential nutrient.
e. contains live enzymes necessary to trigger bodily functions which protect you from cancer.

9. Which one of the following foods is a poor source of vitamin C?

R4

a. oranges
b. tomatoes
c. broccoli
d. green peppers
e. apples

10. An increased risk of cancer of the breast and colon is linked to:

(U5)

a. being overweight.
b. high dietary cholesterol levels.
c. being "out of control" of yourself.
d. low triglyceride levels in the blood.
e. over-consumption of sugar.

11. Of the possible cancer risk factors that can be controlled by an individual, the most harmful one is:

(U8)

a. excessive sun exposure.
b. eating too much fat.
c. smoking tobacco.
d. eating nitrite-cured foods.
e. all risk factors are equal.

12. Which one of the following statements is true?

(U6)

a. A high intake of fat has been linked with increased risk of lung cancer.
b. A high intake of fat has been linked with increased risk of colon cancer.
c. Americans get about 20 percent of their calories from fat, whereas a healthy diet would include a maximum of no more than 10 percent fat.
d. Being underweight increases your risk of getting cancer.
e. Eating more saturated fats than unsaturated fats increases your risk of getting cancer.

13. Which one of the following statements is true?

(U10)

a. The sun's rays are most damaging in the late afternoon.
b. The only way to lower your risk of getting skin cancer is to stay out of the sun.
c. People who tan easily do not get skin cancer.
d. A sunscreen with an SPF of 8 is best for protection from the sun's harmful rays.
e. Some exposure to sunlight is necessary for good health.

14. Which one of the following would most likely decrease your risk of getting cancers of the esophagus, larynx and lung ?

(U3)

a. Jog three miles every day.
b. Eat plenty of whole-grain, high-fiber foods.
c. Eat plenty of foods containing beta carotene.
d. Avoid over-exposure to the sun.
e. Abstain from alcohol.

15. The American Cancer Society recommends that one restrict consumption of smoked, salt-cured, and nitrite-cured foods (such as bacon, ham and hotdogs) because they are

    a. responsible for most of the fat in the American diet.
    b. used as preservatives at an alarmingly high rate in the United States.
(U7) c. associated with an increased risk of lung cancer.
    d. associated with an increased risk of stomach and esophageal cancer.
    e. high in salt.

16. Which one of the following statements is true for alcohol?

    a. To avoid getting cancer of the liver, alcohol must be removed from the diet.
    b. Drinking alcohol and smoking cigarettes is worse when one does both than either one alone.
(U9) c. Moderate drinking of alcohol lowers your risk of getting cancer of the liver and pancreas.
    d. Drinking alcohol is the single most preventable cause of cancer in the United States today.
    e. Alcohol is linked to more than 30% of cancer in Americans.

17. Which one of the following risk factors has been associated with an increased risk of cancers of the uterus, gall bladder and colon?

    a. Not eating enough foods high in beta carotene.
    b. Consumption of alcohol.
(U5) c. Eating to many foods high in nitrates.
    d. Over-exposure to the sun.
    e. Being obese.

Please STOP here. Do NOT continue with the second half of the questionnaire until instructed; after today's presentation.

It is very important that you NOT look at the next section.
Thank you for your cooperation!

APPENDIX J

QUESTIONNAIRE ON HEALTH BELIEFS

APPENDIX J

QUESTIONNAIRE ON HEALTH BELIEFS

(Includes Wallston's HLC, Cancer Locus of Control Test, and Demographic Questions).

The Taking Control Program

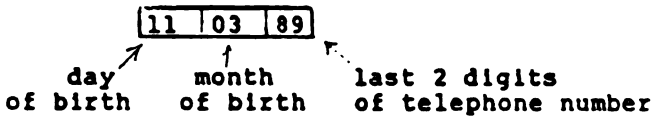
of The American Cancer Society
and Michigan State University
Program Presenter: Sally Anger

Code Number: | | | |

This questionnaire contains a number of questions that ask you about your beliefs about health and cancer issues. Please follow the instructions carefully. It is important that you answer all of the questions as honestly and as accurately as you can.

Some of the questions ask you for personal information; it is important that you remember that this questionnaire is completely confidential. Please do not write your name anywhere on the questionnaire. However it would be helpful to us if all of the information we receive from you is marked with one code number. This code number will be known only to you. Please fill in the code number section in the upper right hand corner of the page by designing a personal code using the 2 digit number which represents the day of your birth, the 2 digit number which represents the month of your birth, and the last 2 digits of your telephone number.

For example: If your birthday is March 11, and your telephone number ends in 89, then your code number is:



On the day of the American Cancer Society program, everyone will be given a personal packet according to their code number.

Thank you for participating!

Code Number ___/___/___

QUESTIONNAIRE ON HEALTH BELIEFS *

Directions: Please write your CODE NUMBER on each sheet. Please do not write your name on this questionnaire.

This is a questionnaire designed to determine the way in which different people view certain important health related issues. Each item is a belief statement with which you may agree or disagree. Beside each statement is a scale which ranges from strongly disagree (1) to strongly agree (6). For each item we would like you to circle the number that represents the extent to which you disagree or agree with the statement. The more strongly you agree with a statement, then the higher will be the number you circle. The more strongly you disagree with a statement, then the lower will be the number you circle. Please make sure that you answer every item and that you circle only one number per item. This is a measure of your personal beliefs; obviously, there are no right or wrong answers.

Please answer these items carefully, but do not spend too much time on any one item. As much as you can, try to respond to each item independently. When making your choice, do not be influenced by your previous choices. It is important that you respond according to your actual beliefs and not according to how you feel you should believe or how you think we want you to believe.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
1. If I get sick, it is my own behavior which determines how soon I get well again.	1	2	3	4	5	6
2. No matter what I do, if I am going to get sick, I will get sick.	1	2	3	4	5	6
3. Having regular contact with my physician is the best way for me to avoid illness.	1	2	3	4	5	6
4. Most things that affect my health happen to me by accident.	1	2	3	4	5	6
5. Whenever I don't feel well, I should consult a medically trained professional.	1	2	3	4	5	6
6. I am in control of my health.	1	2	3	4	5	6

* Questions 1 - 18 from Wallston & Wallston
Questions 19 - 24 = Cancer Locus of Control
Questions 25 - 33 = Demographic Questions

Code Number ___/___/___

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
7. My family has a lot to do with my becoming sick or staying healthy.	1	2	3	4	5	6
8. When I get sick, I am to blame.	1	2	3	4	5	6
9. Luck plays a big part in determining how soon I will recover from an illness.	1	2	3	4	5	6
10. Health professionals control my health.	1	2	3	4	5	6
11. My good health is largely a matter of good fortune.	1	2	3	4	5	6
12. The main thing which affects my health is what I myself do.	1	2	3	4	5	6
13. If I take care of myself, I can avoid illness.	1	2	3	4	5	6
14. When I recover from an illness, it's usually because other people (for example, doctors, nurses, family, friends) have been taking good care of me.	1	2	3	4	5	6
15. No matter what I do, I'm likely to get sick.	1	2	3	4	5	6
16. If it's meant to be, I will stay healthy.	1	2	3	4	5	6
17. If I take the right actions, I can stay healthy.	1	2	3	4	5	6
18. Regarding my health, I can only do what my doctor tells me to do.	1	2	3	4	5	6
19. Whether or not I get cancer is entirely up to me.	1	2	3	4	5	6
20. Avoiding cancer is mostly a matter of good fortune.	1	2	3	4	5	6
21. No matter what I intend to do, if I get cancer or not, it is just going to happen.	1	2	3	4	5	6
22. If I eat properly, get enough exercise, rest and avoid cancer-causing substances, I can prevent myself from getting cancer.	1	2	3	4	5	6
23. If I get cancer or not is a matter of fate.	1	2	3	4	5	6
24. I can avoid cancer by taking good care of myself.	1	2	3	4	5	6

Code Number___/___/___

25. What is your age?
    a. 20's
    b. 30's
    c. 40's
    d. 50's
    e. 60's

26. What is your sex?

    a. female
    b. male

27. What is your level of education?

    a. 6th grade or lower
    b. high school diploma or equivalent
    c. bachelor's degree from college
    d. graduate degree
    e. other, please specify_____

28. Do you have cancer?

    a. yes
    b. no
    c. I don't know

29. Does someone in your extended family have cancer?

    a. yes
    b. no
    c. I don't know

30. Have you ever seen a program done by the American Cancer Society before?

    a. yes (if yes, which program?_____)
    b. no

31. Have you attempted to change your diet in any way in the last two years?

    a. yes
    b. no

32. If your answer to the previous question was "yes", how have you attempted to change your diet?

    a. weight reduction
    b. lower cholesterol
    c. both a and b
    d. other, please specify:_____
    e. my answer to the previous question was "no".

33. What is your job title?_____

APPENDIX K

VALUES, ATTITUDES AND INTENTION TO CHANGE BEHAVIOR SURVEY

APPENDIX K

VALUES, ATTITUDES AND INTENTION TO CHANGE BEHAVIOR SURVEY.

VALUE SURVEY

Below you will find a list of ten values listed in alphabetical order. We would like for you to arrange them in order of their importance to YOU, as guiding principles in your life.

Study the list carefully and pick out the one value which is the most important to you. Write the number "1" in the space to the left of the important value. Then pick out the value which is second most important to you. Write the number "2" in the space to the left. Then continue in the same manner for the remaining values (3 through 10) until you have included all ranks from 1 to 10. EACH VALUE SHOULD HAVE A DIFFERENT RANK. Only ONE value is ranked "1", only ONE value is ranked "2", only ONE value is ranked "3", and so on.

We realize that some people find it difficult to distinguish the importance of some of these values. Do the best you can, but PLEASE RANK ALL 10 OF THEM. The end result should truly show how YOU really feel.

_____ **A COMFORTABLE LIFE (a prosperous life)**

_____ **AN EXCITING LIFE (a stimulating, active life)**

_____ **FREEDOM (independence, free choice)**

_____ **HAPPINESS (contentedness)**

_____ **HEALTH (physical and mental well-being)**

_____ **INNER HARMONY (freedom from inner conflict)**

_____ **PLEASURE (an enjoyable leisurely life)**

_____ **SELF-RESPECT (self-esteem)**

_____ **A SENSE OF ACCOMPLISHMENT (lasting contribution)**

_____ **SOCIAL RECOGNITION (respect, admiration)**

Code Number __/__/__

This questionnaire contains a number of questions that ask you about your attitudes and beliefs about nutrition. Please answer all of the questions as honestly and as accurately as you can.

DIRECTIONS: Each statement below is a belief statement with which you may agree or disagree. Beside each statement is a scale which ranges from strongly disagree (1) to strongly agree (6). For each item please darken the circle on your answer sheet which corresponds to the number that represents the extent to which you disagree or agree with the statement. The more strongly you agree with a statement, then the higher will be the number you darken on your answer sheet UP TO SIX. The more strongly you disagree with a statement, then the lower will be the number that you darken on your answer sheet.

Please make sure that you answer every item and that you choose ONLY ONE number per statement. This is a measure of your personal beliefs, so obviously there are no right or wrong answers. It is important that you respond according to your actual beliefs and not according to how you feel you should believe or how you think we want you to believe.

		Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree	
1.	Nutrition is not so important to me as long as I am eating plenty of food.	1	2	3	4	5	6	R & S* (-)
2.	I intend to start eating a more healthy diet in the near future.	1	2	3	4	5	6	Intent
3.	My doctor thinks it would be good for me to change my diet.	1	2	3	4	5	6	SN
4.	It is very likely that I will start eating a diet aimed at lowering my risk of getting cancer.	1	2	3	4	5	6	CBI
5.	Trying new and different foods appeals to me.	1	2	3	4	5	6	Boren

* R & S = from Rosander & Sims' Personal Control Over Eating
Intent = Intent to change eating habits
SN = Social Norm question
CBI = Cancer Behavior Intention
Boren = from Boren's Attitude Toward Nutrition
(-) = question reversed for scoring

Code Number__/__/__

		Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree	
6.	Other people's opinions about my diet are important to me.	1	2	3	4	5	6	SN
7.	I would be willing to try an unfamiliar food at least once.	1	2	3	4	5	6	Boren
8.	Changing my diet would help lower my risk of getting cancer.	1	2	3	4	5	6	CA*
9.	I eat whatever I want and never think about it later.	1	2	3	4	5	6	R & S (-)
10.	For better health, I would be willing to try a food I hadn't eaten before or several foods over a period of time.	1	2	3	4	5	6	Boren
11.	In my spouse, fiance, boyfriend or girlfriend's opinion, my changing my diet in the near future would be bad.	1	2	3	4	5	6	SN (-)
12.	It's too late for me to change my diet to lower my risk of cancer.	1	2	3	4	5	6	CA (-)
13.	I like to make my own decisions about what I eat, but I often eat what everybody else is eating.	1	2	3	4	5	6	R & S (-)
14.	My parents would like it if I changed my eating habits.	1	2	3	4	5	6	SN
15.	I've been eating the same way for years and, at this point, it would be impossible to change.	1	2	3	4	5	6	R & S (-)

* CA = Cancer Attitude

Code Number __/__/__

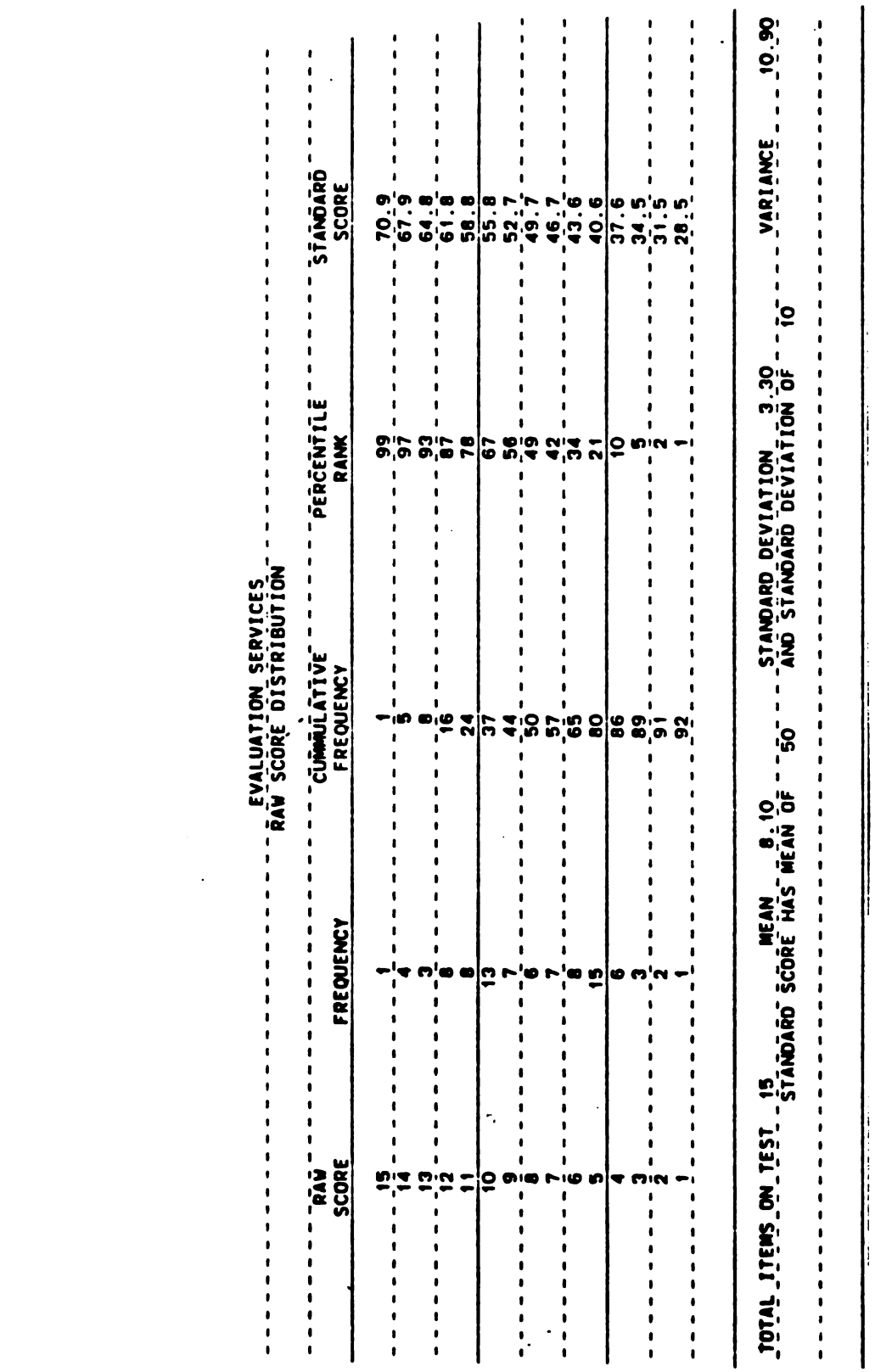
		Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree	
16.	I would be willing to spend time in making nutritious foods available for myself and/or family instead of eating convenience foods of low nutritional quality.	1	2	3	4	5	6	Boren
17.	My close friends would think it was bad if I adopted a diet to lessen my risk of cancer.	1	2	3	4	5	6	SN (-)
18.	Unfamiliar foods often interest me.	1	2	3	4	5	6	Boren

APPENDIX L

SCORING OFFICE RESULTS - FINAL VERSION NCKT

APPENDIX L

SCORING OFFICE RESULTS - FINAL VERSION NCKT



EVALUATION SERVICES
RAW SCORE DISTRIBUTION

RAW SCORE	FREQUENCY	CUMULATIVE FREQUENCY	PERCENTILE RANK	STANDARD SCORE
15	1	1	99	70.9
14	4	5	97	67.9
13	3	8	93	64.8
12	8	16	87	61.8
11	8	24	78	58.8
10	13	37	67	55.8
9	7	44	56	52.7
8	6	50	49	49.7
7	7	57	42	46.7
6	8	65	34	43.6
5	15	80	21	40.6
4	6	86	10	37.6
3	3	89	5	34.5
2	2	91	2	31.5
1	1	92	1	28.5

TOTAL ITEMS ON TEST 15 MEAN 8.10 STANDARD DEVIATION 3.30 VARIANCE 10.90
STANDARD SCORE HAS MEAN OF 50 AND STANDARD DEVIATION OF 10

ITEM RESPONSE SUMMARY DATA

DISTRIBUTION OF ITEM DIFFICULTY INDICES			DISTRIBUTION OF DISCRIMINATION INDICES		
	NUMBER OF ITEMS	PERCENTAGE		NUMBER OF ITEMS	PERCENTAGE
90 -100	0	0	90 -100	0	0
81 - 90	0	0	81 - 90	0	0
71 - 80	0	0	71 - 80	3	20
61 - 70	2	13	61 - 70	1	7
51 - 60	4	27	51 - 60	4	27
41 - 50	5	33	41 - 50	4	27
31 - 40	1	7	31 - 40	2	13
21 - 30	3	20	21 - 30	1	7
11 - 20	0	0	11 - 20	0	0
00 - 10	0	0	00 - 10	0	0
			LESS THAN 00	0	0

MEAN ITEM DIFFICULTY	46
MEAN ITEM DISCRIMINATION	54
KUDER RICHARDSON RELIABILITY #20	.7281
STANDARD ERROR OF MEASUREMENT	1.7206