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College Students' Nutrition Labeling Knowledge And Behavior

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COLLEGE STUDENTS' NUTRITION LABELING KNOWLEDGE AND BEHAVIOR

ROGERS

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COLLEGE STUDENTS' NUTRITION LABELING

KNOWLEDGE AND BEHAVIOR
(TITLE)

BY

Jennifer Lee Rogers

THESIS

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ABSTRACT

Results of prior studies indicate that consumer education is necessary so that consumers may more effectively use the Nutrition Facts label. For this study, a questionnaire was developed with the objectives of assessing the current labeling knowledge and behavior of college students and employing the Stages of Change Model to categorize students' into specific educational target groups based on their different levels of label usage. Components of the 90-item questionnaire were based on a list of principles and competencies that when understood, were thought to increase the usefulness of the nutrition label. A series of questions were used to identify the college students' stage of change in regards to label use. A stages of change nutrition labeling algorithm was used to classify the students into the various stages of change including precontemplation, contemplation, decision, action and maintenance. A 28-item knowledge test (Kuder-Richardson 20=.63) was included within the 90-item questionnaire to assess current nutrition labeling knowledge. Three-hundred forty mid-west university students (69% female) completed the knowledge test, 319 answered all questions that were part of the algorithm. Results suggest that college students are using nutrition labeling information, as 68% of the students were classified in the action or maintenance stages in regards to label use. A chi square test of independence of effects revealed that males and females were classified into different stages of change from one another not by chance ($x^{2(4)}=25.68$, $p<.0001$). Fewer females than males were classified in the precontemplation and contemplation stages (20.7% vs 44.2%, $p<.001$). The mean knowledge score was

18.2±3.7 (65% correct). College students do seem to be confused about some components of the Nutrition Facts label such as serving sizes, Percent Daily Value and Daily Value and percent of calories from fat. Females had higher knowledge scores than males (18.6 vs. 17.6, <.05). There was a positive but weak correlation between the stage of change and knowledge test score (r=.24, p<.0001). There was a stronger correlation between college students' perception of knowledge of label regulations and format (r=.48, p<.0001) and understanding of label information (r=.35, p<.0001) and stage of change. These results suggest that the Stages of Change Model/Staging algorithm is an effective means of classifying students into various educational target groups with regards to Nutrition Facts label use. Determining the current use and knowledge of the nutrition label as well as the development of stage matched nutrition labeling education programs should increase the effectiveness of the labeling education effort.

DEDICATION

To my family, who are always there to encourage and support my personal and academic achievements; and have shown me through example the value of education and hard work.

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PREFACE

This thesis has been written in an alternative format approved by the Eastern Illinois University Graduate School and the School of Home Economics.

Part One and Part Two are written as separate manuscripts to be submitted for publication in specific professional journals. The format for each of these manuscripts is consistent with the author guidelines of that journal.

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INTRODUCTION

The nutrition labeling knowledge and behavior of college students as consumers is not well documented in the literature. Consumers have been exposed to the new nutrition label only for a short time. Therefore, research is needed to assess the current knowledge and behaviors toward the new food label in order to develop and implement nutrition labeling education campaigns (Derby & Fein, 1994). Provisions for this sort of education have been made available by the National Labeling and Education Act (NLEA) of 1990 (Liu & Guthrie, 1992). In a review of nutrition labeling research, Derby & Fein (1994) reported three main purposes of such research, (1) to describe the current situation and trends, which is a necessary starting point for consumer education, (2) to clarify the important variables associated with healthful behaviors, and (3) to identify the differences among target groups, which is necessary to tailor messages to these various groups. Current research indicates that young adult consumers, age 18-24, are paying more attention to nutrition labeling than in the past (Food Marketing Institute [FMI], 1994). Therefore, assessing the nutrition label usage and behaviors of college students will help in targeting this group with specific nutrition labeling education.

Prochaska, Norcross & DiClemente (1994) have demonstrated with a dozen different problem behaviors that change involves progress through a series of stages. The Stages of Change Model (Prochaska & DiClemente, 1982) applies to a wide range of problematic behaviors. In a representative sample across more than fifteen

high-risk behaviors, Prochaska et al. (1994) have reported that fewer than 20 percent of a problem population are prepared for action at any given time, yet more than 90 percent of behavior change programs are designed with this 20 percent in mind. They suggest that programs targeted specifically to an individual or groups' stage in the change process would be more effective. The use of this model has been documented (Glanz & Eriksen, 1993; Greene, Rossi, Reed, Willey & Prochaska, 1994; LaForge, Greene & Prochaska, 1994; O'Brien, Woolcott, & Finlay, 1994) to be of significant value in formulating specific nutrition education programs.

The purpose of this study was to examine college students' current nutrition labeling knowledge and behavior in order to make suggestions for future nutrition labeling education efforts. Prochaska and DiClementes' (1982) Stages of Change Model was utilized to classify students nutrition labeling behaviors. Information gained from this research will help in the development of nutrition labeling education targeted at the college population. It is very important to target individuals in this age group with such education, as they are forming nutrition behavior that may continue throughout life.

The specific behavior and knowledge objectives of this study were as follows:

Behavior

1. examine how frequently college students use the nutrition label in making food purchase decisions.
2. utilize the Stages of Change Model (Prochaska & DiClemente, 1982) in order to categorize college students into specific educational

target groups based on their different levels of nutrition label usage.

Knowledge

1. examine college students' understanding of various label principles and competencies (Appendix A) that increase the usefulness of the nutrition label in making healthful food choices.
2. compare the knowledge level of college students who are in different stages of change.

The researchers hypothesized that college students who are in the action and maintenance stages of change, (as determined by the scaling/scoring algorithm, Appendix D), have greater labeling knowledge (as determined by the knowledge test, items 47-74, Appendix B and C), than do students who are in the precontemplation, contemplation, and decision stages. The null hypothesis then is that there is no difference in labeling knowledge test scores among students in these different stages.

REVIEW OF LITERATURE

Literature relevant to this research includes descriptive reports on labeling reform and the new "Nutrition Facts" label, studies dealing with consumer knowledge and understanding of the nutrition label, studies dealing with consumer nutrition label behaviors including consumers' perception of the usefulness of the nutrition label, and studies that have employed the Stages of Change Model (Prochaska & DiClemente, 1982). Although much has been written about the potential role of the new nutrition label in improving the nutrition knowledge and dietary behaviors of consumers (Cronin, Achterberg, & Sims, 1993; Kurtzweil, 1994; Zarkin, Dean, Mauskopf, & Williams, 1993), little research has been published to date that addresses consumers' knowledge of label facts or their use of label information to select healthful diets. Much of the research that has been conducted was conducted by government, food industry related trade organizations, or private industry, and full reports of several of these studies are not readily available. For some of these surveys, this literature review draws on reviews by Derby & Fein (1994); Geiger, Wyse, Parent, and Hansen (1991); and other secondary sources.

Labeling Reform and the New "Nutrition Facts" Label

The National Labeling and Education Act of 1990 brought nutrition issues to the top of the Food and Drug Administration's (FDA) priority list. It has been stated that the new federal food labeling rules are the most drastic changes since the Federal Food, Drug and Cosmetic Act was passed in 1938 (Scarlett, 1992). The new FDA

food labeling regulations went into effect May 8, 1994 (Kurtzweil, 1994). These regulations insure that there is overall consistency in new label information (Cronin, Achterberg & Sims, 1993). Key changes in the new Nutrition Facts label include expanded nutrition information such as the Daily Values (DV) which are the new standards for nutrients on the nutrition label, a changed and reordered required nutrient list emphasizing prevention of chronic disease, voluntary nutrients, more uniformity in serving sizes which means serving sizes based on amounts people typically consume expressed in household and metric measures, bold graphics emphasizing important information, calories from fat reflecting the current concern with fat, a DV footnote providing a listing for 2,000 and 2,500 calorie diets, a caloric conversion footnote which is optional, definitions of nutrient content claims and allowable health claims and conditions of use (Geiger, Dichter, Fishman, 1994).

Earl & Wellman (1990) stated that a sound, coordinated nutrition labeling system would improve the food and nutrition literacy of Americans. Derby & Fein (1994) reported that the new food labels will make it easier for concerned consumers to identify significant sources of nutrients. Although Scarlett (1992) reported that the new label will lessen confusion from nonstandardized descriptors and assurance that health claims have achieved a minimum level of scientific acceptance, Derby & Fein (1994) stated that consumers must first have an awareness of the links between dietary behavior and chronic diseases and that benefits of the new food label will only be realized with education (Derby & Fein, 1994). Liu & Guthrie (1992) believe that consumers must first understand the concept of a balanced diet before utilizing the

information on the nutrition label effectively. It is important to note that large segments of the population receive information about nutrition in the context of selecting and purchasing food (Glanz, Hewitt & Rudd, 1992). Bender & Derby (1992) stated that as many different groups will use the label, specially tailored nutrition labeling education will be most effective in helping a variety of consumers use the new label.

Consumer Knowledge of the Nutrition Label Information

Geiger et al. (1991) reviewed surveys conducted by the FDA, the food industry, and health and consumer organizations that monitored consumers' knowledge of the old nutrition label. They reported that while consumers thought the food label was one important source of information, it was not well understood by all consumers.

During the new nutrition label development process, several studies were conducted to determine consumers' preference for and ability to effectively use various nutrition label formats. Geiger, Wyse, Parent & Hansen (1991) examined the effects of three levels of nutrition information format (traditional, bar graph, and bar graph nutrient density), three levels of nutrition information load (some, more, and most), and four levels of nutrition information expression (traditional, absolute numbers, percentages, and both absolute numbers and percentages) on consumers' perceptions of label usefulness in purchase decisions. Information from prior labeling research and focus group interviews were used to develop the twelve nutrition label designs. Labels were consumer tested using computer interactive interviews with 252 consumers in a shopping mall.

Results indicate that consumers preferred the nutrition label that displayed nutrient values using a bar graph format, offered the most information load and expressed nutrient values using both absolute numbers and percentages. They also preferred nutrition information arranged in an order that grouped nutrients that should be consumed in adequate amounts at the top, calories in the middle, and nutrients that should be consumed in lesser amounts on the bottom.

Label formats that consumers prefer, however, may not be the ones that are most effective. Food and Drug Administration (FDA) researchers used an experimental design to compare performance and preference for different label formats in two studies. In the first study (Levy, Fein, Schucker, 1992), researchers presented five label formats to 1460 consumers in eight shopping malls in different areas of the country. Participants were asked to choose the format they considered most and least helpful for selecting nutritious foods and planning meals and to perform product comparison tasks. The results indicated that labels with the least information were easiest for consumers to use, but consumers preferred the labels that had more information. The younger, better educated consumers performed better in areas of accuracy, task time, and judgment.

In the second study (Foulke, 1992 and Derby & Fein, 1994), researchers presented seven formats to 1200 consumers from the same eight malls who were asked to show that they could use labels to perceive differences between products, maintain diets, use the Daily Values, rate front panel statements as true or false, and assess a product's healthfulness. Researchers found that consumers were able to identify

nutrient differences between two products with 78% accuracy when using the new label format. Forty-five percent were more often correct than incorrect in identifying nutrients to seek or avoid after eating three servings of the food presented to them. When asked to calculate servings needed to meet Daily Value, the majority of these consumers could not correctly estimate the servings. However, consumers who were given a brief introduction about Daily Value were more accurate in this task than were those who did not receive this information. In this study subjects also were asked to identify nutrients to consume more or less of after eating a particular food. The results showed that the size of the number affected the response when only metric information was given. For example, sodium at 115mg, a nutritionally small amount, was listed as a nutrient to eat less of because the number appeared much bigger than other nutrients listed on the label.

Byrd-Bredbenner (1994) also evaluated potential nutrition label formats in order to identify characteristics that were acceptable to consumers and that would facilitate consumer use, understanding, interpretation, and application of the information provided on the label. Three different label formats (adjectival ratings, absolute measures, and percentage standards) alone and in all possible combinations were presented to 309 food shoppers in a supermarket. Participants were interviewed to determine (1) ability to locate information on the label, manipulate the information, and make comparisons, (2) ability to interpret label information accurately and make appropriate dietary choices, (3) perceived task difficulty, (4) ability to read calorie information correctly, and (5) ability to interpret fat information correctly. Participants

were also asked to identify the one label format they thought was most and least helpful for selecting nutritious foods and planning meals, explain why they found the label format most or least helpful, and identify anything they thought was confusing about the label. Results indicate that the "ideal" label data presentation method, i.e. one that combines the characteristics identified as most useful and helpful, differed very little from the Nutrition Facts label currently in use.

In the 1994 Food Marketing Institute Shopping for Health survey, 38% of the 1000 consumers surveyed indicated they were aware of the new label while 53% indicated they were not. Young consumers and those who indicated they regularly read food labels, live with someone on a medically restricted diet, or have made major dietary changes because of health concerns were most likely to know about the new label. These data indicate that shoppers who are most likely to understand the nutrition label are those who already have an excellent understanding of diet and nutrition. Derby & Fein (1994) also have stated that while awareness of diet-disease relationships may motivate consumers to pay attention to label information, a working knowledge about the nutrients of concern is required for them to correctly use the information to guide food choices. These researchers reviewed literature addressing such knowledge and reported that consumers' level of knowledge of the recommended number and size of servings of fruits and vegetables to eat each day is low and that consumers' level of knowledge of dietary fats and cholesterol is increasing, but that misunderstandings in this area may also be increasing. They also report consumer misunderstandings about the fat and fiber content of many foods, and that most

consumers do not know the recommended intake levels for specific nutrients. Derby & Fein (1994) predict however, that the new food label will enable most people to make healthful food choices without the level of nutrition understanding which was necessary in the past.

A few studies have examined consumers' knowledge of label terminology. Mueller (1991) reported that FDA survey results indicate that 80% of consumers have a functional understanding of terms like cholesterol, calcium, preservatives and sodium, while 70% understand the nutrition related meaning of protein, calories, fiber and grams. Meier & Staub (1993) surveyed 192 university students to investigate the perceived meanings of twelve nutrient content claim terms set by the FDA for the new label. Results indicated that FDA definitions and students' perceptions of the meanings of these terms were consistent.

Prior to implementation of the new label, Fullmer, Geiger, and Parent (1991) investigated the knowledge of breakfast cereal label health claims of 241 supermarket shoppers. Results indicated that consumers' understanding of these label health claims was relatively low but there was greatest understanding of diet-disease relationship messages among consumers with highest educational levels. The researchers urged public policy makers to ensure that health messages on food labels are responsible and accurate. Also prior to new label implementation, Anderson & Calingaert (1994) found that consumers thought that products with nutrition labels were healthier than those without labels, so it is important that the new label be uniformly displayed on almost all products.

While limited research is available on knowledge and understanding of the new label, the views of many nutrition professionals have been reported in the literature. Cronin et al. (1993) believe that consumers must have knowledge of both household and metric measures in order to effectively use the nutrition label. They suggest that some consumers are distrustful of numbers that they do not understand and that information that involves mathematical manipulation such as percentage, is difficult for some individuals to understand. According to these authors, one common incorrect assumption made by consumers is that the %DV for fat represents the percent of calories from fat. Cronin et al. (1993) also stated that if consumers are going to use information it must be important to them and since most Americans care about their health, knowledge of diet/disease relationships is a key factor in getting consumers to use the label information. Fullmer et al. (1991) reported that consumers want more information about nutrients that may be negatively associated with disease, such as saturated fat and are not as concerned with positive nutrients such as fiber.

McNeal (1992) summarized professionals' general conclusions of consumer research at a 1992 National Exchange for Food Labeling Education Conference. Professionals indicated that misconceptions are common, especially those concerning fat and cholesterol. Many people lack the math skills needed to perform label information computations thus consumers are most in need of techniques for using the label and manipulating the information. The greatest challenges of labeling education campaigns may be reaching unmotivated and disinterested populations because other consumers have many more ways of accessing information.

Consumer Nutrition Label Behavior and Use

The field of consumer behavior is a body of knowledge which concerns theory and empirical research regarding purchasing behavior, the effect of the purchasing environment on consumers' selection and decision processes prior to and at the point of sale (Glanz & Mullis, 1988). Forecasting the strength of consumer response to changes in nutrition and health claims on labeling is a very difficult undertaking (Caswell, 1992). Derby & Fein reported (1994) that consumer use of food labels is a motivated behavior. Since many consumers who have low interest in nutrition labeling state that they use the labels, educators will need to consider motivation as much as label reading skills. Key factors in determining consumer response to new nutrition label information have been reported to be the consumers' desire to read the new labels, to understand new label information and to change their purchase behavior (Zarkin & Anderson, 1992). These researchers stated that the literature in this area is limited mainly to the effect of shelf-labeling in groceries and of health claims displayed on products, rather than the effect of changes in food purchases when only the nutrition panel is changed. Similarly, Glanz et al. (1992) stated that estimates of the actual quality, usability and impact of nutrient label information are controversial. More studies need to be done to assess consumer propensity to use the nutrition label.

Caswell & Padberg (1992) stated that food labels have existence values separate from their direct use value in that consumers are comforted knowing that the presentation of food products is being monitored. Schucker (1985) reported that food labeling does appear to facilitate information transfer when the public has reached a

certain threshold. In a study to investigate consumer stimulus characteristics that influence the use of nutrition information, Moorman (1990) found that consumers need to be targeted with nutrition information only if they have a high or moderate level of education and if the consumers are uneducated then nutrition information along with education becomes necessary. More generally stated, both education and information may be necessary for consumers when using an unfamiliar stimulus.

Zarkin, Dean, Mauskopf & Williams (1993) designed a study to focus on changes in consumers' dietary intakes of total fat, saturated fat and cholesterol in relation to changes in food consumption resulting from changes in the nutrition label. The results indicated that consumers are very different in their awareness of diet-health relationships, knowledge of nutrition information, propensity to read nutrition labels and willingness to substitute foods within and between groups in response to the new nutrition label information. Results showed that small changes in nutrient intakes however, may generate many benefits.

A number of recent studies have examined consumers' use of nutrition labeling. Mueller (1991) reported that Americans see food packages as their most useful source for nutrition information. In a Roper survey, over half (52%) of those surveyed indicated they read food packages for nutrition facts, 70% felt that labels are the best source of nutrition information, and 58% indicated they remember what they read on labels. A National Food Processors Association survey indicated that 79% of consumers always or sometimes use the nutrition label information before buying a product for the first time.

In the 1994 FMI/Shopping for Health survey, 56% of shoppers said they almost always read the nutrition labels on foods they are buying for the first time and 24% say they sometimes read this information. Twenty-four percent of shoppers said that nutrition labels are very clear and understandable while 53% said that they are only somewhat clear and understandable. Survey results indicate that two-thirds of those who have seen the new food label say it is more clear and understandable than the old label. The researchers found that 45% of those surveyed had changed a food buying decision in the last month because of reading the nutrition label. The survey results indicated that the ingredient list seems to be of less interest than the nutrition label as slightly fewer than one half said they almost always read the list. However, Derby & Fein (1994) reported that 1990 FDA Health and Diet survey data indicated that consumers were more likely to perceive the ingredient list and vitamin and mineral content on the label as "always accurate" rather than nutrient content claims. These data also indicate that those consumers who had a high interest in the label were less likely than average to believe in the accuracy of health and nutrient content claims. According to Derby & Fein (1994) , 1992 Roper poll data indicate that a majority of consumers believe serving sizes on labels are inaccurate.

Derby and Fein (1994) also report that a substantial proportion of American adults use food labels, at least some of the time. In the 1990 FDA Health and Diet Survey, 34% of consumers said they always used the nutrition label for first time purchases and 22% said they always read the label at other times. Derby and Fein (1994) state that shopper self-report surveys may over-estimate actual label use. Label

use estimates determined by observation in real-life shopping situations are generally substantially lower than those determined by self-report. Since labels may be used by consumers when food is cooked or consumed, however, supermarket use may underestimate total label use.

In a qualitative study to assess consumers' attitudes toward various parts of the nutrition label, Anderson & Calingaert (1994) found that taste, price and nutrition content, respectively, were most important in choosing food. Kurtzweil (1994) reported that the 1993 FMI survey data indicated that shoppers found labels useful for identifying fat content, calories and ingredients. Results of a 1992 National Food Processors Association survey, as reported by Derby & Fein (1994), indicate that consumers most commonly use the nutrition label to calculate how high or low a product is in calories, salt, vitamins and fat, to get a general idea of nutrition content, to compare different types of food items to each other and to help decide which brand of a particular food item to buy. The least common uses were to determine whether something that was said on the package is true, to figure out how much of a product an individual in the household should eat and to help in meal planning.

Consumer usage of nutrition labels seems to vary with a number of different characteristics, including gender, age, living situation, knowledge, educational level, concern for health, and available time. According to a recent national survey, people living in the Midwest geographical region are less concerned with the nutritional content of foods they purchase than are people in any other region (Food Marketing Institute [FMI]). Persons least likely to use nutrition labels are reported to be male,

living alone, with little nutrition knowledge, little education and little concern about the Dietary Guidelines (National Exchange for Food Labeling Education conference summary [NEFLE], 1992). Fein, Levy & Schucker (1992) reported that men and nonwhites are least likely to judge nutritional quality correctly. A 1991 national survey conducted by American Demographics found that 86% of the men surveyed always or sometimes read food labels compared to 92% of the women surveyed (Krafft, 1991). Cronin et al. (1993) reported that consumers who rarely or never read food labels often say that they do not understand the information on the nutrition label. In the FMI Shopping for Health Survey, researchers found that only 27% of male shoppers were health conscious compared to 73% of women shoppers. In the 18-24 age group only 9% were health conscious. Shoppers aged 65 or over were more likely to have health concerns and therefore were less likely than younger shoppers to know about the nutrition label. Bender & Derby (1992) reported that consumers who pay attention to the ingredient list but not the nutrient label are older, non-white and male, while those who read the nutrient label but not the ingredient list are younger and less educated.

The 1994 FMI Trends survey data suggest that almost all shoppers (95%) are somewhat concerned with the nutritional content of food (FMI/Trends, 1994). The concern about fat content was significantly higher than in 1993 with 59% of those surveyed being concerned with this nutrition component. Second to fat in concern was cholesterol, with 21% of those surveyed being concerned.

Seventy-six percent of those surveyed reported that nutrition is very important

in food selection; 62% of younger consumers (18-24 years) reported that nutrition was very important. Sixty-two percent of those surveyed reported being very concerned about the nutritional content of foods, a significant increase from 54% in 1993; 49% of younger consumers (18-24 years) were very concerned, up from 12% in 1992 (FMI/Trends, 1994). The 1994 FMI Shopping for Health survey data indicate that shoppers from more affluent households and those with a family member on a medically restricted diet are most likely to always read the nutrition labels (FMI/Shopping, 1994). Of all college educated persons surveyed 51% reported checking ingredient labels when trying new foods. More women than men consider nutrition important and this difference seems to increase with age.

Several researchers have reported that consumers would use labels more frequently if they had more time. Geiger, Wyse, Parent, & Hansen (1991) found that 37% of those surveyed said that lack of time and lack of information (27%) were the most common reasons for not using the label.

Research on grocery shopping behavior indicates that decision making quality deteriorates when the shopper is under time pressure (Caswell & Padberg, 1992) Caswell & Padberg (1992) reported that American Demographics survey data indicate the average consumer makes one trip per week to the grocery, spending one hour in the store. The food labels' impact on purchase decisions therefore may be limited because labels are only one element, and not the most prominent or easy to use when compared to the variety of consumer product information.

Stages of Change

Prochaska & DiClemente (1982) have described transtheoretical therapy, as developed by Prochaska in 1979 from an analysis of 18 leading therapy systems, as the model of change or stages of change model. These researchers have studied how individuals change on their own compared with change in formalized situations such as under the care of a health professional. The researchers initially identified four stages, contemplation, determination, action and maintenance. Verbal processes are most important in preparing clients for action while behavioral processes are most important once clients have committed themselves to act. The model more recently has been expanded to include precontemplation and termination (Prochaska, Norcross & DiClemente, 1994).

The stages of change model draws on the essential tenets of many diverse theories of psychotherapy. The model has been tested, revised and improved through many empirical studies and is currently in use by professionals around the world. Prochaska et al. (1994) describe what exactly each of the stages of change involve for the person who is trying to change and what processes are most appropriate to work through each stage (Appendix E). These researchers have found through many studies that successful changers use different tools of change only at specific times, therefore, using different tools whenever the situation demanded a new approach. These specific times seem to be constant from one person to the next, regardless of the problem.

Prochaska et al. (1994) state that each stage does not inevitably lead to the next as it is possible to become stuck at one stage or another. When the model was

first developed, the researchers believed that self-changers moved consistently from one stage to the next, or the model was linear. However, they found that most people slip up, at some point, returning to contemplation or precontemplation. Therefore, the model is a spiral one rather than linear. Of the contemplators followed for two years, only 5 percent made it through the cycle of change without at least one setback.

In order to determine what stage of change a person is in, one can look for responses to four basic statements (Prochaska et al., 1994). Those are: I solved my problem more than six months ago, I have taken action on my problem within the past six months, I am intending to take action in the next month and I am intending to take action in the next six months. The researchers state that the use of this model to determine target audiences can result in high intensity, interactive programs that demand much less of both professionals and participants. Action-oriented health promotion programs typically generate 1 to 5 percent participation rates, whereas, programs based on stages of change typically generate 50 to 85 percent participation.

Glanz & Eriksen (1993) describe the stages in the model as precontemplation or having no intention to change, contemplation or thinking about change, decision or determined to change, action or actively modifying habits and/or behavior and maintenance or maintaining new healthier habits. They stated that initial activities emphasize awareness and motivation, followed by opportunities for action and later promoting maintenance of change. Once the persons' stage has been determined, that person can be directed to information about nutrition and dietary change strategies that are appropriate for his or her current stage. The goal is to move a person to the next

stage of adopting improved behavior.

Sandoval, Heller, Wiese & Childs (1994) reported that the Stages of Change Model has been used to describe the process of health behavior change but has received little attention in nutrition counseling. They agree that people may move from one stage to another at any time and may repeat stages, and believe that the model can be useful in dealing with common problems in nutrition counseling by selecting stage-matched strategies to enhance behavior change. These authors encourage use of the model to measure nutrition counseling success as moving clients to the next stage of change, not only as achieving a final criterion. Several research studies utilizing the Stages of Change Model have been carried out in the field of nutrition. O'Brien, Woolcott & Finlay (1994) developed a Stages of Change algorithm to assess grocery shoppers' stage of change in nutrition label use and the perceived value of a nutrition label guide (Appendix D). These researchers surveyed 65 adults aged 18 to 44 years old. The researchers found that the majority of respondents (55%) were in maintenance stage, 25% were in action stage, 6% in contemplation stage and 14% in precontemplation stage. The researchers concluded that although the small study sample size limits the interpretation of their findings, it appears that different interventions may be needed for people at different stages of change related to nutrition label use.

Laforge, Greene & Prochaska (1994) utilized the Stages of Change Model in a study to determine the relationship between stage of change and consumption of fruits and vegetables. In order to measure the stage of readiness to change, the subjects

were asked if they had been eating 5 or more servings a day for more than 6 months. The subjects were placed in the precontemplation stage if they reported eating fewer than 5-A-Day and had no intention of doing this, contemplation if they would adopt this practice in the next six months, preparation if they intended to adopt this practice within the next 30 days, action if they were eating 5-A-Day but for less than six months and maintenance if eating 5-A-Day for more than six months. The researchers found that 38% of the subjects were in precontemplation, 28.6% contemplation, 18.5% preparation, 1.7% action and 13.1% maintenance stages. The distribution differed significantly by gender, with 46% of males versus 34% of females in the precontemplation stage. The authors reported that the stage distribution in this population parallels what has generally been found with other high risk behaviors. The authors concluded that action oriented education programs are not useful for people in precontemplation and contemplation stages, but that cognitive and experiential processes are more relevant for people in the precontemplation stage. Targeting this group with information about the health benefits of 5-A-Day for example would be appropriate for precontemplators.

Greene, Rossi, Reed, Willey & Prochaska (1994) investigated the possibility that utilization of the Stages of Change Model would help people reduce dietary fat intake. Previous studies had indicated that persons in the preaction stages (precontemplation, contemplation and preparation/decision) had higher fat intakes than persons in the action and maintenance stages. The researchers developed a stage of change algorithm for determining dietary fat intake $\leq$ 30% of energy. Participants who had been

avoiding high fat foods for more than six months were placed in the maintenance stage. Those who had been avoiding high-fat foods for less than 6 months were placed in the action stage, and those who were not avoiding high-fat foods but wanting to start in the next 30 days were placed in the preparation stage. Participants who were not currently avoiding high-fat foods but intended to start in the next six months were placed in the contemplation stage. Those not avoiding high fat foods and not intending to start doing so in the next six months were classified in the precontemplation stage. Participants in the action and maintenance stages were reclassified into the preparation stage if they failed to meet certain behavioral action criteria specified in the survey. The researchers concluded that the algorithm developed was a rapid, self administered instrument that can be used to tailor interventions to a persons stage of change.

Based on the studies and reports reviewed, it is apparent that many factors influence nutrition label knowledge and use. Although there has been some research in the area of current nutrition labeling knowledge and behavior, the literature seems to reveal the need for additional study of the knowledge of and behavior toward the Nutrition Facts label specifically. Determining the current labeling knowledge and behavior, including utilizing the Stages of Change Model to determine labeling useage, is important for successful nutrition labeling education programs.

PART ONE

College students' knowledge and use of the Nutrition Facts label

INTRODUCTION

The National Labeling & Education Act of 1990 is the most drastic change that the Food and Drug Administration (FDA) has made since the Federal Food, Drug and Cosmetic Act was passed in 1938.[1] This act includes provisions for modifying the nutrition panel, now called "Nutrition Facts", more uniformity in serving sizes, Daily Values information which is the new standard for nutrients, and definitions of nutrient content claims and allowed health claims.[2] These FDA food labeling regulations went into effect May 8, 1994.[3]

Because consumers have been exposed to the Nutrition Facts label for only a short time, the nutrition labeling knowledge and behaviors of college students as consumers is not well documented in the research literature. Derby & Fein[4] reported three main purposes of such research, (1) to describe the current situation and trends, (2) to clarify the important variables associated with healthful behaviors, and (3) to identify the differences among target groups which is necessary to tailor messages to these various groups. Current research indicates that young adult consumers, age 18-24, are paying more attention to nutrition labeling than in the past.[5] Therefore, assessing the current nutrition label knowledge and behaviors of college students will help in targeting this group with specific nutrition labeling education. It is believed

that the new food labels will make it easier for concerned consumers to identify significant sources of nutrients.[4]

Geiger, Wyse, Parent & Hansen[6] reported that while consumers thought the food label was one important source of information; it was not well understood by all consumers. Therefore, the potential benefits of the new food label will only be realized with education.[4] Much of the information that consumers do receive in regards to the nutrition label is through the print media.[7] Allen[7] found evidence that consumers would benefit if nutrition educators teamed up with the media to relay nutrition labeling education information.

Food Marketing Institute (FMI) Shopping for Health 1994 survey data indicate that those who are most likely to understand the nutrition label are those who already have an excellent understanding of diet and nutrition.[8] Although many people are using nutrition labeling information, the greatest challenges of labeling education campaigns may be reaching unmotivated and disinterested populations because other consumers have many more ways of accessing information.[9] Key factors in determining consumer response to new nutrition label information have been reported to be the consumers' desire to read the new labels, to understand new label information and to change their purchase behavior.[10]

The purpose of this study was to describe the current nutrition labeling knowledge and behavior of college students. Two objectives guided this study: (1) to examine to what extent and how college students use the nutrition label; and (2) to examine college students' understanding of various label principles and competencies

that increase the usefulness of the nutrition label in making healthful food choices.

METHODS

Instrumentation. A non-experimental survey design method of research[11] and a self-report data collection technique was used in this study. The 90 item questionnaire consisted of a nutrition labeling knowledge test, questions to assess students' use of the nutrition label, and demographic questions.

Questions assessing students' shopping and label use practices and their perceptions of the new label were included. Students were asked how often they shop for foods for meals or snacks, why and when they use nutrition labels and why they do not use nutrition labels more frequently. They were also asked beliefs about the potential benefits of nutrition labeling and the accuracy of label information. The knowledge test included questions on serving sizes, DV and %DV, and nutrient content claims. Demographic questions assessed students' gender, age, year in college, major area of study, housing situation, family background.

Development of the knowledge test began with identification of twenty-two label principles and competencies believed important for optimum understanding and usefulness of the new nutrition label. Multiple-choice and true-false questions to assess understanding of each of these principles and competencies were constructed or selected from prior research. [12,13] As part of the whole questionnaire, the test was piloted with forty-four college students, after which several principles were combined

or revised and five were omitted to keep the test brief. Content validity of the final 28-item test was established by six nutrition faculty who agreed the principles and competencies identified were important and who verified congruence of the test questions with the remaining 17 principles and competencies. The Kuder-Richardson Formula 20 reliability coefficient[14] of the knowledge test for the study sample was .63 which indicated moderate internal consistency.

Sample population. A non-probability convenience sample method was used to select the sample. With the professors' permission, the questionnaire was administered to willing students in seven sections of an introductory general education nutrition course at a midwest university. The students had not studied about the Nutrition Facts label in this course at the time the data were collected. Subjects who reported being older than 25 years of age (n=6) were excluded from analysis in order to get a more accurate representation of traditional-age college students. Three hundred forty of 353 eligible participating students (96%) returned questionnaires complete enough to be used.

The sample demographic distribution was similar to the distribution of students at the university from which the sample was drawn with two exceptions; more of the students in the study sample were female or were underclassmen. Of the 340 students, 233 (66%) were female and 105 (30%) were male; two subjects omitted the question on gender. Most of the respondents (92%) were between the ages of 18 and 21 years. The sample consisted primarily of underclassmen; roughly 70% were either freshmen

or sophomores. The family background of the sample was not extremely diverse; 90% were White, 6% were Black/African American, 2% were Asian/Pacific Islander, 1% were Spanish/Hispanic and 1% were other backgrounds, not specified. Majors varied; 21% were non-science related majors or education majors with a non-science concentration (17%), 14% were home economics majors and 21% were science related majors. The majority of the sample (96%) were single, never married and more than two-thirds (68%) lived in a campus residence hall. Only 17% indicated they had taken a class previously in which they were taught about the new nutrition label.

Data collection. Data were collected in January 1995. The questionnaire required approximately thirty minutes to complete. The testing protocol was as follows: the general purpose of the research and the testing format were explained, the questionnaires and op-scan code sheets were distributed; upon completion of the questionnaire code sheets were quickly reviewed for obvious omissions and collected.

Data analyses. Data were analyzed with the Statistical Analysis System (Release 5.18, 1986, SAS Institute, Cary, NC). Descriptive statistics were generated for all study variables. Frequencies were generated for males and females separately among all variables and t-tests or chi square tests of independence of effects were conducted to compare knowledge scores and other responses of female and male students. Pearson correlation coefficients were calculated to examine the relationship between the students' actual knowledge score and his or her reported perception of knowledge

and understanding of the label.

RESULTS

Nutrition Facts label use. Frequency of shopping for foods for meals and snacks was not particularly high for this group (n=340). Forty percent reported they shop for snacks and 38% reported they shop for meals approximately 2-3 times a month. Only 6.5% indicated they shop for snacks more than once a week and 7.9% for meals. Sixty-three percent of the sample reported that they have noticed new food labels on products that they buy or use. Seventy-four percent of the sample reported that they had used nutrition information on food labels to help them choose food products. According to student responses to a series of questions on label use, 49% have used nutrition label information for the past 7 months, 21% have never used nutrition label information and have not thought about using it within the past month, 19% have used nutrition label information for 6 months or less, 7% have never used nutrition label information but have thought about using it in the past month, but are not very confident they will use nutrition label information in the next month, and 4% have never used nutrition label information but have thought about using it in the past month and are fairly confident they will use it in the next month.

Students were asked to indicate, on a scale of 0 = not at all to 3 = extremely, how important several factors were in influencing their food purchase decisions. Mean values indicate for the group as a whole, (2.8), price (2.3), nutrition/healthfulness

(2.1), ease of preparation (2.0), and claims such as light and low fat (2.0) were more often rated important than were factors such as brand name (1.2) and preparation time (1.8). Females were more likely than males to rate claims such as light and low fat as being important (2.2 vs. 1.6, $p<.0001$). However, compared to females, males were more likely to rate the nutrition/healthfulness of food as being important (2.81 vs. 2.78, $p<.0001$).

Students also were asked to indicate which of several reasons for not using the label more often applied to them. Almost half (46%) reported they did not use nutrition labels more frequently because they already knew the label information or had read it before, 36% because they did not have time, 30% because they were not interested, and 22% because they did not understand the labels. Compared to females, males more often reported not using the label more frequently due to already knowing the information on the label or having read the information before ($x^{2(1)}=6.26$, $p<.01$) and not being interested ($x^{2(1)}=21.34$, $p<.0001$), than did females.

Students indicated how often they used different parts of the label. Students reported using the carbohydrate, protein, fat and fiber information most often (2.09), followed by nutrient content claims, such as "low fat", "high fiber"(1.84), serving size information (1.66) and vitamin and mineral information (1.10). Nearly three-fourths indicated they use the carbohydrate, protein, fat and fiber information on the label often (48%) or sometimes (25%). Over two-thirds of the students reported using nutrient content claim statements such as "low fat", "high fiber" , sometimes (35%) or often (31%). Only about a third of these students reported using the vitamin and

mineral information on the nutrition label, sometimes (24.4%) or often (6.8%).

More than half of the students indicated they use serving size information often (23%) or sometimes (35%). Students were asked to indicate which one of several purposes was their main purpose for using serving size information. The most frequently reported reason was "to see how much I/we should eat" (31%) followed by "to help me understand the nutrient information" (27%), and "to tell which size/how many packages to buy/use" (12%). Purposes reported less frequently for using serving size information were "to help me compare the nutrient characteristics of different products" (9%) and "to check the amount needed for a recipe" (8%).

Nutrition Facts label beliefs. Using a scale of 0= not at all to 3= extremely, almost all of these students agreed that having nutrition information on food labels is somewhat (38%) or extremely (60%) helpful. Females were more likely to report that having nutrition information on food labels was helpful than were males, ($M=2.67$ vs. 2.35, $p<.0001$). Of those students who had indicated they had noticed the new label ($n=221$) the majority reported they would rate the new labels as somewhat (35%) or much better (47%) in comparison to the old labels; only 2% reported the new labels as being somewhat or much worse. Students were asked to indicate their agreement with several stated potential benefits of nutrition labeling. Most students agreed that to satisfy consumers' right to know (99%), to help consumers choose foods for special diets (97%), to help consumers choose more nutritious foods (97%), to help consumers' learn more about nutrition (89%)and to help select a balanced diet (89%)

were benefits of nutrition labeling.

Students were asked several questions to assess their perception of the accuracy of information on the label. Fewer students agreed that to improve consumers confidence in the food industry (71%), to encourage food industry to produce more nutritious foods (68%) and to help consumers get more nutrition for their money (57%) were benefits. Of those students who indicated they pay attention to serving sizes (n=304), 42% reported that the number of servings listed on the food labels varies so that sometimes the sizes are about right and sometimes one gets more or fewer servings than the package says. Another 35% thought that they usually get fewer servings than are stated on the label, 4% thought they usually get more servings, and 19% thought the serving size information is usually correct.

When asked how many of the food labels which use terms such as "low fat" they believe are accurate, only 3% indicated they thought almost all were accurate,a nd 27%, 59%, 8% and 3% indicated they thought most, only some, almost none, ore none were accurate respectively. When asked how many of the food labels which use terms like light, lean, reduced or healthy they believed to be accurate, 1% reported almost all, 20% most, 65% only some, 12% almost none, and 2% more. Forty-six percent of the students reported they thought the terms "light" and "healthy" were confusing, 43% thought "lean" was confusing and 31% thought "reduced" was confusing.

Nutrition Facts knowledge. The mean knowledge score for the sample (n=340) was 18.2+3.7 (65% correct). Seventy-seven percent of the students got $\leq$ 75% of the

knowledge questions correct and only 3.8% got 90% or more correct. Females had somewhat higher knowledge scores than males (18.6±3.5 vs. 17.6 ± 4.1, $p<.05$). Students also were asked to report how knowledgeable they considered themselves to be about the new labeling regulations and label format. Two percent reported they knew everything, 19% reported they knew quite a lot, 44% reported they knew some 23% reported they knew very little and 12% reported they didn't know anything about new labeling regulations and format.quite a lot. There was a positive but weak correlation between the students' perception of knowledge of the nutrition label and knowledge test score ($r=.23$, $p<.0001$). The mean values for perception of knowledge of new labeling regulations and format for females was somewhat higher than that for males (1.89 vs. 1.54, $p<.01$). Students also were asked to report how well they understand nutrition information on the food label. Four percent reported they understand completly, 39% reported understanding quite a lot, 48% reported understanding some of this information, 39% reported understanding some, 7% reported understanding very little of the information and 1% reported they did not understand at all. . There was a positive correlation between the students' perception of their understanding of nutrition label information and knowledge test score ($r=.35$, $p<.0001$). There was no difference between females and males in mean values for students' perception of their understanding of nutrition label information.

Table 1 summarizes student responses to Nutrition Facts knowledge questions as based on the list of principles and competencies. Students most often incorrectly answered questions in reference to serving sizes, % of calories from fat and DV and

%DV information when asked questions in reference to nutrition labels attached to the questionnaire. Most students correctly reported that the nutrients listed on the new nutrition label include those nutrients that relate most closely to today's important health concerns (81%). They also correctly reported that the type of nutrition information and the way that information is presented is very similar for all products with the new label (84%). Over half (62%) of the students answered incorrectly when asked if the serving sizes for similar products are the same. When asked whether the serving sizes on the nutrition label were set to be consistent with serving sizes in the Food Guide Pyramid over half of the students answered incorrectly. However, students did report correctly on some serving size regulations (Table 1).

Students reported correctly the concepts behind the %DV a majority of the time but more often incorrectly answered specific questions that asked them to use the %DV information on a nutrition label (Table 1). Sixty percent of the students correctly reported that the %DV information on the label is not intended to help consumers determine which foods are good and which foods are bad and 76% correctly answered that the %DV shows how much of a nutrient the food contributes to the diet, not how much of a nutrient is in the food. When told that a certain product contributes 25% DV for saturated fat, and then asked in order to meet recommendations, what should the %DV for saturated fat for all other foods eaten that day, only 44% of the students correctly answered this question. However, students (71%) correctly chose which of two products had less fat according to the %DV information.

Students were able to answer questions correctly when asked to use the Nutrition Facts Daily Values footnote. Almost three-fourths of the students correctly answered a question asking the recommended amount of total fat per day if a person generally eats less than 2000 calories per day. Students accurately calculated the calories from fat when told that two servings of a specified product on a nutrition label was eaten (82%). Students also accurately calculated how many total grams of fat a person would consume if eating one serving of a product on a specified nutrition label (89%). However, students had more difficultly in correctly answering what percent of calories in a specified product come from fat and determining if one product had seven times as much fat as another product (Table 1).

DISCUSSION AND CONCLUSION

College students do not seem to shop often for meals or snacks and therefore may be limited in exposure to the Nutrition Facts label. However, many college students have seen the new food label on the foods they do purchase. As is consistent with previous research, results of this study indicate that this age group is using the nutrition label.[8] College students are using the nutrition label to help choose food products; this has been determined in previous research[8,15] to be a common use of the nutrition label. Taste, price and nutrition or healthfulness of food products, respectively, are factors that influence college students' food purchase decisions. In a qualitative study to assess consumers' attitudes toward the nutrition label, Anderson & Calingaert[16] found these same factors to be most important to adult consumers in a

qualitative study to assess consumers' attitudes toward the nutrition label. There are differences between males and females among the factors influencing food purchase decisions. Female college students seem to be more interested in claims such as light and low fat than do college males. Such variations are important to note so that educational programs may include information that is thought to be most important to different groups.

Consumer usage of the nutrition label does seem to vary with gender. Previous research has indicated that males are among those least likely to use the nutrition label.[9] Results of this study are consistent with previous research that indicates lower nutrition label use by males[4,8,15]. Increasing the interest in the nutrition label may be a potential starting point for nutrition labeling education for this group, especially males who indicated non-interest as a reason for non-use or less frequent use of the nutrition label. In addition a major barrier it seems for those who do not use the label frequently is not understanding the information. Cronin et al.[17] reported in 1993 that consumers who rarely or never read food labels often say that they do not understand the information on the nutrition label. Previous research has indicated that time is a constraint in non-use of the label.[6,19] Time was a constraint for non-label use among one-third of the college students.

Knowledge of which of the various parts of the nutrition label students most often use can be helpful to nutrition educators when planning nutrition labeling education programs. It seems that college students most often use the carbohydrate, protein, fat and fiber information. College students also consider nutrient content

claims to be important components of the label. These results indicating the importance of carbohydrate, protein, fat and fiber information as well as nutrient content claims are consistent with previous reports which have stated that consumers find labels useful for identifying fat content, calories and ingredients.[18] College students do not seem to be as interested in serving size information nor trust the accuracy of this information, as has been found in previous research.[4,18] When using nutrition labels this group is least concerned with the vitamin and mineral information.

Caswell & Padberg[19] indicated that food labels have existence values separate from their direct use value. Findings from this group of college students are consistent with this view; almost all students agreed that having nutrition information on food labels is helpful. Results indicate that the majority of thesecollege students think the new food labels are better than the old labels, this is consistent with 1994 Food Marketing Institute/Shopping for Health survey data.[8] As with previous research with adult consumers[15], results of this study indicate that college students believe potential benefits of nutrition labeling include helping consumers choose more nutritious foods and helping consumers learn more about nutrition. Therefore, nutrition labeling education programs may be used not only to increase effective use of the new label but also may be used to help consumers learn more about nutrition in general. Many of these college students do not trust the accuracy of nutrient content claims or terms such as "light" and "reduced"; this also has been reported in previous research with consumers. Increased knowledge and understanding of these claims and terms, gained through educational programs, might lead to increased trust in the accuracy of the

information.

Results of this study suggest that college students' knowledge of the Nutrition Facts label is fairly low and therefore experiential labeling education programs would be beneficial to increase knowledge of the label. Direct use of food labels during education programs may increase the knowledge of the food label. Although we observed differences in knowledge among male and female college students, the practical significance of this difference between mean knowledge scores is questionable as the actual mean knowledge score point difference was very small. College students' perception of knowledge and understanding of the nutrition label is related to how much they actually know about the label. Female college students do perceive themselves as knowing more about the nutrition label as is consistent with their higher knowledge scores.

Study results indicate that college students are most often confused by the serving size, percent of calories from fat, Daily Value and Percent Daily Value. All of these components of the nutrition label seem to be difficult to understand for a variety of reasons as noted in earlier research. Cronin et al.[17] reported that consumers are distrust numbers that they do not understand and McNeal[9] reported that many people lack the math skills needed to perform label information computations. This may be true of students in this study. Students were able to report concepts behind %DV, for example, but were unable to use this information a majority of the time. Many students had difficulty determining the percent of calories from fat in a certain product. Research[17] has shown that consumers incorrectly assume that %DV for fat

represents the percent of calories from fat; this mistake was common among this group of college students. As McNeal[9] reported, consumers are most in need of techniques for using the label and manipulating the information.

Although shopper self-report surveys may over-estimate actual label use[4], this study indicates that a majority of college students are using the nutrition label with only a moderate understanding and knowledge of its contents. Our study determined some of the ways in which college students are using the food label and how much they already know about the food label which will allow nutrition educators to target nutrition labeling education programs more effectively. Our study identified some of the constraints for label use, portions of the new label that are most confusing to consumers and what consumers want to know most about the new label, which will help educators more effectively target nutrition labeling education programs. Although applicability of the contents of this study to other populations cannot be assumed without further research, many of the results found here are consistent with previous research on varied adult consumer populations. One limitation of our study may be that the sample is not representative of all college students due to the fact that the students were drawn from a course in which they were studying nutrition indicating an interest in this area.

Table 1. Correct responses (%) to Nutrition Facts knowledge test questions (n=340).

Item	Number and % of students answering correctly					
	Total sample		Males		Females	
	n	%	n	%	n	%
Serving size:						
Serving sizes for similar products are seldom the same.	129	38	33	31	94	40
Serving sizes have been determined by manufacturers themselves or government rule?	204	60	64	62	139	60
Serving sizes are set to make products look the best or reflect the amounts people generally eat.	241	71	70	67	170	73
DV & %DV:						
If you eat 5 servings of this product for which nutrients would you get at least 25% of the DV?	156	47	52	51	104	45
Which of these products would contribute over 40% of DV for fiber in 2 servings?	207	61	65	62	141	61
For which nutrients should you eat no more than the DV amount in a day?	25	74	78	75	172	74
Fat:						
Approximately what % of calories in a specified product come from fat?	63	19	19	18	44	19
According to following labels, product A has ~7 times as much fat as product B.	209	63	68	67	140	61
According to specified label, how many g of saturated fat appropriate for a 2500 kcal diet?	233	69	72	69	161	69

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PART TWO

College students' stage of change for use and knowledge of the Nutrition Facts label

Introduction

The Nutrition Facts label has been available to consumers since May 8, 1994 (1). Provisions for nutrition labeling education have been made available by the National Labeling and Education Act (NLEA) of 1990 (2). Information about the use and knowledge of the Nutrition Facts label of various consumer groups is necessary to develop and implement effective nutrition labeling education campaigns for these audiences (3). Some current research indicates that young adult consumers, age 18-24, are paying more attention to nutrition labeling than in the past (4). To date, little research on nutrition label knowledge and behaviors of this age group is available.

STAGES OF CHANGE MODEL

The Stages of Change Model, as developed by Prochaska and DiClemente, has provided a theoretical background for research studies that have shown accelerated rate of behavior change in a population (5-8). Prochaska, Norcross and DiClemente have demonstrated with a dozen different problem behaviors that change involves progress through a series of stages (9). As the Stages of Change Model applies to a wide range of behaviors, health professionals should be aware that this model has been demonstrated to be effective with every behavior studied thus far (9).

The model suggests that people are at various points along a continuum of change readiness (8); it has been tested, revised and improved through many

empirical studies (5-8). The current model includes five stages: precontemplation, contemplation, decision, action, and maintenance (Table 1) (9). An individual's stage can be identified based on his or her responses to a series of questions. Directing an individual to information or to change strategies most appropriate for his or her current stage will help that individual move to a higher stage (10). This model is a spiral rather than linear model (9,11). Therefore, people may return to contemplation or precontemplation stages after having reached a higher stage of change. It has been noted that relapse is a common problem in maintaining new eating habits (11). A person may also get trapped in one stage such as contemplation and replace thinking for acting (11).

Most interventions attempting to change behavior are developed for people who are ready to take action (11). However, if the target educational group is not in the action stage, then this kind of intervention program underserves the group (9). Action-oriented health promotion programs have been shown to generate 1 to 5 percent participation rates, whereas, programs based on stages of change typically generate 50 to 85 percent participation (9). The model has been used with success to accelerate the rate of change for behavior through self-initiated programs and programs that are adaptable to public health interventions (9).

The use of this model has been documented (5-7,11) to be of value in formulating specific nutrition education programs. Greene, Rossi, Reed, Willey and Prochaska (5) developed a stages of change algorithm for fat intake < 30% of energy. Participants (n=614 adults) were classified in a stage of change based on responses to

questions assessing their behavior related to avoiding high-fat foods. This algorithm was determined to be useful in dietary counseling to tailor interventions to a patient's stage of change. Laforge, Greene and Prochaska (6) applied the Stages of Change Model in a study of 405 adult respondents who were classified by stage of readiness to adopt the practice of eating 5 or more fruits and vegetables each day. These researchers found that males were twice as likely as females to be in the precontemplation stage. The researchers concluded from their results that stage of readiness to change should be considered as well as other factors in planning interventions for increasing fruit and vegetable consumption. Registered dietitians who use the model in counseling say that using staged-matched strategies makes sense when developing programs (11).

Limited use of the Stages of Change Model has been reported in the area of nutrition labeling. O'Brien, Woolcott and Finlay (7) developed a scale and scoring algorithm using Prochaska and DiClemente's (8) framework. They used the algorithm to categorize adults (n=65), 18-44 years old, into various stages of change according to their intentions to use nutrition labels in food purchase decisions. These researchers found that respondents were categorized into four stages of behavior change. The majority of the respondents (55%) were in maintenance stage, 25% were in action stage, 6% in contemplation stage and 14% in precontemplation stage. These researchers reported that different interventions may be needed for people at different stages of change in nutrition label use.

The purpose of our study was to utilize the Stages of Change Model to

categorize college students into specific educational target groups based on their different levels of label usage and to determine whether knowledge of the Nutrition Facts label was associated with an individual's stage of change with regards to label use. Such information may help develop effective nutrition labeling education for this population.

METHODS

A non-experimental survey design method of research (12) and self-report questionnaire data collection technique was used in this study.

Questionnaire

The 90 item questionnaire consisted of a nutrition labeling knowledge test, questions to assess students' use of the nutrition label, and demographic questions. The O'Brien et al. (7) five label use questions and scaling and scoring algorithm, developed from the Stages of Change Model (8), were used to classify students into the five stages of change.

Additional questions assessing students' shopping and label use practices and their perceptions of the new label were also included. Demographic questions assessed students' gender, age, year in college, major area of study, housing situation, family background, and diet-related family health conditions.

We began development of the knowledge test by first identifying twenty-two label principles and competencies we believed consumers should understand for optimum usefulness of the new nutrition label. We then selected from prior research

(7,13) or constructed multiple-choice and true-false questions to assess understanding of each of these principles and competencies. As part of the whole questionnaire, the test was piloted with forty-four college students, after which several principles were combined or revised and five were omitted to keep the test brief. Content validity of the final 28-item test was established by six nutrition faculty who agreed the principles and competencies we had identified were important and who verified congruence of the test questions with the remaining 17 principles and competencies. The Kuder-Richardson Formula 20 reliability coefficient (14) of the knowledge test for the study sample was .63 which indicated moderate internal consistency.

Sample and Data Collection

A non-probability convenience sample method was used to select the sample. With the professors' permission, the questionnaire was administered to willing students in seven sections of an introductory general education nutrition course at a midwest university. Subjects who reported being older than 25 years of age (n= 6) were excluded from analysis in order to get a more accurate representation of traditional-age college students. Three hundred forty of 353 eligible participating students (96%) returned questionnaires complete enough to be used.

Data were collected in January 1995. The questionnaire required approximately thirty minutes to complete. The testing protocol was as follows: the general purpose of the research and the testing format were explained, the questionnaires and op-scan code sheets (NCS General Purpose Answer Sheet Form MP4887) were distributed;

upon completion of the questionnaire code sheets were quickly reviewed for obvious omissions and collected.

Data analysis

Data were analyzed with the Statistical Analysis System (Release 5.18, 1986, SAS Institute, Cary, NC) (15). Descriptive statistics were generated for all study variables. A t-test was performed to compare knowledge scores of female and male students. A Pearson correlation coefficient was calculated to examine the relationship between each student's knowledge score and stage of change. Based on frequency distributions, students were regrouped into two stages (precontemplation, contemplation, decision and action, maintenance); an a priori comparison was performed to compare the scores of the students in these two groups. Chi square tests of independence of effects were performed to determine differences in responses to selected label use questions by students in the different stages.

RESULTS

Of the 340 students, 233 (66%) were female and 105 (30%) were male; two subjects omitted the question on gender. Most of the respondents (92%) were between the ages of 18 and 21 years. The sample consisted primarily of underclassmen; roughly 70% were either freshman or sophomores. The family background of the sample was not extremely diverse; 90% were white, 6% were Black/African American, 2% were Asian/Pacific Islander, 1% were Spanish/Hispanic and 1% being other backgrounds,

not specified. Majors varied; 21% were non-science related majors or education majors with a non-science concentration (17%), 14% were home economics majors and 21% were science related majors. The majority of the sample (96%) were single, never married and more than two-thirds (68%) lived in a campus residence hall. Only 17% indicated they had taken a class previously in which they were taught about the new nutrition label. Thirty-eight percent of the sample shopped for food for meals two to three times a month, 30% once a month or less, 25% once a week. Forty percent of the sample reported shopping for food for snacks two to three times a month, 30% once a week and 22% once a month or less.

This paper addresses the classification of students into label use groups based on the Stages of Change Model and the association between label use stage and knowledge of the Nutrition Facts label. Details of students' knowledge and label use are described elsewhere (16). Table 2 describes label use stages and presents the distribution of the sample by stage of change. The majority of the students (68%) were classified in the action or maintenance stages. Chi square analysis indicated that the distribution across stages was different for males and females ($x^{2(4)}=25.68$, $p<.0001$). Males were more likely than females to be classified in the precontemplation stage whereas females were more likely than males to be classified in the maintenance stage. There was a strong positive correlation between stage of change and age of the students ($r=.98$, $p<.001$).

The mean knowledge score for the sample (n=340) was 18.2 ± 3.7 (65% correct). There were significant differences between males and females and among

those in different stages with regards to the knowledge scores. Females had somewhat higher knowledge scores than males (18.6 $\pm$ 3.5 vs. 17.6 $\pm$ 4.1, $p<.05$). The correlation between stage of change and knowledge score was positive but weak ($r=.24$, $p<.0001$).

Table 3 summarizes the knowledge scores by stage of change. Because of the unequal distribution, students were re-classed into two groups; those in the lower stages of precontemplation, contemplation and decision were grouped together and those in the higher action and maintenance stages were grouped together. An a priori comparison (using the coefficients 2,2,2 and 3,3) revealed that the mean knowledge score of those in the lower stages ($\underline{M}=16.9$) was significantly lower than the mean knowledge score of those in the higher stages ($\underline{M}=19$) , $F(1,314)=3466$, $p<.00001$.

Students were also asked how knowledgeable they considered themselves to be about the new labeling regulations and label format and how well they thought they understood the nutrition information on the nutrition label. Twenty percent of the sample (n=340) reported knowing quite a lot about the new labeling regulations and label format, , 44% reported that they know some about the new labeling regulations and label format, 23% reported knowing very little, and 12% reported knowing nothing about format and regulations. Students' reported understanding of nutrition information on the label was similar to their reported knowledge of format and regulations; 39% reported they understand quite a lot, 48% reported they understand some, and 7% very little of the information. Only 1% reported they do not understand the nutrition label information at all and none indicated they understand

completely. Pearson product-moment correlational analysis indicated significant positive relationships between stage of change and perception of both knowledge of label regulations and format ($r=.48$, $p<.0001$) and understanding of label information ($r=.35$, $p<.0001$).

Using a 4 point scale (0=not at all to 3=extremely), students were asked to indicate how important several factors were to them when they shopped for foods for meals or snacks. Stage of change was positively correlated with the nutrition/healthfulness of food ($r=.60$, $p<.0001$)and claims such as light and low fat ($r=.68$, $p<.0001$) but negatively correlated with the importance of taste ($r= -.17$, $p<.01$) and brand name ($r= -.14$, $p<.05$).

When asked which of several stated reasons for not using nutrition labels more frequently applied to them, respondents in the five stages answered somewhat differently (Table 3). Students in the higher action and maintenance stages more often stated that they already knew the information on nutrition labels than did those students in the lower stages of change ($x^{2(4)}=70.74$, $p<.0001$). Students in the lower stages of precontemplation, contemplation and decision more often reported not being interested as a reason for non-use than did those in action and maintenance stages ($x^{2(4)}=131.11$, $p<.0001$). Compared to those in the higher stages, students in the lower stages also more often reported not understanding the nutrition label information ($x^{2(4)}=17.27$, $p<.005$). The perception of time as a constraint for not using the label more frequently did not seem to vary among students in the five stages.

Discussion

Although mean knowledge scores were significantly different among females and males, we recognize that there may not be a great practical difference between the scores of these two groups. The lower knowledge scores seem to be related to the decreased frequency of nutrition label usage among males, or being classified into the lower stages of change. Prior nutrition research also has demonstrated males more often being classified in the lower stages of change (6).

Although previous stage of change research (6,9) with a number of problem behaviors indicates the majority of the population to be in the lower stages of change, the majority of college students in our study were classified in the higher stages with regards to nutrition label use. This is consistent with results of O'Brien and colleagues (7) who found that 80% of adults were classified in the higher maintenance and action stages based on the same nutrition label use algorithm. Although college students seem to be using the Nutrition Facts label, the mean knowledge score for the sample was still relatively low, indicating that knowledge of the Nutrition Facts label in general needs to be improved among college students. Stage of change is an indicator of relative knowledge of the nutrition label. However, it seems that stage of change is a better predictor of what students think they know and understand in reference to the nutrition label rather than what they actually do know as determined by a knowledge test. In addition because the reported amount of label use was very high, it is believed that these students may have over-reported their use of the Nutrition Facts label, as is consistent with results from previous shopper self-report surveys which are

thought to overestimate actual label use (3).

The Stages of Change Model appears to be effective in characterizing people by use of the Nutrition Facts label. The stages of change nutrition label use algorithm demonstrated that people in the lower stages of change less frequently used nutrition label information and had less knowledge of the nutrition label information than people in the action or maintenance stages, as was consistent with another nutrition labeling study (7). Our results indicate that many college students are using the label and those who are using the label are in general more knowledgeable about the Nutrition Facts label content.

A nutrition labeling education program based on stage of change will guide intervention efforts to assist college students in better understanding these labeling concepts. Tailoring these interventions to the audience might help move people into higher stages of change indicating increased use of the nutrition label.

The motivation to use the nutrition labels or to be in a higher stage of change seems to be related to age; those college students who are older seem to use the label more frequently. It seems as though people in higher stages of change are more likely affected by factors such as nutritive value of food and claims such as light and low fat when making food purchase decisions, than are those in the lower stages of change. The effects that factors such as taste and brand name have are less with those people in the higher stages of change.

Students in the lower stages of change, or those people who do not use nutrition label information at all or infrequently, are not using the nutrition label due

to not being interested or not understanding the nutrition label information. Whereas those students in the higher stages of change, or those people who are currently using nutrition label information may not do so more frequently due to assuming that they already know the nutrition label information. Although a common characteristic of college students is the lack of time they have, our results do not indicate that this is a major barrier to nutrition label use. College students have been determined in the past to be interested in nutrition information (17).

Applications

Previous studies based on the Stages of Change Model (5-7,9) have demonstrated that stage-matched education programs increase participation rates. Many education programs are based on action oriented strategies. However, if the target audience is not composed of those ready for action this form of program may misserve the group (9). Thus, the stages of change algorithm for nutrition label use could help nutrition professionals target nutrition labeling education efforts more effectively.

If dealing with people known to be in action or maintenance stage, then action oriented education programs should be used. For example, the actual use of Nutrition Facts labels to discuss issues such as purchasing various foods when planning healthful diets would be appropriate. If targeting a group that has many of the various stages represented such as a group with both males and females, the program may need to take into consideration the combination of stages represented. Those people in the higher stages use behavioral processes to change while those in the lower stages use

cognitive processes such as conscious-raising to progress (9). Therefore, the education program may need to contain education tactics for dealing with both groups. For example, discussing the benefits of using the Nutrition Facts label along with hands on use of nutrition labels would seem to be appropriate.

The specificity and detailed nature of the information relayed in nutrition labeling education programs may depend on the stage of change as well, as those in higher stages of change might already know a great deal of information about the nutrition label. However, nutrition educators would benefit from determining stage of change as this seems to be a good indicator of how much people think they know about the nutrition label; this can affect what people are willing to learn and therefore affect the nature of information relayed as well. Programs that encourage the continued use of the nutrition label would seem to be necessary as people can get stuck in the action stage and then not maintain their label use behaviors, or people can return to a lower stage of change rather than maintaining their current nutrition labeling use behaviors.

This study used a nutrition label use algorithm to classify people into various stages of change. The algorithm could be used to target nutrition labeling education programs more effectively. This research suggests that more emphasis should be placed on experiential strategies when developing nutrition labeling education programs for college students.

Table 1
Stages of Change Model (9)

Stage of change	Characteristics
Precontemplation	The subject has active resistance to change and has no intention of changing behaviors in the future. People in this stage feel they can't fail here, they are free from social pressure. In this stage the question arises of whether help is even a possibility. People in this stage advance more freely into the next stage if they can identify with the developmental or environmental forces that are urging them to change as well as raise their conscious about the problem.
Contemplation	Subjects are eager to talk about themselves and their problems and want to change but also have the desire to resist change. People in this stage are developing an awareness. People in this stage advance into the next stage when emotional arousal is used effectively. Here a person is developing a personal conviction of the value of change. Here pros and cons of changing are considered.
Preparation or Decision	Subjects in this stage are at the cornerstone of effective action. Commitment is the most important change process available at this stage. People in this stage continue to reevaluate both themselves and their problems. In this stage people advance more readily to the next stage by focusing on the future and the "new self".
Action	Subjects in this stage purposefully modify their lives in order to alter behavior. This stage begins with commitment. In this stage the focus is on the processes of control, countering, and reward. This stage is the busiest period of change. People in this stage advance more readily to the next stage when following action oriented programs. This stage lasts for several months. The first month or two is the most likely time for relapse.
Maintenance	Subjects in this stage take all of the work that they have done in the action stage and build on it in this stage. The most common threats to maintenance are social pressures, internal challenges and special situations. The goal of maintenance is nothing short of a permanent change that becomes part of the persons personality.

Table 2
Label use stages and stages of change[a] for total and female (n=233) vs. male (n=105) college students

Stage of Change	Definition	Females[b]		Males[b]		Total	
		n	%	n	%	n	%
Precontemplation	Have never used nutrition information and have not thought about using it within the past month.	32	14.4	34	35.8	66	20.7
Contemplation	Have never used nutrition label information, have thought about using it in the past month, but are not very confident they will use nutrition label information in the next month.	14	6.3	8	8.4	23	7.2
Decision	Have never used nutrition label information, have thought about using in the past month, and are fairly confident they will use it in the next month.	9	4.1	4	4.2	13	4.1
Action	Have used nutrition label information for 6 months or less.	41	18.5	21	22.1	62	19.4
Maintenance	Have used nutrition label information for the past 7 months or more.	126	56.8	28	29.5	155	48.6

[a]Determined through use of stage of change algorithm (7)
[b]Distribution across stage was different for females and males ($x^{2(4)}=25.68$, $p<.0001$)

Table 3

Knowledge scores[a] and reasons for not using nutrition labels more frequently by stage of change[b] (n=319)

Stage of Change	Knowledge[c] Mean±SD[d]	Time	Reasons for not using nutrition labels (%) Already know	Not interested	Don't understand
Precontemplation (n=66)	17.3±3.8	41	8	79	32
Contemplation (n=23)	17.0±4.8	44	30	61	26
Decision (n=13)	16.5±3.0	31	31	23	46
Action (n=62)	18.7±3.7	42	47	26	27
Maintenance (n=155)	19.3±3.2	32	68	5.3	13

[a]Determined through use of a knowledge test (Kuder-Richardson 20=.63)

[b]Determined through use of a stage of change algorithm

cStudents were re-classed into two groups; precontemplation, contemplation and decision vs. action and maintenance. An a priori comparison revealed mean knowledge scores of those in lower stages ($\underline{M}$=16.9) was different from mean knowledge scores of those in higher stages ($\underline{M}$=19), $F(1,314)=3466$, $p<.00001$.

[d]Standard Deviation

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SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Consumers' current nutrition labeling knowledge and behavior is not well documented in the literature. Information about the use and knowledge of the Nutrition Facts label of various consumer groups is necessary to develop and implement effective nutrition labeling campaigns for these audiences (Derby & Fein, 1994). There are many potential benefits of the new nutrition label such as helping consumers choose more healthful foods/diets and helping consumers get more nutrition for the money they spend while teaching the consumer about basic nutrition at the same time. However, the potential benefits of the new label will only be realized with education as many do not understand the new label (Derby & Fein, 1994). Key factors in determining consumer response to new nutrition label information have been reported to be the consumers' desire to read the new labels, to understand new label information and to change their purchase behavior (Zarkin & Anderson, 1992). Therefore, it is essential to determine these factors in order to target nutrition labeling education programs more effectively.

This study examined the current labeling knowledge and behavior of college students, through an examination of whether and how college students use the nutrition label and an examination of college students' understanding of various label concepts that increase the usefulness of the nutrition label. Prochaska and DiClemente's (1982) Stages of Change Model was used to categorize college students into specific educational target groups based on their different levels of label usage and to determine whether knowledge of the Nutrition Facts label was associated with an

individual's stage of change with regards to label use. The model consists of a continuum of change readiness with five stages representing points along this continuum. Those stages are precontemplation, contemplation, decision, action and maintenance.

A series of questions were used to identify the college students' stage of change in regards to label use. A stages of change nutrition labeling algorithm was used to classify the students into the various stages. Other data were collected from the students and analyzed to assess nutrition labeling behavior and knowledge. Knowledge scores, stages of change and various nutrition labeling behaviors were analyzed among the students including analyzing differences among age and sex of the students.

Results suggest that college students are using nutrition labeling information but are confused about some components of the new nutrition label. The Stages of Change Model/Staging algorithm was an effective means of classifying students into various educational target groups with regards to Nutrition Facts label use. Those who indicated they use the label more frequently did score significantly higher than those who use the label less frequently. We rejected the null hypothesis as there was a difference in the knowledge scores among those in the various stages of change. Females were significantly more knowledgeable of the nutrition label than were males. However, the difference among mean knowledge scores of these two groups was small, so the practicality of this significance is questionable. Furthermore, the overall mean knowledge score was relatively low indicating that college students in general do

not have a high degree of knowledge of the Nutrition Facts label.

Stage of change was determined to be related to the knowledge of the nutrition label. Those in higher stages of change or those that use the nutrition label more frequently scored higher on the knowledge test. However, possibly an even better predictor of knowledge of the nutrition label was college students' perception of knowledge and understanding of the nutrition label. Those students who believed themselves to be more knowledgeable scored higher on the knowledge test.

Based on some limitations of this study, further research is suggested on the examination of consumers' use and knowledge of the nutrition label as well as the development of stage matched nutrition labeling education programs to increase the effectiveness of the labeling education effort. One limitation was that the students in the sample may have been more interested in nutrition than other college students since they were enrolled in a general nutrition course. The internal consistency of the knowledge test was not extremely high and therefore the knowledge scores may not be truly representative of current knowledge. The use of self report surveys may lead to over-reporting of nutrition label use. The use of experiential strategies in nutrition labeling education is important when targeting this group or other groups who are using the nutrition label currently in a variety of capacities.

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APPENDIX A

Principles Submitted to Faculty for Validation

Attached is a copy of principles and competencies. My aim is that an overall understanding of these principles and competencies increases the usefulness of the new nutrition label in making healthful food choices. I would appreciate any feedback that you have in reference to my objectives and concepts. I am trying to determine if the list of concepts I have generated would be considered to be a comprehensive list, so that I may go forward in my development of a questionnaire based on these concepts in order to assess college students' knowledge of , and behavior and attitudes toward the new nutrition label.

Nutrition Label Knowledge Test Principles and Competencies

General:

*The new nutrition labels provide consistent information to help consumers select healthful diets.

*Specific nutrition information is required for almost all food products.

*Specific nutrition information and format is very similar for all products.

*The required nutrient list includes those nutrients that relate most closely to today's important health concerns.

*Calories from fat are the number of calories that are supplied by fat in a serving of food, not the percent of calories from fat.

*Reading the nutrition label allows to see the amounts of various nutrients in a serving of food.

Serving Size:

*Serving sizes on the new nutrition label are regulated.

*Serving sizes on the new nutrition label generally reflect the amounts people actually eat.

*Serving sizes on the new nutrition label are generally consistent within product categories.

*Conversion of regulated reference amounts to label serving sizes may result in somewhat different serving sizes for similar foods.

*Serving sizes on the new nutrition label are almost always presented in common household measurements.

*Serving sizes on the new nutrition label are not always consistent with serving sizes in the USDA Food Guide Pyramid.

Daily Value:

*Daily Values represent amounts of nutrients recommended per day.

*Daily Values for some nutrients are the maximum recommended levels while for others are minimum levels.

*A person's individual Daily Values may be lower or higher than those on the nutrition label.

*%DVs on the nutrition label show how one serving of a food fits into a 2,000 calorie reference diet.

*Using %DV information helps consumers fit foods into their overall daily diet rather than classify foods as good or bad.

Nutrient Content Claims:

*Because there are predetermined criteria for all nutrient content claims, terms such as "free", "low", and "reduced" now mean the same thing form one product to another.

*Reference amounts are used to see if a food qualifies for a nutrient content claim.

Health Claims:

*Health claims are statements about the relationships between various diet components and chronic diseases.

*If the reference amount of a food meets the criteria for one or more of several approved relationships, those health claims may be present on the food label.

*Approved health claims are based on expert consensus that available scientific evidence adequately supports the diet-health relationship.

APPENDIX B

Knowledge test principles and related questions

(See Appendix C for specific questions)

***Nutrition information is required for almost all food products**

Question 48

***Specific nutrition information and format are very similar for all products**

Question 56

***The required nutrient list includes those nutrients that relate most closely to today's important health concerns**

Question 51

***Calories from fat are the number of calories that are supplied by fat in a serving of food, not the percent of calories from fat**

Questions 62 and 63

***Reading the nutrition label allows one to see the amounts of various nutrients in a serving of food**

Questions 64 and 65

***Serving sizes on the new nutrition label are regulated**

Question 57

***Serving sizes on the new nutrition label generally reflect the amounts people actually eat**

Question 59

***Serving sizes on the new nutrition label are generally consistent within product categories**

Question 47

***Conversion of regulated reference amounts to label serving sizes may result in somewhat different serving sizes for similar foods**

Question 52

***Serving sizes on the new nutrition label are almost always presented in common household measurements**

Question 50

***Serving sizes on the new nutrition label are not always consistent with serving sizes in the USDA Food Guide Pyramid**

Question 55

***Daily Values represent amounts of nutrients recommended per day**
Questions 66, 69, and 71-74

***Daily Values for some nutrients are the maximum recommended levels while for others are minimum levels**
Question 61

***A person's individual Daily Values may be lower or higher than those on the nutrition label**
Question 60

***%DVs on the nutrition label show how one serving of various foods fit into a 2000 calorie reference diet**
Questions 54, 67, 68, and 70

***Using %DV information helps consumers fit foods into their overall daily diet rather than classify foods as good or bad**
Question 49

***Because there are predetermined criteria for all nutrient content claims, terms such as "free", "low", and "reduced" now mean the same thing from one product to another**
Question 53

APPENDIX C

We are interested in learning about the shopping habits and food labeling use of college students. Please respond to each of the following items by darkening the appropriate circle on the accompanying answer sheet. All information gained from this study will remain confidential.

1. How often do you shop for food for meals?
   a. Once a month or less
   b. 2-3 times a month
   c. Once a week
   d. 2-6 times a week
   e. At least once a day

2. How often do you shop for food for snacks?
   a. Once a month or less
   b. 2-3 times a month
   c. Once a week
   d. 2-6 times a week
   e. At least once a day

Questions 3-10:
When you shop for foods for meals or snacks, how important are each of the following in helping you make your decisions? Please rate each using the descriptors on the right.

3. Taste
4. Nutrition/healthfulness of food
5. Food safety
6. Price of food
7. Brand name
8. Food preparation time
9. Ease of preparation
10. Claims such as light and low fat

a. Not at all important
b. Not very important
c. Somewhat important
d. Extremely important

11. To what extent do you think having nutrition information on food labels is helpful?
    a. Not at all helpful
    b. Not very helpful
    c. Somewhat helpful
    d. Extremely helpful

12. Have you ever used nutrition information on food labels to help you choose food products?
    a. Yes
    b. No, (leave #13 and #14 blank, Go to #15)

13. Are you currently using nutrition label information to help you choose foods?
    a. Yes
    b. No, (leave #14 blank, Go to #15)

14. How long have you been using nutrition label information to help you choose foods?
    a. Less than 30 days, (leave #15 blank, Go to #16)
    b. 1-6 months
    c. 7-12 months
    d. Over 1 year

15. In the past month, have you thought about using nutrition label information to help you select specific foods?
    a. Yes
    b. No

16. How confident are you that you will use nutrition label information to help you choose foods the next month?
    a. Not at all confident
    b. Slightly confident
    c. Fairly confident
    d. Very confident

Questions 17-20.
Which of these are your reasons for not using nutrition labels more frequently? Answer a for yes and b for no.

17. Do not have time to read labels
18. Already know information on label/have read before
19. Not interested
20. Do not understand labels

a. Yes
b. No

Other, please specify_____

21. In the last two weeks, can you remember an instance where your decision to buy or use a food product was changed because you read the nutrition label?
    a. Yes, What kind of food product was it? Please specify_____
    b. No

22. In the past few months, have you noticed any new food labels on products you buy or use? The new food label says "Nutrition Facts" at the top instead of "Nutrition Information Per Serving."
    a. Yes
    b. No (Respond to Question #23 with "f")

23. Overall how would you rate the new food labels you have seen in comparison to the old food labels?
    a. Much worse
    b. Somewhat worse
    c. About the same
    d. Somewhat better
    e. Much better
    f. Haven't noticed, answered no to Question #22

24. How important is the detailed nutrition information on the package in helping you choose a particular type of food?
    a. Not at all important
    b. Not very important
    c. Somewhat important
    d. Extremely important

Questions 25-32:
Which of these do you feel are potential benefits of nutrition labelling? Answer a for yes, and b for no.

25. To satisfy consumers' right to know
26. To help consumers' learn more about nutrition
27. To help consumers choose foods for special diets
28. To help consumers choose more nutritious foods
29. To help consumers select a balanced diet
30. To encourage food industry to produce more nutritious foods
31. To help consumers get more nutrition for their money
32. To improve consumer confidence in the food industry

a. Yes
b. No

33. How knowledgeable do you consider yourself to be about the new labeling regulations and label format?
    a. Do not know anything about format and regulations
    b. Know very little
    c. Know some
    d. Know quite a lot
    e. Know everything

34. How well do you think you understand the nutrition information on the food label?
    a. Do not understand at all.
    b. Understand very little.
    c. Understand some.
    d. Understand quite a lot.
    e. Understand completely

35. How often do you use the serving size information on the nutrition label?
    a. Never
    b. Rarely
    c. Sometimes
    d. Often

36. What is your main purpose for using serving size information? Please choose only one.
    a. To see how many people it will serve.
    b. To see how much I/We should eat.
    c. To tell which size/how many packages to buy/use.
    d. To help me understand nutrient information.
    e. To check the amount needed for a recipe.
    f. To help me compare the nutrient characteristics of different products.

37. Based on your experience, are the number of servings listed on the food label usually about right, or do you usually find you get more or fewer servings than the package says?
    a. Usually correct
    b. More servings
    c. Fewer servings
    d. It varies
    e. Do not pay attention to serving sizes

38. How often do you use the vitamin and mineral information on the nutrition label?
    a. Never
    b. Rarely
    c. Sometimes
    d. Often

39. How often do you use the carbohydrate, protein, fat and fiber information on the nutrition label?
    a. Never
    b. Rarely
    c. Sometimes
    d. Often

40. How often do you use statements about the amount of certain nutrients in products, such as "low fat", "high fiber"?
    a. Never
    b. Rarely
    c. Sometimes
    d. Often

41. About how many of the food labels which use terms such as "low fat" do you believe are accurate?
    a. None
    b. Almost none
    c. Only some
    d. Most
    e. Just about all

Questions 42-45:
Which of the following terms are confusing, answer a if confusing and b if not confusing:

42. Light
43. Lean
44. Reduced
45. Healthy

a. Confusing
b. Not confusing

46. About how many of the food labels which use terms like light, lean, reduced or healthy do you believe are accurate?
    a. None
    b. Almost none
    c. Only some
    d. Most
    e. Just about all

The following items relate to the <u>new</u> label only.
Answer <u>a</u> if you believe the following statements to be <u>true</u> and <u>b</u> if you believe them to be <u>false</u>.

47. The serving sizes for similar products are seldom the same, for example the serving size for Corn Flakes may be different from the serving size for Wheaties and the serving size for American cheese may be different from the serving size for Swiss cheese.

48. According to new labeling regulations, nutrition information is required in a food label only if the manufacturer wants to make a nutrient content or health claim.

49. The %DV information on the label is intended to help consumers determine which foods are good and which foods are bad.

50. The serving sizes on almost all nutrition labels are listed in common household measures (such as cups and tablespoons).

51. The nutrients listed on the new nutrition label include those nutrients that relate most closely to today's important health concerns.

52. The serving size for all similar products must be the same. For example the listed serving size for all cookies must be one cookie, regardless of the type or size of cookie.

53. Terms such as "reduced fat" or "light" are not useful to consumers because manufacturers are allowed to define these terms however they wish.

54. The Percent Daily Value shows how much of a nutrient the food contributes to the diet, not how much of a nutrient is in the food.

55. The serving sizes on the nutrition label were set to be consistent with serving sizes in the Food Guide Pyramid.

56. The type of nutrition information and the way that information are presented is very similar for all products with the new label.

Answer the following statements by darkening in the appropriate circles on the accompanying answer sheet.

57. The serving sizes listed on the new label have been determined by:
    a. The manufacturers themselves
    b. Government rules

58. For which of these nutrients should you eat no more than the Daily Value amount in a day?
    a. Fiber
    b. Carbohydrate
    c. Sodium
    d. Iron

59. Serving sizes on the new label are set to:
    a. Make the products look the best
    b. Reflect the amounts people generally eat

60. If a person generally eats less than 2000 calories per day, it is recommended that the person eat:
    a. More than 65g of total fat per day
    b. Less than 65g of total fat per day
    c. Exactly 65g of total fat per day

61. For which of these nutrients should you eat at least the Daily Value amount in a day?
    a. Sodium
    b. Fat
    c. Fiber
    d. All of these

Please pull off the back page of this questionnaire now and refer to the labels there as directed in the following statements.

Use the label for Product A for the following statements.

62. Approximately what percent of calories in this product come from fat?
    a. 3%
    b. 5%
    c. 30%
    d. Information not stated on label

63. If a person ate 2 servings of product A, he or she would be eating _____ calories from fat.
    a. 30
    b. 60
    c. 130
    d. 260

64. If a person ate 1 serving of product A, he or she would be eating _____ grams of total fat.
    a. 3.5
    b. 2
    c. 5
    d. 7

65. How many servings of product A would a person have to eat to get 46g of total carbohydrate?
    a. 2
    b. 3
    c. 4
    d. Not enough information given

66. According to this label, how many grams of saturated fat are appropriate for a 2500 calorie diet?
    a. 5
    b. 20
    c. 25
    d. Information not stated on label

67. About how many servings of this product would you need to eat to get at least 100% of the Daily Value (DV) for sodium?
    a. 3
    b. 4 1/2
    c. 5
    d. 6

Use the label for Product B for the following statement.

68. If you were to eat 5 servings of this product, for which nutrient/s would you get at least 25% of the Daily Value?
    a. Total fat
    b. Total Carbohydrate
    c. Sodium
    d. Total Carbohydrate and Sodium

Use the label for Product C for the following statement.

69. The numbers for fat, saturated fat, cholesterol, sodium, total carbohydrate and dietary fiber at the bottom of this label represent:
    a. The amounts of nutrients in one serving of this food
    b. Daily recommended intakes for these nutrients

70. One serving of Product C contributes 25% DV for saturated fat. In order to meet recommendations, the total %DV for saturated fat for all other foods eaten that day should equal no more than:
    a. 5%
    b. 30%
    c. 60%
    d. 75%

Use both labels for Products A and B for the following statement. Answer a for true or b for false.

71. Product A has about 7 times as much fat as the product in Label B.

Use both labels for Products B and C for the following statements.

72. According to the %DV which of these products has less fat?
    a. Product B
    b. Product C
    c. The %DV is not different for the two products

73. Which of these products would contribute over 40% of the Daily Value for fiber in 2 servings?
    a. Product B
    b. Product C
    c. Neither of these

74. Which product contains a lot of carbohydrate and dietary fiber and only a little fat, saturated fat and cholesterol?
    a. Product B
    b. Product C
    c. Neither of these

Please give us some information about yourself:

75. What is your gender?
    a. Female
    b. Male

76. What is your age?

a. 18 or less	d. 21	g. 24
b. 19	e. 22	h. 25
c. 20	f. 23	i. Greater than 25

77. What year are you in college?

a. Freshman	d. Senior
b. Sophomore	e. Graduate
c. Junior	

78. What is your major area of study?
    a. Home Economics-Dietetics
    b. Home Economics-Food and Business
    c. Home Economics-Other
    d. Science Related-For example: Biology, Zoology, Chemistry
    e. Non-Science Related-For example: Business, Music
    f. Education-Science concentration
    g. Education-Non-science concentration
    h. Physical Education-Health
    i. Undeclared

79. Where do you live?
    a. On campus in a residence hall
    b. On campus in married student housing
    c. On campus in university apartments
    d. In a fraternity or sorority house
    e. Off campus by yourself or with a roommate
    f. Off campus with your parents
    g. Off campus with a spouse and/or children

80. Are you at present....?
    a. Married or living together
    b. Single, never married
    c. Separated/divorced/widowed

Do you or anyone else in your family have one of the following health conditions that requires a special diet? Answer a for yes and b for no.

81. Overweight
82. Underweight
83. Heart condition, angina, previous heart attack
84. High blood pressure
85. High blood cholesterol or triglycerides
86. Diabetes
87. Allergies
88. No health problems

a. Yes
b. No

Other, specify_____

89. What is your family background?
    a. Black/African American
    b. White
    c. Asian/Pacific Islander
    d. American Indian/Alaskan Native
    e. Spanish/Hispanic
    f. Other, specify_____

90. Have you ever taken a class in which you were taught about the new nutrition label?
    a. Yes
    b. No

Thank you for participating in this study. Your time is greatly appreciated!

APPENDIX D

O'Briens' (1994) Stages of Change Scaling and Scoring Algorithm

Staging Scale

Staging questions for nutrition label information use

1. Have you ever used nutrition information on food labels to help you choose food products ?

Yes	1	(Go to # 1A)
No	2	(Go to # 2)

1A. If Yes, Are you currently using nutrition label information to help you choose foods ?

Yes	1	(Go to # 1B)
No	2	(Go to # 2)

1B. If Yes, How long have you been using nutrition label information to help you choose foods ?

Less than 30 days	1	
1-6 months	2	
7-12 months	3	
over 1 year	4	(Go to # 2A)

2. In the past month, have you thought about using nutrition label information to help you select specific foods ?

Yes	1
No	2

2A. How confident are you that you will use nutrition label information to help you choose foods the next month ?

Very confident	1
Fairly confident	2
Slightly confident	3
Not at all confident	4

Staging Algorithm

Stage	Question(s)	Answer(s)	Definition
Precontemplation	1 or 1A 2	No No	Have never used nutrition label information and have not thought about using it within past month.
Contemplation	1 or 1 A 2 2A	No Yes Slightly or not at all confident	Have never used nutrition label information, have thought about using it in past month, but are not very confident they will use nutrition label information in the next month.
Decision	1 or 1A 2 2A	No Yes Fairly or very confident	Have never used nutrition label information, have thought about using in the past month, and are fairly confident they will use it in the next month.
Action	1 and 1A 1 B	Yes 6 months or less	Have used nutriton label information for 6 months or less.
Maintenance	1 and 1 A 1 B	Yes 7 months or less	Have used nutrition label information for the past 7 months or more.

APPENDIX E

Stages of Change Model

Stage of change	Characteristics
Precontemplation	The subject has active resistance to change and has no intention of changing behaviors in the future. People in this stage feel they can't fail here, they are free from social pressure. In this stage the question arises of whether help is even a possibility. People in this stage advance more freely into the next stage if they can identify with the developmental or environmental forces that are urging them to change as well as raise their conscious about the problem.
Contemplation	Subjects are eager to talk about themselves and their problems and want to change but also have the desire to resist change. People in this stage are developing an awareness. People in this stage advance into the next stage when emotional arousal is used effectively. Here a person is developing a personal conviction of the value of change. Here pros and cons of changing are considered.
Preparation or Decision	Subjects in this stage are at the cornerstone of effective action. Commitment is the most important change process available at this stage. People in this stage continue to reevaluate both themselves and their problems. In this stage people advance more readily to the next stage by focusing on the future and the "new self".
Action	Subjects in this stage purposefully modify their lives in order to alter behavior. This stage begins with commitment. In this stage the focus is on the processes of control, countering, and reward. This stage is the busiest period of change. People in this stage advance more readily to the next stage when following action oriented programs. This stage lasts for several months. The first month or two is the most likely time for relapse.
Maintenance	Subjects in this stage take all of the work that they have done in the action stage and build on it in this stage. The most common threats to maintenance are social pressures, internal challenges and special situations. The goal of maintenance is nothing short of a permanent change that becomes part of the persons personality.