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**The Effects of Goal Setting and Self-Monitoring on Dietary Behavior Change in
an Introductory Non-Major College Nutrition Class**

by

Roseanne Schnoll

**A dissertation submitted to the Graduate Faculty in Educational Psychology in
partial fulfillment of the requirements for the degree of Doctor of Philosophy,
The City University of New York**

1997

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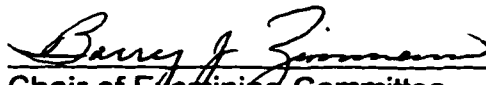
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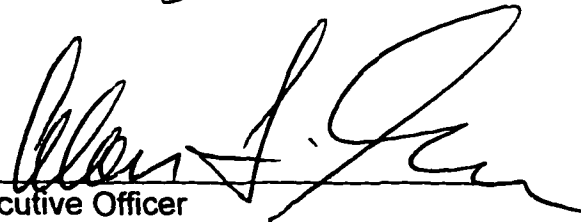
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This manuscript has been read and accepted for the Graduate Faculty in Educational Psychology in satisfaction of the dissertation requirement for the degree of Doctor of Philosophy.

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THE CITY UNIVERSITY OF NEW YORK

Abstract

The Effects of Goal Setting and Self-Monitoring on Dietary Behavior Change in an Introductory Non-Major College Nutrition Class

By

Roseanne Schnoll

Advisor: Professor Barry J. Zimmerman

A challenging task for nutrition educators is to foster dietary behavior change in our students. Studies have shown that knowledge is a necessary but insufficient condition for dietary change. Researchers have been successful in improving dietary behavior using a mixture of behavioral techniques. However, no attempt has been made to compare individual treatments with one another. The goal of this study was to investigate the effects of incorporating two self-regulatory strategies (goal setting and self-monitoring) into an nutrition education class to enhance dietary fiber self-efficacy and foster a positive change in dietary fiber consumption. One hundred and thirteen students from an undergraduate nutrition class were randomly assigned to one of four treatment conditions; goal setting (GS), self-monitoring (SM), goal setting + self-monitoring (GS + SM), and no goal setting + no self-monitoring (no GS + no SM) conditions. The GS + SM condition exhibited a significantly larger increase in dietary fiber consumption than all the other conditions, and the GS condition alone exhibited the second largest increase in fiber consumption. The GS + SM and the GS only groups showed larger increases in post dietary fiber self-efficacy than the

other groups, however, these two goal setting groups' fiber intake significantly surpassed only that of the control group. Path analysis revealed that both goal setting and self-monitoring affected dietary fiber consumption through knowledge and dietary fiber self-efficacy. In addition, goal setting had a strong direct effect on post fiber consumption. The path analysis also indicated that post knowledge affected fiber consumption only through changes in self-efficacy beliefs. This highlights the importance of self-efficacy as a mediator of the relationship between dietary knowledge and behavior change. Results were discussed based on the social cognitive model of self-regulation. Implications for training in this area and recommendations for further research were also considered.

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CHAPTER I

Introduction

One of the most important goals of our nation is to improve the quality of nutrition in order to reduce risk factors for many degenerative diseases (Committee on Diet and Health, 1989). One population which we have the opportunity to reach in educational settings is college students. Dietary assessment of this population has shown that they consume a diet high in fat and sugar and low in fiber. These dietary behaviors have been linked to an increase risk for obesity, cardiovascular disease and cancer. In addition, these young adults will soon become parents of our next generation, selecting and purchasing foods for themselves and their children. A challenging task is to provide effective dietary training techniques to improve the eating behaviors of this important population of Americans.

Research shows that after taking an undergraduate non-major nutrition class, students display an increase in nutrition knowledge but very little change in positive eating behaviors (Byrd-Bredbenner, O'Connell, Shannon, & Eddy, 1984; Johnson & Johnson, 1985; Martinez-Pons, Schnoll, & Bonner, 1991; Perron & Endres, 1985; St. Pierre & Rezmovic, 1982; Shannon & Chen, 1988; Schwartz, 1975; Sims, 1981).

To produce dietary behavior change, most researchers have concluded that self-regulatory and behavioral training such as problem identification, goal setting, problem solving, self-monitoring, self-evaluation and reinforcement must be included.

A variety of self-regulatory principles have shown increased behavior change in studies performed with various populations ranging from elementary school to college students (Coates et al., 1985; Howison, Niedermyer, & Shortridge, 1988; Skinner, 1991; White & Skinner, 1988). Unfortunately, these education programs have used a mixture of educational procedures, making it difficult to determine the effectiveness of each method. To date no attempt has been made to compare individual methods with one another. The goal of this study was to evaluate the effectiveness of incorporating two self-regulatory strategies (goal setting and self-monitoring) into an introductory nutrition education class to promote and enhance dietary self-efficacy and foster a positive change in dietary behavior.

CHAPTER II

Review of the Literature

Nutrition Education

The goal of nutrition education is to improve dietary behavior.

Research has revealed that knowledge is a necessary but insufficient condition for dietary change (Baranowski et al., 1993; Hochbaum, 1981). According to these researchers, passive learning is not enough to create permanent change, proactive instructional strategies are needed. These results have led some researchers to incorporate strategy training into various programs with some success.

For example, Howison, Niedermeyer, and Shortridge (1988) developed a behaviorally-focused nutrition education program for fifth graders. Students were asked to assess their diets by examining food groups rather than specific nutrients. They incorporated goal identification (identifying the most neglected food group), goal setting (developing specific, written plans to meet serving recommendations), role playing, problem solving and record keeping to successfully attain their recommended servings for the four food groups.

In another study, White and Skinner (1988) developed a step by step diet education behavior change program for high school students.

They integrated six concepts identified from the literature. These included personalization, goal setting, self-management, implementation, structured feedback and self-evaluation. Based on a personal dietary analysis, each student selected a goal nutrient to improve. Goal setting was related to behavior change for calcium, vitamin A, vitamin C, and sodium, but not for iron or folic acid. Although intake for these nutrients were less than the recommended dietary allowances at posttreatment, improvements were made consistent with goals set. The authors did not go into detail about the types of goals set (proximal or distal) or how students assessed their intake. The participants reported that baseline food records, comparing dietary analysis to recommendations, implementing solutions, and follow-up classes were the most helpful activities.

Coates et al. (1985) delivered a six lesson nutrition education module as part of the regular health education classes for high school students. The goal was to replace students' consumption of salty snacks with fresh fruits. The module included principles from social learning theory, including informative instruction, participatory classroom activities, personal goal setting, feedback, and reinforcement. The program was effective in decreasing the consumption of salty snack foods and increasing consumption of target snack foods. The effects, however,

lasted only until the end of the school year and changes were not maintained through summer vacation.

Skinner (1991) studied the effects of a five-step model for planned behavior change on students enrolled in a non-major introductory nutrition course. The model of awareness, development of receptive attitudes, trial, reinforcement and adoption was designed to develop skills needed to change dietary behavior. Significant changes were found for female students for calories, fat, vitamin A and C, potassium and calcium, but not for males. She maintained that relatively little course emphasis was placed on the 'trial' portion (finding appropriate solutions for their own dietary problems) of the change process and felt that an increased emphasis on goal setting may lead to greater dietary improvement in this population. She concluded that writing specific goals, finding solutions to problems (completing structured trials) and evaluating the trial experience should be the focus of future studies for behavior change.

Brinberg and Axelson (1990) tested the effectiveness of a behavioral model designed to increase the consumption of dietary fiber in college students. The authors postulated that students presented with dietary recommendations derived from their own perceptions and preferences would be more likely to increase their dietary fiber

consumption compared to students given general dietary recommendations and to a control group. Results demonstrated no significant differences between the three groups. These findings support the contention that just passively presenting information to students, even if personalized and individually tailored, is not sufficient to elicit behavior change. Individuals must take an active role in changing their behavior; this can be achieved by teaching them self-regulatory procedures such as goal setting and self-monitoring.

The results of these studies suggest that many of these interventions can be effective in facilitating health behavior changes. The problem with most of these studies, however, is that so many strategies were used to elicit change (problem identification, goal setting, problem solving, self-monitoring, self-evaluation and reinforcement), it is difficult to determine the relative contribution of each component within the context of the program. Contento et al. (1995) made clear recommendations for nutrition education research based on the results of an extensive review of past nutrition education studies. "Researchers should examine the differential contributions of the components of effective intervention. Most of the studies reviewed used a combination of strategies to produce effective outcomes. It will be valuable to know which components are most

effective” (p. 282). The authors also emphasized the need to focus not only on behavioral changes (food intake) but also on underlying psychological processes, such as health values, personal empowerment, and self-efficacy. The effects of a self-regulatory intervention on dietary self-efficacy and its relationship to dietary behavior change has not been investigated for college students in a basic nutrition course.

Another problem with many of these studies is that the interventions were performed on whole classes rather than randomly assigning students to different treatment conditions. Students who are in one class and then randomly assigned to different treatment conditions receive all the same classroom content and will therefore have a uniform educational experience. Any difference in the outcome can be attributed to the treatment conditions. We cannot make the same assumption for students who are given the treatment condition based on the class they are in. There may be preexisting differences between subjects in each group or something inherent in the different classroom experience that can contribute to the outcome.

One of the theories of self-regulation that might provide a model for understanding dietary behavior change is Social Cognitive Theory (Bandura, 1986). According to this theory, human behavior is a product of

the reciprocal interaction between the environment (social and physical factors), personal characteristics (cognition and affect), and a person's behavior (action and reaction). An important principle of Social Cognitive Theory is that goal attainment is enhanced when a person can self-regulate all three factors. Self-regulation is the process by which an individual initiates and maintains his or her behaviors, cognitions, and affects in the pursuit of a goal (Zimmerman, 1986). Self-regulation includes three subprocesses: self-observation, self-judgment, and self-reaction (Bandura, 1986; Schunk, 1991). Self-observation includes monitoring and recording behavior. It identifies the causes of behavior and provides the information needed to set realistic goals. Self-observation also helps to assess one's progress and increase one's sense of self-efficacy (Bandura, 1994). Self-judgment compares performance to the desired goals, and self-reaction is the process by which the behavior is reinforced after successfully accomplishing the desired goals. These self-regulation techniques are common intervention strategies employed in many dietary compliance studies for weight loss and cholesterol reduction (Boeckener, Kohn, & Rockwell, 1990; Chima, Miller-Kovach, Zeller, & Cook, 1990; Foreyt, Scott, Mitchell, & Gotto, 1979; Johnson, Nicklas, Arbeit, Webber, & Berenson, 1992; McMurry, Hopkins, Gould, Engelbert-Fenton,

Schumacher, Wu, & Williams, 1991; Ornish, 1990; Travers, Tan, McCleave, Murphy, & Whiting, 1992; Wiist & Flack, 1990).

Goal Setting

Goal setting affects self-efficacy, motivation and performance. According to Locke, Shaw, Saari, and Latham (1981), "Goals affect performance by directing attention, mobilizing effort, increasing persistence, and motivating strategy development" (p. 125). To enhance self-efficacy and motivation and to change behavior effectively, goals must be broken down into challenging, but attainable subgoals that are task-specific (Schunk, 1993).

The effect of proximal and distal goals on altering food intake has been investigated (Bandura & Simon, 1977). The authors compared weight loss groups who either monitored food intake only, monitored proximal goals, or monitored distal goals. All groups reduced their caloric intake compared to baseline levels; however, the group which set proximal goals reduced their intake more than the other groups. Half of the subjects who were assigned distal goals altered their condition by spontaneously adopting proximal goals. Both the self-monitoring only group and the distal goal monitoring group had only small reductions of intake and did not lose weight. This demonstrates that a critical component of self-regulation is

the adoption of attainable proximal subgoals with which to compare performance.

Mazzeo-Caputo, Danish, and Kris-Etherton (1985) compared two teaching strategies, diet (socially) directed (participants were given a dietary prescription to follow) and self-directed (individual goal setting). They found no differences between the two groups. An obvious explanation for the lack of success in the individual goal setting group was the type of goal strategies taught. Goals such as “keep healthy snacks available to eat, acquire a taste for a greater variety of foods, and develop confidence that I can continue these new behaviors” (p.554) are very vague and non specific.

In order for dietary change to occur, goals must be proximal and specific for motivating behavior change. Proximal goals are motivators for attaining long term goals since they are achieved more readily. Breaking long term goal into subgoals that are easily attainable will increase self-efficacy and provide a greater chance of success. Specific goals are easier to measure and give individuals the opportunity to accurately evaluate their performance and compare it to their goals (Schunk, 1991).

Self-Monitoring

Self-monitoring provides individuals with the opportunity to evaluate and compare their diets with the new goals presented. This assists them in recognizing specific dietary excesses and deficiencies and in adjusting their intake (McCann et al., 1990). The process of recording one's behavior often leads to spontaneous behavior change, an effect known as "reactivity" (Watson & Tharpe, 1992);

In the area of dietary modification for weight control, there are many examples of the benefits of utilizing self-monitoring strategies. For example, Flanery and Kirchenbaum (1986) evaluated 11 weight loss strategies employed by overweight children. Keeping a daily weight chart was the only technique found to be associated with weight loss maintenance 1 1/2 years after treatment. They also reported an association between consistent use of the self-monitoring strategy and improved weight loss. Guare, Wing, Marcus, Epstein, Burton, and Gooding (1989) found that recording food intake was an important process for weight loss. The participants who continued to record their daily intake lost an average of 18 pounds during a year long posttreatment period, while the participants who did not record their intake, or recorded inconsistently, lost an average of 5 pounds. Fisher, Lowe, Jeffrey,

Levenkron, and Newman (1982) reported that dieters who stopped recording their food intake during a 3 week vacation gained 57 times as much weight as those participants who continued to self-monitor. Baker and Kirschenbaum (1993) found that participants lost more weight during the weeks in which they monitored more consistently compared to the weeks in which they monitored less consistently.

In other research, Spurduto, Thompson and O'Brien (1986) examined the effects of monitoring and charting targeted eating behaviors on drop out rate and number of pounds lost in 8 out of 16 weight reduction groups. The eight groups that employed the diet monitoring demonstrated a higher completion rate, and averaged over a 6 pound greater weight loss than the matched control groups. These differences were still evident three months after the treatment program. Gormally and Rardin (1981) found that 75% of weight loss maintainers, but only 19% of relapsers consistently monitored their body weight and/or their food behavior. The previous research supports the importance of consistent self-monitoring in adhering to a weight loss regimen.

The effects of self-monitoring of diet and exercise on changes in risk factors for cardiovascular disease was investigated (Madsen et al., 1993). The authors found self-monitored changes in diet correlated with

changes in body mass index, systolic blood pressure, total cholesterol, and LDL cholesterol at 12 and 24 months.

Most of the self-monitoring literature for diet includes research with subjects who are already overweight or have cardiovascular disease. Little attention has been given to preventing these problems and encouraging healthy eating. In addition, there is no literature addressing the effect of self-monitoring on self-efficacy.

Goal Setting and Self-Monitoring

Goals setting combined with self-monitoring is a powerful tool to promote behavior change. Baron and Watters (1981) found that monitoring caloric intake in combination with goal setting resulted in greater weight loss than monitoring caloric intake alone. Kayman, Buvold, and Stern (1990) compared successful maintainers of weight loss with relapsers. They found that the maintainers used self-regulatory activities, such as goal setting and self-monitoring of food intake and weight, while the relapsers did not.

Previous research on the effects of nutrition education for elementary, high school, and college students suggest that goal setting and self-monitoring are effective methods for behavior change when used in combination with other strategies (Howison et al., 1988; White &

Skinner, 1988; Coates et al., 1985). Unlike research in other health areas (e.g. diet, exercise, and smoking), however, goal setting and self-monitoring have not been specifically investigated in the classroom setting.

Self-Efficacy and Behavior Change

An individual's behavior is mediated through self-efficacy expectations (Bandura, 1977). According to Bandura (1986) the motivation to perform a specific behavior is driven by the individual's confidence that he or she can perform the actions necessary to produce the specific behavior. This position has been supported in the health education literature. Subjects who had high self-efficacy to follow a particular dietary regimen, quit smoking, exercise, follow a medical protocol, monitor blood sugar, or alter other health behaviors, were more likely to be successful. Perceived self-efficacy was the only factor that predicted adherence to all components of a diabetic self-management program (McCaul, Glasgow, & Schafer as cited in Bandura, 1994). DiClemente, Prochaska, and Gibertini (1985) found that subjects with high self-efficacy scores initiated smoking cessation and were able to remain abstinent.

Studies on weight control suggest that dieting self-efficacy is a predictor of weight loss. Individuals high in weight loss self-efficacy were more successful in reaching their weight goals (Shannon, Bagby, Wang, & Trenkner, 1990). Glynn and Ruderman (1986) found that those individuals who scored high on an Eating Self-Efficacy Scale had increased adherence to the diet and higher weight losses.

In the area of nutrition education, Ward (1990) investigated the effects of dietary self-efficacy on food choices in a group of high school students. Ward found significant correlations between dietary self-efficacy ratings across all food choice categories. The findings showed that dietary self-efficacy perceptions are related to more positive eating habits and the author speculated that "it may be important to assist students in enhancing dietary self-efficacy perceptions" p. 131.

Bandura proposed that one's self-efficacy can be influenced by four major sources of information; personal experience, vicarious experience, verbal persuasion, and physiological cues (Bandura, 1977). An individual's prior experiences performing the behavior or a similar behavior is the most powerful source of information. An individual's prior success strengthens self-efficacy. Vicarious experience is another source of information, observing similar models perform the behavior successfully

can influence the individual's belief in his or her capabilities. A third approach is verbal persuasion which has been used often by health care workers to encourage individuals to make dietary behavior changes. The strength of the effect varies depending on the perceived credibility of the persuader. Finally, individuals judge their capabilities based on emotional arousal or physiological states. Situations that produce anxiety, tension, stress and hunger evoke emotional arousal and may have a negative impact on self-efficacy. Whether or not one can perform in the face of negative physiological signals provides personal information concerning one's competency. Individuals susceptible to anxiety may become preoccupied with their perceived inadequacies and fail (Bandura, 1986). Researchers have taken these information sources seriously and major attempts have been made to build these components into programs to increase self-efficacy for various behaviors.

Bernier and Avard (1986) reported that posttreatment self-efficacy was significantly related to maintenance of weight loss at a six week follow-up. McCann, Retzlaff, Dowdy, Walden, and Knopp (1990) reported that self-efficacy was enhanced through an eight week nutrition education program designed to lower cholesterol levels. The program offered dietary information to reduce fat and incorporated self-regulatory strategies

focusing specifically on goal setting and self-monitoring. Subjects who scored higher on an eating self-efficacy scale (i.e., believed they were capable of adhering to the diets in the face of temptation) reported better dietary compliance and greater reduction in LDL cholesterol than subjects with lower self-efficacy ratings at the first year of follow up.

Self-efficacy influences the choice of behavior and the effort required to achieve that behavior goal (Baldwin & Galciglia, 1995). Conversely, the repetition of the performance of a single task or behavior builds a person's self-efficacy, which in turn effects task persistence.

Dewolfe (1989) examined the effects of a heart healthy nutrition education class on self-efficacy and eating behavior change. She predicted that knowledge of heart disease and heart healthy eating practices would enhance eating self-efficacy and food choices. She found that post-course knowledge had no effect on self-efficacy or on food selection directly or indirectly (through their effects on self-efficacy). This also supports the contention that to increase self-efficacy, passive forms of education are not sufficient. To enhance dietary self-efficacy and promote dietary changes active self-regulation of food intake is necessary. The author concluded that "educators should be concerned with helping students strengthen confidence or self-efficacy to change eating

behaviors... Giving students opportunities to practice new behaviors and building in ways to provide feedback should strengthen self-efficacy” (p. 218). Instructions for improving knowledge is a passive form of education. To change behavior, individuals must take an active role which involves the proactive strategies of setting proximal, specific (daily) goals in addition to self-monitoring behavior.

Self-regulation is the individual’s ability to set specific and attainable goals, employ effective strategies for attaining the goal, and self-monitor to evaluate his or her success in attaining the goal. Self-efficacy is an important predictor for self-regulatory success. An individual's belief in his or her capability to perform a behavior required to achieve a goal is a prerequisite for actual performance of self-regulatory strategies. Setting attainable goals, self-monitoring and self-reward are used to increase self-efficacy and improve motivation to initiate and maintain dietary change. Unless self-efficacy is enhanced, subjects will fail to self-regulate.

The present study evaluated the effectiveness of incorporating self-regulatory strategies into a nutrition education curriculum to promote and enhance dietary self-efficacy and foster a change in dietary fiber consumption. Since prior nutrition education studies used a mixture of

self-regulatory instructional procedures, it is difficult to determine the relative effectiveness of each procedure. Furthermore, these studies have not specifically investigated the effect of goal setting and self-monitoring alone on dietary behavior change or its effect on self-efficacy to influence behavior change.

Fiber Consumption

A nutrition class may be the only opportunity students will have to be exposed to nutrition education. So encouraging dietary change, in addition to increasing nutrition knowledge, is an important goal. The focus of this study is to increase dietary fiber consumption. Researchers have found a link between fiber intake and the prevention of various degenerative diseases including cancer and cardiovascular disease (Brinberg & Axelson, 1990; Truswell, 1994; Anderson, Smith & Gustafson, 1994). Increasing fiber also plays a role in decreasing diseases of the bowel including constipation, hemorrhoids, diverticulosis and colon cancer (Heaton, 1994). Other benefits of increasing fiber intake is reduced blood pressure, improved glycemic control in diabetics, and increased satiety levels leading to improved weight loss and maintenance (Anderson et al., 1994; "Health Implications of Dietary Fiber," 1993). As the evidence mounts, health professionals are strongly advocating increasing the

consumption of dietary fiber. The average fiber intake in the US is about 10-13 grams per day (Lanza, 1987). Tilgner and Schiller (1989) assessed the crude fiber intake of female college students. The students ingested an average of 3.8 grams of crude fiber, which translates into approximately 7-11 grams of dietary fiber per day. Nicklas, Farris, Myer, and Berenson (1995) reported an average daily dietary fiber intake of 12 grams for 19-28 year olds.

The National Cancer Institute (NCI), the National Academy of Sciences (NAS), and the Food and Drug Administration (FDA) recommend tripling our intake to 25-35 grams of dietary fiber per day. The World Health Organization recommends a daily intake of 27-40 grams of dietary fiber per day. The American Dietetic Association ("Health Implications of Dietary Fiber," 1993) recommends a daily fiber intake of 20-35 grams. Increasing dietary fiber encourages students to increase their consumption of fruits and vegetables which also provide important phytochemicals and antioxidant nutrients which have been found to reduce the risks for diabetes, cancer and heart disease as well. Consuming fiber rich foods also replaces low nutrient dense foods (food high in fat and sugar) with high nutrient dense foods increasing satiety and promoting bowel regularity.

The task of self-regulating dietary fiber intake in the healthy population is a challenging one. In fat reduction studies, subjects are more motivated to monitor intake since weight loss or blood cholesterol reduction are highly valued outcomes. However, increasing dietary fiber consumption does not provide immediate visible benefits in the healthy population. Under these conditions, strategy training and self-efficacy enhancement must be the factors that motivate subjects to change their behaviors. Subjects who perceive the greatest self-efficacy to monitor fiber goals are more likely to show the greatest behavior change and maintenance of change.

None of the prior strategy training studies focused on dietary fiber as the dependent measure. In addition, by using a path analysis model, it was possible to look at post dietary fiber self-efficacy as both an independent and dependent variable. It was studied as an independent variable by examining the effects of post fiber self-efficacy on dietary fiber consumption and as a dependent variable by examining the effects of goal setting and self-monitoring on dietary fiber self-efficacy.

Objectives

The purpose of this study was to examine the effects of specific components of social learning theory (dietary fiber self-efficacy, goal-

setting and self-monitoring) on dietary fiber consumption in students receiving nutrition education. Dietary fiber self-efficacy can be defined as the student's confidence that he or she can perform the actions necessary to increase dietary fiber consumption. Goal setting entails setting proximal daily fiber goals, and self-monitoring entails recording daily fiber intakes.

The following research questions were examined:

- What is the effect of proximal goal setting and self-monitoring on dietary fiber consumption?
 - a. Does setting proximal goals increase dietary fiber consumption?
 - b. Does monitoring dietary fiber intake increase dietary fiber consumption?
 - c. Is there an additive effect of goal setting and self-monitoring?
- What is the effect of proximal goal setting and self-monitoring on dietary fiber self-efficacy?
 - a. Does setting proximal goals increase dietary fiber self-efficacy?
 - b. Does self-monitoring increase dietary fiber self-efficacy?
 - c. Is there an additive effect of goal setting and self-monitoring?
- Does goal-setting and self-monitoring affect dietary fiber consumption through mediation of knowledge and dietary fiber self-efficacy?

Hypotheses

This study explored seven hypotheses:

H1: The combination of goal setting and self-monitoring (gp 3) will produce a larger increase on dietary fiber consumption than either condition alone.

H2: The individual treatment conditions, goal setting (gp 1) and self-monitoring (gp 2) will produce a larger increase in dietary fiber consumption than the no goal setting + no self-monitoring condition (gp 4).

H3: There will be no difference in dietary fiber consumption between the no goal setting + no self-monitoring condition (gp 4) and the control group (gp 5).

H4: The combination of goal setting and self-monitoring (gp 3) will produce a larger increase on dietary fiber self-efficacy than either condition alone.

H5: The individual treatment conditions goal setting (gp 1) and self-monitoring (gp 2) will produce a larger increase in dietary fiber self-efficacy than the no goal setting + no self-monitoring condition (gp 4).

H6: There will be no difference in dietary fiber self-efficacy between the no goal setting + no self-monitoring condition (gp 4) and the control group (gp 5).

H7: The effects of goal setting and self-monitoring on dietary behavior change is mediated by nutrition knowledge and dietary fiber self-efficacy.

CHAPTER III

Method

Design

Undergraduate students in an introductory non-major nutrition education class participated in a study of dietary behavior change. All students received the education component normally given in the class. They completed a demographic/ medical history survey (Appendix A), which was designed to ascertain a) who in the household is responsible for food purchasing and preparation, b) family history of disease, c) food allergies, and d) dieting history. The participants also completed diet diaries (see Appendix B) before and following the interventions. They used a pocket food data book (Ulene, 1995) which lists the fiber grams for over 30,000 foods to analyze their diets for fiber intake for an average of three days. The analyses were checked by the researcher for errors. Dietary fiber self-efficacy questionnaires and knowledge instruments were also completed. Using a table of random numbers, students were randomly assigned to one of four experimental conditions:

1. Proximal goal setting only (GS)
2. Self-monitoring only (SM)
3. Proximal goal setting and self-monitoring (GS + SM)

4. No goal setting and no self-monitoring (no GS + no SM)

Another group was added to serve as a control group. These subjects were selected from a non-nutrition class and did not receive the nutrition education (knowledge) component or any interventions. They completed the pre and post diet diaries, knowledge, and self-efficacy instruments.

Dependent Variables

The dependent variables in the study are post tests of dietary fiber intake, dietary fiber self-efficacy, and knowledge (see Table 1 for study design).

Sample

One hundred and thirty-nine students participated in the study. Seventy-two percent were female and 28% were male. One hundred and thirteen students (83 female and 30 male) were enrolled in a non-nutrition major introductory nutrition class and were randomly assigned to one of the four experimental conditions. Each of the four groups included approximately 7-9 males and 20-23 females. Twenty-six other students (17 female and 9 male) from a different (non-nutrition) class served as the control group. The mean age for both males and females was 23. Fifty-nine percent of the students were Caucasian, 19% were African-American, 11% were Hispanic, and 11% were Asian.

Table 1. STUDY DESIGN

	Pre-know. test	Diet Diary	Pre Self-Efficacy	Nutrition Education	Inter-vention	Post-know. test	Post diet diary	Post Self-Efficacy
Group 1	√	√	√	√	GS	√	√	√
Group 2	√	√	√	√	SM	√	√	√
Group 3	√	√	√	√	GS + SM	√	√	√
Group 4	√	√	√	√	no GS/ no SM	√	√	√
Group 5	√	√	√	no	no	√	√	√

Instruments

The following instruments were developed for the study:

Dietary fiber self-efficacy questionnaire. (See appendix C). Self-efficacy can be assessed by asking an individual a) to indicate whether or not he or she thinks he or she can do a specific behavior at the present time and b) to indicate his or her confidence of success on a probability scale (Bandura, 1977). A self-efficacy scale for dietary fiber intake was developed for this study. The dietary fiber self-efficacy scale contained items which examined students' confidence in following a diet ample in dietary fiber. The scale ranged between 0 and 100 points with 10 unit intervals. The following instructions were given to the participants:

"Please rate your confidence that you can do the following: Indicate your degree of confidence by circling the appropriate numbers."

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Definitely <u>Cannot</u> do it	Probably Cannot	Maybe (50/50)	Probably Can	Definitely <u>Can</u> Do It
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Knowledge instrument. (See appendix D). A 25 item multiple choice instrument was developed to assess students' knowledge of fiber (i.e., sources and clinical application of dietary fiber).

Psychometric assessment

Pearson Product Moment Correlations Coefficients were used to determine the test-retest reliability of these instruments, and Cronbach's Alpha was used to determine their internal consistency reliability. For the knowledge scale, test-retest reliability (two week interval) was $r = .63$, $p < .05$. Internal consistency for the knowledge scale was $\alpha = .71$. To assure content validity for the knowledge instrument, a panel of nutrition experts from the Brooklyn College Health and Nutrition Science Department reviewed the items for accuracy. For the dietary self-efficacy scale, test-retest reliability (two week interval) was $r = .80$, $p < .05$. Internal consistency for the dietary fiber self-efficacy scale was $\alpha = .96$.

Intervention

Goal setting group. Students in the goal setting group were assigned the task of setting goals for increasing their dietary fiber intake. After recording the proximal goal of increasing their daily fiber intake by 5 grams for the first week, they proceeded to increase their fiber intake by 5 grams per week until reaching their distal goals of 25-35 grams of dietary fiber per day (see appendix E). For example, if the dietary analysis revealed that a subject consumed only 10 grams of fiber, the first week, he or she was asked to set the goal of increasing dietary fiber intake by 5

grams, the second week another 5 grams, and by week 4 he or she recorded the goal of consuming 30 grams of fiber per day, well within the dietary goals of 25-35 grams. Students recorded the written goals daily and submitted them twice weekly at each class meeting. At the end of the study, they were debriefed to determine whether they spontaneously self-monitored their dietary intake.

Self-monitoring group. The self-monitoring group did not set goals, but recorded their fiber intake daily on the daily fiber monitoring forms (see appendix F). They submitted these forms to the researcher twice a week. At the end of the study, they were debriefed to determine whether they spontaneously set goals.

Goal setting and self-monitoring group. The students in the goal setting and self-monitoring group set written goals for increasing their daily fiber intake by 5 grams for the first week, increasing 5 grams per week until they reached the goal of 25-35 grams per day. They recorded these written goals each day. They completed the daily fiber monitoring forms on a daily basis and submitted it along with the written goals twice a week.

No goal setting and no self-monitoring group. These students did not receive any of the above training for increasing dietary fiber consumption. To give the appearance that they were in a viable treatment

group, they were asked to monitor their daily activity level and to submit the self-monitoring forms to each class meeting.

Control group. Students in a non-nutrition class with a similar demographic profile were selected for the control group. They completed a pre and post diet diary, the pre and post knowledge and dietary fiber self-efficacy instruments.

Human Subjects Approval

A proposal was submitted to the Brooklyn College Committee on the Rights and Welfare of Human Subjects and to the CUNY Graduate School and University Center Committee on the Protection of Human Subjects. Approval was granted on January 30, 1996 (see Appendix G1) from Brooklyn College, and on September 5, 1996 from the CUNY Graduate School (Appendix G2).

Procedure

The demographic intake sheet and the knowledge test were administered to students on the second day of class. On the second week of class, all students were trained to keep a three-day food diary. The diet diaries were submitted by week four of the course. After submitting the food diaries, students completed the dietary fiber self-efficacy questionnaire. Students were then randomly assigned to the four

experimental groups and trained in the intervention on the 7th week of class, after the lecture on dietary fiber (see Appendix H1: Procedure Scripts and Appendix H2: Instructional Format For Fiber Lecture). The four week intervention took place between week 8 and week 12 of this 14 week course. The written dietary goals and dietary fiber forms were submitted at each class meeting (twice a week) by the appropriate treatment groups (see Appendix I, Procedure Table). Students were asked not to communicate with individuals in the other treatment groups until after the study. After the intervention, the post dietary analyses, dietary fiber self-efficacy and knowledge instruments were administered and compared with the pretest data. At the end of the study, students were debriefed. To account for possible contamination, a questionnaire was developed to examine students' practices during the intervention (see Appendix J).

CHAPTER IV

Results

Statistical Tests

Descriptive statistics included the means and standard deviations of all the dependent variables (pre and post dietary fiber intake from diet analysis, dietary fiber self-efficacy scores, and fiber knowledge scores) in the experimental conditions. The data for each dependent variable was analyzed using analysis of variance. Path analysis was conducted to analyze the causal linkages among the dependent and independent variables. A chi square was calculated to determine differences in bowel frequency among the groups.

Dietary fiber intake. A t-test was performed to investigate gender differences in post dietary fiber intake. Since no differences were found for gender, $t(71) = 1.81$, $p = .08$, students' scores were combined. The means and standard deviations for pre and post dietary fiber intake for the entire sample by group appear in Table 2. Analysis of variance results revealed no significant differences among the groups on prefiber scores, $F(4, 134) = .91$, $p = .46$, thus confirming the effectiveness of assignment procedures. ANOVA results for post dietary fiber scores showed significant differences between the groups, $F(4, 134) = 16.54$, $p < .0001$.

Newman-Keuls post hoc comparisons revealed that dietary fiber for the goal setting + self-monitoring group (gp 3), was significantly higher than the goal setting (gp 1), self-monitoring (gp 2), no goal setting + no self-monitoring (gp4), and control groups (gp 5). In addition, the goal setting only group (gp 1) had significantly higher post fiber scores than the self-monitoring (gp 2), no goal setting + no self-monitoring (gp 4) and control groups (gp 5).

The four treatment conditions depicted in figure 1 shows that self-monitoring has significant effect on post fiber intake only when students set goals.

Table 2

Means and Standard Deviations for Pre and Post Fiber Consumption

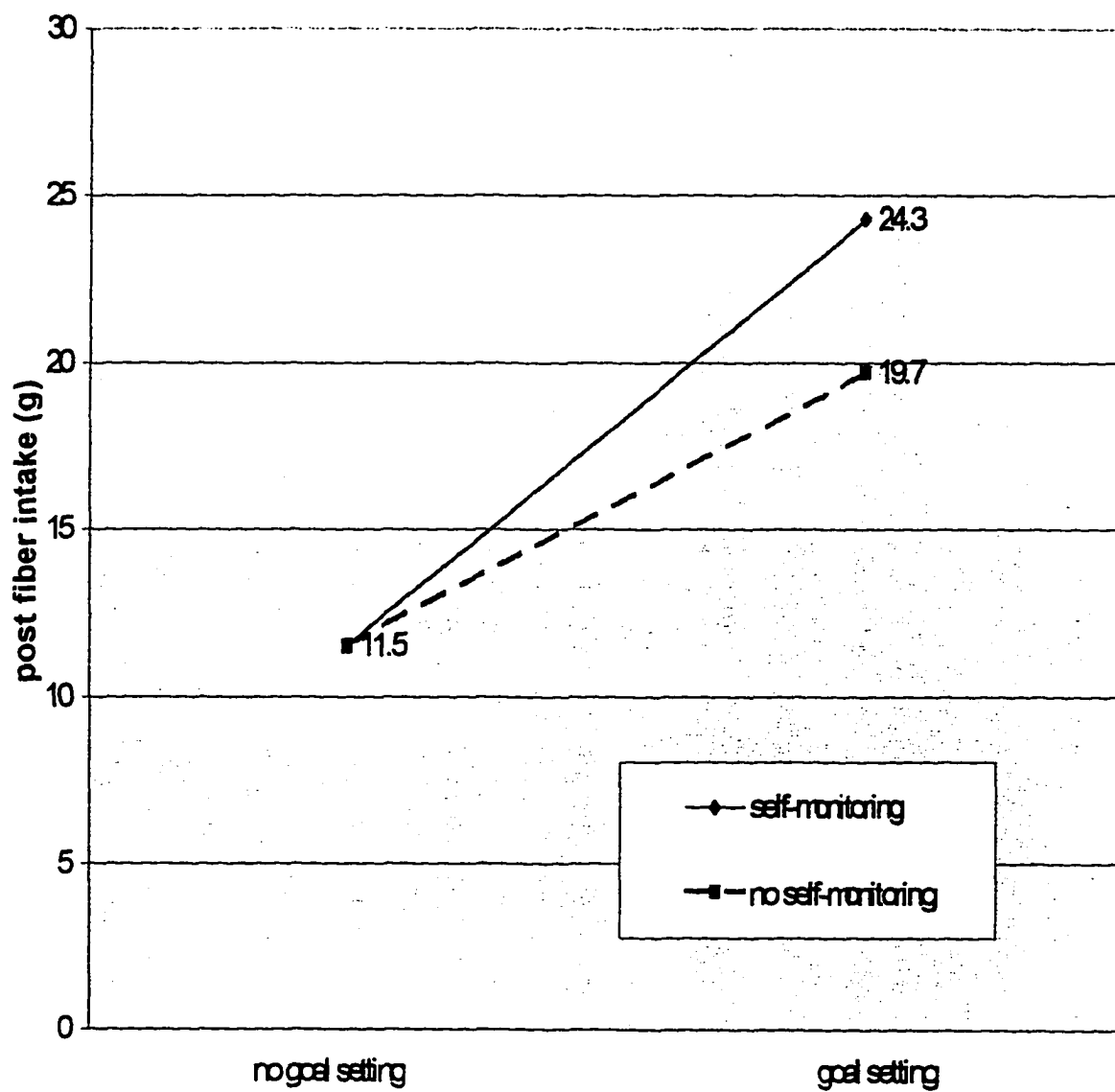
Group	Pre-Dietary Fiber Mean	SD	Post-Dietary Fiber Mean	SD
Gp 1 GS	11.84	8.97	19.72 [†]	9.79
Gp 2 SM	9.99	5.16	11.50	4.01
Gp 3 GS+SM	12.95	8.21	24.33*	10.25
Gp 4 no GS+no SM	9.90	4.79	11.53	5.78
Gp 5 control	11.70	8.08	11.22	7.53

*p < .05, differences in post fiber intake between group 3 compared to groups 1, 2, 4, and 5; using Newman-Keuls post hoc comparisons.

[†]p < .05, differences between group 1 compared to groups 2, 4, 5; using Newman-Keuls post hoc comparisons.

Figure 1

Effect of goal setting and self-monitoring on post dietary fiber consumption



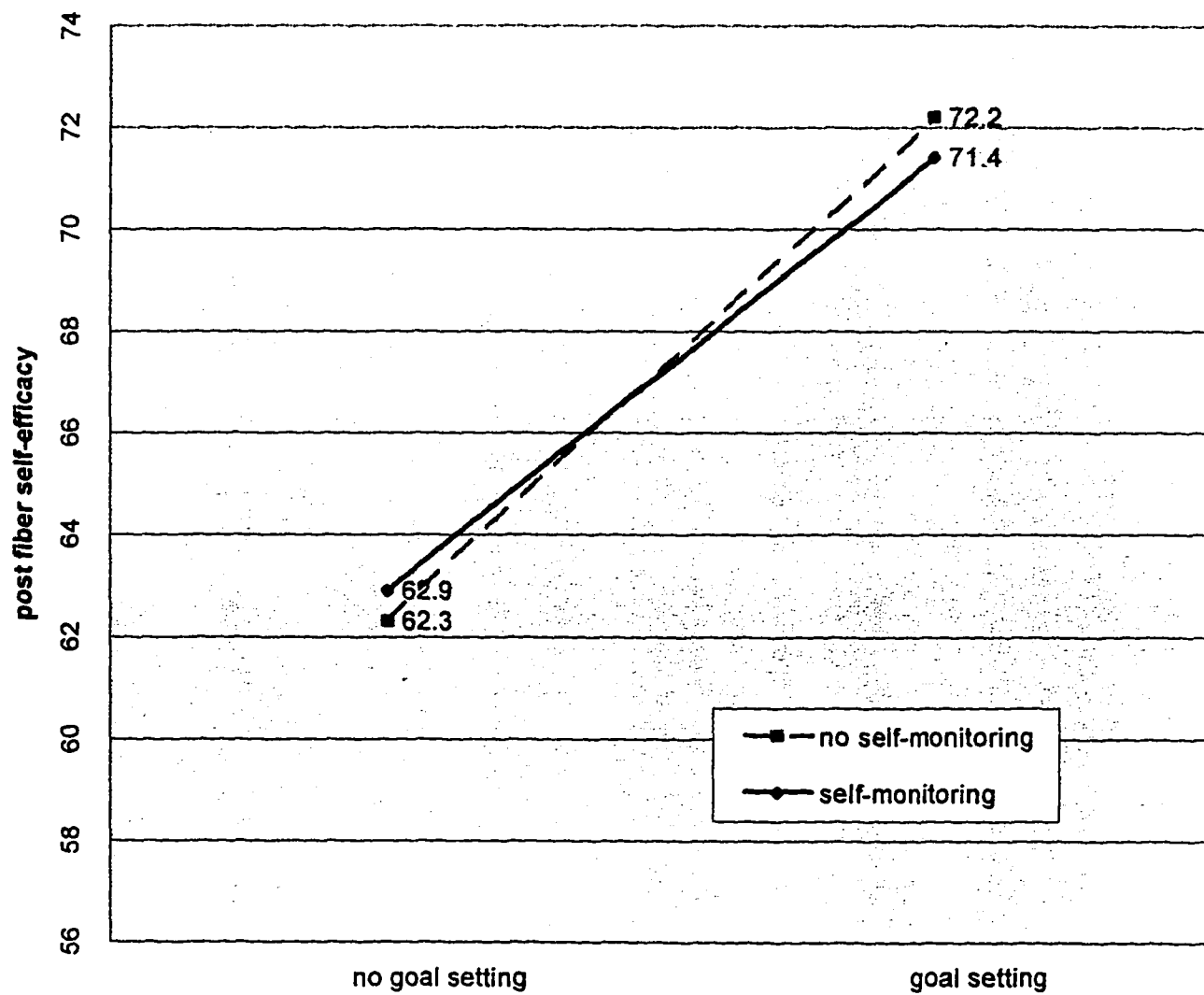
Dietary fiber self-efficacy. A t-test for gender differences was performed. Since no differences were found $t(68) = .11, p = .91$, students' scores were combined. The means and standard deviations for pre and post self-efficacy for the entire sample by group appear in Table 3. Analysis of variance results revealed no significant differences among the groups on preself-efficacy scores, $F(4, 134) = .88, p = .48$, thus confirming the effectiveness of assignment procedures. ANOVA results for post self-efficacy scores showed significant differences between the groups, $F(4, 134) = 3.46, p = .01$. Newman-Keuls post hoc comparisons revealed that the goal setting (gp 1) and goal setting + self-monitoring group (gp 3) were significantly different from the control group (gp 5). Although the goal setting (gp 1) and the goal setting + self-monitoring group (gp 3) numerically surpassed the self-monitoring (gp 2) and the no goal setting + no self-monitoring group (gp 4), these differences did not reach statistical significance.

The four treatment conditions are depicted in Figure 2. Only goal setting appears to exert a significant effect on post dietary fiber self-efficacy.

Table 3**Means and Standard Deviations for Pre and Post Self-Efficacy Scores**

Group	Pre-Dietary SE Mean	SD	Post-Dietary SE Mean	SD
1 GS	60.20	22.32	72.16*	16.46
2 SM	56.50	15.63	62.94	15.21
3 GS+SM	62.15	18.27	71.36*	17.98
4 no GS+no SM	53.99	15.19	62.32	20.93
5 control	58.66	16.17	57.85	16.86

* $p < .05$, differences between post self-efficacy scores for groups 1 and 3 compared to group 5, using Newman-Keuls post hoc comparisons.

Figure 2**Effect of goal setting and self-monitoring on post dietary fiber self-efficacy**

Nutrition knowledge. A t-test for gender differences was performed. Since no differences were found, $t(62) = -1.11, p = .27$, students' scores were combined. The means and standard deviations of pre and post test for the entire sample by group appear in Table 4. Analysis of variance outcomes revealed no significant differences among the groups on preknowledge scores, $F(4, 133) = 1.08, p = .37$, thus confirming the effectiveness of assignment procedures. ANOVA outcomes for post knowledge scores showed significant differences between the groups, $F(4, 134) = 5.97, p = .0002$. Newman-Keuls post hoc comparisons revealed that all four groups who received the nutrition education had significantly higher scores than the control group.

Table 4

Means and Standard Deviations for Pre and Post Knowledge Scores

Group	Pre-Knowledge Mean	SD	Post-Knowledge Mean	SD
1 GS	13.29	3.51	16.59*	3.51
2 SM	12.31	2.56	16.17*	3.41
3 GS+SM	12.62	3.36	17.00*	2.56
4 no GS+no SM	11.88	3.67	15.12*	4.73
5 control	11.65	2.90	12.73	3.75

* $p < .05$, differences between post knowledge scores for groups 1-4 compared to group 5 using Newman-Keuls post hoc comparisons.

Bowel Frequency

A Chi Square was calculated to determine differences in bowel frequency among the groups. Table 5 shows the tabulated outcome. As evidenced by an examination of the table, 79% of the subjects in the goal setting group (gp 1) and 76% of the goal setting + self-monitoring group (gp 3) reported an increase in bowel frequency. By contrast, 31% of the subjects in the self-monitoring group (gp 2), and only 19% of the subjects in the no goal setting + no self-monitoring group (gp 4) reported an increase in bowel frequency. Overall, the differences among the groups are statistically significant, $\chi^2 (3, N= 113) = 33.43, p < .0001$.

Table 5

Chi Square test for groups by bowel frequency

Increase in Bowel Frequency

<u>Group</u>		yes	no	bowel freq. % increase
GS	gp 1	23	6	79%
SM	gp 2	9	20	31%
GS + SM	gp 3	22	7	76%
no GS + no SM	gp 4	5	21	19%

Path analysis

Path analysis was used to determine whether the effects of goal setting and self-monitoring dietary fiber intake were mediated through the intervening variables knowledge and self-efficacy. This procedure was also used to control for the effects of the covariates within the model, pre dietary fiber intake, pre dietary fiber self-efficacy, and pre knowledge scores.

The correlation matrix, means and standard deviations appear in Table 6. Examination of this table reveals a high correlation between goal setting and post dietary fiber intake ($r = .55, p < .001$). Post dietary fiber self-efficacy scores were also highly correlated to post dietary fiber intake ($r = .45, p < .001$). Self-monitoring was significantly correlated to post fiber intake ($r = .19, p < .05$), and post knowledge scores were also significantly correlated to post fiber intake ($r = .35, p < .001$). However, further investigation revealed that although self monitoring and post knowledge scores were significantly correlated to post fiber intake, these correlation proved to be non-significant once the effects of the other variables were statistically controlled.

The analysis results are presented in Figure 3. Pearson correlation coefficients appear inside the parentheses, the path coefficients

(correlations between linked variables corrected for the effect of other variables on the model) are presented as regression weights and are outside the parentheses, and the multiple correlation coefficients, which can be used to calculate the total amount of variance explained for each dependent variable, are represented by R . Basic Statistics System (BSS; Martinez-Pons, 1991), a statistical computer package was used to perform the path analysis.

The final path model had eight variables; goal setting, self-monitoring, pre and post knowledge, pre and post dietary fiber intake, and pre and post dietary fiber self-efficacy. A Chi Squared test was performed to test the reduced models soundness, $\chi^2 (N = 138, 6) = 5.69, p = .46$, indicating a good fit of the data.

Sixty-seven percent of the variance in post fiber intake ($R = .82, p < .05$) was explained by prefiber intake, goal setting, and post dietary fiber self-efficacy. There was a strong direct effect of prefiber on post fiber intake, $P = .54, p < .05$, (P stands for the path coefficient). When the effects of prefiber intake were statistically controlled, the direct effect of goal setting on postfiber intake was statistically significant, $P = .41, p < .05$. In addition, post dietary fiber self-efficacy also contributed significantly to the post fiber measure, $P = .23, p < .05$.

Forty-nine percent of the variance in post dietary fiber self-efficacy ($R = .70, p < .05$) was explained by pre dietary fiber self-efficacy, goal setting and postknowledge. A strong direct effect of pre dietary fiber self-efficacy on post dietary fiber self-efficacy ($\beta = .60, p < .05$) was found. When the effects of pre dietary fiber self-efficacy were statistically controlled, the direct effect of goal setting on post dietary fiber self-efficacy was statistically significant although moderate ($\beta = .15, p < .05$). In addition, the contribution of post knowledge on post dietary fiber self-efficacy also proved to be moderate and statistically significant ($\beta = .17, p < .05$).

Finally, twenty-three percent of the variance in post knowledge scores ($R = .48, p < .05$) was explained by goal setting, self-monitoring and preknowledge scores. A direct effect of preknowledge on postknowledge ($\beta = .36, p < .05$) was found. When the effects of preknowledge was statistically controlled, the direct effect of goal setting on post knowledge was $\beta = .18, p < .05$; and the direct effect of self-monitoring on post knowledge was also $\beta = .18, p < .05$.

Table 6**Correlations Matrix for Variables in the Path Model**

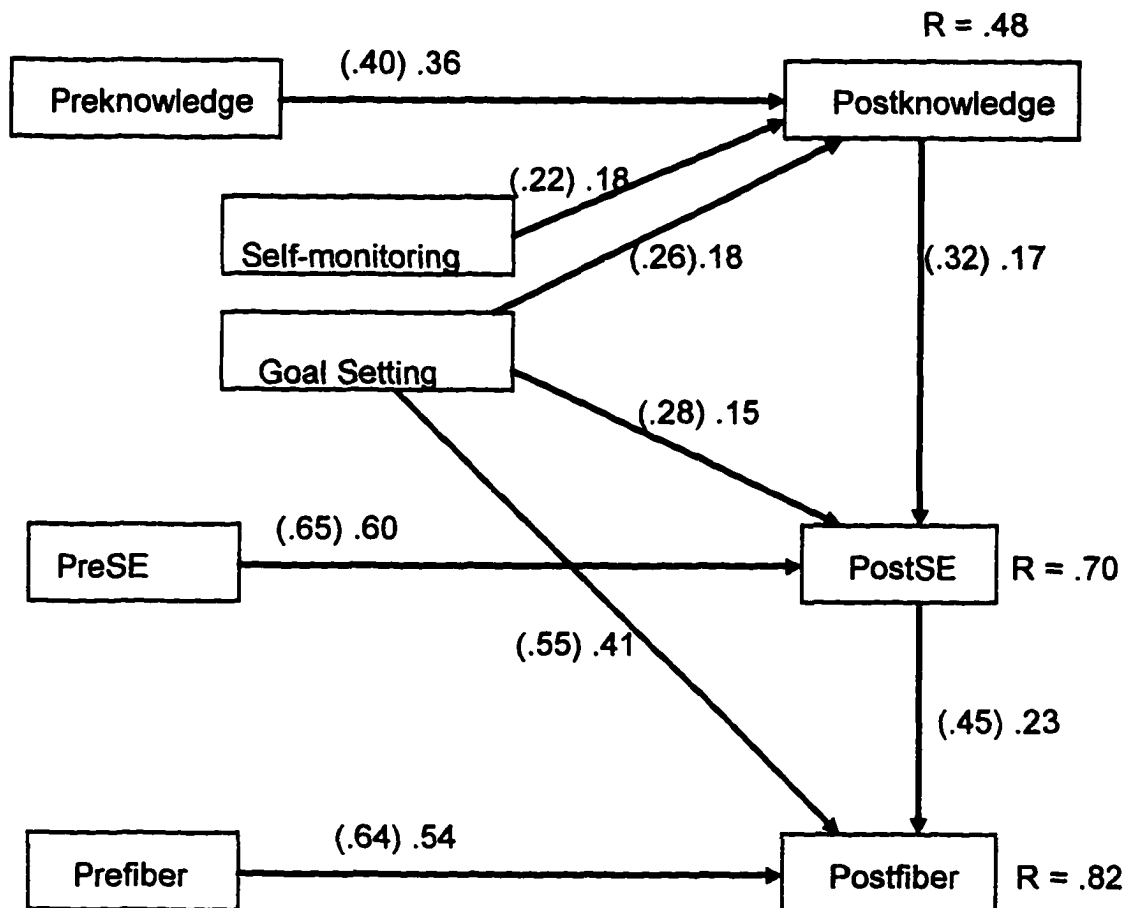
	2	3	4	5	6	7	8	M	SD
1. Preknow	.24**	.16	.03	.15	.40**	.17*	.14	12.37	3.22
2. PreSE	1.00	.32***	.04	.14	.17*	.65***	.33***	58.44	17.82
3. Prefiber		1.00	.02	.13	.15	.18*	.64***	11.29	7.29
4. SM			1.00	.15	.22**	.08	.19*	----	----
5. GS				1.00	.26**	.28**	.55***	----	----
6. Postknow					1.00	.32***	.35***	15.59	3.90
7. PostSE						1.00	.45***	65.38	18.09
8. Postfiber							1.00	15.77	9.49

* p < .05

** p < .01

*** p < .001

Figure 3. Path Analysis Outcomes



$$\chi^2 (N=138, 6) = 5.69 \quad p = .46$$

Note: The Pearson correlation coefficients appear inside parentheses and the path coefficients appear outside parentheses. All coefficients are significant beyond the .05 level.

Tests of a priori hypotheses

Hypothesis One predicted that the combination of goal setting and self-monitoring (gp 3) will produce a larger increase on dietary fiber consumption than either condition alone. This hypothesis was supported. The subjects in the GS + SM ($\underline{M} = 24.33$) condition had significantly higher post fiber intake values than the subjects in the GS ($\underline{M} = 19.72$) and SM ($\underline{M} = 11.50$) conditions.

Hypothesis Two predicted that the individual treatment conditions, goal setting (gp 1) and self-monitoring (gp 2) will produce a larger increase in dietary fiber consumption than the no goal setting + no self-monitoring condition (gp 4). This hypothesis was only partially supported. The GS condition ($\underline{M} = 19.72$) did produce a larger increase in dietary fiber consumption than the no GS + no SM condition ($\underline{M} = 11.53$), however, the SM condition ($\underline{M} = 11.50$) did not produce a larger increase in dietary fiber consumption than the no GS + no SM condition.

Hypothesis Three predicted that there will be no difference in dietary fiber consumption between the no goal setting + no self-monitoring condition (gp 4) and the control group (gp 5). This hypothesis was supported. The post dietary fiber intake for the no GS + no SM condition ($\underline{M} = 11.53$) was no different than the control condition ($\underline{M} = 11.22$).

Hypothesis Four predicted that the combination of goal setting and self-monitoring (gp 3) will produce a larger increase on dietary fiber self-efficacy than either condition alone. This hypothesis was not supported. The subjects in the GS + SM ($\underline{M} = 71.36$) condition did not have significantly higher post fiber self-efficacy scores than the subjects in the GS ($\underline{M} = 71.36$) or the SM ($\underline{M} = 62.95$) conditions.

Hypothesis Five predicted that the individual treatment conditions goal setting (gp 1) and self-monitoring (gp 2) will produce a larger increase in dietary fiber self-efficacy than the no goal setting + no self-monitoring condition (gp 4). This hypothesis was not supported. The GS ($\underline{M} = 71.36$) and the SM ($\underline{M} = 62.95$) conditions did not produce a larger increase in dietary fiber self-efficacy than the no GS + no SM ($\underline{M} = 62.32$).

Hypothesis Six predicted that there will be no difference in dietary fiber self-efficacy between the no goal setting + no self-monitoring condition (gp 4) and the control group (gp 5). This hypothesis was supported. There was no difference in dietary fiber self-efficacy between the no GS + no SM ($\underline{M} = 62.32$) and control conditions ($\underline{M} = 57.85$).

Hypothesis Seven predicted that the effects of goal setting and self-monitoring on dietary behavior change is mediated by nutrition knowledge and dietary fiber self-efficacy. This hypothesis was supported.

CHAPTER V

Discussion

The purpose of this study was to examine the effects of goal setting and self-monitoring on dietary fiber intake and dietary fiber self-efficacy. Another goal of the study was to investigate the mediating role of nutrition education and dietary fiber self-efficacy on dietary fiber intake.

Treatment effect on dietary fiber intake

The findings supported the first hypothesis that the combination of goal setting and self-monitoring would produce a larger increase on dietary fiber intake than either one alone. The subjects in the GS + SM group had significantly higher post fiber intake values than the subjects in the GS, SM, no GS + no SM, and control groups. It is also interesting to note that post fiber intake values for subjects in the GS group were significantly higher than post fiber intake values for subjects in the SM, no GS+ no SM, and the control groups.

The second hypothesis, that individual treatment conditions (GS and SM groups) would produce a larger increase in dietary fiber consumption than the no GS + no SM group was only partially supported. Subjects the GS group had significantly higher post fiber intake values than subjects from the no GS + no SM group. However, post fiber intake

for subjects in the SM group were not different than the post fiber intakes for subjects in the no GS + no SM group.

Why did the self-monitoring condition by itself exert such a poor influence on dietary fiber behavior change? Zimmerman (1989) suggests that self-monitoring consists of three sub-processes that must be present for self-regulation to occur. These subprocesses are self-observation, self-judgment, and self-reaction. This involves adoption of a specific goal and ongoing strategy adjustment for goal achievement. It is clear, that by itself, self-monitoring is not a powerful component for behavior change. It must be combined with goal setting to produce the desired effect.

One important objective of the study was to separate goal setting and self-monitoring from one another to see the relative contributions of each variable. The fact that self-monitoring alone did not directly contribute to behavior change is an important finding. Also, the fact that the goal setting and self-monitoring group (GS + SM) produced a significant increase in dietary fiber intake above either one alone, supports the literature that individuals who self-monitor must have a standard by which they can compare their performance to successfully achieve their goal.

The findings also supported the third hypothesis, that there would be no difference in dietary fiber consumption between the no goal setting + no self-monitoring condition and the control group. This outcome supports the theory that passive education by itself cannot change behavior. The no GS + no SM group received the nutrition education component and yet their fiber intake was no different than that of the control group who did not receive the education component.

Treatment effect on dietary fiber self-efficacy

The findings did not support the fourth hypothesis that the combination of GS + SM would produce a larger increase in dietary fiber self-efficacy than either one alone. Subjects from the GS + SM group only had significantly higher SE scores than the subjects in the control group.

The findings also did not support the fifth hypothesis that the individual treatment conditions (GS and SM groups) would produce a larger increase in dietary fiber self-efficacy than the no GS + no SM group.

The sixth hypothesis was supported. There was no difference in dietary fiber self-efficacy between the no goal setting + no self-monitoring condition and the control group.

The significantly higher SE scores for the subjects in the GS + SM and GS groups compared to the control group supports Bandura's (1986)

contention that the most influential factor in raising perceived self-efficacy is successful enactment of the behavior. The GS + SM and the GS groups both had significantly higher post fiber intakes as well, so they were successful in achieving the desired behavior. Also the GS + SM and GS groups numerically surpassed the SM and no GS + no SM groups. Perhaps given more time to perform the behavior beyond the four weeks designated in the present study, differences in SE scores between the two highest scoring groups (GS + SM and GS) and the SM and no GS + no SM would have reached statistical significance.

An important issue that may have adversely affected self-efficacy perceptions was investigated. Inexperience in monitoring dietary fiber intake may have resulted in recording inaccuracies which may have led students to over or underestimated their fiber intake. These inaccuracies may have caused students to develop faulty post self-efficacy perceptions. To address this issue, a t-test for paired samples was conducted to compare fiber intakes recorded by students to the fiber intakes corrected by the researcher for pre and post diet diaries. The results indicated that there were statistically significant differences in prediet diary fiber values, $t = 3.03$, $p < .01$, but not in post diet diary fiber values. These findings suggest that students had some difficulties monitoring their fiber intake at

the beginning of the study. However, the post diet diaries showed no significant recording inaccuracies. These finding can assure us that the post self-efficacy perceptions were based on accurate data.

Mediation effect of nutrition knowledge and self-efficacy

It was hypothesized that the effects of goal setting and self-monitoring on dietary fiber consumption would be mediated by nutrition knowledge and dietary fiber self-efficacy. These findings were supported by path analysis outcomes. After preknowledge, pre dietary fiber self-efficacy, and prefiber intake were statistically controlled, goal setting and self-monitoring proved to exert a statistically significant indirect effect on post fiber intake mediated through post knowledge and post dietary fiber self-efficacy. In addition, the analysis also indicated that goal setting had a direct effect on post fiber self-efficacy and post fiber intake. It was clear that the intervention of self monitoring and goal setting raised the level of knowledge about dietary fiber, and goal setting alone increased post dietary self-efficacy for achieving a healthy fiber intake. Dietary fiber knowledge and dietary fiber self-efficacy both contributed to the increase in post fiber intake. However, it is interesting to note that goal setting by itself, independently of knowledge and self-efficacy influenced dietary behavior. This provides strong evidence that goal setting by itself is

critical in affecting behavior change. It is also interesting to note that the effect of post knowledge on post fiber intake occurred entirely through mediation of self-efficacy. This finding highlights the importance of self-efficacy as a mediation process in the relationship between knowledge and behavior change.

It was surprising that since goal setting showed a direct effect on post dietary fiber self-efficacy and post fiber intake that there was no direct effect of self-monitoring on dietary fiber self-efficacy and postfiber intake. Self-monitoring only contributed directly to the variance in post knowledge. Students who recorded their daily fiber intake did not directly alter behavior or directly impact on self-efficacy perceptions. However, the activity of self-recording may have made them more aware of the topic of dietary fiber which helped them to retain the knowledge previously learned, which indirectly affected behavior through self-efficacy perceptions. Students receiving goal setting training were also able to access dietary fiber knowledge acquired in class and effectively transform that knowledge through self-efficacy to improve fiber intake.

Treatment effect on bowel frequency

Another interesting finding was the effect of training on bowel frequency. An important goal of the training was to improve the health

outcomes of this population. One of the benefits of increasing fiber in the diet is the positive effects on bowel function. Relief from constipation and an increase in bowel frequency are some positive outcomes of a high fiber diet. These improvements have been shown to reduce the risk for bowel diseases including constipation, diverticulosis and colorectal cancer.

Cancer of the colon is currently the third highest cause of death from cancer after lung, and breast or prostate cancers. In fact, recent research has shown that a high fiber diet may play a role in reducing the risks for breast and possibly prostate cancers as well (Truswell, 1993; Weisburger et al., 1993). As the findings indicated the GS and the GS + SM group besides showing the largest increase in dietary fiber intake and dietary fiber self-efficacy, also reported the largest increase in bowel frequency.

Strategies used to achieve fiber goals

Students were surveyed on the strategies they used to achieve their fiber goals. They reported dining less at fast food restaurants and consuming more home cooked meals. Students also reported that when dining in restaurants they ordered more vegetables, more salads and less fried foods. Purchasing practices included buying more high fiber cereals, whole grain breads, legumes, fruits and vegetables. They reported reading the labels for the nutritional content, buying less packaged foods (potato

chips, cakes and ice cream) and less junk foods. It appears that goal setting and self-monitoring led to increase use of fiber purchasing strategies, another common self-regulatory technique.

Outcomes of increasing fiber in the diet

Students were asked to report on the positive or negative outcomes they observed when increasing dietary fiber. Only one student reported the negative outcome of experiencing flatulence. The rest of the students reported fewer cramps and stomach pains, easier bowel movements, a reduction of pain on defecation, and a reduction in constipation. They also reported experiencing more energy, feeling full longer, and improved weight control. These results indicate that improvements in fiber content of one's diet produced discriminable physiological reactions that are widely positive.

Limitations of the study

At the end of the study, participants completed a questionnaire designed to examine their practices during the intervention to account for possible contamination. None of the subjects from the self-monitoring group set goals, however, 32% of the subjects from the goal setting group who successfully increased their fiber intake spontaneously recorded their daily fiber consumption. At the training session subjects in the goal setting

group were given explicit instructions not to record their intake, and yet 7 out of 22 of them recorded their behavior. In addition, 9 out of 22 or 41% of the subjects in the goal setting group who successfully increased their fiber intake reported that they monitored their intake 'in their heads' by keeping track of what they were eating without recording their intake. These findings were consistent with the findings from the pilot study in which the majority of subjects in the goal setting group self-monitored their intake. Because of these previous findings, careful steps were taken in the present study to explicitly direct the subjects in the goal setting group not to self-monitor, and yet they still did so. It appears that subjects in the self-monitoring group were not motivated to set goals, but subjects in the goal setting group spontaneously self-monitored their behavior to reach a goal. It is possible that this study did not examine goal setting by itself. Even though every attempt was made to separate it from self-monitoring, it appears that subjects in the goal setting group who increased their fiber intake either recorded their intake (32%) or kept a mental record of their intake (41%). These findings suggest that while it is possible to examine self-monitoring apart from goal setting, we cannot examine goal setting apart from self-monitoring. Individuals who self-monitor their behavior can

do so without setting goals, however, individuals who set goals appear to monitor their behavior in some way to achieve their goal.

To determine the effects of the different strategies in the goal setting group, subjects were divided into three subgroups: subjects who kept written records, subjects who kept mental records, and subjects who kept no records. Analysis of variance was performed to investigate differences in post fiber intake and post self-efficacy scores between the subgroups, and a Chi Square was performed to examine bowel frequency. ANOVA results for the differences in post fiber intake between the groups was not significant, $F(2,26) = 2.48, p = .10$. However, the goal setters who kept written records ($M = 24.5$) and the goal setters who kept mental records ($M = 22$) numerically surpassed the goal setters who did not use self-monitoring strategies ($M = 15.5$). The fact that there were no significant difference between the subgroups for post fiber intake was probably due to the small sample size. ANOVA results also revealed no significant differences among the subgroups on pre to post fiber self-efficacy, $F(2,26) = .55, p = .58$. The subgroups who kept written ($M = 77$) and mental records ($M = 73$) showed a small but nonsignificant increase in self-efficacy scores compared to the subjects in the subgroup who did not self-monitor ($M = 69$). Chi Square for bowel frequency between the

subgroups was statistically significant $\chi^2 (2, N=29) = 6.5, p < .05$. Eighty-six percent of the goal setters who kept written records, and 100% of the goal setters who kept mental records reported an increase in bowel frequency compared to 62% of the goal setters who did not use self-monitoring strategies. The findings reveal a numerical trend illustrating that subjects in the goal setting group who used self-monitoring strategies were more likely to reach their goal than the goal setters who did not use self-monitoring strategies. These findings highlight the importance of using self-monitoring in conjunction with goal setting as a self-regulatory strategy to promote self-evaluation and behavioral adjustment.

Another limitation to this study is that we cannot predict if the self-regulatory activities will continue beyond the intervention. The goal of the study is to affect a behavior change for a lifetime, not just for a 30 day period. As part of a bonus question on their final exam (Appendix K), students were asked whether they intended to continue to set goals or monitor their dietary fiber intake. Twenty-nine percent of the participants responded that they would continue to set goals, thirty-eight percent of the participants said they would continue to self-monitor, however, no distinction was made between written records and mental records, and seventeen percent of the participants said they would both self-monitor

and set goals. Sixteen percent of the participants said they would not continue to engage in either the goal setting or self-monitoring activities after the intervention because they felt that self-regulating fiber intake was too time consuming. There is no way to predict whether students who intend to continue self-regulating their fiber intake will actually do so.

In terms of maintaining fiber goals, it is important that subjects can estimate dietary fiber content of foods without the inconvenience of constantly referring to a book. Strategies to categorize foods based on groups with a similar fiber content can help to reduce cognitive load and simplify the self-monitoring process. A goal for future research is to develop such a self-monitoring tool to improve self-regulatory activity. By facilitating the process of identifying high fiber foods, subjects will increase their motivation and self-efficacy to achieve their fiber goals.

Conclusion

The results of this study are consistent with the self-regulation literature. A critical component of self-regulation is for individuals to adopt attainable and proximal goals and monitor their behavior in order achieve their goals. This suggests that before embarking on any behavior change activity an individual must have a goal in mind. Self-monitoring alone was not an independent factor for behavior change, rather an additive factor.

This finding supports Bandura and Simon's (1977) work that showed participants in a weight control program who kept daily food records but did not set goals performed no differently than a control group who did not set goals or self-monitor their food intake. However, participants who both set goals and kept daily records, significantly decreased their food intake. It is clear that self-monitoring must be used in conjunction with goal setting to elicit a behavior change. The self-monitoring literature for weight loss suggests that successful individuals monitored their weight or food intake purposefully, with a goal in mind (Baker & Kirshenbaum, 1993; Baron & Watters, 1981; Spurduto, Thompson, & O'Brien, 1986). Self-monitoring alone can provide individuals with a baseline that can be used to evaluate their performance and establish a goal. If the individual is not motivated to change his or her behavior and set a goal, self-monitoring does not appear to be effective by itself for eliciting dietary behavior change. Self-monitoring cannot be separated from goal setting, they must be used in conjunction for changes to occur.

Another important finding of the study was the effect of goal setting on behavior change. Even after explicit instructions not to self-monitor their behavior, subjects in the goal setting group either recorded their behavior on paper or mentally kept track of their intake without

recording. In either case it appears that subjects who set goals also self-monitored in some way.

From these results it is clear that dietary change does not occur from knowledge alone. Something more systematic must be done. Setting specific goals is essential to establish change. When this is introduced, not only are there differences in knowledge, but there are shifts in perceived self-efficacy as well as dietary change. It is clear that future research needs to incorporate cognitive, behavioral and motivational measures to provide a more complete picture of the determinants of dietary behavior change.

Educational Implications

This study expands the literature in the area of nutrition education by investigating two variables that have not been studied independently. Previous studies combined a variety of interventions and a major overhaul of the nutrition curriculum. The present study incorporated a dietary self-management component that can be implemented with just two skill training classes: 1) training in recording and evaluating initial dietary intake, and 2) setting dietary goals and self-monitoring intake. The design has strong generalizability since the intervention is given in the classroom and can easily be incorporated into any nutrition education curriculum.

The findings suggests that in addition to passive forms of education, dietary change requires active self-regulation of food intake. Goal setting and self-monitoring appear to be two methods of self-regulation, when combined, result in a significant effect on dietary behavior change. If we can elicit a behavior change for a nutrient goal that has been assigned to a student, then the results may even be more impressive if students are allowed to select their own nutrient goals.

NAME _____

DATE _____

TO GET AN AVERAGE FOR CALORIES, FIBER, AND FAT, ADD THE VALUES FOR THE THREE DAYS, AND THEN DIVIDE EACH BY THREE.

DAY	TOTAL CALORIES	TOTAL GRAMS OF FIBER	TOTAL GRAMS OF FAT
DAY 1			
DAY 2			
DAY 3			
ADD VALUES FOR ALL DAYS			
THEN DIVIDE ADDED COLUMNS BY 3 TO GET AVERAGE INTAKE			

Appendix C

DIETARY FIBER SELF-EFFICACY SCALE:

Please rate your confidence that you can do the following:

<p>1. Choose high fiber snacks such as whole grain pretzels, popcorn, fruits, dried fruits and vegetables.</p> <p>Indicate your degree of confidence by circling the appropriate numbers.</p> <p style="text-align: center;">0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</p> <p style="text-align: center;"> Definitely <u>Cannot</u> Do It Probably Cannot Maybe (50/50) Probably Can Definitely <u>Can Do It</u> </p>										
<p>2. Choose breads and cereals made from whole grains instead of white flour and refined products.</p> <p>Indicate your degree of confidence by circling the appropriate numbers.</p> <p style="text-align: center;">0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</p> <p style="text-align: center;"> Definitely <u>Cannot</u> Do It Probably Cannot Maybe (50/50) Probably Can Definitely <u>Can Do It</u> </p>										
<p>3. Eat fruits or dried fruits instead of cookies, candy, cake and ice-cream for dessert.</p> <p>Indicate your degree of confidence by circling the appropriate numbers.</p> <p style="text-align: center;">0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</p> <p style="text-align: center;"> Definitely <u>Cannot</u> Do It Probably Cannot Maybe (50/50) Probably Can Definitely <u>Can Do It</u> </p>										

4. Read labels for fiber content.

Indicate your degree of confidence by circling the appropriate numbers.

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Definitely <u>Cannot</u> Do It		Probably Cannot		Maybe (50/50)		Probably Can			Definitely <u>Can</u> Do It	

5. Eat high fiber cereals (whole oats, rice and wheat).

Indicate your degree of confidence by circling the appropriate numbers.

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Definitely <u>Cannot</u> Do It		Probably Cannot		Maybe (50/50)		Probably Can			Definitely <u>Can</u> Do It	

6. Eat raw or dried fruits instead of drink juice.

Indicate your degree of confidence by circling the appropriate numbers.

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Definitely <u>Cannot</u> Do It		Probably Cannot		Maybe (50/50)		Probably Can			Definitely <u>Can</u> Do It	

7. Take a brown bag high fiber lunch to school, or a choose a high fiber meal from the cafeteria.

Indicate your degree of confidence by circling the appropriate numbers.

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Definitely <u>Cannot</u> Do It		Probably Cannot		Maybe (50/50)		Probably Can			Definitely <u>Can</u> Do It	

8. Bring high fiber snacks with you to school.

Indicate your degree of confidence by circling the appropriate numbers.

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Definitely <u>Cannot</u> Do It		Probably Cannot		Maybe (50/50)		Probably Can			Definitely <u>Can</u> Do It	

9. Increase my fiber intake an additional 5-10 grams a day.

Indicate your degree of confidence by circling the appropriate numbers.

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Definitely <u>Cannot</u> Do It		Probably Cannot		Maybe (50/50)		Probably Can			Definitely <u>Can</u> Do It	

10. Increase my fiber intake an additional 10-15 grams a day.

Indicate your degree of confidence by circling the appropriate numbers.

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Definitely <u>Cannot</u> Do It		Probably Cannot		Maybe (50/50)		Probably Can			Definitely <u>Can</u> Do It	

11. Increase my fiber intake an additional 15-20 grams a day.

Indicate your degree of confidence by circling the appropriate numbers.

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Definitely <u>Cannot</u> Do It		Probably Cannot		Maybe (50/50)		Probably Can			Definitely <u>Can</u> Do It	

12. Increase my fiber intake an additional 20-25 grams a day.

Indicate your degree of confidence by circling the appropriate numbers.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Definitely <u>Cannot</u> Do It	Probably Cannot	Maybe (50/50)	Probably Can	Definitely <u>Can</u> Do It
--------------------------------------	--------------------	------------------	-----------------	--------------------------------

13. Achieve your daily fiber goals on days you are out with friends.

Indicate your degree of confidence by circling the appropriate numbers.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Definitely <u>Cannot</u> Do It	Probably Cannot	Maybe (50/50)	Probably Can	Definitely <u>Can</u> Do It
--------------------------------------	--------------------	------------------	-----------------	--------------------------------

14. Achieve your daily fiber goals on days you have an argument.

Indicate your degree of confidence by circling the appropriate numbers.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90 100%

Definitely <u>Cannot</u> Do It	Probably Cannot	Maybe (50/50)	Probably Can	Definitely <u>Can</u> Do It
--------------------------------------	--------------------	------------------	-----------------	--------------------------------

15. Achieve your daily fiber goals on days when tempting foods are in front of you.

Indicate your degree of confidence by circling the appropriate numbers.

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Definitely <u>Cannot</u> Do It	Probably Cannot	Maybe (50/50)	Probably Can	Definitely <u>Can</u> Do It
--------------------------------------	--------------------	------------------	-----------------	--------------------------------

<p>16. Achieve your daily fiber goals on days when you are very hungry.</p> <p>Indicate your degree of confidence by circling the appropriate numbers.</p> <p>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</p> <p>Definitely Probably Maybe Probably Definitely <u>Cannot</u> Cannot (50/50) Can <u>Can</u> Do It Do It</p>										
<p>17. Achieve your daily fiber goals on days when you are depressed.</p> <p>Indicate your degree of confidence by circling the appropriate numbers.</p> <p>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</p> <p>Definitely Probably Maybe Probably Definitely <u>Cannot</u> Cannot (50/50) Can <u>Can</u> Do It Do It</p>										
<p>18. Achieve your daily fiber goals on days you are at a party.</p> <p>Indicate your degree of confidence by circling the appropriate numbers.</p> <p>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</p> <p>Definitely Probably Maybe Probably Definitely <u>Cannot</u> Cannot (50/50) Can <u>Can</u> Do It Do It</p>										
<p>19. Achieve your daily fiber goals on days that you are rushed.</p> <p>Indicate your degree of confidence by circling the appropriate numbers.</p> <p>0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%</p> <p>Definitely Probably Maybe Probably Definitely <u>Cannot</u> Cannot (50/50) Can <u>Can</u> Do It Do It</p>										

Appendix D

Knowledge Instrument

Please mark the correct answer on the answer grid:

1. Which is not one of the dietary guidelines?
 - a. choose a diet moderate in sugars
 - b. choose a diet low in starchy foods
 - c. choose a diet low in fat, saturated fat and cholesterol
 - d. eat a variety of foods
 - e. choose a diet with plenty of grain products, vegetables and fruits

2. Some of the effects of eating extra dietary fiber from whole grains are:
 - a. more rapid bowel transit time
 - b. decrease in blood cholesterol levels in hypercholesterolemics
 - c. chronic hunger because food goes through the digestive system faster
 - d. both a and b above.
 - e. all the above

3. Legumes are rich in which type of fiber?
 - a. insoluble
 - b. soluble
 - c. crude
 - d. hemicellulose

4. Fiber from oats and beans have been shown to:
 - a. decrease blood cholesterol levels
 - b. increase the immune function
 - c. decrease the risk for developing osteoporosis
 - d. decrease the risk for developing intermittent claudication
 - e. both a and d

5. When whole wheat is refined into white flour what nutrients are lost?
 - a. thiamin
 - b. riboflavin
 - c. niacin
 - d. iron
 - e. a and b
 - f. all the above

6. Which of the following is not an example of fiber?
 - a. "strings" of celery
 - b. pectin in apples
 - c. residue in milk
 - d. skins of corn kernels

7. The term used to describe substances that cannot be broken down by human digestive enzymes is:
- residue
 - crude fiber
 - roughage
 - dietary fiber
8. The average intake of dietary fiber for Americans is approximately:
- 5 grams/day
 - 10 grams/day
 - 20 grams/day
 - 30 grams/day
9. The desirable dietary fiber intake is approximately:
- 5-15 grams/day
 - 25-35 grams/day
 - 45-55 grams/day
 - 100 grams/day
10. It would be appropriate to recommend high fiber foods to someone trying to lose weight because:
- it speed up movement of foods through the upper digestive tract
 - it promotes a feeling of fullness
 - it may displace the consumption of calorie-dense concentrated fats
 - a and b
 - b and c
11. You are explaining to someone how to lower blood cholesterol levels by consuming foods high in fiber. Which of the following foods would you not recommend for this purpose?
- oat bran cereals
 - whole wheat breads
 - apples
 - legumes
12. How would you respond to someone who states that white bread is just as nutritious as whole wheat bread?
- white bread is just as nutritious because it has been enriched with various nutrients.
 - whole wheat bread is preferable because it is likely to contain several nutrients not added to white bread.
 - whole wheat bread is higher in fiber content than white bread
 - a and b
 - b and c
13. An example of a cruciferous vegetable is:
- broccoli
 - tomato
 - cucumber
 - spinach

14. Choose the food below that is highest in fiber
- cottage cheese
 - steak
 - pasta
 - raisins
15. Which disorder(s) may be prevented by consuming a high fiber diet?
- some forms of cancer
 - diverticulosis
 - bulimia
 - osteoporosis
 - a and b
 - b and d
16. Foods rich in phytochemicals are:
- soybeans
 - tomatoes
 - garlic
 - mushrooms
 - all of the above
 - none of the above
17. Which vegetable is highest in fiber?
- tomato
 - lettuce
 - cucumber
 - broccoli

Questions 18-25 are true/false questions. (On the answer grid, mark 'A' for true, and mark 'B' for false).

18. Fiber is easily digested by the human body.
19. On the average, vegetarians consume more fiber than meat eaters.
20. If your stools are heavy and sink to the bottom of the toilet bowl, you are consuming more than enough fiber.
21. Apples, applesauce, and apple juice are equally good sources of fiber.
22. You shouldn't drink too much water with high-fiber foods because it will cause bloating.
23. "Wheat bread" often contains no more fiber than "white bread."
24. Federal regulations require most food packages to list fiber content.
25. High fiber foods are high in calories.

Appendix E
DAILY GOAL FORMS

Name _____ Sec _____

Date _____

Week # 1 2 3 4

My initial fiber intake was _____ grams.

My fiber goal for this week is _____ grams.

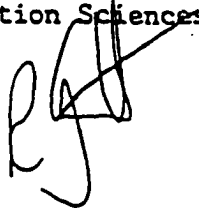
Appendix G1

BROOKLYN COLLEGE, CUNY
COMMITTEE ON THE RIGHTS AND WELFARE OF
HUMAN SUBJECTS

Date: January 30, 1996

To: Professor Roseanne Schnoll
Department of Health & Nutrition Sciences

From: Professor R. Glen Hass
Department of Psychology
Committee Chairperson



Proposal Title: Self-Regulatory Strategies of Increasing Dietary Fiber Consumption

Review By: Committee _____ Expedited Procedure X

The Committee on the Rights and Welfare of Human Subjects has approved the proposed use of human participants in this project.

 The proposal is approved as submitted.

X The proposal is approved with the following stipulations/elaborations.
If the condition(s) of approval are not clear or are unacceptable to you, please contact me at extension 5635.

As elaborated in telephone conversation on 1/30/96

Of course, if the research procedures are altered from the description in the proposal reviewed, you should submit a revised proposal.

Approval of the proposal will expire at the end of the Spring semester in 1997. At that time you will receive a form requesting an annual report on the project (required by DHHS and CUNY). The annual report will be reviewed if continued approval is desired.

In the meantime, if any problems arise concerning the welfare of subjects in the project, please contact me immediately at extension 5635.

Best wishes for the successful completion of your research.

Appendix G2

THE
GRADUATE SCHOOL
AND
UNIVERSITY CENTER

OFFICE OF SPONSORED RESEARCH
AND PROJECT PLANNING

33 WEST 42 STREET, NEW YORK, NY 10036-8099
212 642-2050 FAX 212 642-2546

THE CITY UNIVERSITY OF NEW YORK

October 30, 1996

Ms. Roseanne Schnoll
Ph.D. Program in Educational Psychology

Re: Your human subjects project, "Self-Regulatory Strategies of Increasing Dietary Fiber Consumption"

Dear Ms. Schnoll:

Thank you for your response to the conditions set by the Committee on the Protection of Human Subjects for final approval of your project. Your project was approved as of 9/5/96. Please note that this approval is good for one year; if your research extends beyond that time, you will need to reapply for continuation approval.

Best wishes for success in your research.

Sincerely,

Jane C. Gentilini
Assistant Director

THE GRADUATE SCHOOL AND UNIVERSITY CENTER
IS THE CITY UNIVERSITY OF NEW YORK'S DOCTORATE-GRANTING INSTITUTION, WHICH OPERATES IN CONSORTIUM WITH ALL THE CUNY CAMPUSES.

BERNARD M. BARUCH COLLEGE
BOROUGH OF MANHATTAN
COMMUNITY COLLEGE
BROOKLYN COMMUNITY COLLEGE
BROOKLYN COLLEGE
THE CITY COLLEGE

THE CITY UNIVERSITY OF NEW YORK
MEDICAL SCHOOL
THE CITY UNIVERSITY OF NEW YORK
SCHOOL OF LAW AT QUEENS COLLEGE
THE COLLEGE OF STATEN ISLAND
EUGENIO MARÍA DE HOSTOS
COMMUNITY COLLEGE

HUNTER COLLEGE
JOHN JAY COLLEGE OF CRIMINAL JUSTICE
KINGSBOROUGH COMMUNITY COLLEGE
FRANCIS X. LAGUARDIA COMMUNITY COLLEGE
HERBERT H. LEHMAN COLLEGE
MEDGAR EVERS COLLEGE

MOUNT SINAI SCHOOL OF MEDICINE
(AFFILIATED)
NEW YORK CITY TECHNICAL COLLEGE
QUEENS COLLEGE
QUEENSBOROUGH COMMUNITY COLLEGE
YORK COLLEGE

Appendix H1

Procedure Scripts

Scripts Outlining the Directions for the Treatment Conditions

Goal Setting Condition

1. I am distributing a packet of *daily goal forms* to each of you (see Appendix E). Please take one packet each, make sure you have 28 identical forms.
2. Write your name, date and class section in the space provided.
3. Record your average fiber intake from your three day diet diary in the space provided for your initial fiber intake.
4. Set the goal of increasing your fiber intake by 5 grams for the next week and record it daily in the appropriate space.
5. Continue setting the goal of increasing your fiber intake by 5 grams a week for the next 4 weeks till reaching your distal goal of 25-35 grams a day.
6. Do not write down or record any of the foods you are consuming or keep a written record of your fiber intake.
7. Please complete and submit the *daily goal forms* to me at our class meetings on Tuesdays and Thursdays.

Self-Monitoring Condition

1. I am distributing a packet of *daily fiber analysis forms* to each of you (see Appendix F). Please take one packet each, make sure you have 28 identical forms.
2. Write your name and date in the space provided.
3. Please record all foods consumed for the next 28 days. Make sure you measure serving size. Look up the grams of fiber contained in all foods using your pocket food data book.
4. Add your total fiber intake for the day.
5. Please submit the *daily fiber analysis forms* to me at each of our class meetings on Tuesdays and Thursdays.

Goal Setting + Self-Monitoring Condition

This script was a combination of the two previous conditions.

Appendix H2

Instructional Outline for Fiber Lecture

- ◆ Definition of dietary fiber
- ◆ Insoluble vs. soluble fiber
- ◆ Diseases associated with low fiber intake
 - constipation
 - cancer
 - diabetes
 - diverticular disease
 - heart disease
 - obesity
- ◆ Recommendations
- ◆ Fiber content of selected foods and dietary modification
- ◆ Label reading for high fiber foods
- ◆ Fiber IQ quiz

Appendix I
Procedure Table

Week

1	Knowledge instrument administered				Control group selected from another class Knowledge instrument administered
2	Training on 3 day diet diary				Training on 3 day diet diary
4	Diet diaries submitted Dietary fiber self-efficacy instrument administered				Diet diaries submitted Dietary fiber self-efficacy instrument administered
7	Students randomly assigned to 4 experimental treatment group GS, SM, GS+SM, no GS+ no SM.				
	GS	SM	GS+SM	no GS no SM	
8	written goals submitted twice a week	diet records submitted twice a week	written goals and diet records submitted twice a week	activity records submitted twice a week	
9	written goals submitted twice a week	diet records submitted twice a week	written goals and diet records submitted twice a week	activity records submitted twice a week	
10	written goals submitted twice a week	diet records submitted twice a week	written goals and diet records submitted twice a week	activity records submitted twice a week	
11	written goals submitted twice a week	diet records submitted twice a week	written goals and diet records submitted twice a week	activity records submitted twice a week	
12	knowledge instrument	knowledge instrument	knowledge instrument	knowledge instrument	knowledge instrument
13	Post diet diary due	Post diet diary due	Post diet diary due	Post diet diary due	Post diet diary due
14	Post self-efficacy instrument Debriefing	Post self-efficacy instrument Debriefing	Post self-efficacy instrument Debriefing	Post self-efficacy instrument Debriefing	Post self-efficacy instrument Debriefing

Appendix J

Fundamentals of Nutrition: HNS 25.1

Post study questionnaire

NAME _____ CLASS SECTION _____

1. Circle the group that you were assigned to:

- a. group 1: goal setting of fiber intake
- b. group 2: self-monitoring of fiber intake
- c. group 3: goal setting and self-monitoring of fiber intake
- d. group 4: exercise monitoring

2. Did you set goals for yourself? yes _____ no _____

3. If yes, what type of goals did you set for yourself? daily _____ weekly _____
other _____, describe in detail:

4. Did you keep records? yes _____ no _____

5. If yes, What type of records did you keep? (describe in detail) _____

6. How frequently did you keep records? _____

7. What are your daily fiber requirements? _____

8. Did you experience any changes in bowel function (increase in stool frequency or volume)?

more frequent bowel movements? yes _____ no _____ Please discuss below:

9. Did this nutrition class change the way you purchase foods? Yes _____ No _____

Reading labels for:

Fat content - yes _____ no _____; fiber content - yes _____ no _____

13. Has the course changed other peoples diets besides your own? Yes___ No___
Who else has this course impacted? parents, siblings, friends...

Please rate the effect of the course on other people:

1	2	3	4	5
not at all				a lot

14. Did you find it difficult to complete the required group assignments? Yes__ No__
If yes, what were some of your problems?

Please rate the level of group assignment difficulty:

1	2	3	4	5
not at all				a lot

15. In general do you feel that you are eating a more healthful diet since taking the course? Yes_____ No_____. If yes, give some examples:

Please rate how the course positively affected your diet:

1	2	3	4	5
not at all				a lot

**Appendix K
Final Examination Bonus Questions**

You have learned about the benefits of consuming a high fiber diet. These benefits include a decreased risk for cancer, heart disease, and bowel diseases, e. g. constipation, diverticulosis and colon cancer. Fiber also helps to regulate blood sugar, lowers blood cholesterol levels and increases feelings of fullness.

PLEASE ANSWER THE FOLLOWING QUESTIONS HONESTLY, YOU WILL NOT BE GRADED ON YOUR RESPONSES!!! YOU WILL RECEIVE THE BONUS POINTS JUST FOR COMPLETING THIS QUESTIONNAIRE.

1. Are any of the above benefits important to you? What do you consider to be an important benefit of consuming a high fiber diet?

Please describe what you consider to be an important or beneficial outcome of eating a high fiber diet for yourself?

2. For those of you who did increase your fiber intake, what positive or negative outcomes did you observe?

3. Will you try to keep up your fiber intake?

4. Do you think you will either continue to set goals for or monitor your dietary fiber intake (which will you do?) Please discuss:

Thank you for participating in the dietary fiber project.

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