

COMPREHENSIVE WEIGHT MANAGEMENT PROGRAM
WITH ARMY ROTC CADETS

THESIS

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by

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By

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TABLE OF CONTENTS

	PAGE
ACKNOWLEDEMENTS	iv
LIST OF TABLES.....	vii
LIST OF FIGURES	viii
CHAPTER	
I. INTRODUCTION.....	1
Impact of Overweight/Obesity in Military Service	2
Difficulties with Recruitment.....	2
Declining Rates of Retention	3
Increasing Military Costs	3
Meeting the Military Standards of Physical Appearance.....	4
Military Weight Management Programs	5
AR 600-9: Army Weight Control Program.....	5
Weight Management Guidelines for Military Programs.....	6
Army MOVE!	7
Research Objective	8
II. REVIEW OF THE LITERATURE	10
Adult Weight Management Guidelines	12
Classification of Overweight/Obesity: BMI and Waist	
Circumference (WC)	12
Health Risks Associated with Overweight/Obesity	13
Resting Metabolic Rate (RMR)	14
Physical Activity	16
Review of Dietary Approaches to Weight Management	17
Role of Dietary Fiber and Weight Management	18
Fruit and Vegetable Intake and Body Weight	22
Combined Dietary Intervention: Low-fat, High-fiber and Fruit	
and Vegetable Intake	25
The Role of Breakfast in Weight Management.....	28
Behavior Change	30

Summary and Conclusion	32
III. METHODS	34
Subjects.....	34
Research Design and Methods	35
Selection of Nutrition Counselors.....	35
Procedure and Measures	36
Data Collection.....	37
Dietary Assessment.....	37
Body Mass Index (BMI) Assessment	38
3-Site Skinfold Assessment	39
Air-Displacement Plethysmography (ADP) Assessment	39
Physical Activity Assessment.....	41
Fitness and Physical Performance Assessment.....	42
Behavior Change and Goal Attainment Assessment	43
Biochemical Assessment.....	45
Statistical Analysis	46
IV. RESULTS.....	47
Overall Dietary Analysis	48
Overall Body Composition Analysis.....	50
Overall Daily Physical Activity and APFT Analysis	51
V. DISCUSSION.....	54
Conclusion.....	59
APPENDIX A Research Forms.....	62
APPENDIX B Weekly Progress Sheets and Nutrition Education Handouts	73
APPENDIX C Army References.....	114
APPENDIX D Non-Significant Result Tables	118
REFERENCES	121

LIST OF TABLES

Table	Page
1. Body Fat Equations	15
2. Summary of Dietary Approaches to Weight Management	29
3. The Spirit of Motivational Interviewing.....	31
4. Key Principles of Motivational Interviewing	31
5. Baseline Characteristics of Subjects.....	35
6. Summary of Weekly Weight Management Topics	37
7. The Army's Maximum Allowable Body Fat and Target BMI.....	38
8. Categories of Percent Body Fat	41
9. Description of Daily Physical Activity Level.....	42
10. Summary of Stage of Change and Recommendations	44
11. Summary of Measures and Treatment	46
12. Summary of Significant Outcome Variables.....	47

LIST OF FIGURES

Figure	Page
1. Summary of Intrinsic Effects of Fiber in Weight Management	19
2. Summary of Hormonal Effects of Fiber in Weight Management	20
3. Summary of Colonic Effects of Fiber in Weight Management.....	21
4. Change in Fruit Intake	49
5. Change in Percent Total Calories from Fat	50
6. Change in Percent Body Fat	51
7. Change in Daily Physical Activity Level	52
8. Change in Total Score of APFT	53

CHAPTER I

INTRODUCTION

The term “obesogenic,” is often used to describe America’s society as an environment filled with unhealthful foods, oversized meals and barriers to physical activity that often promote behaviors in individuals or populations that result in the accumulation of excess body weight (1). In adults, the terms “overweight” and “obesity” are used to designate that an individual’s body mass index (BMI) exceeds established standards and reflect an increased risk for chronic diseases associated with excess body weight. BMI is determined by calculating an individual’s body weight in kilograms (kg) divided by height in meters squared (m^2). According to the National Heart, Lung and Blood Institute (NHLBI), an individual is classified as overweight if his or her BMI falls between 25 and 29.9 kg/m^2 , or obese if $BMI \geq 30 kg/m^2$ (2). According to the 1999-2002 National Health and Nutrition Examination Survey (NHANES), 65% and 31% of the adult population were overweight and obese, respectively. While reports from the Centers for Disease Control and Prevention indicate no significant increases in obesity between 2003-2004 and 2005-2006, the obesity levels still remain high (3).

The U.S. military has observed similar trends of overweight and obesity among military personnel. In 2002, the Department of Defense (DoD) reported that 54.9% and 12.4% of military personnel were overweight or obese, respectively (4). There are several ramifications of the high incidence of overweight and obesity for the military, including difficulty in recruitment, declining rates of retention, increased associated costs, and a disconnect with the military's traditional standards for physical appearance.

Impact of Overweight/Obesity on Military Services

Difficulties with Recruitment

The U.S. military relies on volunteers from the general population for recruitment. Nearly 87% of the recruiting population is young adults, ages 18-24 years (5). Obesity rates among young adults have tripled from 8% to 24% within the last three decades (6). In 2005, the Army's goal of enlisting 80,000 new soldiers fell short by 6,600 recruits (7). During the same time, the DoD denied nearly 48,000 potential recruits for failing to meet military weight standards (8). Thus, a factor affecting recruitment may reflect the decline in eligible applicants who meet the military's weight standards (9).

Using data from the NHANES (1988-1994), researchers investigated how many young adults in the U.S. between the ages of 17 and 20 would fail to meet current military weight standards and found that 13-18% of men and 17-43% of women would not meet the military's maximum allowable standard for weight in the Army, Air Force, Navy or Marine Corps (10). Furthermore, in 2001-2004, approximately 33% of men and 54% of females ages 17 to 42 years in the general population were considered to be too overweight for military enlistment (11). Similarly, a fourteen-year study conducted from

1993-2006 showed a 5% increase in overweight and 4% increase in obese military applicants during this time period (12).

Declining Rates of Retention

Recruitment is not the only problem affected by the obesity epidemic. Retention of new recruits has also declined. To be retained in the military, the soldier must not exceed either the maximum allowable weight-for-height or the percent body fat standards (9). If a soldier consistently fails to meet these standards, the soldier may be released from military service. Almost 80% of recruits who exceed weight-for-height standards at service entry have been released from the military before serving their full term of enlistment (9). Furthermore, data from the 2005 DoD Health Related Behavior Survey among military personnel found that obese individuals were more likely to report the intention to leave military service early, as compared to non-obese individuals (2). When these data - the increase in obesity rates among military personnel from 1995-2005 (4.8% to 12.4%) and the expressed intention of obese military personnel to leave service early - are considered together, it is clear that the obesity epidemic in the U.S. and among military personnel may significantly impact retention in the military (2).

Increasing Military Costs

Increased obesity among young adults in the U.S. has increased military costs by negatively impacting successful recruitment and retention, increasing the need for medical services, and increasing the loss in work productivity due to related illnesses. The cost of recruitment is affected by the declining rate of retention among new recruits. Early attrition of new recruits within the Army can cost as much as \$450 million per year,

which is needed to train and recruit new soldiers (13). Medical costs associated with overweight and/or obese military personnel are estimated to be \$1.1 billion dollars per year (14). Furthermore, overweight and obese individuals have higher rates of absenteeism and lower work productivity when compared to normal weight individuals; 28,000 lost workdays per year may be attributable to overweight and obesity and cost the military an additional \$3.5 million (14, 15).

Meeting the Military Standards of Physical Appearance

The military maintains strict standards for fitness and body composition to ensure individuals are physically capable of meeting the increasing demands of military action (16). Standards of military appearance are based on the assumptions that appropriate body weight relative to height signifies good health and the ability to maintain physical readiness at all times (9). Further, the military embraces a strict policy on appearance for several reasons. First, appearance is perceived to be an indicator of fitness. In fact, the U.S. Army describes their weight standards by stating that “excessive body fat connotes a lack of physical discipline, detracts from military appearance, and may indicate a poor state of health, physical fitness, or stamina” (9). Physical appearance of soldiers may affect how not only Americans but also how international populations perceive the U.S. military (9). Recent newspaper headlines, such as “Battling the Bulge,” “Obesity Takes Its Toll on the Military,” and “Are U.S. Troops Too Fat to Fight?” illustrate the negative impact of overweight on perception of the military.

Military Weight Management Programs

Each branch of the military (Army, Navy, Air Force, Marine Corps) has established weight management policies and procedures for addressing overweight soldiers. For all programs, weight is screened at least one time per year and elevated percent body fat mandates placement into a weight management program. However, the structure of the weight management treatment offered to soldiers varies by military branch (9). The following section reviews the Army's weight control program.

AR 600-9: Army Weight Control Program

In 1976, Army Regulation 600-9, the Army's Weight Control Program (AWCP) was established so that all military personnel could have a uniform "soldierly" appearance while maintaining the physical demands of combat (17). The AWCP clearly establishes specific policies, procedures and objectives that apply to the Active Army, the Army National Guard, and the U.S Army Reserve. According to the established protocol, all personnel must uphold and establish discipline, maintain operational readiness and fitness for combat conditions, and present a "trim and uniform military appearance by meeting appropriate weight and body fat standards".

To ensure proper weight control, soldiers are monitored semi-annually for weight, body composition, personal appearance, and fitness. Thus, a soldier's weight and results of the Army Physical Fitness Test (APFT) are documented at least every 6 months. Height and weight tables based on age and sex are used to screen a soldier's weight and identify those who exceed the recommendations. If overweight, the soldier's percent body fat is calculated by a body circumference "tape" test. Unit commanders perform

these measurements using specific instructions detailed in AR 600-9. For males, circumference measurements around the neck and waist are taken, while female measurements include the neck, waist and hip. Allowable ranges for body fat are 20-26% and 30-36% for males and females, respectively. After body fat has been calculated, those who exceed the maximum allowable body fat percentage, based on age and sex, are required to enroll in the AWCP. The program is structured for soldiers to learn basic concepts about healthy eating and about how to increase physical activity levels via “face to face” weight reduction counseling with a Registered Dietitian (RD). For the duration of the program, the soldier is required to lose a minimum of 3-8 pounds of body weight per month for two consecutive months. After six months, a soldier who fails to lose the requisite weight and meet appropriate body fat level standards without an extenuating medical reason may be separated from service. Conversely, release from the AWCP can only occur when body fat levels meet Army standards. Body fat is monitored for 2-3 years after completion of the AWCP (9, 18). Hence, body fat is the standard used to place require enrollment in or release from the AWCP.

Weight Management Guidelines for Military Programs

To address the effects that overweight and obesity have had on all military branches, the Subcommittee on Military Weight Management, in collaboration with the Institute of Medicine and Committee on Military Nutrition Research of the Food and Nutrition Board, released a report entitled “Weight-Management: State of the Science and Opportunities for Military Programs”. This report reviewed the strategies used to prevent and remediate overweight in military personnel and identified essential components needed for an effective weight loss/maintenance program. Based on the

results of this review, key recommendations for a weight management program were established, and include basic training on diet and health at initial entry, frequent assessment of body composition, promotion of individualized behavior modification, advice to maintain a daily activity and exercise program and incorporate “heart healthy” meals in the diet, along with maintaining a structured follow-up with a weight management counselor (9).

Army MOVE!

To date, the Army utilizes difference approaches to enact the AWCP. Prior to 2008, the educational nutrition and fitness component of the AWCP was based on the “Weigh to Stay” (WTS) program. The WTS program provided soldiers with three one-hour classroom sessions over various weight management topics and three follow-up appointments. A limitation of the WTS program was that it did not provided education about weight-related behaviors specific to the individual. Also, the program did not require follow-up appointments. In 2008, the Army *MOVE!* program replaced WTS. Army *MOVE!* is an online personalized weight management program designed to promote healthy eating and physical activity behaviors for active and reserve personnel. The program consists of 13 one-hour modules conducted through an interactive web conference video. All materials are based on clinical practice guidelines and taught by RDs or Dietetic Technicians. The online sessions and educational tools used in the program are designed to provide the same benefits as face-to-face nutrition counseling. Unlike the WTS program, this program permits the soldiers to complete their sessions on their own time through online access by text messaging or through voice over communications.

Research Objective

The prevalence of overweight and obesity has affected recruitment of Army officers. A major recruitment method for Army officers is through Reserve Officers' Training Corp (ROTC) programs, which trains cadets to become officers. To be commissioned as officers, cadets in Army ROTC programs must meet weight and body fat requirements so that they are eligible to attend the Army's Leadership Development and Assessment Course (LDAC) following their junior year of the program.

Preliminary data evaluating weight and body fat measurements of the Texas State University- San Marcos' Army ROTC junior cadet class revealed that 13% of cadets failed to meet the Army's standards for body fat. Thus, our **overriding goal** was to conduct a controlled, five-month comprehensive weight management program using the American Dietetic Association (ADA) evidence-based Adult Weight Management Guidelines in order to increase the percentage of cadets who meet appropriate body fat standards prior to attending LDAC. Briefly, the ADA's Adult Weight Management Guidelines are based on a systematic analysis of scientific literature assembled by health experts of the NHLBI and the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDKD) (19). This study was designed to investigate the efficacy of an intensive weight management program with university Army ROTC cadets by monitoring dietary intake, physical activity, and other health-related behavior changes. Cadets in the Army ROTC junior class were randomized into two groups. Briefly, subjects in the control group received nutrition education handouts while the treatment group received individualized weight management counseling. The specific **objective** of this study was as follows:

To evaluate whether a comprehensive weight management program consisting of individual weight management counseling is effective in improving weight related measures (weight, BMI, percent body fat, fat-free mass, diet, physical activity and fitness, blood lipids) in Texas State Army ROTC cadets.

Our hypothesis was as follows:

Weight related measures (weight, BMI, percent body fat, fat-free mass, diet, physical activity and fitness, blood lipids) in the treatment group (receiving weight management counseling) will improve in comparison to those in the control group (receiving nutrition education handouts) after five months

This study addressed a gap in knowledge regarding the effectiveness of implementing a comprehensive weight management program among university Army ROTC cadets. To our knowledge, this was the first study to implement a comprehensive weight management program at a university Army ROTC unit. The results of this study identified key approaches for developing an effective weight management program specific for this population. Determining the effectiveness of a weight management program at a university or college Army ROTC unit has ramifications for preparing Army recruits for meeting the military standards for weight and body fat in order to attend LDAC.

CHAPTER II

REVIEW OF THE LITERATURE

The American Dietetic Association (ADA) is the premier organization of food and nutrition professionals in the United States, and includes as part of its mission to “empower its members to be the nation’s food and nutrition leaders”. To realize this mission, ADA is committed to optimizing the nation’s health through education and research, and through advocating for the importance of food and nutrition to Congress members so that improvements in public policy regarding food, nutrition, and health can be implemented. As a resource for members, ADA has developed a library of scientific literature, referred to as the Evidence Analysis Library (EAL). Within this library, there are sets of evidence-based guidelines (EBG) that consist of various nutrition recommendations pertaining to the treatment specific diseases.

In 2006, experts at ADA, the NHLBI and the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDKD) developed the ADA’s Evidence-Based Nutrition Practice Guidelines for Adult Weight Management. These guidelines are designed for nutrition professionals to use when treating clients, in collaboration with an interdisciplinary healthcare team. Target populations for implementing the guidelines include younger adult (19-44 years), mid-aged (45-64 years) and aged (65-79 years) individuals who are classified as overweight and/or obese.

According to the ADA's Adult Weight Management Guidelines, the success of a weight management program is dependent on several key components, including the duration of the program, the number of professional encounters with the client, the setting of realistic goals, and the types of interventions implemented throughout the program. The duration of a program should be at least six months, but can be shorter if weight loss is achieved sooner. Frequent encounters (e.g. once per month) between the practitioner and the client improve the likelihood of achieving weight loss or maintenance (19, 20). Weekly meetings have shown to be an effective approach in promoting behavior change (20). According to the scientific literature, a weight loss goal of 10% of initial body weight can be achievable and a sustainable loss, and thus should be the original goal set by the practitioner and client (19, 20).

The Adult Weight Management Guidelines list several additional recommendations. Briefly, these recommendations include assessing and evaluating the current health status of the client, implementing a combination of dietary, physical activity, and health-related behavioral strategies tailored to the client's needs, and monitoring and evaluating program compliance and weight loss success of the client. In some circumstances, the use of weight loss medications may be necessary. FDA-approved weight loss medications should be considered as part of a comprehensive weight loss program only if an individual has a BMI $\geq 27 \text{ kg/m}^2$ (with obesity-related risk factors or diseases) or a BMI $\geq 30 \text{ kg/m}^2$ (without obesity-related risk factors or diseases). For very obese clients (i.e., BMI $\geq 40 \text{ kg/m}^2$ or BMI $\geq 35 \text{ kg/m}^2$ with increased risk for mortality), weight loss surgery (i.e., bariatric surgery) may be recommended (20).

Adult Weight Management Guidelines

Classification of Overweight/Obesity BMI and Waist Circumference (WC)

When determining an individual's risk status for weight management, an individual's BMI and WC should be assessed (20). Overweight and obesity are classified differently for the general population and for the Army. In the general population, overweight is defined as having a BMI between 25-29.9 kg/m² and obesity is defined as having a BMI of 30 kg/m² or greater. In the Army, weight status is assessed using weight-for-height screening tables based on sex and age, with age divided into four categories, including 17-20 years, 21-27 years, 28-39 years and ≥ 40 years. The target BMI range increases slightly with each age category but for soldiers of either sex BMI must be between 27.5 kg/m² (21).

The use of BMI to classify soldiers and military recruits as overweight is controversial. For the Army, it has been suggested that the use of a higher BMI cut-off to define 'overweight' may be appropriate because some soldiers and military recruits have a greater muscle mass, meaning they may be 'large, but lean' (22). In fact, several studies have investigated the validity of using the NHLBI standards to classify soldiers and military recruits as overweight (22-24). One study investigated the relationship between BMI and body fat (measured by bioelectrical impedance) in 449 military recruits. Results of this study revealed that the 6.5% military recruits classified as overweight (BMI ≥ 25 kg/m²) had a normal/healthy body fat level (24). Other studies reported comparable results in college athletes and young adults (25, 26). For example, Witt and Bush found that of 38 college athletes considered 'overweight' (BMI ≥ 25 kg/m²) by national standards, only 11% were found to have excess body fat as determined by triceps and

subscapular skinfold testing (26). Thus, the use of BMI alone may not accurately categorize an individual as overweight or obese, particularly in populations who tend to have more lean muscle mass such as college athletes and military personnel.

One way to predict the risk status of overweight and obese individuals is to measure their WC. This measurement has been shown to positively correlate with excess abdominal fat and is an independent risk factor for development of comorbidities associated with overweight and obesity such as heart disease and type 2 diabetes (27). For the general population, an individual is considered at risk for comorbidities associated with obesity if WC exceeds 102 cm (40 inches) for men and 88 cm (35 inches) for women. WC standards for men in the Army are more stringent than those included in the NHLBI guidelines. For example, a 38.5-inch WC for men, considered acceptable by NHLBI standards, is considered by WC methods described in AR 600-9 to be equivalent to the maximum allowable body fat of 26% (22).

Health Risks Associated with Overweight/Obesity

In addition to calculating BMI and WC, it is also important to assess the individual's risk of developing comorbidities associated with overweight and/or obesity. Studies have demonstrated that as BMI increases, there is an increased risk for developing cardiovascular disease (CVD) stroke, type 2 diabetes, sleep apnea, respiratory problems and certain cancers (20). Within a weight management program, identifying specific risk factors for CVD along with measuring an individual's level of physical activity can help the practitioner determine the intensity of interventions (20). Obesity is positively associated with specific CVD risk factors including hypertension (systolic

blood pressure ≥ 140 mm Hg or diastolic blood pressure ≥ 90 mm Hg), elevated blood levels of LDL-cholesterol (≥ 160 mg/dL), low HDL-cholesterol (<35 mg/dL), and impaired fasting blood glucose levels (110-125mg/dL) (20). Reducing body fat and body weight have been shown to improve blood profiles for total cholesterol, LDL-cholesterol, triglycerides and glucose levels (20, 28, 29). Additionally, physical inactivity may increase the risk for developing CVD and may be an independent risk factor for all causes of mortality, as well as CVD mortality (20). An increase in physical activity may promote weight loss and thus reduce the risk of developing comorbidities associated with obesity (20).

Resting Metabolic Rate (RMR)

It is important to determine an individual's resting metabolic rate (RMR) because it identifies the number of calories needed to maintain physiologic functioning when the body is at complete rest (30). RMR accounts for nearly 60-70% of total energy expended in most adults and thus can be used to estimate total energy expenditure. The two main determinants of RMR are an individual's lean muscle mass (or fat-free mass) and percent body fat (31). As lean muscle mass increases and body fat decreases, RMR is likely to increase; thus, frequent assessment of an individual's RMR is an important component in a weight management program. If RMR changes, then recommendations for total caloric intake and/or energy expenditure should be modified in order to increase the likelihood of weight loss and to prevent weight gain. In order to lose weight, an individual must maintain a negative energy balance by reducing caloric intake, increasing energy

expenditure or a combination of both. Excessive energy intake without equal energy expenditure can lead to weight gain over time.

There are many methods used to measure RMR, all of which depend on calculation of body density. Body density is divided into two components consisting of the fat compartment and the fat-free compartment, which is comprised of muscle, water, bone/non-bone mineral (31, 32). Body fat is less dense than muscle; therefore, a high body density is associated with a lower percentage of body fat. Specific equations are used to determine percent body fat (33-36) and are included in Table 1. Once body fat is determined, then fat-free mass can be calculated. The BOD POD[®] is an instrument that measures an individual's body density (mass/volume) using air-displacement plethysmography (ADP). RMR can be estimated using the calculated body density along with specific equations. The BOD POD[®] has been shown to be highly reliable and a valid (37-40) tool in determining body fat, especially when compared to other established methods of measuring body composition such as dual energy x-ray absorptiometry (DEXA) (41-44) and hydrostatic weighting (45-48).

Table 1
Body Fat Equations^a

Name	Equation	Population
Siri ³³	% Fat= $(4.95/D_B - 4.50) * 100$	General Population
Schutte ³⁴	% Fat= $(4.37/D_B - 3.928) * 100$	African American and Black Males
Ortiz ³⁵	% Fat= $(4.83/D_B - 4.37) * 100$	African American and Black Females
Brozek ³⁶	% Fat= $(4.75/D_B - 4.412) * 100$	Lean and Obese Individuals

Note. D_B - Body Density; M_B - subject's body weight

^a Equation integrated into the BOD POD[®] calculation of body composition.

Physical Activity

Physical activity is a component of energy expenditure, and physical inactivity is a modifiable risk factor for several diseases (30). Increasing physical activity is one way to achieve a caloric deficit in support of weight loss. Physical activity may also decrease accumulation of excess abdominal fat (20). The American College of Sports Medicine (ACSM) and the American Heart Association (AHA) recommend that adults engage in moderate levels of physical activity for at least 30 minutes per day, five days a week or to engage in vigorous activity for at least 20 minutes three days of the week (49). Similarly, the *2008 Physical Activity Guidelines for Americans*, recommend that adults perform at least 150 minutes a week of moderate-intensity, or 75 minutes a week of vigorous-intensity aerobic activity or the equivalent combination of moderate and vigorous aerobic activity. For more extensive health benefits, it is recommended that adults engage in at least 300 minutes a week of moderate-intensity aerobic activity or 150 minutes a week of vigorous-intensity, or a combination of moderate and vigorous-intensity activity (50).

Various techniques are used to determine physical activity levels in individuals including subjective (self-reported questionnaires or diaries) and objective (pedometers, accelerometers, and heart-rate monitors) methods (30, 51). Subjective methods for assessing physical activity are based on an individual's perception, while objective methods are based on recording activity using an instrument (30). Some advantages of subjective measures include that they are relatively inexpensive, easy to administer, and useful when studying large populations. A disadvantage of subjective measures is the tendency of individuals to underreport or overreport exact physical activity performed.

On the other hand, objective measures reduce the chance for error in the individual's ability to recall a particular activity. Additionally, instruments used for objective measures of physical activity are usually small and unobtrusive (30). Disadvantages of objective measures include their expense and lack the ability to identify the type of physical activity performed by an individual.

Review of Dietary Approaches to Weight Management

Understanding the etiology of weight gain in individuals can be quite complex. However, it is well established that excessive caloric intake is a primary cause of weight gain. Adhering to a reduced calorie meal plan (≥ 500 kcal/day deficit) can lead to a pound or more of weight loss in a week (19). Various dietary approaches have been studied for their effectiveness in promoting weight loss and/or maintenance. Specifically, these dietary approaches include consuming adequate amounts of dietary fiber, fruits, vegetables, substituting high-fat foods with low-fat foods, and eating breakfast regularly. A review of the following dietary approaches to weight management are include the following sections:

- 1) the role of fiber in weight management;
- 2) the relationship between fruit and vegetable intake and body weight;
- 3) the influence of low-fat foods in adjunct to adequate fruit, vegetable and fiber intake;
- 4) the role of breakfast in weight management.

Role of Dietary Fiber in Weight Management

In 2002, the Institute of Medicine (IOM) published three definitions for fiber. (52). Dietary fiber is defined as nondigestible carbohydrates and lignin that are intrinsic and intact in plants (52), whereas functional fiber is defined as isolated, nondigestible carbohydrates that have beneficial physiological effects in humans. Total fiber is the sum of both dietary fiber and functional fiber. The Dietary Reference Intakes (DRI) for daily dietary fiber consumption for adults recommends 14g of fiber/1,000 kcal or 25g for women and 38g for men (52). This amount can be met by consuming a variety of fruits, vegetables, whole grains, legumes and nuts. There are two types of fiber present in food, which have different functions in the body. Insoluble fiber may function as stool-bulking agents, whereas soluble fiber may aid in slowing the digestion of nutrients and other dietary components. Both forms of dietary fiber are shown to influence physiological behaviors that may aid in weight management (53).

Intrinsic, hormonal and colonic effects of fiber consumption have been shown to influence physiological mechanisms that may aid in weight regulation (53). An intrinsic effect of fiber on weight management may be due to its relatively low energy density (1.5-2.5 kcal/g). Low energy dense foods typically provide low palatability since they are low fat, which may decrease hunger by enhancing satiation. Satiation can be described as the state of fullness during an eating episode while satiety refers to the sensations of fullness between eating episodes (54). Satiation is likely to occur after the consumption of a high fiber meal by increasing chewing time and effort, decreasing the rate of ingestion and increasing the feeling of fullness. Over time, this will lead to a decrease in total

caloric intake, resulting in an increase in fat oxidation and a decrease in fat storage (53).

Figure 1 summarizes the intrinsic effects of fiber in weight management.

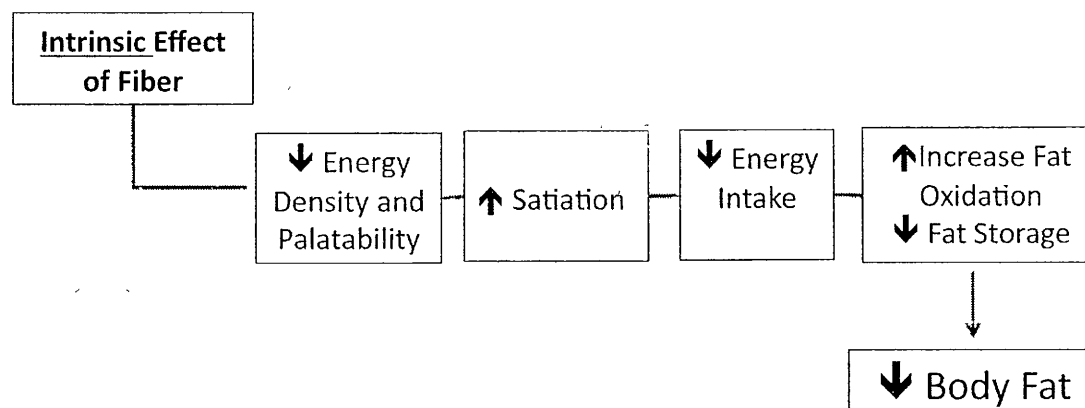


Figure 1: Summary of Intrinsic Effects of Fiber in Weight Management. Figure adapted from Pierra et al., 2001 (53).

Fiber may aid in weight management through hormonal effects by altering the release of specific gut hormones and decreasing the rate of carbohydrate absorption after a meal. For example, when soluble fiber is consumed, intraluminal viscosity may increase and cause a delay in gastric emptying. In response to a delay in gastric emptying, the absorption of glucose and other nutrients may be delayed (53). If there is a delay in carbohydrate absorption, this may decrease postprandial blood glucose concentrations and decrease excessive insulin secretions (53). Alterations in glucose absorption following a high-fiber meal may cause an increase in fat oxidation, decrease in fat storage and thus decrease body fat. Another hormonal effect in which fiber may aid in weight management is due to an increased response and prolonged circulation of specific gut hormones. For example, cholecystokinin (CCK) and glucagon-like peptide-1 (GLP-1) are hormones that have been shown to aid in satiety by regulating gastric emptying and

postprandial satiety (53, 55). Overall, hormonal effects of dietary fiber may be associated with decreased food intake and enhanced satiety by altering insulin secretions and releasing gut hormones. Figure 2 summarizes the hormonal effects of fiber in weight management.

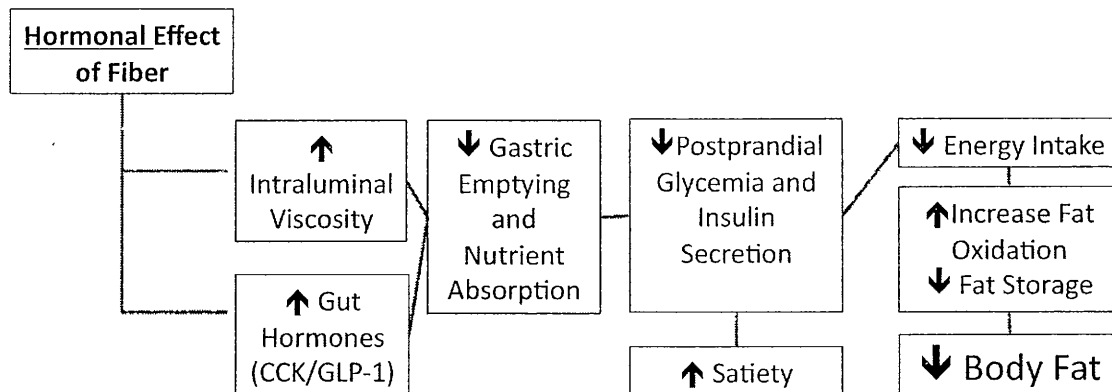


Figure 2: Summary of Hormonal Effects of Fiber in Weight Management. Figure adapted from Pierra et al., 2001 (53).

Finally, fiber's role in weight management may be due to the fermentation process that occurs in the colon after the consumption of insoluble fiber. The function of insoluble fiber to serve as a bulking agent is well known, however some studies suggest that there may be underlying mechanisms that occurs in the colon which may be responsible for weight regulation. For example, the nondigestible components of insoluble slowly pass through the colon where they are likely to be fermented by colonic bacteria. As a result of bacterial fermentation in the colon, short-chain fatty acids (SCFA) are produced. An increase in SCFA in the blood may stimulate secretion of GLP-1 to up-regulate satiety and decrease energy intake (53). Figure 3 summarizes the colonic effects of fiber in weight management.

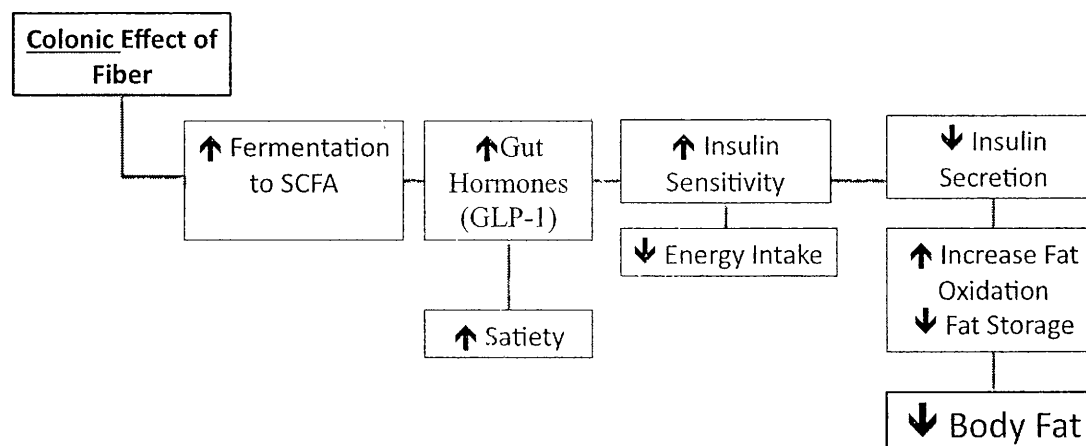


Figure 3: Summary of Colonic Effects of Fiber in Weight Management. Figure adapted from Pierra et al., 2001 (53).

Combined data from several studies have supported an inverse association of fiber intake and body weight of individuals (53, 55, 56). For example, studies have consistently found that overweight and/or obese individuals are likely to have low intakes of fiber, while lean and/or normal weight individuals are likely to have high intakes of fiber in their diet. In a 10-year prospective study, young adults who consumed the most fiber gained less weight throughout the duration of the study than those who consumed less fiber, even after controlling for fat intake (55).

Between 1984-2000, there were 27 clinical studies that investigated dietary fiber and satiety (53). Of those, 17 studies showed positive effects of enhancing satiety and thus reducing total energy intake while eating high-fiber diets, despite methodological differences. Methodological differences in these studies included study duration, type and dose of fiber, and the use of subjective or objective measures in assessing satiety (53). Even though many of these studies were short-term, the effects of high-fiber foods and/or supplements in the form of guar, pectin, whole grains (breakfast cereal and barley) and

non-specified high-fiber meals support fiber's role in weight management. Howarth and colleagues reviewed studies that investigated the effects of fiber on satiety, hunger, energy intake, and body weight (55). Their analysis revealed that under a controlled setting, soluble and insoluble were shown to enhance satiety and decrease hunger. Under ad libitum conditions, high-fiber diets were shown to produce modest weight loss in healthy adults, averaging 1.9 kg over 3.8 months. In overweight/obese individuals, high-fiber diets were shown to have a greater effect on weight loss (2.4 kg) and reduced energy intake by as much as 18% (55). Overall, the physiological effects of fiber to increase satiety reduce energy intake and thus decrease body weight has been scientifically supported.

Fruit and Vegetable Intake and Body Weight

Consuming fruits and vegetables is not only associated with the prevention of chronic diseases such as certain cancers, diabetes and cardiovascular disease (57-59), but may also be an important strategy in weight management. According to the *Dietary Guidelines for Americans (DGA) 2005*, individuals should consume at least two cups of fruits and two and one-half cups vegetables daily (60). With the high prevalence of overweight and obesity and with nearly 60% of Americans not meeting the recommended consumption of fruits and vegetables (61), educating individuals on how to increase their intake of fruits and vegetables can be a cost effective approach to weight management (62).

Fruits and vegetables may be effective in promoting weight loss since most are low in fat, high in fiber, and add volume to meals through their high water content (63).

Because most fruits and vegetables are low-fat, and contain fiber (1.5-2.5 kcal/g) and water (0 kcal/g), they are considered low energy dense foods or have a relatively small number of calories per weight of food (64). The fiber and water content of fruits and vegetables adds to the volume of food being consumed while contributing a small number of calories to a meal. Thus, fruits and vegetables may aid in enhancing satiation and satiety and thus may regulate energy intake (64).

Although there are limited direct studies focusing solely on the relationship between fruit and vegetable intake and weight management, there is strong evidence showing that increasing fruit and vegetable intake can be a beneficial strategy in a weight management program. Two extensive literature reviews have examined the relationship between fruit and vegetable intake and weight management (65, 66). Tohill and colleagues reviewed several epidemiological studies conducted between 1966-2003, which investigated the relationship between fruit and vegetable intake and body weight in free-living individuals. Of the studies reviewed, the majority demonstrated a consistent association between fruit and/or vegetable intake with body weight status in men and women (65). Specifically, overweight men and women were likely to have a lower fruit and/or vegetable intake compared to men and women who were normal weight. Over a 10-year period, Kahn et al. found that as men and women consumed more vegetables, there was a decrease in BMI and WC (67). Some studies found different trends in fruit and vegetable intake between sexes. For example, obese men, but not obese women, were shown to consume fewer vegetables compared to healthy weight individuals (68). Overweight women were shown to consume less fruit than normal weight women, but no

significant differences in fruit intake were seen between overweight men and normal weight men (69).

Rolls and colleagues reviewed intervention studies that investigated the effects of fruit and vegetable intake on enhancing satiety and decreasing energy intake (66). Among these studies, those of short duration supplied and/or monitored food intake, while long-term studies were primarily conducted as part of a comprehensive dietary plan or to decrease risk of disease. The long-term studies accounted for multiple outcome variables such as sex, race, smoking, physical activity and other dietary patterns. Intervention studies investigating the effects of fruit and vegetable intake on enhancing satiety are difficult to compare since there are several factors to consider. These factors include the form of food (whole, dried, puree, liquid), the method of food preparation, the time of food consumption, the food components in an eating episode, and the amount/portion of food consumed (66, 70). Also, a complete description of food intake is required to determine the effectiveness of satiety since some of the above factors affect the energy density of a particular food or meal. In order to control for energy density, Ledikwe and colleagues provided women and men with different energy dense diets to investigate the effects of satiety (71, 72). Findings revealed that women and men who consumed low energy dense foods, particularly fruits and vegetables, consumed fewer calories (250-425 kcal) despite consuming more food by weight than men and women who consumed high energy dense foods (72). Therefore, fruits and vegetables, which are relatively low energy dense foods can enhance satiety and reduce caloric intake.

Other studies investigated the effect of consuming different forms of fruits and/or vegetables on satiety. When comparing the effects of consuming apples, applesauce, or apple juice, with and without added fiber, prior to a meal, whole apples were shown to enhance satiety greater than applesauce or apple juice (70). In another study, researchers investigated the effect of raw carrots or cooked carrots on satiety. Consumption of raw carrots was shown to produce greater satiety 3.5 hours after consuming the meal (73). Other studies reported similar results supporting the effectiveness of consuming whole fruits and vegetables to enhance satiety and thus reduce total energy intake (74, 75). Overall, studies have shown that consuming whole fruits and vegetables had a greater effect on satiety than either pureed or liquid forms (70, 73-75). Thus, consuming whole fruits and/or vegetables prior to a meal or with a meal may aid in weight control.

Combined Dietary Interventions: Low-fat, High-fiber, and Fruit and Vegetable Intake

As part of a comprehensive dietary intervention program, it is evident that consuming adequate amounts of fiber, fruits, and vegetables may aid in weight management by enhancing satiety and thus decreasing caloric intake. However, consuming low-fat foods has also been supported in the literature as an effective method in weight control (76). The following section discusses the effects of consuming a diet that is low-fat, high-fiber and with adequate amounts of fruits and vegetables in relation to weight management.

Studies have shown that recommending a diet high in fiber, fruits, and vegetables while decreasing fat intake significantly promotes weight loss compared to low-fat diets alone (77-83). In the PREMIER clinical trial, researchers investigated the effects of

energy density on anthropometric measures by randomly assigning hypertensive subjects to one of three groups (77). These groups included the established group who received standard anti-hypertensive recommendations (weight loss, sodium reduction and physical activity); the established + DASH (Dietary Approaches to Stop Hypertension which primarily focuses on dietary fiber, increased fruit and vegetable and low-fat dairy consumption); and the advice group who received one session of counseling about standard hypertensive recommendations or the DASH recommendations. At the end of the six-month intervention, all groups significantly decreased weight, BMI and WC; however the greatest change was found among the established + DASH group who had a mean weight loss of 13.4 lbs. The established group and advice group lost approximately 11.2 lbs and 2.4 lbs, respectively. It is important to note that even though energy intake decreased in all three groups, the weight of food eaten by the established + DASH diet group increased along with fruit and vegetable intake (77). Thus, consumption of fruits, and vegetables in combination with a low-fat diet may aid in reducing food intake by controlling hunger.

Another study also found an indirect association between diet composition and weight loss. The objective of the Polyp Prevention Trial (PPT) was to conduct a four year dietary intervention program to study the recurrence of adenomatous polyps in approximately 1,840 participants who consumed low-fat, high-fiber diets with increased servings fruits and vegetables (78). Participants were randomly assigned to a control group or intervention group. The intervention group received intensive nutrition education, dietary counseling and behavior modification techniques in order to achieve dietary goals based on individualized energy intake. Dietary goals included consuming a

diet consisting of no more than 20% of energy from fat (low-fat), at least 18 g of fiber per 1000 kcal (high-fiber) and at least five to eight servings of fruits and vegetables depending on energy intake. The results of the study found that participants in the intervention group significantly reduced fat, increased fiber, and increased fruit and vegetable intake compared to the control group. Furthermore, the intervention group had consistent improvements in their dietary intake throughout the four-year study. Within the first year of the study, participants in the intervention group lost the most weight, averaging 4.3 lbs. Even though some participants in the intervention group regained their lost weight, most of them maintained a weight below their baseline after four years (78). Weight maintenance among the intervention group may be due to consistent improvement in their dietary intake throughout the four years by consuming fruits, vegetables, and low-fat, high-fiber foods.

Although weight loss was not the main outcome variable in most of these studies, incorporating fiber, fruits, vegetables, and low-fat foods has been supported in the literature as effective dietary components in a weight management program. However, since most studies included different types of interventions, it is difficult to attribute direct associations between specific dietary intakes of fiber, fruits, vegetables, and fat with weight loss. Future studies that are primarily focused on weight management as the primary outcome are needed to investigate the direct association between diets rich in fruits, vegetables, fiber and low-fat foods. Nonetheless, emphasis on consuming a variety of whole foods, including foods high in fiber and fruits and vegetables, and reducing the amount of refined foods should be encouraged as part of a weight management diet plan.

The Role of Breakfast in Weight Management

Numerous studies have shown that breakfast consumption provides many health benefits, especially in improving dietary quality and body composition (84, 85). Nearly 30% of adults in the U.S. do not eat breakfast (86), and the lowest rate of breakfast consumption is found among young adults ranging in age from 19-29 years (87-89). In 2006, researchers conducted a five-year longitudinal study with over 9,000 participants to investigate the occurrence of breakfast skipping and fast food consumption during the transition period between adolescence (11-21 years of age) to adulthood (18-27 years of age). The findings revealed a significant increase in breakfast skipping, fast food consumption, and weight gain during this transition period. Specifically, breakfast was consumed four to five times per week by adolescents and decreased to three times per week in young adults (89). Many studies have found an inverse relationship between BMI and breakfast consumption (88, 90-93). Specifically, individuals who skipped breakfast were shown to have a higher BMI and a greater caloric intake in the evening hours than those who ate breakfast (93). It is proposed that breakfast skippers may experience an increase in hunger and are more likely to overeat unhealthy foods throughout the day (90). Ma and colleagues found that breakfast skippers have 4.5 times the risk of becoming obese compared to those who consumed breakfast regularly (94).

Eating breakfast regularly has been shown to be a major component in maintaining weight loss; however, this is dependent on the types of food being consumed (95). For example, consuming a low-fat, high-fiber breakfast can increase satiety and aid in controlling energy intake compared to a high-fat breakfast (85, 87, 96). Holt and colleagues compared the effects of consuming a high-fiber or high-fat breakfast with

satiety and total energy intake. Findings showed that a high-fiber breakfast enhanced satiety and significantly decreased fat intake by as much as 6 % (96). A high-fat breakfast provided less satiety, and more calories were consumed throughout the day.

In summary, skipping breakfast is associated with a higher BMI and increased risk for obesity, whereas breakfast eaters have been shown to maintain or lose weight in a healthful way. Individuals manage their weight are likely to consume breakfast foods that are high-fiber and low in fat. Over time, this can lead to a decrease in total fat intake and an increase in fiber intake which can significantly decrease energy intake and thus be an effective strategy in weight loss or maintenance (90, 89, 95).

A summary of all dietary factors related to weight management can be found in Table 2.

Table 2 Summary of Dietary Approaches to Weight Management		
Dietary Approach	Recommended Amount	Rationale
Fruits & Vegetables	2 cups fruits ^a 2 ½ cups vegetables ^a	Fruits and vegetables provide fiber and water while adding food volume; may aid by increasing satiety and reducing hunger. ^b
Fiber	14 g/1000 calories ^c 20-35 g/day	May aid in satiety and satiation to reduce total caloric intake; may also interfere with macronutrient absorption. ^b
Total fat	20-35% total calories ^a	Replacing high calorie dense foods (high-fat) with low-fat foods may aid in long-term weight management. ^b
Breakfast	Encourage consuming breakfast daily. ^b	Skipping breakfast is associated with increased total calorie intake, which may lead to greater weight gain overtime. ^b

^a Based on the *Dietary Guidelines for Americans 2005* for a 2,000 calorie meal plan (60).
^b Based on ADA evidence-based literature (53-96).
^c Based on *Dietary Reference Intakes* for Fiber (52).

Behavior Change

In addition to diet and physical activity interventions, behavioral therapy should also be part of a comprehensive weight management program. There is no single behavior strategy that has a greater effect in producing weight loss, rather multiple behavior strategies to facilitate behavior change are recommended (19). Behavior therapy strategies include self-monitoring, stress management, cognitive restructuring, social support and problem solving. For example, in weight management programs, tracking daily food intake and daily physical activity are self-monitoring strategies used to facilitate behavior changes in individuals.

Motivational interviewing (MI) has also been identified as a highly effective strategy in promoting behavior change. MI is designed to create a “client-centered, directive method for enhancing intrinsic motivation to change by exploring and resolving ambivalence” (97). Unlike traditional counseling, the role of the counselor in MI sessions is to help guide individuals to facilitate a change in behavior rather than the counselor directing the individual (98). The spirit of MI and the key principles of MI are summarized in Tables 3 and 4.

Table 3
The Spirit of Motivational Interviewing^a

<u>Fundamental approach of MI</u>	<u>Mirror-image opposite approach to counseling</u>
<i>Collaboration.</i> Counseling involves a partnership that honors the client's expertise and perspectives. The counselor provides an atmosphere that is conductive rather than coercive to change.	<i>Conformation.</i> Counseling involves overriding the client's impaired perspectives by imposing awareness and acceptance of "reality" that the client cannot see or will not admit.
<i>Evocation.</i> The resources and motivation for change are presumed to reside with the client. Intrinsic motivation for change is enhanced by drawing on the client's own perceptions, goals, and values.	<i>Education.</i> The client is presumed to lack key knowledge, insight and/or skills that are necessary for change to occur. The counselor seeks to address these deficits by providing the requisite enlightenment.
<i>Autonomy.</i> The counselor affirms the client's right and capacity for self-direction and facilitates informed choice.	<i>Authority.</i> The counselor tells the client what he or she must do.

^a Table duplicated from Miller & Rollnick 2002 (97).

Table 4
Key Principles of Motivational Interviewing^a

1. Express Empathy
 - Acceptance facilitates change.
 - Skilful reflective listening is fundamental.
 - Ambivalence is normal.
2. Develop Discrepancy
 - The client rather than the counselor should present the arguments for change.
 - Change is motivated by a perceived discrepancy present behavior and important personal goals or values.
3. Roll with Resistance
 - Avoid arguing for change.
 - Resistance is not directly opposed.
 - New perspectives are invited but not imposed.
 - The client is a primary resource in finding answers and solutions.
 - Resistance is a signal to respond differently.
4. Support Self-Efficacy
 - A person's belief in the possibility of change is an important motivator.
 - The client, not the counselor, is responsible for choosing and carrying out change.
 - The counselor's own belief in the person's ability to change becomes a self-fulfilling prophecy.

^a Information gathered from Miller and Rollnick, 2002 (97).

Miller and Rollnick were the first to develop the framework of MI in treating alcoholism (99), but within the last decade the literature supports the effectiveness of MI in improving other health-related behaviors (100), specifically changes in diet (101-104), physical activity (105), and weight loss (106, 107). Unfortunately, many of these studies

do not fully explore the effectiveness of MI alone, since combined treatment therapy is typically involved such as providing nutrition education or engaging in a physical activity regimen. In this case, MI is primarily used as a set of techniques to facilitate behavior change rather than as a primary intervention strategy. For example, in the Eat for Life Trial, Resnicow and colleagues used MI techniques in one of three treatment groups to promote fruit and vegetable intake among African Americans (102). Participants from fourteen black churches were randomly assigned to one of three groups. The three groups included a comparison control group who received only standard nutrition education materials; a self-group who engaged in culturally sensitive interventions with one telephone cue call, and the MI group who engaged in culturally sensitive self-help interventions with one cue call and three MI counseling calls. MI techniques used in the counseling calls included listening reflectively, eliciting self-motivational statements and scaling questions to identify the subjects motivation to increase their fruit and vegetable intake. Results revealed that the MI group consumed at least one or more servings of fruits and vegetables compared to the comparison and self-help group. Overall, MI may be an effective strategy in facilitating and encouraging healthy dietary behaviors.

Summary and Conclusion

In summary, studies have demonstrated that developing a weight management program should be developed using a multi-factorial approach. The ADA's Adult Weight Management Guidelines provide key recommendations for individuals to achieve successful weight loss and/or maintenance based on the most current literature and incorporates the diet, activity and behavioral strategies already discussed. One key

recommendation is to determine an appropriate duration of weight management therapy along with the number of follow-up appointments so that setting realistic weight goals can be accomplished. Another key recommendation is to fully assess the individual's current health status by calculating BMI, measuring WC and determining if there are any associated risk factors or comorbidities associated with being overweight and obese. Other evidence-based suggestions are that a weight management program includes diet, physical activity, and behavioral therapy. Specific dietary recommendations include encouraging the consumption of fruits, vegetables, fiber, low-fat foods and breakfast as part of a weight management program since these practices have been shown to enhance satiety, decrease energy intake and reduce body fat. Overall, these strategies have been demonstrated to be effective approaches to weight management.

Army cadets need to meet military weight and body fat requirements to attend LDAC. Upon completion of LDAC, Army ROTC cadets can be commissioned as officers in the active Army, Army National Guard or the Army Reserve. Since weight management is crucial for cadets to attend LDAC, implementing a weight management program may be an effective approach for cadets to meet the military weight and body fat requirements. To our knowledge, there are no studies investigating the effectiveness of a weight management program among Army cadets enrolled in a university Army ROTC unit.

CHAPTER III

METHODS

Subjects

A total of 23 subjects completed the five month comprehensive weight management program. The subjects ranged in age from 20-30 years (22.8 ± 3.2). 87% of the subjects were male; 78% were Caucasian, 12% Hispanic and 4% Asian. This sample was chosen at the request of the Army ROTC program officers based on the fact that some cadets were not meeting body fat requirements and would not be allowed into the Army's LDAC in the summer following their junior year. The average age, gender, and ethnicity profile of this population is similar to the demographic profile of the Army recruiting population, except our sample does not include African Americans. Subjects were randomly assigned to either a control group or a treatment group. At baseline, t-tests were conducted to compare the groups in terms of the significant variables of interest in this research. No significant differences between the treatment group and the control group for baseline characteristics of age, sex, height, weight, BMI and percent body fat were found. Detailed baseline characteristics of the subjects are presented in Table 5.

Table 5
Baseline Characteristics of Subjects

Characteristic	Control (n=12)	Treatment (n=11)	Overall (n=23)
Age, mean (SD), y	22.8 (3.4)	22.8 (3.2)	22.8 (3.2)
Height, mean (SD), in	66.7 (2.7)	69.3 (4.5)	68.0 (3.6)
Weight, mean (SD), lbs	157.1 (26.6)	168.4 (30.7)	164.7 (27.5)
BMI, mean (SD), kg/m ²	23.7 (2.9)	24.3 (2.2)	23.8 (2.3)
Sex, No. (%)			
Female	3 (25)	0 (0)	3 (13)
Male	9 (75)	11 (100)	20 (87)
Race/Ethnicity, No. (%)			
African American	0 (0)	0 (0)	0 (0)
Asian	0 (0)	1 (9)	1 (4)
Caucasian	10 (83)	8 (73)	18 (78)
Hispanic	1 (8)	2 (18)	3 (13)
Other	1 (8)	0 (0)	1 (4)
Living Status, No. (%)			
On-Campus	6 (50)	0 (0)	6 (26)
Off-Campus	6 (50)	11 (100)	17 (74)
Supplement Use, No. (%)			
Multivitamin	5 (42)	3 (27)	8 (35)
Calcium	1 (8)	0 (0)	1 (4)
Herbal	0 (0)	1 (9)	1 (4)
Protein	1 (8)	2 (18)	3 (13)
Alcohol Use, No. (%)			
Yes	9 (75)	10 (91)	19 (83)
No	3 (25)	1 (9)	4 (17)
Current Smoker, No. (%)			
Yes	2 (17)	2 (18)	4 (17)
No	10 (83)	9 (82)	19 (83)

Note: BMI = Body Mass Index

Research Design and Methods

Selection of Nutrition Counselors

Research has shown that using nutrition students as weight management counselors can be an effective method to promote dietary changes in subjects within a university campus (108). Initially, eleven undergraduate and graduate students from the Nutrition and Foods program at Texas State volunteered to serve as nutrition counselor

for this study. After a meeting in which researchers provided and explained forms regarding professional confidentiality and job expectations, nine students were selected to complete the study (see Appendix A).

Procedure and Measures

The study was conducted for five months (January - May, 2009). During a preliminary meeting with all subjects, investigators provided information regarding the program's purpose, subject selection, procedures, risks, benefits, and researchers' contact information and provided written consent forms and health history questionnaires (see Appendix A). Once written informed consent was obtained, subjects were randomly assigned to either a control or treatment group. Subjects in the control group only received nutrition education handouts while the treatment group received individualized dietary, physical activity and behavior counseling. Confidentiality was enforced throughout the study by de-identifying all subject data using a numbering system with only the principle investigators (PI) knowing the code. Data was collected at three periods in the study [baseline (T1), midpoint (T2) and endpoint (T3)]. All research data and documents were kept in a locked file cabinet in a locked room in the Family and Consumer Sciences building located on the Texas State campus. This study was approved by the Texas State Institutional Review Board and funded by the Texas State Research Enhancement Program.

Through the Texas State website, a TRACS site for the project was created. Subjects were able to access the site using their Texas State student identification number and password. The purpose of the TRACS site was to provide an avenue for

communication and to post information pertaining to the study for the subjects to view or download. Each week a weight management topic was posted on TRACS for all subjects to access. The topics were chosen to assist with data collection, as well as to provide education based on the EBG for Adult Weight Management. Table 6 summarizes the weekly weight management topics. Appendix B contains copies of each weight management handout that was available on the TRACS site.

Table 6
Summary of Weekly Weight Management Topics

Date	Topic	Date	Topic
<u>Week 1</u>	How to Keep a Food Journal	<u>Week 8</u>	Benefits of Fiber
<u>Week 2</u>	Identifying Portions	<u>Week 9</u>	Know Your Fats
<u>Week 3</u>	Grocery Shopping: What to Look for	<u>Week 10</u>	Eat More, Weigh Less
<u>Week 4</u>	10 Eating Tips for College Students	<u>Week 11</u>	Calcium and Vitamin D
<u>Week 5</u>	Healthy Eating and Easy Recipes	<u>Week 12</u>	Benefits of Breakfast
<u>Week 6</u>	Balancing Meals	<u>Week 13</u>	Beverage Consumption
<u>Week 7</u>	Eating Lean on the Run	<u>Week 14</u>	Finding Time to Train

Data Collection

Dietary Assessment

All subjects were trained by a RD to accurately maintain diet/physical activity records. Three-day diet records (two weekdays and one weekend) were collected from all subjects during each of the three testing periods. Subjects in the treatment group were also required to keep a *daily* food/physical activity record and meet weekly with a nutrition counselor for a 45-minute individual or group motivational counseling session to promote weight loss or maintenance. The counseling sessions were structured to provide a review of the previous week's progress, and counselors provided feedback based on the subject's dietary and physical activity records (see Appendix B). In the

counseling sessions, counselors also discussed the weekly weight management topic as outlined in Table 6. The control group received only printed material over each weight management topic, available online through the TRACS website.

Body Mass Index (BMI) Assessment

BMI or Quetelet's Index is a standard measure used to determine adiposity based on the height and weight of adults (20). It is generally used as a screening tool for adults in order to identify weight related health problems. A normal BMI is defined as 18.5-24.9 kg/m². Overweight is defined as having a BMI of 25-29.9 kg/m² and a BMI of 30 kg/m² or greater is defined as obese (20). On the other hand, the Army screening tool for weight is based on sex specific height-for-weight tables (see Appendix C). When converted to BMI, the Army permits a BMI range between 25.0-27.5 kg/m² regardless of sex, but is dependent on age group (21). This range was determined to account for a soldier's need for larger muscle mass for strength and improved resistance against illness (109).

Maximum body fat and BMI allowances for the Army are included in Table 7.

Table 7			
The Army's Maximum Allowable Body Fat and Target BMI^a			
Age	Gender	Maximum Body Fat (%)	Target BMI (kg/m²)^a
17-20	Male	20	25.8
	Female	30	25.0
21-27	Male	22	26.5
	Female	32	25.3
28-39	Male	24	27.2
	Female	34	25.6
≥ 40	Male	26	27.5
	Female	36	26.0
^a Maximum BMI is based on height for weight tables in revised AR 600-9. Information adapted from Bathalon et al., 2004 (21).			

Each subject's height was measured at baseline by having the subject stand straight with their feet flat at the base of the floor with their back flat against the wall. Individual weights were collected at the three testing periods using the BOD POD[®] electronic scale which was calibrated prior to each testing period. BMI was calculated by dividing the individual's weight in kilograms by their height in meters squared (20)

3-Site Skinfold Assessment

Both treatment and control subjects had a skinfold measurement taken at each of the three testing periods to estimate percent body fat. Chest, abdominal and thigh measurements were taken for males, while the triceps, suprailiac and thigh measurements were taken for females. Generally, these sites are chosen because they are reliable and highly correlated with other measures of body fat percentage (110).

Air-displacement plethysmography (ADP) Assessment

All subjects were tested for body fat and fat-free mass using the BOD POD[®]. The basic principles of air-displacement plethysmography (ADP) include determining densitometry (mass/volume), body mass (BM), body volume (BV), thoracic gas volume (TGV) and surface area. All subjects were instructed regarding the BOD POD[®] testing protocol prior to the measurement: (1) No exercise or strenuous activity at least two hours prior to testing. (2) No intake of large amounts of food and beverages at least two hours prior to testing. (3) Wear only form-fitting Speedo or Lycra/spandex-type swimsuit or single layer compression shorts without padding. A single layer sports bra could also be worn for females who chose not to wear a bathing suit. (4) Swim caps must be worn and will be provided for each subject. The BOD POD[®] testing room was located in a small

room inside the Family and Consumer Sciences building. To ensure privacy, a curtained changing area was located in the same room and robes were provided for modesty.

The BOD POD[®] was calibrated and quality control measures were conducted each testing day, prior to any subjects being tested. A complete assessment requires approximately 10-15 minutes. While the subject was changing into the testing garb, basic subject information was entered into the computer (ID numbers were used instead of names) and the BOD POD[®] was calibrated. An electronic scale, a component of the BOD POD[®], was used to weigh each subject. Instructions about the testing process were given to each subject according to the operation manual. Then, the subject entered the BOD POD[®] and had BV and TGV directly measured. TGV accounts for air trapped in the subject's thoracic cavity. This measurement is deducted when the machine calculates the total body volume measurement. TGV was measured only at T1, as recommended by BOD POD[®] protocols.

Since several studies have shown that body fat can be dependent on race, sex and age, several different equations are available through the BOD POD[®] software to translate whole body density to percent body fat. The results of body fat measurements were categorized according to the body fat rating table programmed in the BOD POD[®] software which was based on criteria from the ACSM and the American Council on Exercise (30). Categories of percent body fat are included in Table 8.

Table 8
Categories of Percent Body Fat^a

Body Fat	Male	Female	Description
Risky (high body fat)	> 30%	> 40%	Ask health care provided about how to modify your body composition.
Excess Fat	20-30%	30-40%	Indicates an excess accumulation of fat over time.
Moderately Lean	12-20%	22-30%	Fat level is generally acceptable for good health.
Lean	8-12%	18-22%	Lower fat level than many people. This range is generally excellent for health and longevity.
Ultra Lean	5-8%	15-18%	Fat levels often found in elite athletes.
Risky (low body fat)	< 5%	< 15%	Ask your health care professionals about how to safely modify your body composition.

^a Table as seen on BOD POD[®]. ACSM's Resource Manual for Guidelines, 5th edition (30).

Physical Activity Assessment

Initially, Polar E600 heart rate monitors were provided to all subjects in order to measure daily physical activity levels. All subjects were required to wear the monitor for at least 8 hours a day on 3 consecutive days during T1. However, after analyzing the initial data from the monitors, we identified issues in obtaining accurate data. These issues included the subject's noncompliance in wearing the heart rate monitors and interference from other electronics on the monitor's ability to accurately record heart rate. To overcome these problems, cadets were instructed to record physical activities performed on 3 consecutive days at each testing period, which included two weekdays and one weekend to categorize levels of physical activity. Activity reports could include the prescribed ROTC physical training, consisting of moderate to vigorous activities for 1 hour, 3 days each week, if the training occurred on one of the collection days. The ROTC physical training was mandatory, and therefore data for this training were only collected if the training coincided with a collection day. In all subjects, physical activity behavior

was categorized as sedentary, low active, active, and very active based on ACSM categories described in Table 9. The average physical activity level in each subjects was determined by a scale of 1= sedentary and 4= very active. A description of daily physical activity levels is included in Table 9.

Table 9

Description of Daily Physical Activity Level^a

Daily Activity Level	Description
Sedentary	Mostly seated or standing daily; no exercise or other leisure activities.
Low Active	Light exercise and leisure activities (i.e., walking for 50 minutes per day at 3mph or golfing 40 minutes per day).
Active	Moderate exercise and leisure activities (i.e., cycling moderately for 75 minutes per day or playing tennis 90 minutes per day).
Very Active	Heavy manual labor job or heavy exercise and leisure activities (i.e., jogging 75 minutes per day or playing basketball 60 minutes per day).

^a Based on ACSM's Resource Manual for Guidelines, 5th edition (31).

Fitness and Physical Performance Assessment

All subjects performed exercise training prescribed and supervised by the Army ROTC officers. Level of fitness was assessed each month using the APFT. The APFT test consisted of a timed 2-mile run, push-ups and sit-ups. Cadets are required to complete the APFT within 2 hours and are given no more than 20 minutes rest between each event. Pass or fail of this test is dependent on the combined score of each event. Each event is worth 100 points, totaling a maximum score of 300, while the minimum score is 60 points per event, totaling a minimum passing score of 180 (111). The 2-mile run has been validated as a measure of cardiovascular endurance (predictive of VO₂max), while the push-ups and sit-ups are indicators of muscular strength (113).

Behavior Change and Goal Attainment Assessment

All subjects were asked to identify three health-related goals at baseline. Progress towards meeting these goals was measured by an 11-item questionnaire designed to reflect the subject's progress in meeting their health-related goals. Questions included perceptions about diet, physical fitness and performance, body composition and preparation for LDAC and were measured using a 5-point Likert scale ranging from 1= Strongly Disagree to 5= Strongly Agree.

In order to facilitate behavior change in the treatment group, nutrition counselors used MI techniques and provided nutritional education in their weekly counseling sessions. Prior to the study, nutrition counselors were required to attend a Motivational Interviewing (MI) workshop. This approach was based on previous studies supporting the effectiveness of MI techniques in improved specific dietary habits (102) and weight loss (106). To establish application of these techniques, nutrition counselors met with the RD each week throughout the study to discuss these topics in relation to their upcoming sessions. Counseling sessions were supervised periodically throughout the study by the PI.

Identifying 'Stage of Change' (SOC) is a key construct in defining the Transtheoretical Model. This theory is based on an individual's process of changes towards achieving a specific goal (115). SOC is recognized by the following stages: pre-contemplation, contemplation, preparation, maintenance and action. Nutritional counselors in this study were trained to identify each SOC according to definition describe in Prockaska & DiClemente 1996 (113), and recommendations for each stage

were based on guidelines addressed in Kristal et al., 1999 (114). Definitions and recommendations for each SOC are included in Table 10.

Table 10

Summary of Stage of Change and Recommendations

Stage of Change	Definition ^a	Recommendation ^b
Pre-contemplation	No intention to change behavior in the foreseeable future.	<input type="checkbox"/> Provide personalized information. <input type="checkbox"/> Allow client to express emotions about his or her disease or about the need to make dietary changes.
Contemplation	Aware a problem exist and is seriously thinking about overcoming it; but has not made a commitment to change.	<input type="checkbox"/> Discuss and resolve barriers to dietary change. <input type="checkbox"/> Encourage support networks. <input type="checkbox"/> Give positive feedback about a client's abilities. <input type="checkbox"/> Help to clarify ambivalence about adopting behavior and emphasize expected benefits.
Preparation	Intend to take action within the next month.	<input type="checkbox"/> Encourage client to set specific achievable goals. <input type="checkbox"/> Reinforce small changes that client may already achieved.
Action	Modify their behavior, experience or environment in order for them to overcome their problems.	<input type="checkbox"/> Refer to educate program for self-management skills. <input type="checkbox"/> Provide self-help materials.
Maintenance	Work to prevent relapse and consolidate the gains attained during action	<input type="checkbox"/> Encourage client to anticipate and plan for potential difficulties. <input type="checkbox"/> Collect information about local resources. <input type="checkbox"/> Encourage client to 'recycle' if he or she has a lapse or relapse. <input type="checkbox"/> Recommended more challenging dietary changes if client is motivated.

^a Prochaska & Diclemente 1992 (113)

^b Kristal et al., 1999 (114)

SOC was identified subjectively by the counselors according to the definitions of each SOC, body and language cues, and measures of the subject's readiness, importance, and confidence towards achieving their goal(s). In order to determine the subjects readiness, importance and confidence towards achieving their goal, counselors were trained to scale questions from 1 = not ready to change/not very important/not very confident to 5 = very ready to change/very important/very confident. To ensure that

counselors were appropriately using MI techniques and identifying SOC, counselors were required to turn in weekly progress sheets summarizing their counseling session. The progress sheet included a summary of weekly goals, a brief summary of assessment (food intake/history, physical activity, stress, behaviors issues, etc.), SOC, and an intervention plan. The principle investigator arranged individual appointments with each counselor to discuss their progress with the subject and one “sit-in” session with the counselor and their subject to confirm if appropriate MI techniques were utilized.

Biochemical Assessment

All subjects had fasted blood samples drawn for analysis of lipids and basic metabolic panels at T1, T2, and T3 to evaluate nutritionally related indicators of health status. The Texas State Student Health Center provided these services at no cost to the participants. Table 11 provides a summary of the treatment and measures that were used in the study.

Table 11
Summary of Measures and Treatment

<u>Measures</u>	<u>Treatment</u>	<u>Control</u>
Weekly online weight management handouts	X	X
Weekly nutritional counseling (with a nutrition counselor)	X	
3-day food/PA records (at each testing period)	X	X
Daily food records	X	
Weekly weigh-ins	X	
3-site skinfold measurements (at each testing period)	X	X
BOD POD [®] analysis (at each testing period)	X	X
Daily activity records	X	
APFT results (at each testing period)	X	X
Goal attainment questionnaire	X	X
Motivational sessions to achieve health-related goals	X	
Blood analysis (lipid and metabolic panels)	X	X

Statistical Analysis

Repeated measures analysis of variance (ANOVA) with simple contrasts using Statistical Package for Social Sciences (SPSS for Windows version 16.0 SPSS Inc, Chicago, Ill) were conducted to assess the effectiveness of the intervention by investigating changes in anthropometric (i.e., weight, BMI and percent body fat), dietary (i.e., intake of calories, total fat, fruits, vegetables, fiber and breakfast), daily physical activity levels and fitness (determined by the APFT total score), and biochemical measures (i.e. blood lipid and basic metabolic panel) at each of the three testing periods (T1, T2 and T3). If differences were seen either within or between the two groups, post-hoc t-tests were used to determine where the significant differences occurred.

CHAPTER IV

RESULTS

There were no significant differences found in body weight, BMI, fat-free mass, intake of calories, total fat, vegetables, fiber, or breakfast or any biochemical measures (see Appendix D). There were significant differences within all subjects for 1) percent intake of calories from fat, 2) percent body fat, 3) daily physical activity level, and 4) APFT total score. The only significant difference between the treatment and control groups was fruit intake. A summary of significant outcome variables can be found in Table 12.

Table 12					
Summary of Significant Outcome Variables					
Outcome Variable	n	T1 mean ± SD	T2 mean ± SD	T3 mean ± SD	Main Effect <i>P</i> value
<i>Between Group Differences</i>					
Fruit, cup					
Control	12	0.4 ± 0.4	0.5 ± 0.4	0.5 ± 0.3	.04
Treatment	11	0.9 ± 1.5 ^c	1.3 ± 1.0 ^c	1.3 ± 1.3 ^c	
<i>Within Group Differences</i>					
Total Dietary Fat, %					
Control	12	30.7 ± 8.5	27.5 ± 12.1	32.3 ± 11.0	.03
Treatment	11	34.2 ± 4.7	32.4 ± 8.0	27.7 ± 8.8 ^{cd}	
Body Fat, %					
Control	12	18.4 ± 7.4	15.1 ± 7.5 ^c	16.7 ± 8.2 ^d	.02
Treatment	11	17.3 ± 5.2	16.3 ± 4.8 ^c	17.9 ± 4.4 ^d	

Table 12- Continued

Daily Physical Activity^a					
Control	12	3.2 ± 0.6	3.3 ± 0.6	2.8 ± 0.8 ^{cd}	.007
Treatment	11	3.3 ± 0.7	3.2 ± 0.4	2.7 ± 0.7 ^{cd}	
APFT, total score^b					
Control	10	253.0 ± 43.9	264.7 ± 32.3	272.8 ± 22.7 ^c	< .001
Treatment	10	243.5 ± 26.5	253.6 ± 13.7	268.8 ± 19.3 ^{cd}	

Note: T1= baseline, T2= midpoint, T3= endpoint periods.

^a Average daily physical activity was based on a scale of 1= sedentary to 4= very active.

^b The mean APFT total score is based on a maximum score of 300 points and a minimum score of 180 points.

^c Significant difference from T1.

^d Significant difference from T2.

^e Significant difference between groups.

Overall Dietary Analysis

Repeated measures ANOVA examining changes in fruit intake (i.e., servings of fruit) was the only variable found to be significantly different ($F_{1,21} = 4.59$, $p = .04$) between the treatment and control groups at all three testing periods. The treatment group consumed more fruit than the control group at T1, increased their fruit intake throughout the duration of the study compared to the control group. Figure 4 shows differences in fruit intake between in treatment group and control groups at each of the three testing periods.

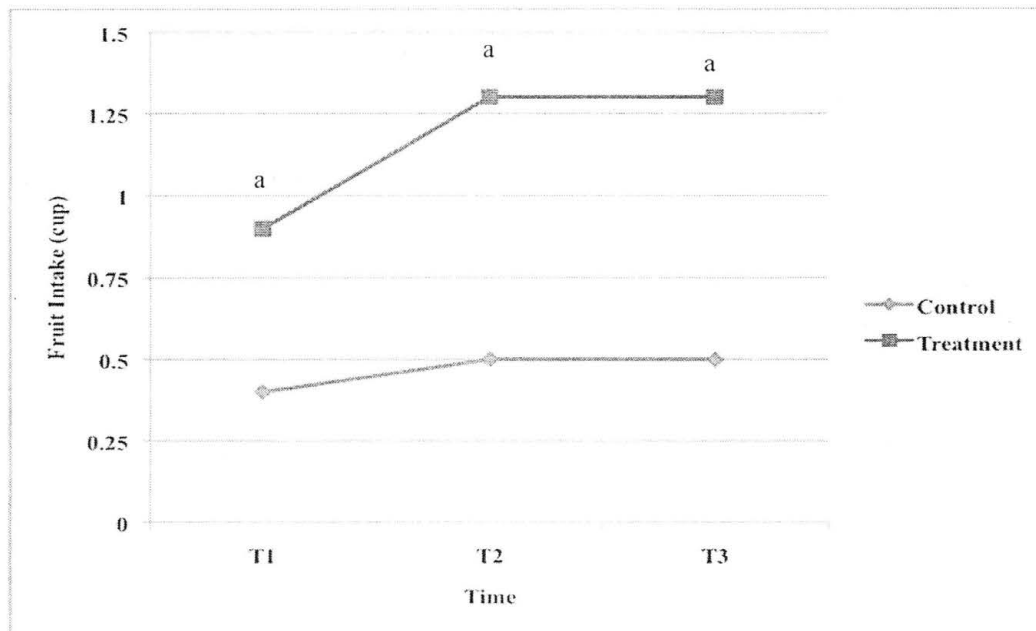


Figure 4. Change in Fruit Intake. ^a Significant difference between groups.

The percent intake of calories from fat at T1, T2, and T3 showed a significant within group interaction ($F_{2,42} = 3.77$, $p = .03$). The change of percent intake of fat calories within the treatment and control groups occurred in opposite directions between T1 to T3 ($F_{1,21} = 4.71$, $p = .04$) and T2 to T3 ($F_{1,21} = 7.77$, $p = .01$). Specifically, the treatment group significantly decreased their intake of percent calories from fat while the control group increased their intake of percent calories from fat throughout the intervention. Post hoc t-tests revealed where the significant differences occurred. Specifically, the change in percent intake of calories from fat was significantly different between the groups from T1 to T3 ($t = 2.32$, $p = .03$) and from T2 to T3 ($t = 2.79$, $p = .01$). The treatment group significantly *decreased* percent intake of calories from fat by 4.8% from T2 (32.4 ± 8.0) to T3 (27.7 ± 8.8) and by 6.6% from T1 (34.2 ± 4.7) to T3 (27.7 ± 8.8). The control group significantly *increased* their intake of percent calories from fat by

4.8% from T2 (27.5 ± 12.1) to T3 (32.3 ± 10.9) and by 1.6% from T1 (30.7 ± 8.5) to T3 (32.3 ± 10.9). Figure 5 illustrates the changes in intake of percent calories from fat in the treatment and control groups at each of the three testing periods.

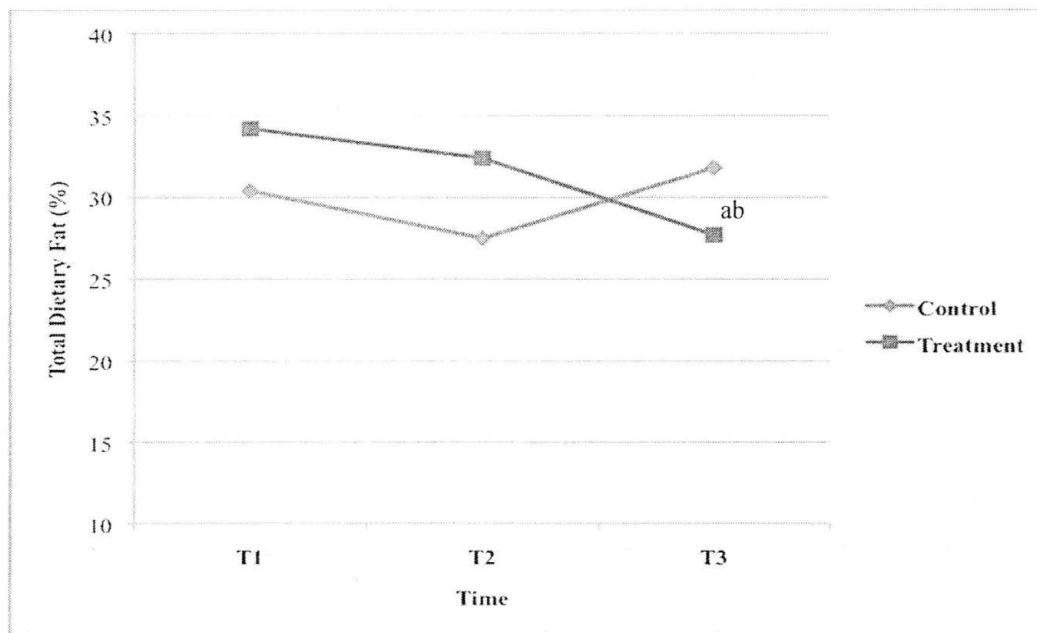


Figure 5. Change in Percent Total Calories from Fat. ^a Significant difference from T1; ^b Significant difference from T2.

Overall Body Composition Analysis

Results of repeated measures ANOVA examining subjects' percent body fat at T1, T2, and T3 revealed a significant difference across time ($F_{1.5, 32.3} = 5.14$, $p = .02$). Specifically, percent body fat in both groups significantly *decreased* ($F_{1,21} = 8.73$, $p < .003$) from T1 (17.9 ± 6.3) to T2 (15.7 ± 6.2) and significantly *increased* ($F_{1,21} = 10.95$, $p < .008$) from T2 to T3 (17.3 ± 6.6). Figure 6 shows the changes in percent body fat in the treatment and control groups at each of three testing periods in the study.

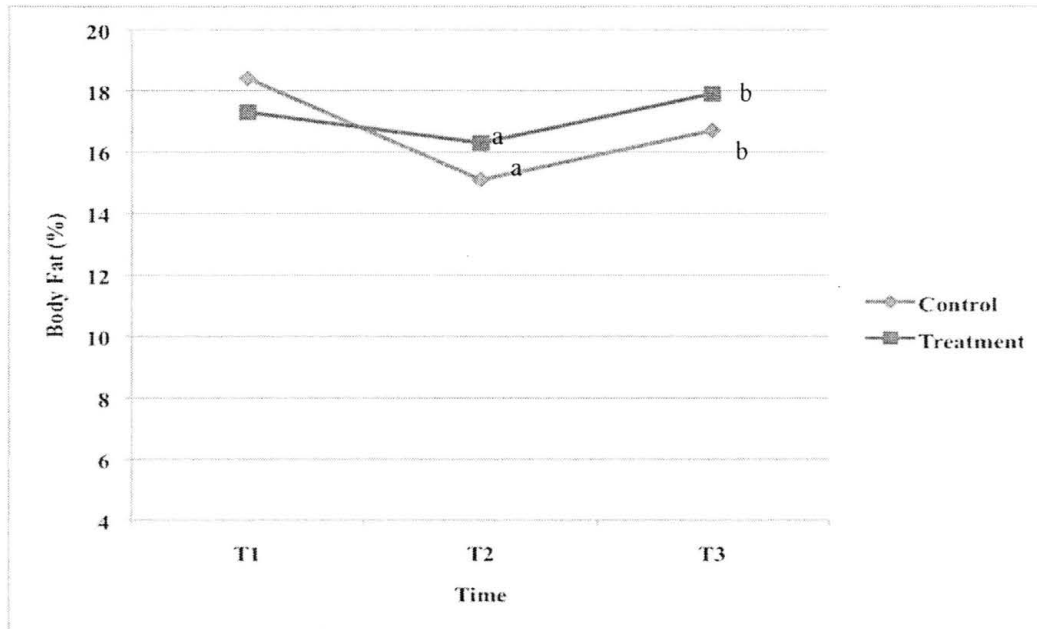


Figure 6. Change in Percent Body Fat. ^a Significant difference from T1; ^b Significant difference from T2.

Overall Daily Physical Activity and APFT Analysis

Similarly, repeated measures ANOVA found physical activity levels to be significantly different across time ($F_{2,42} = 5.62, p < .007$). Daily activity levels were analyzed on a scale ranging from 1 = sedentary to 4 = very active. Unexpectedly, daily physical activity levels in both the treatment and control groups significantly *decreased* ($F_{1,21} = 4.36, p < .006$) from T2 (3.22 ± 0.52) to T3 (2.78 ± 0.74) and ($F_{1,21} = 4.43, p = .02$) from T1 (3.22 ± 0.60) to T3. Figure 7 illustrates the change daily physical levels in the treatment and control groups at each of the three testing periods.

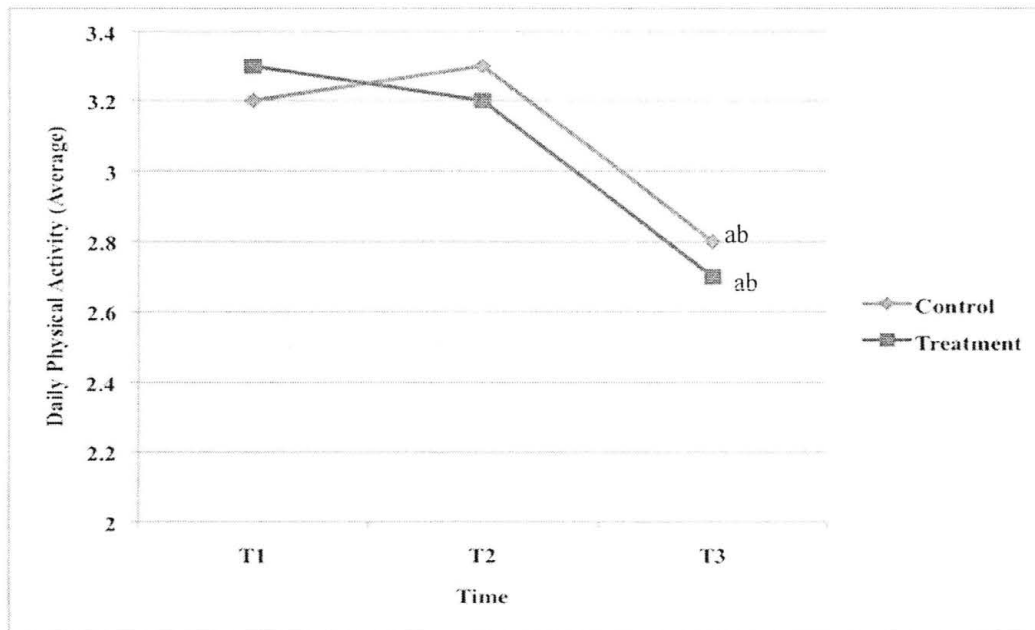


Figure 7. Change in Daily Physical Activity Level. Daily physical activity levels were averaged based on a scale of 1= sedentary to 4= very active. ^a Significant difference from T1; ^b Significant difference from T2.

Analysis of the APFT total scores revealed a significant time and group interaction ($F_{1,26} = 16.61$, $p < .001$). Both groups significantly *increase* ($F_{1,18} = 22.14$, $p < .001$) average APFT total score from T1 (251.7 ± 33.9) to T3 (271.8 ± 22.2). However, there was a significantly greater increase in the APFT total scores ($F_{1,18} = 11.27$, $p < .004$) in the treatment group from T2 (252.2 ± 13.5) to T3 (271.8 ± 22.0) compared to the control group (T2 = 264.7 ± 32.3 , T3 = 272.8 ± 22.7). At baseline the control group had a higher APFT total score (253.0 ± 43.9) than the treatment group (243.5 ± 26.5), but at the end of the study, there was little difference between total APFT scores between the treatment (272.8 ± 22.7) and control groups (268.8 ± 19.3). Figure 8 illustrates the change in the APFT total score in the treatment and control groups at each of the three testing periods.

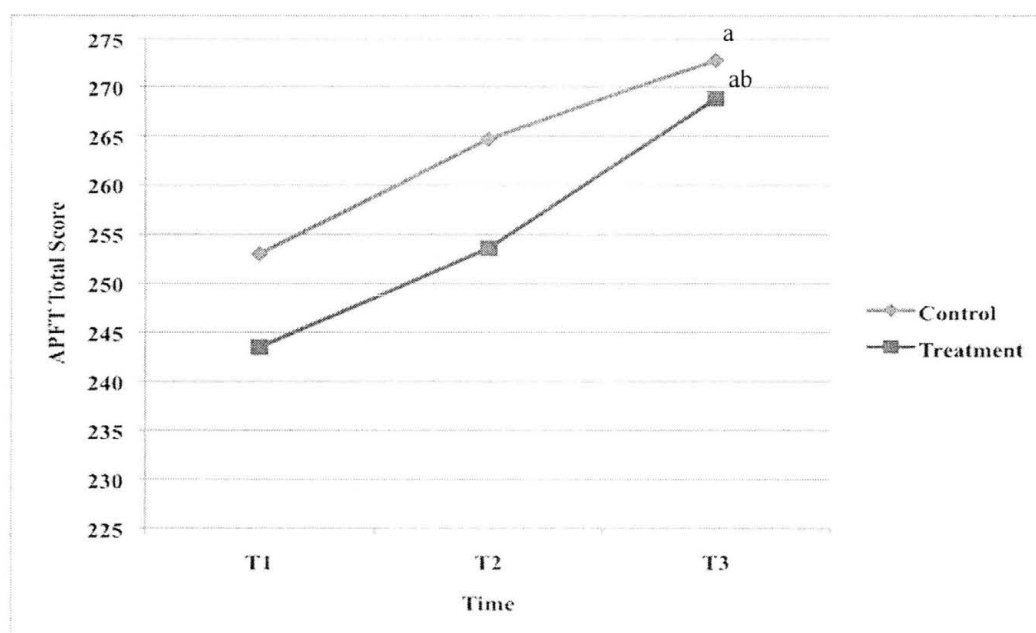


Figure 8. Change in Total Score of APFT. ^a Significant difference from T1; ^b Significant difference from T2.

CHAPTER V

DISCUSSION

Previous studies have investigated the effects of a comprehensive weight management program on military populations (115-117), but none have been conducted on Army cadets enrolled in a university ROTC program. We hypothesized that a comprehensive weight management program, including weekly individual counseling sessions addressing diet, physical activity and weight-related behaviors, would improve weight-related measures in Army cadets enrolled in a university ROTC program. However, results of this study revealed that our comprehensive program *did not* significantly change many of the weight-related variables tested, including anthropometric measures (i.e., weight, BMI, and fat-free mass), dietary measures (i.e., intake of calories, fat, vegetables, fiber, and breakfast) and blood lipid values. However, in support of our hypothesis, subjects in the treatment group, all of whom received individual counseling, did significantly decrease their intake of fat (measured as percent of caloric intake) and improve their APFT scores. Importantly, although not originally stated as part of our hypothesis, by the end of the study, all subjects enrolled in the program met the Army criteria for BMI and % body fat, thus qualifying for admission to the LDAC. Thus, at the very least, this intervention was pragmatically important to the ROTC program because it enabled ‘overfat’ cadets to qualify for officer training.

There were significant differences found *within* each group and across time for several variables measured including 1) percent intake of calories from fat, 2) percent body fat, 3) daily physical activity levels, and 4) the APFT total score. The treatment group significantly *decreased* fat consumption from 34% to 28% throughout the intervention, while the control group showed little change in percent intake of calories from fat intake. Thus, it is likely that applying individual counseling using MI techniques and the SOC model, combined with nutrition education, was effective in decreasing fat intake among the cadets in the treatment group. Our findings are in agreement with previous studies that have found individual counseling to be an effective strategy in decreasing fat intake in other populations (118, 119). For example, Dalgard et al. concluded that individuals with ischemic heart disease who received 50 to 60 minutes of tailored comprehensive counseling and nutrition education significantly decreased fat consumption from 33% to 28% of calories after one year (118). Additionally, Lin et al. found that hypertensive subjects who participated in a 6 month intervention combining individual and group counseling sessions using MI techniques and the transtheoretical SOC model effectively decreased their intake of fat by as much as 9% of total calories (119).

Percent body fat in both the treatment and control groups changed significantly throughout the study. Surprisingly, percent body fat significantly decreased by 2.2% from T1 to T2 and then significantly increased by 1.6% from T2 to T3. This reversal is difficult to understand. Although total body fat in both groups increased by the end of the study, the average percent body fat among all subjects did not significantly increase above baseline nor did average percent body fat for all subjects exceed the Army or

ACSM standard of a healthy body fat level (i.e., < 20%). An explanation for the increases in body fat from T2 to T3 may be due to the significant decrease in daily physical activity seen during this same time.

While changes in the daily physical activity levels of the treatment and control groups were statistically significant over the course of the study, the results were not as predicted. Specifically, for both groups, the daily physical activity levels at T1 and T2 were 'active' to 'very active', but at T3, when activity levels should have increased as a result of our counseling, they almost diabolically decreased significantly to 'active' to 'low active'. There are several possible explanations for this finding. First, the prescribed ROTC exercise program ended between T2 and T3. While this exercise program was not part of the intervention, it very likely influenced our results because cadets probably exercised less each day when no longer forced to exercise as part of their training. Second, T3 occurred after Spring Break, which may traditionally be a time when college students become 'lazy' and engage in fewer voluntary physical activities. Finally, our results were based on physical activity records kept by the cadets and may have been less accurate than results obtained by more objective measures. Ideally, the 3-day physical activity records should have been validated using an objective measure such as a heart rate monitor or motion sensor. It is possible that the more objective measures would not have validated the unexpected decline in physical activity at T3.

This study also revealed changes in fitness levels. Specifically, both groups significantly increased their total score on the APFT by as much as 20 points. The *rate of improvement* was significantly greater in the treatment group, particularly from T2 to T3.

During this time period, the treatment group increased their total APFT score by 16 points, compared to the control group, who increased their total score by only 8 points. This finding suggests that all subjects in the study may have been highly motivated to improve their APFT total scores. The rate of improvement in the treatment group may be attributed to the weekly counseling sessions, which provided social support to the cadets. In general, the high APFT total scores may also indicate that this sample of Army cadets has an acceptable level of fitness and physical performance.

Our study supported the contention that NHLBI BMI standards sometimes incorrectly classify fit soldiers as overweight. Specifically, using NHLBI standards for overweight (i.e., BMI between 25-29.9 kg/m²) 7 of 23 cadets at T1 were overweight. However, when assessed by the Army's standards (Table 7) and by ACSM criteria as determined by BOD POD[®] analysis (Table 8) only 4 actually had excessive body fat levels. Similarly, at T2, almost 50% of cadets were classified as overweight (i.e., 11 of 23) according to NHLBI standards, but, in reality, only 2 cadets had excessive body fat according to BOD POD[®] analysis. The large discrepancy may be attributed to the decrease in body fat (2.2%) and an increase in fat-free mass that occurred due to training between T1 and T2. Although the increase in fat-free mass was not found to statistically significant, both the treatment and control groups averaged an 8-pound gain in fat-free mass. Our findings, that NHLBI BMI standards do not accurately classify the weight status of Army cadets, supports previous research involving both military and athletic populations (22-26). For example, Heinrich et al. found that in 451 military personnel, 35% of men were misclassified as obese using BMI (i.e., ≥ 30 kg/m²) despite having appropriate body fat levels via the Tanita Body Composition Analyzer (23). Similarly,

Mullie et al. found that 40% of 448 male military recruits were misclassified as overweight using BMI (i.e., $> 25 \text{ kg/m}^2$) even though body fat levels were considered healthy via bioelectrical impedance analysis (24).

There were several limitations in this study. First, the majority of subjects (83%) had appropriate body fat levels at the beginning of the study. Thus, given that only 4 cadets were ‘overfat’ at T1, this sample was not likely to exhibit significant changes in weight or body fat as the result of a weight management program. Second, the unexpected reversal in results from T2-T3 may have been influenced by an external factor, which we have termed a “Spring Break Effect.” Specifically, in a college environment, spring break is generally associated with ‘partying’ and students may be motivated prior to spring break to engage in weight conscience behaviors commensurate with improving physical appearance. In fact, in our study, subjects in both the treatment and control groups reported high levels of physical activity (i.e., active to very active) prior to spring break. Although not found to be statistically significant, both the treatment and control groups also exhibited improved body composition (i.e., decreased body weight and increased fat-free mass) and improved in dietary intake (i.e., decreased intake of total calories and fat). Data collected after spring break, however, revealed an opposite trend. The cadets’ percent body fat significantly increased and daily physical activity levels significantly declined. Therefore, the results of our intervention may have been affected by spring break since it occurred at the midpoint period of our study. Finally, the design of the study may have threatened internal validity due to “social interaction” between the treatment and control groups. Since all subjects were in the same junior ROTC class, it is likely that the subjects discussed the type of treatment provided to the

control subjects. This may have caused a competitive rivalry called the John Henry Effect, which occurs when the control group tries to out perform the treatment group (120). This rivalry may have equalized the outcomes of both groups and minimized any significant effects in the program, masking the program's possible effectiveness.

Despite these limitations, this study had several strengths. First, this was the first study to explore the effectiveness of an evidenced based weight management program in Army ROTC cadets prior to attending LDAC and thus provides a foundation upon which future studies can expand. Second, tailored weight management strategies were provided in subjects in the treatment group. These strategies included weekly 45-minute counseling sessions, weekly weigh-ins and monitoring daily diet/physical activity records. Additionally, RMR was assessed at each testing period and used to make appropriate recommendations for caloric intake for weight loss/maintenance. Third, we were able to measure body fat and fat-free mass using the BOD POD®, which has a very small (1-2%) measurement error. For athletic populations such as Army cadets, assessing body fat and fat-free mass are particularly useful in determining if changes in weight were related to changes in fat mass or muscle mass. Since athletic populations tend to have larger muscle mass, assessing body fat and fat-free mass in weight management program should be assessed to avoid misclassify athletic subjects as overweight rather than using BMI alone.

Conclusion

In summary, ADA Adult Weight Management Guidelines comprised of a comprehensive weight management program including dietary, physical activity and

behavioral interventions (19), was found to be an effective approach in increasing the percentage of cadets who met appropriate body fat requirements for acceptance into LDAC. Specifically, our intervention was effective in decreasing dietary fat intake and may have improved fitness levels. A variety of factors, including the “Spring Break Effect”, the duration and timing of the study, and the existing level of relative fitness of the study population may have affected the results of this study.

Future research should investigate areas that were identified in this study to be problematic. For example, future research should identify patterns in health-related behaviors among college students and Army ROTC cadets before and after spring break in order to test our proposed “Spring Break Effect.” Since this “effect” may have profoundly affected our results, future research with college students should consider and account for a “Spring Break Effect”. Additionally, research should also include the assessment of physiological and lifestyle behaviors that may influence body weight and dietary intake among ROTC cadets. Previous research has found that military recruits endure stressful and rigorous military training which requires conformity and obedience to unit officers while managing the demands of school-work and social values (121, 122). Thus, investigating changes in behavior throughout a weight management program should be considered in order to better understand factors that may influence body composition and dietary intake. Finally, longitudinal studies need to be conducted in order to assess the long-term effects of a weight management program in Army cadets. Embarking on this new area research will be beneficial for other Army ROTC to adopt in order to prepare cadets for LDAC. Assessing the long-term effects of a weight

management in Army ROTC programs may help to improve retention rates in the military.

APPENDIX A

RESEARCH FORMS

1. Consent Form
2. Health History Questionnaire
3. Confidentiality Agreement Form
4. Expectations as a Counselor in the ROTC Study

Consent Form to Participate in Research

Comprehensive Weight Management Program Study

Principal Investigator(s) and Contact Information:

Texas State University – Human Nutrition Program

- Dr. BJ Friedman, Professor of Human Nutrition
Phone: 512-245-8342 Email: bfriedman@txstate.edu
- Dr. Sylvia Crixell, Professor of Human Nutrition
Phone: 512-245-2482 Email: scrixell@txstate.edu
- Arisa Cardenas, Graduate Student Human Nutrition
Phone: 361-443-5508 Email: ac1297@txstate.edu
- Julia Von Bank, Graduate Student Human Nutrition
Phone: 512-585-4759 Email: jv1210@txstate.edu

You are being asked to participate in a research study. This form provides you with information about the research. We ask that you read this form and ask any questions you may have before agreeing to be in this research. Your participation in this study is entirely voluntary. You should read the information below and ask questions about anything you do not understand before deciding whether or not to participate. You are being asked to participate in this study because you are a Texas State University ROTC cadet.

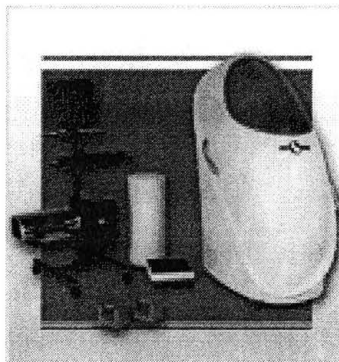
What is the purpose of this study and how many will be involved?

The purpose of this research is to implement and evaluate evidence-based practice strategies to improve and/or maintain body composition to assist you in meeting the US Army standards for participation in the Army's Leadership Development and Assessment Course (ALDAC) using an intensive weight-management program. Participants in the study will include all of the members of the MS3 ROTC cadet class at Texas State University. You will be randomly assigned to either a treatment or control group.

What will be done if you take part in this research study?

All participants:

1. The study will be conducted for five months beginning in January 2009 and ending in May 2009.
2. You will be expected to answer questions related to personal and family medical history and exercise habits. For example, you will be asked about your use of medications, and supplements, if you have any food allergies, and about your personal and family health problems. These questions are used to assess your health status and risk for disease. You have the right decline to answer any question(s) for any reason.
3. You will be asked to complete a phone interview regarding food intake at three different periods (January, March and May). You will be responsible for accurately recording everything you eat and drink for 3 days at 3 different time periods (January, March, May) throughout the study. Training for maintaining diet records will be provided. Appropriate forms for documentation will also be provided.
4. You will be required to participate in the following tests 3 times during the study:
 - a. weight , height,
 - b. body measurements to determine your lean body mass and fat mass using skinfold measures of triceps, chest, mid-axillary, subscapular, suprailiac, abdominal, thigh muscles. (See the chart posted in the room.)
 - c. BOD POD® measurement of lean and fat mass. You will sit in a small, enclosed chamber for about 5 minutes. You must wear a swimsuit or comparable clothing and a swimcap. This testing will be done in a private location with only you and the researchers in the room. (See photo of BOD POD®). There will be a slight pressure change which most people do not notice.



- d. heart rate monitoring. You will be expected to wear a watch for 3 days that monitors heart rate at three different stages in the research (beginning, middle and end) in order to monitor daily physical activity and energy expenditure. These monitors are used to assess cardiovascular health and physical fitness.
5. You will be required to donate a fasting blood sample for testing for serum lipids and a basic metabolic panel at the Texas State University-Student Health Center at the beginning and end of the study. As a participant in the study, you will agree to release the results from the blood tests to the researchers listed above.
6. You are expected to refrain from talking about your role in the study with other MS3 cadets since this could impact the results of the study.

Treatment Group

You will be asked to do all of the items above and each **week of the study**

1. Meet with a nutrition counselor to discuss health related goals and receive nutrition education/counseling. For example, a counselor may ask, “What types of foods do you avoid?” or “What areas in your current diet do you think need improvement?” A counselor may teach you about good sources of dietary fiber and best choices to stay hydrated.
2. Turn-in a daily food and exercise journal for all food eaten and exercise done during the previous week. Training for maintaining the journal will be provided.
3. Have your body weight measured

What are the possible risks?

There are minimal risks involved in participating in this research. Blood draws and skinfold measurements may cause slight discomfort. The BOD POD® chamber which uses air displacement plethysmography (ADP), may cause discomfort for subjects with claustrophobia. ADP is considered a safe method of assessing body composition.

What are the possible benefits to you or to others?

If you are chosen to participate in the treatment group, you will benefit from the intensive individual counseling provided for weight loss/maintenance, increased muscle mass, and improved health. The control group will benefit from the general nutrition guidance provided by the handouts. All subjects will be given the results of all testing and general outcomes of the study. This knowledge may be helpful for the cadets to become eligible for the Army's LDAC and be commissioned as a US Army officer.

If you choose to take part in this study, will it cost you anything?

It will cost you nothing to participate in this program.

What if you don't want to continue in the study?

Participation in this study is voluntary and you may withdraw from the study at any time without prejudice or jeopardy to their standing with the University and any other relevant organization/entity with which you are associated.

Will you receive compensation for your participation in this study?

Compensation will not be provided.

What if you are injured because of the study?

If you are injured due to any activities related to the study, you will not receive any money for treatment. However, if you are a Texas State student you may receive medical attention from the Student Health Center.

In addition, if you have questions about your rights as a research participant, or if you have complaints, concerns, or questions about the research, please contact the IRB chair, Dr. Jon Lasser at (512) 245-3413- lasser@txstate.edu, or to Ms. Becky Northcut, compliance Specialist at (512) 245-2102.

How will your privacy and the confidentiality of your research records be protected?

Authorized persons from Texas State University and the Institutional Review Board have the legal right to review your research records and will protect the confidentiality of those records to the extent permitted by law. Otherwise, your research records will not be released without your consent unless required by law or a court order.

All research data and documents will be kept in a locked file cabinet in a locked room in the Family and Consumer Sciences Building. Only the identified researchers will have keys to the file cabinets. All digital data will be kept on secured computers located within the Family and Consumer Sciences Building and will require a password to access the information. Only the identified researchers will have passwords to access the digital data.

All data will be de-identified. If the results of the research are published or presented at scientific meeting, your identity will not be disclosed.

Will the researchers benefit from your participation in this study?

The researchers will not benefit from the study beyond publishing or presenting results.

Statement of Consent:

I have read the above information and clearly understand my role as a participant in the study. I have asked questions and have received answers. I, _____ consent to participate in the study.

Signature: _____ Date: _____

Signature of Investigator: _____ Date: _____

Health History Questionnaire

Personal Information			
Name:		DOB: ____ / ____ / ____	Age:
Gender: M / F			
Address:			
City, State, Zip:			
Do you live on campus? Yes / No		If so, where?	How long?
Ethnicity (circle): Caucasian Hispanic Native American African American			
Other:			
Home Phone: ()		Work Phone: ()	Email:
Occupation:			
In case of an emergency, please notify:			
Name:		Relationship:	
Address:			
City, State, Zip:			
Home Phone: ()		Work Phone: ()	

General Information		
Height (ft):	Weight (lbs):	
Any unexplained weight loss/gain within the last <input type="checkbox"/> 6 months? <input type="checkbox"/> 1 year? <input type="checkbox"/> No		
If yes, please explain:		
Do you currently exercise independently of ROTC training? <input type="checkbox"/> Yes <input type="checkbox"/> No		
If yes, how long have you been exercising regularly?		
What type of exercises do you perform and how often?		
Exercise (low, moderate, high)	Duration/Frequency	Level of Intensity

Medical Information
Are you currently under the care of a physician or other health care provider? <input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, list the reason and frequency?
Are you currently taking any medications, supplements, diet aids, vitamin, minerals, etc?

<input type="checkbox"/> Yes <input type="checkbox"/> No					
(If yes, please complete the following)					
<u>Type</u>	<u>Dosage/Frequency</u>			<u>Reason</u>	
Please list all known allergies:					
Have you ever had any of the following conditions? (Please circle)					
Heart attack	YES	NO	Emboli (Blood clot)	YES	NO
Angina	YES	NO	Coronary Artery Disease	YES	NO
Asthma	YES	NO	Stroke	YES	NO
Diabetes	YES	NO	Cancer	YES	NO
Type _____			Type _____		
Osteoporosis	YES	NO	Pulmonary Disease	YES	NO
Cardiovascular	YES	NO	Anemia	YES	NO
Currently pregnant	YES	NO	Rheumatic Fever	YES	NO
Emphysema	YES	NO	Renal Disease	YES	NO
Allergies	YES	NO			
High Blood Pressure	YES	NO			
Do you have a family history of any of the above conditions? If so, please list with associated family member?					
Any special condition not listed above:					
Have you been ill within the last year?			<input type="checkbox"/> Yes <input type="checkbox"/> No		
If so, how long and from what?					
Have you ever broken any bones?			<input type="checkbox"/> Yes <input type="checkbox"/> No		
If so, what bone and how long ago?					
Are you currently under any stress?			<input type="checkbox"/> Yes <input type="checkbox"/> No		
If so from what (school, work, friends, family, etc)?					
What level of stress are you currently at (circle)?					
Very high High Moderate Minimally Low					
How do you handle your stress?					
Have you ever had your cholesterol checked?			<input type="checkbox"/> Yes <input type="checkbox"/> No		
If so, what were the results?			How recent?		
If abnormal, how was it treated?					

Have you ever checked your blood pressure? <input type="checkbox"/> Yes <input type="checkbox"/> No	
If so, what were the results?	How recent?
If abnormal, how was it treated?	
Have you ever been tested for diabetes? <input type="checkbox"/> Yes <input type="checkbox"/> No	
If yes, do you take insulin? <input type="checkbox"/> Yes <input type="checkbox"/> No	When were you diagnosed?
Do you currently smoke? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, how long have you been smoking?	
How much? 1-5 cigarettes/day 6-10 cigarettes/day 11-15 cigarettes/day >15 cigarettes/day	
Do you consume alcohol? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, what type?	
How much do you consume ____ daily; ____ weekly; ____ monthly?	

General Nutritional Information	
Are you currently on any specific food/nutritional plan? <input type="checkbox"/> Yes <input type="checkbox"/> No	
If yes, please list type and duration.	
Do you prepare your own meals? <input type="checkbox"/> Yes <input type="checkbox"/> No	
If so, how often? _____	
Do you eat out often? <input type="checkbox"/> Yes <input type="checkbox"/> No	
If so, how often? Daily _____	Weekly _____ Monthly _____
Do you eat on campus? <input type="checkbox"/> Yes <input type="checkbox"/> No	
If so, how often? Daily _____	Weekly _____ Monthly _____
Where do you dine?	
How many caffeine-containing beverages do you consume daily? _____ Weekly? _____	
Are you allergic to any foods? If so, what?	
How would you describe your eating habits (circle)?	
Excellent	Great Average Poor Not sure

Confidentiality Agreement

I, (print) _____, a research assistant, agree to:

1. I will keep all the research information shared with me confidential by not discussing or sharing the research information in any form or format (e.g., diet forms, questionnaires, transcripts) with anyone other than the *Researcher(s)*.
2. I will keep all research information in any form or format secure while it is in my possession.
3. I will return all research information in any form or format (e.g., diet forms, questionnaires, transcripts) to the *Researcher(s)* when I have completed the research tasks.
4. After consulting with the *Researcher(s)*, I will erase or destroy all research information in any form or format regarding this research project that is not returnable to the *Researcher(s)* (e.g., information stored on computer hard drive).

Research Assistant

(Signature)

(Date)

Researcher (s)

(Signature)

(Date)

(Signature)

(Date)

Expectations as a Counselor in the ROTC study

As a counselor in this study, you are expected to perform the following but are not limited to the following:

1. To devote your time and knowledge to making this research a success.
2. To perform a 45-minute weekly nutrition education/counseling session with your assigned cadet(s) along with weekly weigh-ins.
3. To complete and analyze weekly food and exercise journals from the cadet(s). These must be completed on time.
4. To check emails daily for updates, education materials, form, etc. that may be presented to you throughout the study.
5. To review any materials that the researcher(s) post on TRACS that will benefit you in counseling skills, nutrition topics, and/or communications skills while taking part in this study.
6. To attend meetings with the researcher(s) when needed. These may involve frequent updates on your sessions with your assigned cadet(s).
7. To consult with the researcher as soon as you encounter any problems including but not limited to meeting with a cadet, attending a counseling session, analyzing diet/physical activity records, etc.
8. Agree with the statements noted on the confidentiality form.
9. If you feel that you can not take part in this study, you must let me know at least 2 weeks in advance.

Name (printed) _____ Signature _____ Date _____
Counselor

Name (printed) _____ Signature _____ Date _____
Researcher

APPENDIX B

WEEKLY PROGRESS SHEETS AND NUTRITION EDUCATION HANDOUTS

Weekly Progress Sheet

Name: _____ Wk of: _____ Subject # _____

Summary of Goals:

1. _____

2. _____

3. _____

Brief Summary of Assessment: (food intake/history, PA, stress, behavior issues, etc.)

What Stage of Change? (circle)
Maintenance

Pre-Cont. Contemplation Preparation Action

Plan/Goal:

Intervention/Recommendations:

Summary of Overall Session:

How to Keep a Food Journal

Keeping a food journal will not only help you keep track of your food and beverage intake, but it will help you recognize why you eat the foods you do. This will help you identify any behavior habits that may have been unrecognized that associate your moods and feelings with food.

In a small notebook that is easy to carry around with you, write down everything you eat and drink as you consume it. Try not to rely on your memory because it's very easy to forget. Try to keep track of at least two weekdays and one weekend day.

Recording Your Eating Habits

Steps:

1. *Record your daily intake of food and beverage.* It's important that you estimate the size (inches), weight (ounces), volume (cups) or quantity of the food you ate.
2. *Be specific.* What kind of food did you eat? Identify brand names, menu items from restaurant and be sure to remember condiments and toppings such as butter, salad dressings, mayonnaise, etc.
3. *Identify the time of your meals/beverage.* What time of day was it?
4. *Write down where you ate.* In a restaurant, at the dining room table, over the sink, in your car, on campus, walking to class, at work, in front of the TV, etc?
5. *Identify who you ate with.* Fill in who you were eating with, or if you were alone. Was it a social, family, or religious gathering?
6. *Take notes on how you were feeling while you were eating.* Were you happy, sad, angry, stressed, bored, etc.?

Food/Beverage with Amounts	Time/Place	With whom?	Mood
Breakfast: 1 cup frosted flakes; ½ cup of skim milk; 4 whole strawberries 8 oz of orange juice	8:15 am at my apartment	Alone	Happy and tired

Tips:

- At the end of the day, also document any type of activity you performed. Did you do aerobic activity or strength training? If so, how long and what was the intensity? Low (easily carry conversation)- Moderate (can somewhat carry a conversation)- Vigorous activity (cannot carry conversation).
- Interpret your journal at the end of the day. Was this a typical day of eating or was it worse? What factors may have made you eat less or more than normal? Factors such as school work, stress, family or friends can all influence the way we eat from time to time.
- Be honest. The purpose of this is to identify and analyze your eating behaviors so that if needed, improvements can be made. There will be nothing gained by being dishonest with yourself.
- At first it may be difficult to identify the portion size of your meals but there are some quick and easy to identify your portions without having to use a measuring cups or scales. Below are some quick and easy tips:

What Do Serving Sizes Look Like

three ounces of meat = the size of a palm



one medium piece of fruit or 15 grapes = tennis ball



one ounce of cheese (one and a half - two ounces is a serving) = a thumb



one cup raw, leafy green vegetables = the size of a fist



one half cup cereal, cooked pasta, rice, cooked or raw or chopped vegetables or fruit = one half of a fist



Eat small amounts of high-fat foods - one teaspoon =
a thumb tip



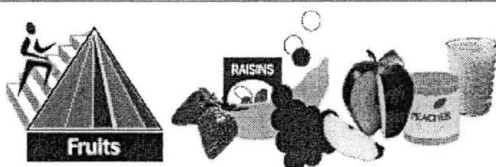
one ounce of nuts = one handful pretzels = two
handfuls

Making Healthy Food Choices

Identifying the Right Portions

One size doesn't fit all. MyPyramid offers personalized eating plans, interactive tools to help you plan and assess your food choices, and advice to help you:

- ▶ Make smart choices from every food group.
- ▶ Find your balance between food and physical activity.
- ▶ Get the most nutrition out of your calories.
- ▶ Stay within your daily calorie needs.



$\frac{1}{4}$ cup dried fruit = $\frac{1}{2}$ cup fruit

Eat the equivalent of 2 cups of fresh, canned or frozen fruits per day. (Based on 2,000 calorie diet)

What counts as a cup of fruit?

In general, 1 cup of fruit or 100% fruit juice, or $\frac{1}{2}$ cup of dried fruit can be considered as 1 cup from the fruit group. The following specific amounts count as 1 cup of fruit (in some cases equivalents for $\frac{1}{2}$ cup are also shown) towards your daily recommended intake:

Amount that counts as 1 cup of fruit	
Apple	1 small (2.5" diameter) or 1 cup sliced or chopped, raw or cooked
Banana	1 cup sliced or 1 large (8" to 9" long)
Grapes	1 cup whole or cut-up or 32 seedless grapes
Grapefruit	1 medium (4" diameter) or 1 cup sections
Mixed fruit (fruit cocktail)	1 cup diced or sliced, raw or canned, drained
Orange	1 large (3-1/16" diameter)
Peach	1 large (2 3/4" diameter) or 2 halves, canned
Pineapple	1 cup chunks, sliced or crushed, raw, cooked or canned, drained
Strawberries	About 8 large berries or 1 cup whole, halved, or sliced, fresh or frozen
Watermelon	1 small wedge (1" thick) or 1 cup diced or balls
Dried fruit (raisins, prunes, apricots, etc.)	$\frac{1}{2}$ cup dried fruit is equivalent to 1 cup fruit $\frac{1}{2}$ cup raisins $\frac{1}{2}$ cup prunes cup dried apricots



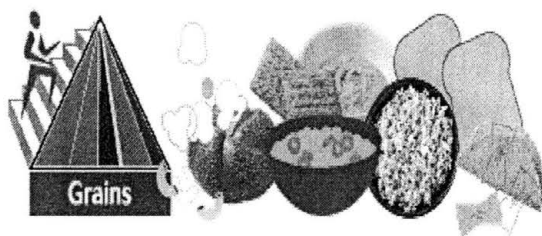
2 cups raw leafy greens = 1 cup of vegetable

Eat the equivalent of 2 ½ cups of raw or cooked vegetables per day. (Based on 2,000 calorie diet)

What counts as a cup of vegetables?

In general, 1 cup of raw or cooked vegetables or vegetable juice, or 2 cups of raw leafy greens can be considered as 1 cup from the vegetable group. The chart lists specific amounts count as 1 cup of vegetables (in some cases equivalents for ½ cup are also shown) towards your recommended intake:

Amount that counts as 1 cup of vegetables	
Broccoli	1 cup chopped or florets or 3 spears 5" long raw or cooked
Greens (collards, mustard greens, turnip greens, kale) Spinach	1 cup cooked; 2 cups raw
Carrots	1 cup, strips, slices or chopped, raw or cooked; about 12 baby carrots
Dry beans/peas	1 cup whole or mashed, cooked
Tofu	1 cup ½ cubes (about 8 oz)
Corn	1 cup, 1 large ear (8" to 9" long)
White Potatoes	1 cup diced, mashed; 1 med boiled or baked; 20 med French fries
Tomatoes	1 large raw whole (3")



1 slice of bread = ½ cup cooked pasta,
rice or cereal = 1 c ready-to-eat cereal

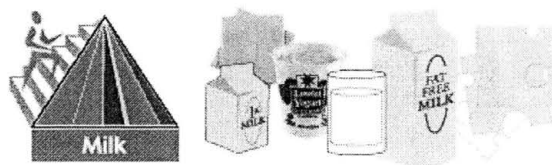
Eat 6 oz equivalent. (Based on 2,000 calorie diet). At least 3 oz or more of whole grain products with the remained coming from enriched or whole-grain products.

What counts as an ounce equivalent of grains?

In general, 1 slice of bread, 1 cup of ready-to-eat cereal, or ½ cup of cooked rice, cooked

pasta, or cooked cereal can be considered as 1 ounce equivalent from the grains group. The chart lists specific amounts that count as 1 ounce equivalent of grains towards your daily recommended intake.

Amount that counts as 1 ounce of grain	
Bagels	1 "mini" bagel
Biscuits	1 small (2" diameter)
Breads	1 regular slice
Crackers	5 whole wheat crackers
English muffins	½ whole wheat
Oatmeal	½ cup cooked or 1 packet instant or 1 ounce dry (regular or quick)
Pancakes	1 pancake (4 ½" diameter) or 2 small pancakes (3" diameter)
Popcorn	3 cups, popped
Rice	½ cup cooked
Pasta--spaghetti, macaroni, noodles	½ cup cooked
Tortillas	1 small flour tortilla (6" diameter) or 1 corn tortilla (6" diameter)



Consume 3 cups per day of fat-free milk or low-fat milk or equivalent milk products.

8 oz milk = 1 cup yogurt = 1 ½ oz natural cheese

What counts as 1 cup in the milk group?

In general, 1 cup of milk or yogurt, 1 ½ ounces of natural cheese, or 2 ounces of processed cheese can be considered as 1 cup from the milk group.

The chart lists specific amounts that count as 1 cup in the milk group towards your daily recommended intake:

Amount that counts as 1 cup of milk group	
Milk <i>[choose fat-free or low-fat milk most often]</i>	1 cup; 1 half-pint container; ½ cup evaporated milk
Yogurt <i>[choose fat-free or low-fat yogurt most often]</i>	1 regular container (8 fluid ounces) or 1 cup
Cheese <i>[choose low-fat cheeses most often]</i>	1 ½ ounces hard cheese (cheddar, mozzarella, Swiss, parmesan) 1/3 cup shredded cheese 2 ounces processed cheese (American)

	$\frac{1}{2}$ cup ricotta cheese 2 cups cottage cheese	
Milk-based desserts <i>[choose fat-free or low-fat types most often]</i>	1 cup pudding made with milk 1 cup frozen yogurt 1 $\frac{1}{2}$ cups ice cream	



1 oz meat = $\frac{1}{4}$ cooked dry beans = 1 egg

Eat 5 $\frac{1}{2}$ ounce-equivalents (for 2,000 calorie diet). Choose lean meats and poultry. Vary your choices- more fish, beans, peas, nuts and seeds.

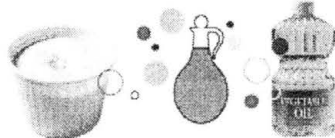
What counts as an ounce equivalent in the meat & beans group?

In general, 1 ounce of meat, poultry or fish, $\frac{1}{4}$ cup cooked dry beans, 1 egg, 1 tablespoon of peanut butter, or $\frac{1}{2}$ ounce of nuts or seeds can be considered as 1 ounce equivalent from the meat and beans group.

The chart lists specific amounts that count as 1 ounce equivalent in the Meat and Beans group towards your daily recommended intake:

Amount that counts as 1 oz meat and bean group	
Meat	1 ounce cooked lean beef; 1 ounce cooked lean pork or ham
Poultry	1 ounce cooked chicken or turkey, without skin 1 sandwich slice of turkey (4 $\frac{1}{2}$ x 2 $\frac{1}{2}$ x $\frac{1}{8}$ "
Fish	1 ounce cooked fish or shell fish 1 can of tuna, drained = 3 to 4 ounce equivalents
Eggs	1 egg
Nuts and seeds	$\frac{1}{2}$ ounce of nuts (12 almonds, 24 pistachios, 7 walnut halves) $\frac{1}{2}$ ounce of seeds (pumpkin, sunflower or squash seeds, hulled, roasted) 1 Tablespoon of peanut butter or almond butter
Dry beans and peas	$\frac{1}{4}$ cup of cooked dry beans (such as black, kidney, pinto, or white beans) $\frac{1}{4}$ cup of cooked dry peas (such as chickpeas, cowpeas, lentils, or split peas) $\frac{1}{4}$ cup of baked beans, refried beans 2 Tbsp. hummus

1 cup split pea soup = 2 oz eq
 1 cup lentil soup = 2 oz eq
 1 cup bean soup = 2 oz eq
 ¼ cup (about 2 ounces) of tofu
 ¼ cup roasted soybeans 1 falafel patty (2 ¼", 4 oz)
 1 soy or bean burger patty = 2 oz eq



A person's allowance for oils depends on age, sex, and level of physical activity. Daily allowances for females and males ranges 19-30 years of age typically ranges from 6-7 teaspoons.

* 1 Tbs = 3 tsp

Why is it important to consume oils?

Most of the fats you eat should be polyunsaturated (PUFA) or monounsaturated (MUFA) fats. Oils are the major source of MUFAs and PUFAs in the diet. PUFAs contain some fatty acids that are necessary for health—called “essential fatty acids.” These fats must be attained in your diet in limited amounts.

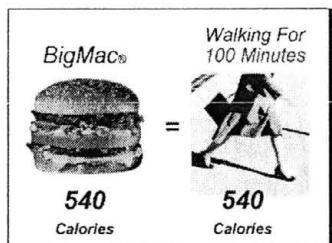
	Amount of food	Amount of oil/fat	Calories from oil/fat
Oils: Vegetable oils (such as canola, corn, cottonseed, olive)	1 Tbsp	3 tsp/14 g	120
Margarine, soft (trans fat free)	1 Tbsp	2 ½ tsp/11 g	100
Mayonnaise	1 Tbsp	2 ½ tsp/11 g	100
Olives, ripe, canned	4 large	½ tsp/ 2 g	15
Avocado*	½ med	3 tsp/15 g	130
Peanut butter*	2 T	4 tsp/ 16 g	140

Controlling Your Portions

Is getting more food always worth the extra few dollars?

Eating Out?

Be sure the next time you eat out that that you're making the best



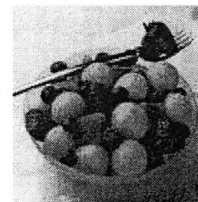
decision for your wallet and your health. The little extra money that you saved on a "value meal" can actually cost you a few extra hundred calories! Here are some simple tips to help control your portions while eating out.

1. *Take at least half your meal home.* Once your meal arrives, box half of it and save the rest for another day. This will help you from being tempted to eat more than you need.
2. *Stop eating when you begin to feel full.* Once you have reached this point, you know you have eaten the amount needed; anything more and you'll reach an uncomfortable fullness.
3. *Eat more salads.* Eating a salad before lunch or dinner is a sure-fire way to keep from overeating. It will help curb your appetite and give you a sense of satiety sooner.
4. *Avoid buffet style restaurants.* Because they offer an unlimited amount of food, it makes it tempting to get your money's worth thus causing you to overeat. Avoid putting your self in this sticky situation and stick to ordering a single portion meal.
5. *Share your meal, order half portions, or eat an appetizer as a meal.* This will help to ensure you that you eating a reasonable amount of food. Choose healthy appetizers like a tomato or broth based soup, chicken or tuna salad or a shrimp cocktail.

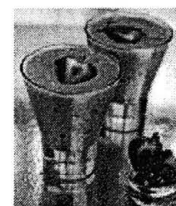
At Home?

There are many ways to enjoy eating the foods you love without having to count every calorie. Once you become familiar with visualizing portion sizes then these simple suggestions will help you control your portions at home.

1. *Instead of eating out of the box or bag, take one serving out and place it in a plate.* This will help you from being tempted to overindulge in one setting.
2. *Avoid eating while watching TV or doing other activities.* When you're eating, you should pay attention to what you're eating and fully enjoy and savor each bite.
3. *Trying filling up on fruits and vegetables rather than meats or desserts.* This will keep you feeling fuller longer and save you hundreds of calories.
4. *Eat slowly.* It takes at least 20 minutes for the brain to get the message from your stomach that it's full.
5. *Avoid skipping meals or going without eating for more than four hours.* This will help from overeating at your next meals.



6. *Choose healthy snacks when buying groceries.* Instead of high-caloric foods like chips, cookies and soda, try replacing them low-fat yogurts, smoothies, or whole grain crackers.





Healthy Grocery Shopping

Week of Feb. 2-6

More Tips:

- ♦ **Shop for variety.** Try new fruits and vegetables each week!
- ♦ **Spice up your meals.** Explore the spice aisle to add new herbs and flavors to poultry, meat, seafood or vegetables.
- ♦ **Plan your meals.** Think of ways to prepare the same entrée in a variety of ways. For example, you can use ground meat to make spaghetti one night and tacos another.

For More Information

The American Heart Association website:
www.americanheart.org

Be a Smart Shopper: Quick Tips to Remember

- ♦ **Plan Ahead.** Take a few extra minutes to think about the meals and snacks you plan to prepare for the week. Prepare a list and stick to it. This will help save trips to the grocery store and vending machines.
- ♦ **Go on a full stomach.** Avoid going to the grocery store on an empty stomach. This will help prevent you from shopping on impulse and making unhealthy food choices.
- ♦ **Shop the perimeter.** Stick to the outer aisles of the grocery store. This means stocking up on produce, whole grains, meats/seafood and dairy products. Limit your items from the inner aisles.

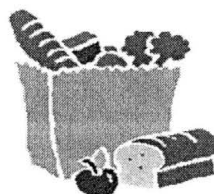
Finding your way to Healthy Eating

1. Produce. Most of the food in your cart should be filled with fresh produce. Adding in a rainbow of colorful fruits and vegetables will help ensure yourself that your meals will provide vitamins, minerals, and nutrients that help reduce your risk of certain diseases.

2. Breads, Cereals, and Pasta. Choose whole grain foods that are least processed and contain a good source of fiber. Try and look for foods that contain at least 4-5 grams of fiber per serving. Also, pay close attention to the amount of sugar per serving, especially in cereals and breakfast bars. If you need some sweetness in your cereal, add a handful of blueberries, slice strawberries or bananas. When choosing pasta, rice, and other grains, try whole-wheat options and brown rice for added fiber and vitamins. If choosing whole grains is new to you, then try blending in the whole grains until you get used to the taste

and texture.

3. Meat, Fish, and Poultry. The American Heart Association recommends two servings of fish a week. Recent



research shows that eating oily fish containing omega-3 fatty acids (for example, salmon, trout and herring) may help lower your risk of coronary artery disease. Prepare fish baked, broiled, grilled or boiled. Be sure to choose lean cuts of meat (like round, top sirloin, and tenderloin), skinless poultry, and watch your portion sizes.

4. Dairy. Dairy foods are an excellent source of bone-

building calcium and vitamin D. Try gradually minimizing your intake on whole or 2% dairy products to fat free or low-fat products.

5. Frozen Foods. Stocking up on frozen fruits and vegetables (without sauce) are a convenient way to prepare meals. Toss some vegetables in a soup, add to a pizza or a quick stir-fry. Blend some fruits for a quick smoothie or top off your cereal or oatmeal. When choosing frozen meals, you must pay close attention to the food label especially the serving size, calories, fat and sodium. Look for healthy meals that contain a balance portion of meat, grains and vegetables.

6. Canned and Dried Foods. Keep a variety of canned vegetables, fruits, and beans on hand to toss into soups, salads, pasta, or rice dishes. Try choosing vegetables labeled with no added salt, and fruit packed in its own juice. Choose canned meats such as tuna packed in water.



10 Eating Tips for Busy College Students

The average college student is often pressed for time, under a lot of stress and eating on the go. You may find it difficult to avoid bad habits like skipping meals or frequenting fast food restaurants. But eating a healthy diet can help you feel better, cope with stress and perform better in the class-room and on the athletic field. It really isn't that hard to get started.

1 - Stock your dorm room/ kitchen cabinet with healthy items such as fruit (fresh, dried and canned without added sugar), vegetables (fresh, frozen and canned), nuts, seeds and peanut butter, canned tuna and Alaskan pink salmon, high fiber cereals, yogurt, hummus, crackers made without hydrogenated fats and green tea.

2 – Don't even think about skipping breakfast! Even if you are the kind of person who rolls out of bed at the last possible moment, you still have time to grab a piece of fruit to munch while walking to class. If you have just a bit more time, spread a graham cracker or slice of whole grain toast with natural peanut butter. Studies consistently show that people who eat breakfast have a significantly higher metabolism than those who skip out on this tasty meal.

3 - Skipping out on lunch is also not an option. Plan ahead for those busy days when your classes go back to back, by throwing some simple protein / carbohydrate combinations into your book bag. A handful of nuts with an apple, or a string cheese stick with several healthy crackers (made without hydrogenated fats) can fill in for lunch until you have a break.

4 - When you do have time for lunch, steer clear of the cheeseburger and fries and opt instead for a lean protein source and veggies, such as a tuna wrap with spinach and tomatoes, or a chicken sub with all the veggies. Bean burritos with a side salad are another good option. The dining hall salad bar can be either an asset or a detriment to your diet depending on how you choose from it. Of course, leafy greens, raw vegetable and fresh fruit are beneficial. But if you choose lot of creamy dressing, bacon bit, and mayonnaise based salads, the calories and fat may equal or even exceed those of a burger and fries.

5 - Instead of downing glasses of regular soda, fruit flavored drinks or heavily sweetened tea with your meals, consider drinking water, skim or soy milk, or unsweetened (or lightly sweetened) tea. Your body needs at least eight glasses a day, and if you exercise vigorously, you may need more. To remind yourself, carry a water bottle along to class and keep it handy during late night study sessions.

6 - Become a “mindful” eater. Take at least 20 minutes to eat your meals. In this way, you will allow sufficient time for your brain to register you had food. You will be able to better identify the point of comfortable fullness.....and will be able to stop eating at that point, instead of overeating. Also, pay attention to when your body is trying to signal that it needs food. Don't ignore your hunger!

7 - Find ways to get in at least 5 servings of fruits and vegetables per day. One serving is considered ½ cup of cooked or raw vegetables or fruit, a medium piece of fruit or one cup for raw leafy vegetables such as spinach or lettuce.

8 – Why are you about to eat that third slice of pizza at 11:00 p.m.? Eating a healthy snack when you are truly hungry is appropriate, but if you are not hungry, you are clearly eating in response to another cue (boredom, studying, eating because others around you are eating, etc.).

9 - Look for ways to have your favorite foods, but in a more healthy way. For example, order a thin crust pizza and top with several veggies instead of the meats. Load your Mexican food with salsa, instead of sour cream. Instead of polishing off the entire plate of pasta, take some home for lunch tomorrow.

10- So many desserts to choose from in the dining hall, sorority/fraternity house or restaurant! Consider sharing one dessert with a friend. Better yet, enjoy a generous portion of fresh fruit as an alternative to heavy desserts.

Healthy and Easy

Recipes for College Students

Cut these recipes out for quick, inexpensive meal ideas!

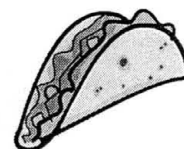
Taco Salad

Makes 4 servings

- | | |
|----------------------------|--|
| 1/2 lb lean ground beef | 1 tomato, sliced |
| Cayenne to taste | 1/4 green pepper, finely chopped |
| Chili powder to taste | 3 tablespoons finely chopped red onion |
| Salt and pepper to taste | 1/3 cup salsa |
| 24 baked corn chips | 4 olives, thinly sliced |
| 1/4 head lettuce, shredded | |

1. In a small skillet over medium heat, brown the beef. Season with the spices.
2. Line the edges of four serving bowls with the chips. Add the lettuce and top with the meat, followed by the tomato, green pepper, onion, a dollop of salsa, and sliced olives.

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Nutrition Information

Calories	151
Fat	10g
Protein	11g
Carbohydrates	3g
Cholesterol	39mg
Sodium	223mg



Sweet Orange Chicken

Makes 4 servings

- | | |
|---|---------------------------|
| 4 boneless, skinless chicken half-breasts | 1 cup orange juice |
| 4 teaspoons Dijon mustard | 2 teaspoons butter |
| 1/2 medium onion, diced | 2 tablespoons brown sugar |

1. Preheat the oven to 350 degrees.
2. Place the chicken in an ovenproof dish and spread mustard evenly over each piece. Sprinkle the onion over the chicken, pour orange juice over all, and place 1/2 teaspoon morsels of butter near each piece of chicken. Bake uncovered for 25 minutes.
3. Flip the chicken and sprinkle brown sugar evenly over each piece. Cook for an additional 10 minutes uncovered, or until cooked through (no pink shows in the middle).

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Nutrition Information

Calories	204
Fat	4g
Protein	27g
Carbohydrates	15g
Cholesterol	70mg
Sodium	159mg

Handouts provided by: Health Promotion/Nutrition Counseling, Lafene Health Center, Kansas State University

Healthy and Easy

Recipes for college students--no cooking skills required!

Cut these recipes out for quick, inexpensive meal ideas!

Personal Pizza

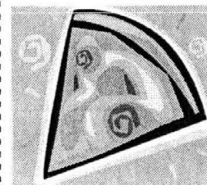
Makes 1 serving

- 1 English muffin
 - 1 Tbsp tomato or spaghetti sauce
 - 2 Tbsp shredded mozzarella cheese
1. Split the English muffin into two halves.
 2. Spread sauce evenly on both halves.
 3. Sprinkle cheese evenly on both halves.
 4. Broil in toaster oven for one minute or until cheese melts.

Nutrition Information

Per serving:

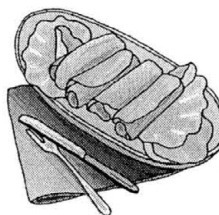
Calories	234
Fat	7g
Protein	13g
Carbohydrates	32g



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Bean Burritos

Makes 4 servings



- 4 flour tortillas
- 1 16 oz can vegetarian refried beans
- 1/2 cup salsa
- 1/2 cup shredded cheddar cheese

1. Divide beans between tortillas
2. Top with salsa and cheese
3. Roll tortilla, tucking in at the end
4. If you have a microwave, you can heat these on high for one minute, and the cheese will melt.

Nutrition Information

Per Serving:

Calories	340
Fat	10g
Protein	15g
Carbohydrates	49g

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Egg Salad

Makes 4 servings

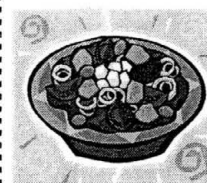
- 4 hard-cooked eggs, with shell removed
- Chopped celery and chopped onion (optional)
- 4 Tbsp mayonnaise
- Salt and pepper to taste

1. Place eggs in medium size bowl.
2. Chop into pieces.
3. Add mayonnaise. Mix well.
4. Add celery and onion. Mix Well.
5. Season with salt and pepper.

Nutrition Information

Per Serving:

Calories	133
Fat	10g
Protein	6g
Carbohydrates	4g



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Handouts provided by: Health Promotion/Nutrition Counseling, Lafene Health Center, Kansas State University



Balancing *Your* Health

Week of February 16-20

Calorie Count: Finding Balance

Many Americans gain weight in adulthood, increasing their risk for high blood pressure, heart disease, stroke, diabetes, certain types of cancer, arthritis, breathing problems, and other illness. Therefore, most adults should not gain weight. If you are overweight and have one of these problems, you should try to lose weight, or at the very least, not gain weight.

Maintain your weight

In order to stay at the same body weight, people must balance the amount of calories in the foods and drinks they consume with the amount of calories the body uses. Physical activity is an important way to use food energy. Most Americans spend much of their working day in activities that require little energy. In addition, many Americans of all ages now spend a lot of leisure time each day being inactive, for example, watching television or working at a computer. To burn calories, devote less time to sedentary activities like sitting. Spend more time in activities like walking to the store or around the block. Use stairs rather than elevators. Less sedentary activity and more vigorous activity may help you reduce body fat and disease risk. Try to do 30 minutes or more of moderate physical activity on most -- preferably all -- days of the week.

The kinds and amounts of food people eat affect their ability to maintain weight. High-fat foods contain more calories per serving than other foods and may increase the likelihood of weight gain. However, even when people eat less high-fat food, they still can gain weight from eating too much of foods high in starch, sugars, or protein. Eat a

variety of foods, emphasizing pasta, rice, bread, and other whole-grain foods as well as fruits and vegetables. These foods are filling, but lower in calories than foods rich in fats or oils.

The pattern of eating may also be important. Snacks provide a large percentage of daily calories for many Americans. Unless nutritious snacks are part of the daily meal plan, snacking may lead to weight gain. A pattern of frequent binge-eating, with or without alternating periods of food restriction, may also contribute to weight problems.

Location of body fat

Research suggests that the location of body fat also is an important factor in health risks for adults. Excess fat in the abdomen (stomach area) is a greater health risk than excess fat in the hips and thighs. Extra fat in the abdomen is linked to high blood pressure, diabetes, early heart disease, and certain types of cancer. Smoking and too much alcohol increase abdominal fat and the risk for diseases related to obesity. Vigorous exercise helps to reduce abdominal fat and decrease the risk for these diseases. The easiest way to check your body fat distribution is to measure around your waistline with a tape measure and compare this with the measure around your hips or buttocks to see if your abdomen is larger. If you are in doubt, you may wish to seek advice from a health professional.

Problems of excessive thinness

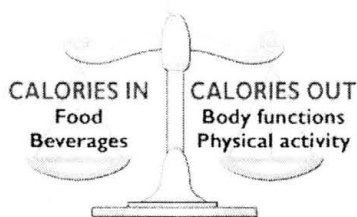
Being too thin can occur with anorexia nervosa, other eating disorders, or loss of appetite, and is

linked to menstrual irregularity and osteoporosis in women, and greater risk of early death in both women and men. Many people -- especially women -- are concerned about body weight, even when their weight is normal. Excessive concern about weight may cause or lead to such unhealthy behaviors as excessive exercise, self-induced vomiting, and the abuse of laxatives or other medications. These practices may only worsen the concern about weight. If you lose weight suddenly or for unknown reasons, see a physician.

Lose weight

If you are overweight and have excess abdominal fat, a weight-related medical problem, or a family history of such problems, you need to lose weight. Healthy diets and exercise can help people maintain a healthy weight, and may also help them lose weight. It is important to recognize that overweight is a chronic condition which can only be controlled with long-term changes. To reduce caloric intake, eat less fat and control portion sizes. If you are not physically active, spend less time in sedentary activities such as watching television, and be more active throughout the day. As people lose weight, the body becomes more efficient at using energy and the rate of weight loss may decrease. Increased physical activity will help you to continue losing weight and to avoid gaining it back.

Many people are not sure how much weight they should lose. Weight loss of only 5-10 percent of body weight may improve many of the problems associated with overweight, such as high blood pressure



If you are...	Your calorie balance status
Maintaining weight	"in balance." You are eating roughly the same number of calories that your body is using. Your weight will remain
Gaining weight	"in caloric excess." You are eating more calories than your body is using. You will store these extra calories as fat and you'll gain weight.
Losing weight	"in caloric deficit." You are eating fewer calories than you are using. Your body is pulling from its fat storage cells for energy, so your weight is decreas-

Calorie Count: Finding Balance cont...

and diabetes. Even a smaller weight loss can make a difference. If you are trying to lose weight, do so slowly and steadily. A generally safe rate is 1/2-1 pound a week until you reach your goal. Avoid crash weight-loss diets that severely restrict calories or the variety of foods. Extreme approaches to weight loss, such as self-induced vomiting or the use of laxatives, amphetamines, or diuretics, are not appropriate and can be dangerous to your health.

through better eating and exercise habits. Take steps to keep your weight within the healthy range; neither too high nor too low.

For more information:

U.S. Department of Agriculture

Dietary Guidelines

<http://www.nal.usda.gov>

Summary

Try to maintain your body weight by balancing what you eat with physical activity. If you are sedentary, try to become more active. If you are already very active, try to continue the same level of activity as you age. More physical activity is better than less, and any is better than none. If your weight is not in the healthy range, try to reduce health risks

8 Ways to Eat 100 Calories Less per Day

Did you know?

It takes an excess of 3,500 calories to gain a pound! Break that into smaller bites and 100 extra calories a day can put on a 10 pounds a year!

- 1. Modify Your Milk.** Instead of drinking two cups of whole milk, switch to two cups of 1% low fat milk or skim milk. The nutrients are comparable.
- 2. Rethink Your Drink.** Substitute a 12-ounce can of a diet soft drink at 0 calories for a similar amount of a regular soft drink at 150 calories. Or, drink a cold glass of water, perhaps with a slice of lemon! This strategy also may help you eat less in other ways.
- 3. Dress, Don't Drown Your Salad.** Try using 1 Tbsp of oil and a tsp of vinegar for each 1-1/2 cup portion of salad. One-fourth cup of vinaigrette should be enough to dress 2 quarts (8 cups) of loosely packed salad, an amount they suggest for 4 servings. That means each 2-cup serving of salad greens should have about 1 Tbsp of dressing on it or less.
- 4. Size up Your Cereal Bowl.** A recent study found the amount of cereal eaten by adults was approximately twice the serving size listed on the box. That's not necessarily bad, but maybe one place calories are sneaking into meals. Check the portion size you're pouring in relation to the size cited on the box; decide if you're pouring more calories than desired. Try eating from a smaller bowl to aid in portion control.
- 5. Watch Your Bread and Spread.** Limit the amount of bread (or rolls) and spread eaten before the main course to one serving when dining out.
- 6. Count Your Cookies.** A single medium-sized cookie easily can have about 100 calories. Often we pop two or more into our mouths before we realize it. If you feel you're not getting enough, crunch by limiting yourself to one cookie, try eating an apple instead the calories are similar.
- 7. Top Your Potato with Fewer Calories.** It's easy to slather a couple of tablespoons of butter or margarine (200 calories/2 tablespoons) on a baked potato. Try switching to sour cream; you can have as much as a fourth cup for 100 calories. For even fewer calories, use one of the light or fat-free sour creams. Or, substitute yogurt for sour cream.
- 8. Lessen Your Liquor.** If you drink alcohol, limit your daily consumption to one drink for women and two drinks for men as recommended by the Dietary Guidelines. A typical 5-oz. glass of wine has 100 calories; a 12-oz. serving of beer, 150 calories; and 1 1/2 ounces of distilled spirits, 100 calories.

Balancing *Your* Meals: What makes a healthy meal?

Every day we are bombarded with nutrition information in the media, on TV, at the drug store, the grocery store, and the local book store. Both experts and celebrities want to tell us their latest idea on what a healthy diet looks like. The word "healthy" itself means different things to different people. For the purpose of this article, a "healthy diet" is defined as a way of eating that will improve longevity, reduce the risk of chronic disease, and provide adequate energy so you can lead an active lifestyle and maintain a healthy weight.



Energy

Energy, expressed in terms of calories, can only come from food. We do not get energy from vitamins, minerals or water. Energy comes from the three major nutrients: protein, fat and carbohydrate. To lead an active lifestyle, you need the right mixture of these three nutrients. The recommended dietary references intakes are 10-35 percent protein, 45-65 percent carbohydrate, and less than 20-35 percent fat.

Balance

Think of an eight-inch plate, divided into four sections, like four pieces of pie. One section should contain fruit; one section vegetables; one section grains; and one section protein. Next, set a goal to eat at least three meals per day based on this healthy plate. If at first it seems like the volume of food is too large for one meal, save a part of the plate for a snack. For example, use the breakfast fruit and a protein for a strawberries with-yogurt morning snack; use a lunch protein and a starch for a low-fat cheese-and cracker afternoon snack. The "plate method" of meal planning incorporates guidelines from the USDA, the American Heart Association and the National Cancer Institute, so it is a great start to a long and healthy life. The emphasis is on grains, fruits, and vegetables because these foods provide energy, most of the vitamins and minerals we need, plant chemicals (called phytochemicals) that have powerful disease preventing capabilities, and fiber. The average person eats only 10-15 grams of fiber per day and a healthy diet should contain 25-35 grams. Fiber foods can lower cholesterol, help control blood sugar, lower blood pressure, keep bowels regular, reduce the risk of certain cancers, and help keep bones strong.

Variety

For optimal fiber and nutrient intake, incorporate grain products that list the word "whole" as the first ingredient. Don't be fooled by the words "multi-grain" or "contains whole grain," as these products may not be high in fiber. Look at the fiber content on the label and aim for one gram of fiber for every 40 calories. Experiment with different grains such as barley and couscous. For fruits and vegetables, pay attention to color. Every color is associated with a different phytochemical that can benefit your health. The more colorful your diet, the healthier it will be. Protein is also important, not only for growth and repair of all the tissues in your body, but also to help reduce hunger between meals. Most people eat more than that but they place too much emphasis on animal proteins. Ideally, animal protein should be consumed at only one meal per day. Experiment with soy foods, bean dishes and nuts as your protein source. Legumes, which include dried beans, peas, and lentils, are also good sources of fiber. A healthy diet should contain at least one serving of legumes each day AND one serving of nuts. Nuts provide healthy fat and fiber in addition to protein. For animal protein, the best choice is fish of any type. For meat and poultry, choose lean cuts and trim off the visible fat.

Moderation

The types of fat eaten as well as the amount are important. Fats that are hard at room temperature (think of meat fat, butter fat, coconut oil and hydrogenated or trans fats) tend to raise cholesterol and triglycerides and increase blood pressure and cancer risk. Omega 3 fats found in fatty fish, flaxseeds and walnuts have been shown to help with arthritis pain as well as heart disease and cancer prevention. They also seem to be effective in lowering blood pressure. Healthy monounsaturated fats like olive and canola oils can be used in cooking or salads. An average person only needs six teaspoons of fat per day. Choosing to eat healthy is not always easy in our fast-food, fast-paced world, but it can be done! Take time for breakfast and explore new options for lunch and dinner. You will be rewarded with more energy and a much improved quality of life. After all, that is what is most important.

Nancy Kennedy, M.S., R.D.
ACSM Fit Society— Winter 2007; pg 4
www.acsm.org



Eating Lean On the Run

When time is limited and fast food is the only option, keep in mind these tips to still choose healthy options.

Burgers:

- Plain burgers are the best choice.
- Hold the mayonnaise or special sauces, but pack on the veggies: lettuce and tomatoes!
- Choose grilled or broiled chicken breast.
- Pick some healthy sides. Pass on the fries and get in an extra serving of vegetables by ordering a side salad (dressing on the side)

Chicken/Veggies/Fish:

- Pass on the breaded chicken, nuggets and fish and save about a hundred calories or more!
- Pack the grilled or broiled chicken breast.

Sandwiches and Subs

- Pass on the cheese, pepperoni, bacon, salami, meatballs and other high fats and save at least 10g of fat!
- Choose lean deli-meats like turkey, chicken or roast beef.
- Pick mustard, hot sauce, relish or vinaigrettes.
- Pass on the mayonnaise and creamy dressings.

Check this out!

Food	Calories	Fat (g)
<u>McDonald's</u>		
Plain Ham-burger with veggies	256	9
Big Mac	530	29
Chicken McGrill	380	15
<u>Whataburger</u>		
Whataburger Jr.	300	15
Whataburger, double meat	870	49
Whataburger, triple meat	1120	68
Grilled chicken salad	220	8
<u>Subway</u>		
6" Turkey breast	244	3.4
6" Roasted Chicken breast	291	5.2
6" Meatball	508	27

Eating Lean On the Run

Page 2

Pizza:

- Pass on the pepperoni, sausage, salami and beef. Pick only one meat topping such as ham or chicken or go vegetarian.
- Top on the veggies and hold off the grease and go light on the cheese.
- Choose thin crusts so you don't fill on the extra breading of a thick crust.

Asian Foods:

- Pass on the deep-fried dishes such as tempura, spring rolls and egg rolls. Also, dishes such as sweet and sour and sour pork and lemon chicken are deep fried *BEFORE* stir-fried with the sauce.
- Pick dishes with lots of vegetables, like chop suey.
- Sushi, sashimi and Vietnamese salad rolls are healthy choices. Watch out for the tempura and extra sauces that are added to sushi rolls. Calories add up fast!

Sides

- Great chance to get a serving of vegetables in for the day by choosing a salad over fries or onion rings.
- Watch the toppings on your baked potato. Go light on the cheese, butter, bacon and sour cream. They all are high in fat and calories.

Check this out!

Food	Calories	Fat (g)
<u>Domino's (1 slice of med. pizza)</u>	80	6
Hand tossed Veggie Fest		
Pepperoni Feast	130	11
MeatZZa feast	150	11
<u>Pizza Hut (1 slice of hand-tossed med. Pizza)</u>		
Veggie Lover's	200	7
Meat Lover's	310	17
Egg roll (1)	228	12
Fried rice, 2 cup	438	17
Lemon chicken	426	20
Sweet and Sour pork, 1cup	400	25

Quick and Healthy Recipe Ideas

Fresh Fruit Dip

8 ounces light cream cheese, softened
 1/3 cup light sour cream
 1/3 cup honey
 1/2 - 1 tsp almond flavoring (to taste).

Mix all ingredients together. Refrigerate until ready to use.

Cut up a selection of your favorite fruits into bit size pieces. Thread onto skewers and serve with this wonderful fruit dip.

Suggestions for Popcorn Toppings

- o Grated parmesan cheese
- o Herb toppings – mix oregano, basil & parsley with melted butter
- o Salt & vinegar – lightly spray popcorn with vinegar (ideally using a spray bottle); sprinkle with salt
- o Lemon pepper
- o Garlicky Popcorn – sauté garlic in butter and pour over popcorn

A Little Bit of Mexican – sprinkle popcorn with taco seasoning mix

Delightfully Delicious Granola

- o 4 cups oats
- o 1 cup coarsely chopped nuts
- o 1/2 cup shelled sunflower seeds
- o 1/2 cup ground flax seeds
- o 1 cup flaked coconut
- o 1/2 cup sesame seeds
- o 1/2 tsp. salt
- o 1/2 cup honey
- o 1/2 cup molasses
- o 1/2 cup vegetable oil
- o 1 tbsp. vanilla



Blend all dry ingredients together in a large bowl. Gently heat the molasses, honey and oil in a saucepan or in the microwave. Add vanilla. Pour over dry ingredients and toss to blend all ingredients together. Line a cookie sheet with parchment paper, or grease well. Spread mixture onto cookie sheet and bake at 250F for 40 minutes, turning every 10 minutes. When finished baking, remove from oven, let cool, and store in an airtight container.

Optional: add your favorite dried fruit or shredded coconut.

Recipes from the Kitchentable.com

Quick & Easy Nachos

Great as a quick snack or as a main course.

- o Ground beef
- o Whole wheat tortilla chips
- o Low-fat cheddar cheese

Any combination of the following ingredients: Black beans, Salsa, Chopped tomatoes, Black or green olives

Brown ground beef in a fry pan until fully cooked for about 20 minutes. Drain off fat.

Spread tortilla chips in an ovenproof dish or cookie sheet. Spread cooked meat over chips, then top with your optional ingredients. Cover with grated cheese. Bake in oven at 350° for approximately 10 minutes, until cheese is melted. Serve with hot sauce and guacamole, as desired.

Berry Delicious Smoothie



Great for a quick and healthy breakfast, or for a energy boosting study snack!

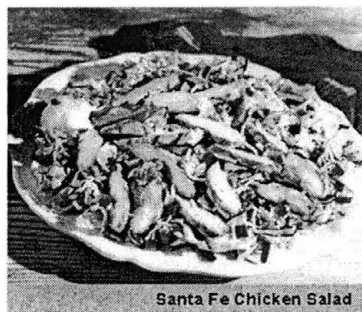
- 6 ounces skim or soy milk
- ½ cup light strawberry, vanilla or lemon yogurt
- ½ cup fresh or frozen strawberries or raspberries (no sugar added) – or any mixture of your favorite berries
- 1 small ripe banana
- ¾ ice cubes

Combine all ingredients in a blender and blend for 1-2 minutes. If desired, additional ice cubes can be added for a thicker consistency.

Santa Fe Rotisserie Chicken Salad

A quick and healthy meal that you can pull together in just minutes.

- o Your favorite selection of mixed salad greens or spinach (many comes in bags, pre-washed and ready to use).
- o Cooked rotisserie chicken (always great to have on hand in the refrigerator – can use for salads, sandwiches, or in casseroles).
- o Add corn, black beans, onions, sliced avocado and light shredded cheese as desired.
- o Place salad fixings in bowl, top with chicken and toss with a spicy vinaigrette dressing.



Santa Fe Chicken Salad



Fiber

Understand the Benefits of Fiber

What Is Fiber?

Dietary fiber, also known as roughage or bulk, includes all plant foods that your body can't digest or absorb. Unlike other food components such as fats, proteins or carbohydrates — which your body breaks down and absorbs — fiber isn't digested by your body. Therefore, it passes virtually unchanged through your stomach and small intestine and into your colon.

Fiber is often classified into two categories: those that don't dissolve in water (insoluble fiber) and those that do (soluble fiber).

Insoluble fiber. This type of fiber promotes the movement of material through your digestive system and increases stool bulk, so it can be of benefit to those who struggle with constipation or irregular stools. Whole-wheat flour, wheat bran, nuts and many vegetables are good sources of insoluble fiber.


Soluble fiber. This type of fiber dissolves in water to form a gel-like material. It can help lower blood cholesterol and glucose levels. You can find generous quantities of soluble fiber in oats, peas, beans, apples, citrus fruits, carrots, barley and psyllium.

The amount of each type of fiber varies in different plant foods. To receive the greatest health benefit, eat a wide variety of high-fiber foods.

How much Fiber do I need?

The National Academy of Sciences Institute of Medicine, which provides science-based advice on matters of medicine and health, gives the following daily recommendations for adults.

	Age 50 and younger	Age 51 and older
Men	38 grams	30 grams
Women	25 grams	21 grams



Benefits of a high-fiber diet

A high-fiber diet has many benefits, which include:

- **Prevents constipation.** Dietary fiber increases the weight and size of your stool and softens it. A bulky stool is easier to pass, decreasing your chance of constipation. If you have loose, watery stools, fiber may also help to solidify the stool because it absorbs water and adds bulk to stool.
- **Lowers your risk of digestive conditions.** A high-fiber diet may lower your risk of specific disorders, such as hemorrhoids, irritable bowel syndrome and the development of small pouches in your colon (diverticular disease).
- **Lowers blood cholesterol levels.** Soluble fiber found in beans, oats, flax-seed and oat bran may help lower total blood cholesterol levels by lowering low-density lipoprotein, or "bad," cholesterol levels.
- **Controls blood sugar levels.** Fiber, particularly soluble fiber, can slow the absorption of sugar, which for people with diabetes, can help improve blood sugar levels. A high-fiber diet may also reduce the risk of developing type 2 diabetes.
- **Aids in weight loss.** High-fiber foods generally require more chewing time, which gives your body time to register when you're no longer hungry, so you're less likely to overeat. Also, a high-fiber diet tends to make a meal feel larger and linger longer, so you stay full for a greater amount of time. And high-fiber diets also tend to be less "energy dense," which means they have fewer calories for the same volume of food.
- **Uncertain effect on colorectal cancer.** Evidence that dietary fiber reduces colorectal cancer is mixed — some studies show benefit, some show nothing and even some show greater risk. If you're concerned about preventing colorectal cancer, adopt or stick with a colon cancer screening regimen. Regular testing for and removal of colon polyps can prevent colon cancer.

Fitting in Your Fiber

Need ideas for high-fiber meals and snacks? Try these suggestions:

- Start your day with a high-fiber breakfast cereal — 5 or more grams of fiber per serving. Opt for cereals with "bran" or "fiber" in the name. Or add a few tablespoons of unprocessed wheat bran to your favorite cereal.
- Add crushed bran cereal or unprocessed wheat bran to baked products such as meatloaf, breads, muffins, casseroles, cakes and cookies. You can also use bran products as a crunchy topping for casseroles, salads or cooked vegetables.
- Switch to whole-grain breads. These breads list whole wheat, whole-wheat flour or another whole grain as the first ingredient on the label. Look for a brand with at least 2 grams of dietary fiber per serving.
- Substitute whole-grain flour for half or all of the white flour when baking bread. Whole-grain flour is heavier than white flour. In yeast breads, use a bit more yeast or let the dough rise longer. When using baking powder, increase it by 1 teaspoon for every 3 cups of whole-grain flour.
- Eat more whole grains and whole-grain products. Experiment with brown rice, barley, whole-wheat pasta and bulgur.
- Take advantage of ready-to-use vegetables. Mix chopped frozen broccoli into prepared spaghetti sauce. Snack on baby carrots.
- Eat more beans, peas and lentils. Add kidney beans to canned soup or a green salad. Or make nachos with refried black beans, baked tortilla chips and salsa.
- Eat fruit at every meal. Apples, bananas, oranges, pears and berries are good sources of fiber.
- Make snacks count. Fresh and dried fruit, raw vegetables, and low-fat popcorn and whole-grain crackers are all good choices.

High-fiber foods are good for your health. But adding too much fiber too quickly can cause intestinal gas, abdominal bloating and cramping. Increase fiber in your diet gradually over a period of a few weeks. This allows the natural bacteria in your digestive system to adjust to the change. Also, drink plenty of water. Fiber works best when it absorbs water, making your stool soft and bulky. Without the added water, you could become constipated.

All information gathered from Mayoclinic.com

Fruits	Serving Size	Total Fiber (grams)
Raspberries	1 cup	8.0
Apple	1 medium	5.1
Banana	1 medium	3.1
Grains, Cereal & Pasta		
Spaghetti, whole wheat	1 cup (cooked)	6.3
Bran Flakes	3/4 cup	5.1
Oatmeal	1 cup	4.0
Brown rice	1 cup (cooked)	3.5
Bread, whole wheat	1 slice	1.9
Legumes, Nuts & Seeds		
Split peas	1 cup (cooked)	16.3
Black beans	1 cup	15.0
Baked beans	1 cup	10.4
Sunflower seeds	1/4 cup	3.6
Almonds	1 ounce (22 nuts)	3.3
Vegetables		
Artichokes	1 medium	10.3
Peas	1 cup	8.8
Broccoli	1 cup	5.1
Sweet corn	1 cup	4.6
Carrot, raw	1 medium	1.7

Know Your Fats

MARCH 9-13

Understanding the Difference Between Fats

Some fats such as Omega-3, Omega-6 and monounsaturated fats are considered better fats because they either promote heart health or do not contribute to heart disease. Like all foods, fats have calories, so consider the amount of calories in fats when deciding what to eat. Even beneficial fats should be eaten in moderation. Other fats, such as saturated and *trans* fats should be avoided, because diets high in these fats are strongly associated with the development of heart disease and stroke.

The American Heart Association recommends keeping saturated fat to less than 7 percent of total calories, and trans-fats to less than 1 percent of total calories by eating a healthy dietary pattern, rich in fruits, vegetables, low-fat dairy products, high-fiber whole grains, lean meat, poultry, and fish twice a week. A range of 25 percent to 35 percent of total calories from all fat is an appropriate level for a healthy eating pattern.

	Very beneficial	Beneficial	Good	Avoid/limit	Avoid/limit
	Omega-3 Polyunsaturated fatty acids (PUFA)	Omega-6 Polyunsaturated fatty acids (PUFA)	Mono- unsaturated fatty acids (MUFA)	Saturated fat	Trans fat
Found in	Fatty fish, shellfish, flaxseed, walnuts, and canola	Nuts, seeds, vegetable oils such as sunflower, safflower, corn and soybean oils	Canola and olive oil	Animal-based products including full fat dairy products – butter, cream, cheese and meat Also present in tropical oils such as coconut and palm oil	Manmade: Margarine, commercially fried and baked foods
Amount	Most People: 2 servings of fish per week People with high cholesterol: talk to your physician about whether omega-3 fatty acid supplements are right for you	Up to 5 percent to 10 percent of total calories, as part of the total fat intake About 12-22 grams per day Take the calories in each teaspoon into consideration within your daily food choices (About 40 cal per tsp vegetable oil)	Most of the fat you eat should be MUFA or PUFA Total fat should be about 56 to 78 grams per day	No more than 7 percent of total calories consumed About 16 grams on a 2000 calorie per day diet Select lean meats and poultry and eat 2-3 servings of low-fat or fat- free dairy products per day	No more than 1 percent of total calories consumed Avoid commercially baked or fried foods that are not trans- fat free Read labels and avoid products made with hydrogenated oils

FOR RELEASE 3 p.m. CT/4 p.m. ET, Monday, Jan. 26, 2009


 American Heart Association
 7272 Greenville Avenue
 Dallas, Texas 75231



Reading Food Labels

If a food claims to be... It means that one serving of the product contains...

Fat

Fat Free

Less than 0.5g of fat

Low Fat

3g of fat or less

Reduce fat or less fat

At least 25% less fat than regular product

Low in saturated fat

1g of saturated fat or less, with not more than 15% of the calories coming from saturated fat.

Lean

Less than 10g of fat, 4g of saturated fat and 95 mg of cholesterol

Extra Lean

Less than 5g and 2g of saturated fat and 95mg of cholesterol

Light

At least one-third fewer calories or no more than half the fat of the regular product, or no more than half the sodium of the regular product

Cholesterol

Cholesterol Free

Less than 2mg of cholesterol and 2g of saturated fat

Low Cholesterol

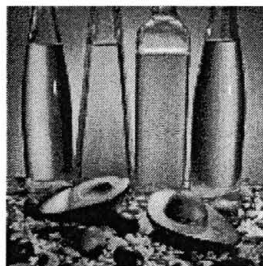
20 or fewer mg of cholesterol and 2g or less of saturated fat

Reduced Fat

At least 25% less cholesterol than the regular product and 2g or less of saturated fat

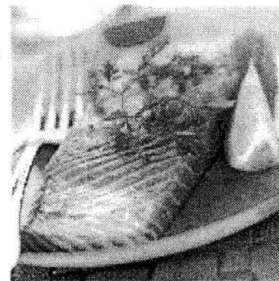
Effects on Heart Health

Saturated and trans fats (trans-fatty acids): These are the less healthy kinds of fats. They can increase your risk of heart disease by *increasing your total and LDL ("bad") cholesterol*. Dietary cholesterol isn't technically a fat, but it's found in food derived from animal sources. Intake of dietary cholesterol increases blood cholesterol levels, but not as much as saturated and trans fats do, and not to the same degree in all people.



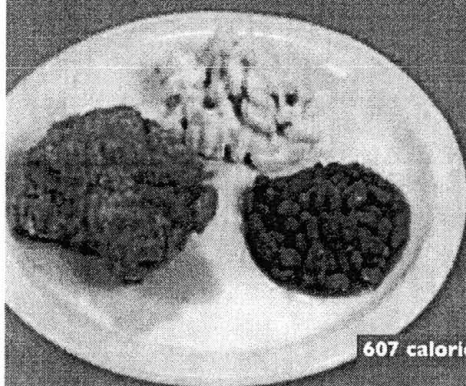
Unsaturated fats: monounsaturated and polyunsaturated fats. These fats, if used in place of others, can *lower your risk of heart disease by reducing the total cholesterol and low-density lipoprotein (LDL) cholesterol levels* in your blood.

Essential Fats: Omega-3 fatty acids, may be especially beneficial to your heart. Omega-3s appear to *decrease the risk of coronary artery disease*. They may also protect against irregular heartbeats and *help lower blood pressure levels*.



Eat More, Weigh Less?

How to manage your weight
without being hungry



607 calories



293 calories



DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION



Can you weigh less without eating less?

Have you tried to lose weight by cutting down the amount of food you eat? Do you end up feeling hungry and not satisfied? Or have you avoided trying to lose weight because you're afraid of feeling hungry all the time? If so, you are not alone. Many people throw in the towel on weight loss because they feel deprived and hungry when they eat less. But there is another way. Aim for a slow, steady weight loss by decreasing calorie intake while maintaining an adequate nutrient intake and increasing physical activity. You can cut calories without eating less nutritious food. The key is to eat foods that will fill you up without eating a large amount of calories.

If I cut calories, won't I be hungry?

Research shows that people get full by the *amount of food* they eat, not the *number of calories* they take in. You can cut calories in your favorite foods by lowering the amount of fat and/or increasing the amount of fiber-rich ingredients, such as vegetables or fruit.

Let's take macaroni and cheese as an example. The original recipe uses whole milk, butter, and full-fat cheese. This recipe has about 540 calories in one serving (1 cup).

540 calories



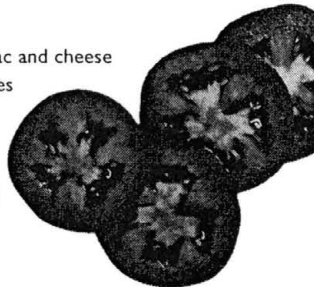


Here's how
to remake
this recipe:

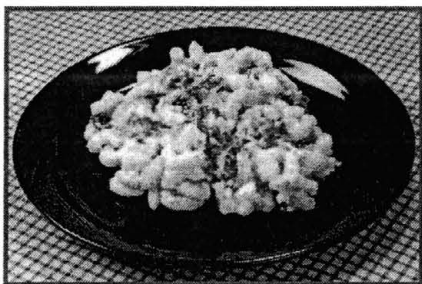
- Use 2 cups non-fat milk instead of 2 cups whole milk.
- Use 8 ounces light cream cheese instead of 2 ¼ cups full-fat cheddar cheese.
- Use 1 tablespoon butter instead of 2 or use 2 tablespoons of soft trans-fat free margarine.

• Add about 2 cups of fresh spinach and 1 cup diced tomatoes (or any other veggie you like).

Your redesigned mac and cheese now has 315 calories in one serving (1 cup). You can eat the same amount of mac and cheese with 225 fewer calories.



315 calories



What foods will fill me up?

In order to be able to cut calories without eating less and feeling hungry, you need to replace some higher calorie foods with foods that are lower in calories and fat and will fill you up. In general, this means foods with lots of water and fiber in them. The chart below will help you make smart food choices that are part of a healthy eating plan.

These foods will fill you up with less calories. Choose them more often...

Fruits and vegetables (prepared without added fat)
Spinach, broccoli, tomato, carrots, watermelon, berries, apples

Low-fat and fat-free milk products
Low- or fat-free milk, low or fat-free yogurt, low- or fat-free cottage cheese

Broth-based soup
Vegetable-based soups, soups with chicken or beef broth, tomato soups (without cream)

Whole grains
Brown rice, whole wheat bread, whole wheat pastas, popcorn

Legumes (beans and peas)
Black, red kidney and pinto beans (without added fat), green peas, black-eyed peas

Lean meat, poultry and fish
Grilled salmon, chicken breast without skin, ground beef (lean or extra lean)

Technically speaking...

The number of calories in a particular amount or weight of food is called "calorie density" or "energy density." Low-calorie-dense foods are ones that don't pack a lot of calories into each bite.

A healthy eating plan is one that:

- Emphasizes fruits, vegetables, whole grains, and fat-free or low-fat milk and milk products.
- Includes lean meats, poultry, fish, beans, eggs, and nuts.
- Is low in saturated fats, trans fats, cholesterol, salt (sodium), and added sugars.
- Stays within your calorie needs

These foods can pack more calories into each bite. Choose them less often...

Fried foods

Eggs fried in butter, fried vegetables, French fries

Fatty cuts of meat

Bacon, brisket, ground beef (regular)

Full-fat milk products

Full-fat cheese, full-fat ice cream, whole and 2% milk

Dry snack foods

Crackers or pretzels, cookies, chips, dried fruits

Higher-fat and higher-sugar foods

Croissants, margarine, shortening and butter, doughnuts, candy bars, cakes and pastries

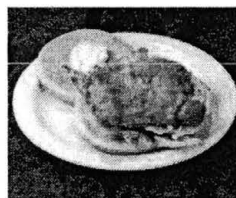
Foods that have a lot of water or fiber and little fat are usually low in calorie density. They will help you feel full without an unnecessary amount of calories.

Here are some more ideas for cutting back on calories without eating less and being hungry:

Make substitutions

Instead of...

Try...



Fried chicken sandwich

with 1 tbsp. mayonnaise
= 599 calorie



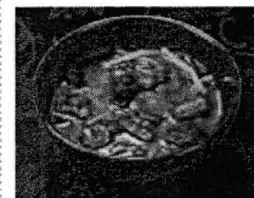
Grilled chicken salad with low-fat dressing

2 cups lettuce, 2 oz. grilled chicken breast, 2 tbsp. light balsamic vinaigrette dressing
= 178 calories



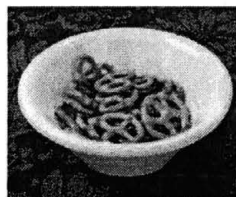
Cream-based soup

1 cup mushroom bisque
= 400 cal



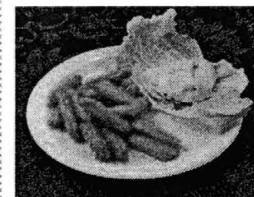
Broth-based soup

1 cup minestrone
= 112 calories



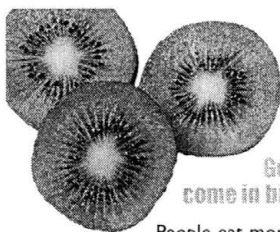
Chips or pretzels

1.5 oz. pretzels
= 162 calories



Baby carrots with hummus

16 baby carrots
with 1 tbsp. hummus
= 75 calories



Good things can
come in big packages

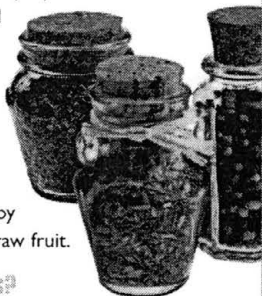
People eat more than they realize when faced with large portion sizes. This usually means eating too many calories. But, not all large portions are created equal. Larger portions of water- and fiber-rich foods, like fruits, vegetables, and broth-based soups, can fill you up with less calories.

Start with an appetizer

Research shows that if you eat a low-calorie appetizer before a meal, you will eat fewer total calories during the meal. Start your meals with a broth-based soup or a green salad without a large amount of cheese, or croutons.

Fruits and veggies: Keep it simple

Most fruits and veggies are low-calorie and will fill you up, but the way you prepare them can change that. Breading and frying, and using high-fat creams or butter with vegetables and fruit will add extra calories. Try steaming vegetables and using spices and low-fat sauces for flavor. And enjoy the natural sweetness of raw fruit.



What about beverages?

While drinking beverages is important to good health, they don't help you feel full and satisfied the way food does. Choose drinks without calories, like water, sparkling water, or unsweetened iced tea. Drink fat-free or low-fat milk instead of 2% or whole milk.

On the front cover:

Chicken, 1/2 breast, meat and skin fried with flour, bone removed: 218 calories, 9g fat, 0g fiber

Macaroni and cheese made with whole milk, butter, and full-fat cheese, 1/2 cup: 270 calories, 14g fat, 1.5g fiber

Baked beans with pork and tomato sauce, 1/2 cup: 119 calories, 1 g fat, 5g fiber

Total for meal: 607 calories, 24g fat, 6.5g fiber

Chicken, 1/2 breast, bone and skin removed, roasted: 142 calories, 3g fat, 0g fiber

Sweet potato, half of one large, baked: 81 calories, 0g fat, 3g fiber

Broccoli, large stalk, cut up (about 1 cup): 55 calories, 1g fat, 5g fiber

Tomatoes, 3 slices of a large tomato: 15 calories, 0g fat, 0g fiber

Total for meal: 293 calories, 4g fat, 8g fiber



DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION
NATIONAL CENTER FOR
CHRONIC DISEASE PREVENTION AND HEALTH PROMOTION
DIVISION OF NUTRITION AND PHYSICAL ACTIVITY



Nutrition

fact sheet



Calcium and Vitamin D: Essential Nutrients for Bone Health

Calcium and vitamin D are both essential nutrients when it comes to bone health. Although most people link calcium to strong bones, vitamin D sometimes gets overlooked—and it shouldn't. Recent research shows that vitamin D plays an important role, along with calcium, in bone health. The stronger your bones are at age 30, the more you will have “invested” in your “calcium bank account” as you get older. To maintain strong bones and get enough calcium and vitamin D in your diet, stay active with weight-bearing exercise and get 15 minutes of sunlight several times a week.

Calcium and Vitamin D for Everyone

Building strong bones is a lot like building a healthy balance in your “calcium bank account.” Bones are living tissue and constantly in a state of turnover, making calcium deposits and withdrawals daily. Vitamin D is also essential for strong bones. Your body needs it for optimum bone strength and to help absorb calcium. However, most people are not getting enough of either of these nutrients. Bones don't come with a lifetime guarantee. They need continuing maintenance or they can weaken and break. If your diet is low in calcium, your body will take calcium from

your bones to keep blood calcium at normal levels. For a lifetime of healthy bones:

- consume 3 servings of low-fat or fat-free milk or other dairy products every day.
- supplement your diet with calcium from calcium-fortified foods and beverages, if you don't or can't consume milk.
- follow an overall healthy eating plan using the MyPyramid Food Guidance system (www.mypyramid.gov) and
- be physically active with weight-bearing exercise like walking, running or weight training.

Calcium and Vitamin D Goals

Age (males & females)	Calcium (mg*/day)	Vitamin D (IU**/day)
1–3	500	200
4–8	800	200
9–18	1,300	200
19–50	1,000	200
51–70	1,200	400
71 and over	1,200	600
*Milligrams		** International Units

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Information

American Dietetic
Association
Knowledge Center

For food and nutrition
information or for a
referral to a nutrition
professional in your
area call:

800/366-1655

or visit:
www.eatright.org

Tropicana
www.tropicana.com

How much calcium and vitamin D do you need?

The Institute of Medicine of the National Academy of Sciences sets the dietary recommendations for the daily nutrition requirements for Americans. The recommendations for calcium and vitamin D can be found in the table on page 1.

Focus on Food First!

Dietitians recommend food as the primary source of vitamins, minerals and other nutrients, such as calcium and vitamin D. Dairy products, fortified cereals and calcium-fortified orange juice are good sources of calcium and vitamin D.

Are all sources of calcium absorbed efficiently?

Calcium is absorbed best if your intake of calcium-rich foods is spread out during the day. For all sources of calcium, adequate vitamin D from food or sunlight is necessary to help the absorption. The calcium in milk products is very well absorbed as is the calcium in fruit juice fortified with calcium citrate malate. Since calcium citrate malate is a patented

calcium source, it is found in only certain fruit juices.

A registered dietitian can help you choose foods or a combination of foods and a supplement to meet your individual calcium and vitamin D needs, while keeping in mind that calcium intake should not exceed 2,500 milligrams per day.

More Tips for Bone Health

- Do some weight-bearing activities daily—like walking, running, dancing, weight training.
- Avoid smoking and excessive alcohol intake.
- Ask your physician if you need a bone density test based on your risk factors for osteoporosis or if you are a woman over age 50.
- Read food labels and look for foods and beverages that provide calcium and vitamin D.
- Choose a calcium supplement—if you need it—that contains vitamin D.
- See a registered dietitian for individual assistance and recommendations.

Sources of Calcium and Vitamin D

Foods and Beverages	Calcium (milligrams)	Vitamin D (International Units)
Milk, low-fat or non-fat, 1 cup	301	98
Calcium & vitamin D- Fortified orange juice, 1 cup	350	100
Fruit yogurt, low-fat, 1 cup	372	100
Cheddar cheese, low-fat, 2 oz.	236	*
Salmon, pink, canned with soft bones, 3 oz.	208	530

*Not a significant source of nutrient indicated.
Note: Sunlight causes skin to make vitamin D and, for most people, 15 minutes of sunlight several days a week (with hands and face exposed) is enough.

**American
Dietetic
Association**
Your link to nutrition and health™
120 South Riverside Plaza, Suite 2000
Chicago, Illinois 60606-6995

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This fact sheet expires 4/1/2009.

Food Sources of Calcium

Food Sources of Calcium ranked by milligrams of calcium per standard amount; also calories in the standard amount.

Food, Standard Amount	Calcium (mg)	Calories
Plain yogurt, non-fat (13 g protein/8 oz), 8-oz container	452	127
Romano cheese, 1.5 oz	452	165
Pasteurized process Swiss cheese, 2 oz	438	190
Plain yogurt, low-fat (12 g protein/8 oz), 8-oz container	415	143
Fruit yogurt, low-fat (10 g protein/8 oz), 8-oz container	345	232
Swiss cheese, 1.5 oz	336	162
Ricotta cheese, part skim, ½ cup	335	170
Pasteurized process American cheese food, 2 oz	323	188
Provolone cheese, 1.5 oz	321	150
Mozzarella cheese, part-skim, 1.5 oz	311	129
Cheddar cheese, 1.5 oz	307	171
Fat-free (skim) milk, 1 cup	306	83
Muenster cheese, 1.5 oz	305	156
1% low-fat milk, 1 cup	290	102
Low-fat chocolate milk (1%), 1 cup	288	158
2% reduced fat milk, 1 cup	285	122
Reduced fat chocolate milk (2%), 1 cup	285	180
Buttermilk, low-fat, 1 cup	284	98
Chocolate milk, 1 cup	280	208
Whole milk, 1 cup	276	146
Yogurt, plain, whole milk (8 g protein/8 oz), 8-oz container	275	138
Ricotta cheese, whole milk, ½ cup	255	214

Blue cheese, 1.5 oz	225	150
Mozzarella cheese, whole milk, 1.5 oz	215	128
Feta cheese, 1.5 oz	210	113

Non-Dairy Food Sources of Calcium

Non-Dairy Food Sources of Calcium ranked by milligrams of calcium per standard amount; also calories in the standard amount. The bioavailability may vary.

Food, Standard Amount	Calcium (mg)	Calories
Fortified ready-to-eat cereals (various), 1 oz	236-1043	88-106
Soy beverage, calcium fortified, 1 cup	368	98
Sardines, Atlantic, in oil, drained, 3 oz	325	177
Tofu, firm, prepared with nigari ^b , ½ cup	253	88
Pink salmon, canned, with bone, 3 oz	181	118
Collards, cooked from frozen, ½ cup	178	31
Molasses, blackstrap, 1 Tbsp	172	47
Spinach, cooked from frozen, ½ cup	146	30
Soybeans, green, cooked, ½ cup	130	127
Turnip greens, cooked from frozen, ½ cup	124	24
Ocean perch, Atlantic, cooked, 3 oz	116	103
Oatmeal, plain and flavored, instant, fortified, 1 packet prepared	99-110	97-157
Cowpeas, cooked, ½ cup	106	80
White beans, canned, ½ cup	96	153
Kale, cooked from frozen, ½ cup	90	20
Okra, cooked from frozen, ½ cup	88	26
Soybeans, mature, cooked, ½ cup	88	149
Blue crab, canned, 3 oz	86	84
Beet greens, cooked from fresh, ½ cup	82	19
Pak-choi, Chinese cabbage, cooked from fresh, ½ cup	79	10

Clams, canned, 3 oz	78	126
Dandelion greens, cooked from fresh, ½ cup	74	17
Rainbow trout, farmed, cooked, 3 oz	73	144

BREAKFAST

Why you may want to think twice before skipping



THE MOST IMPORTANT

A healthy breakfast refuels your body and replenishes your blood sugar, giving you the energy necessary to start a new day. In addition, research shows that breakfast is good for both your physical and mental health. Here's why...

Consume more vitamins and minerals and less fat and cholesterol during the day. Several studies show that increasing your daily eating frequency may be associated with consuming more healthy nutrients and less unfavorable nutrients.

Have better concentration and be more productive throughout the day. Research shows that breakfast may replenish blood glucose levels; therefore, providing the brain with its main source of energy.

Manage your weight. Researchers speculate that eating breakfast may reduce hunger later in the day, or it may cause eaters to choose lower calorie foods at later meals. Therefore, fewer calories are consumed throughout the day.

Have more strength and endurance. People who eat breakfast-and thus have higher energy levels-may engage in more physical activity than people who skip breakfast.

What makes a healthy breakfast?

To make a healthy breakfast, choose one item from at least three of the following four food groups:

Fruits and Vegetables: Consider fresh, whole fruits and vegetables, fruit smoothies, or 100% juice without added sugar.

Grains: Choose whole-grain rolls, bagels, hot/cold cereals or bran muffins.

Dairy: Consider skim milk, low-fat yogurt and cheeses.

Protein: Choose hard-boiled eggs, peanut butter and lean meats.

Breakfast Ideas



Monday

Oatmeal

Wholegrain oatmeal served with blueberries, blackberries or strawberries topped with chopped walnuts, pecans or almonds. Add a glass of low fat milk to provide some added protein and fluid.

Tuesday

Omelet

Try making an omelet. Make an omelet with diced bell peppers and ham, a whole grain bagel and one serving of fruit. Egg whites substituted for egg yolks will decrease cholesterol intake. (Four whole eggs are recommended per week.)

Wednesday

Waffles

Whole-grain waffles topped with diced peaches, hard-cooked eggs and one cup of low fat milk.

Thursday

English Muffin

English muffins topped with scrambled egg, slice of low fat cheese and Canadian bacon. Add low fat milk or a fruit cup.

Friday

Toast

Whole-grain toast with peanut butter and sliced bananas. Add a container of yogurt and 100 percent juice.

Nutrition Fact Sheet

Adult Beverage Consumption:

Making Responsible Drinking Choices

More than 100 million American adults drink beverage alcohol responsibly. For these adults, moderate consumption of beverage alcohol—distilled spirits, beer or wine—can be an acceptable diet and lifestyle choice. Of course, some individuals should not drink alcohol beverages at all.

Those adults who choose to drink alcohol beverages should do so sensibly and in moderation

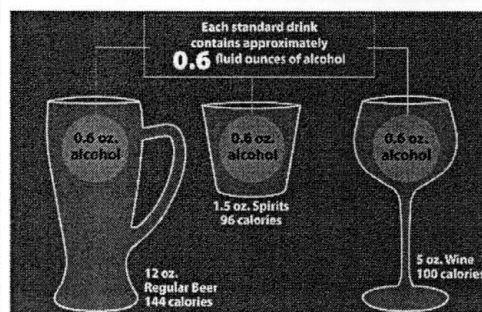
Moderate drinking is defined by the federal government's *2005 Dietary Guidelines for Americans* as up to one drink per day for women and up to two drinks per day for men. This limit is based on differences between the sexes in both weight and metabolism. Drinking patterns also appear to be as important as the amount. One to two drinks per day does not mean you can drink a "week's worth" of alcohol over a period of a few hours or a few days. Knowing what is a standard drink helps guide responsible drinking decisions. The following count as one drink:

- 12 fluid ounces of regular beer (144 calories)
- 5 fluid ounces of wine (white wine 100 calories, red wine 105 calories)
- 1.5 fluid ounces of 80 proof distilled spirits (96 calories).

Some people should not drink at all, including:

- Children and adolescents,
- Women of childbearing age who may become pregnant,
- Pregnant and lactating women,

Standard Drinks



Standard Drinks

Each standard drink contains 0.6 fluid ounces (14 grams) of alcohol (ethanol). It is the alcohol in each beverage that is associated with both potential risks and benefits, and has the identical effect on your body whether from beer, wine or distilled spirits. This important fact is taught by the federal government and numerous public health organizations including National Institute on Alcohol Abuse and Alcoholism, United States Departments of Transportation, Education, and Health and Human Services; National Consumers League, National Council on Alcoholism and Drug Dependence, and Mothers Against Drunk Driving (MADD) to guide responsible decisions about drinking.

- Individuals who cannot restrict their alcohol intake,
- Individuals taking medications that can interact with alcohol, and
- Individuals with specific, medical conditions.

Drinking should be avoided by individuals

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engaging in activities that require attention, skill or coordination, such as driving or operating machinery. For a full copy of the *Dietary Guidelines*, go to www.healthierus.gov/dietaryguidelines.

Moderate Drinking and Health

According to the *2005 Dietary Guidelines*, "The consumption of alcohol can have beneficial or harmful effects depending on the amount consumed, age and other characteristics of the person consuming the alcohol, and specifics of the situation....The lowest all-cause mortality occurs at an intake of one to two drinks per day. The lowest coronary heart disease mortality also occurs at an intake of one to two drinks per day. Morbidity and mortality are highest among those drinking large amounts of alcohol."

Current scientific research shows:

- Light to moderate beverage alcohol consumption for some age groups may reduce the risk of heart disease, the leading cause of death in the United States.
- The reported potential benefits are associated with the ethanol (alcohol) in *all* beverage alcohol products—distilled spirits, beer or wine. There are also a number of other dietary and lifestyle factors associated with reducing disease.
- Even one drink per day can slightly increase the risk of breast cancer, according to a report from the National Institute on Alcohol Abuse and Alcoholism.
- According to the *Dietary Guidelines* report, moderate drinking does not affect overall diet quality and is not associated with

obesity. Some research suggests that alcohol energy may be used differently than energy from other calories consumed. However, all alcohol drinks contain calories and heavy drinking contributes to weight gain.

According to the National Institute on Alcohol Abuse and Alcoholism, "Most adults who drink alcohol drink in moderation and are at low risk for developing problems related to their drinking. However, all drinkers, including low-risk drinkers, should be aware of the health risks associated with alcohol consumption."

Drink Responsibly

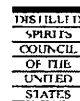
Individuals should not choose to drink alcohol for health reasons. Adults who choose to drink should do so responsibly at all times, and even less-than-heavy alcohol consumption is associated with significant risks. Alcohol abuse can cause serious health and other problems and, as noted in the *Dietary Guidelines*, "The hazards of heavy alcohol consumption are well known..." There is also a body of scientific literature regarding the reported health risks of beverage alcohol consumption generally, and there are warning labels on all alcohol beverage containers sold in the US. The decision whether or not to drink is a personal choice. For anyone under twenty-one years of age, know the law—it is illegal to purchase beverage alcohol if you are underage. As always, potential risks and benefits of drinking—as well as all other health, diet and lifestyle choices—should be discussed with a registered dietitian and/or physician. For more information go to NIAAA at <http://www.niaaa.nih.gov>.

**For a referral to a registered dietitian and for additional food and nutrition information
visit www.eatright.org**



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APPENDIX C

ARMY REFERENCES

1. Army Weight-for-Height Screening Tables
2. Army Body Fat Content Worksheet

Table 3-1
Weight for height table (screening table weight)

Height (in inches)	Minimum weight (in pounds)*	Male weight in pounds, by age				Female weight in pounds, by age			
		17-20	21-27	28-39	40+	17-20	21-27	28-39	40+
58	91	—	—	—	—	119	121	122	124
59	94	—	—	—	—	124	125	126	128
60	97	132	136	139	141	128	129	131	133
61	100	136	140	144	146	132	134	135	137
62	104	141	144	148	150	136	138	140	142
63	107	145	149	153	155	141	143	144	146
64	110	150	154	158	160	145	147	149	151
65	114	155	159	163	165	150	152	154	156
66	117	160	163	168	170	155	156	158	161
67	121	165	169	174	176	159	161	163	166
68	125	170	174	179	181	164	166	168	171
69	128	175	179	184	186	169	171	173	176
70	132	180	185	189	192	174	176	178	181
71	136	185	189	194	197	179	181	183	186
72	140	190	195	200	203	184	186	188	191
73	144	195	200	205	208	189	191	194	197
74	148	201	206	211	214	194	197	199	202
75	152	206	212	217	220	200	202	204	208
76	156	212	217	223	226	205	207	210	213
77	160	218	223	229	232	210	213	215	219
78	164	223	229	235	238	216	218	221	225
79	168	229	235	241	244	221	224	227	230
80	173	234	240	247	250	227	230	233	236

Notes

* Male and female Soldiers who fall below the minimum weights shown in table 3-1 will be referred for immediate medical evaluation

¹ Height will be measured in stocking feet (without shoes), standing on a flat surface with the chin parallel to the floor. The body will be straight but not rigid, similar to the position of attention. The measurement will be rounded to the nearest inch with the following guidelines: If the height fraction is less than 1/2 inch, round down to the nearest whole number in inches; if the height fraction is 1/2 inch or greater, round up to the next highest whole number in inches.

² Weight will be measured and recorded to the nearest pound within the following guidelines: If the weight fraction is less than 1/2 pound, round down to the nearest pound; if the weight fraction is 1/2 pound or greater, round up to the next highest pound.

³ All measurements will be in a standard PT uniform (gym shorts and T-shirt, without shoes).

⁴ If the circumstances preclude weighing Soldiers during the APFT, they will be weighed within 30 days of the APFT.

⁵ Add 6 pounds per inch for males over 80 inches and 5 pounds for females for each inch over 80 inches.

M

TAB

TAB

TAB

TAB

TAB

NAME (Last, First, Middle Initial)

SSN

RANK

NOTE:

DOE, JOHN

198-00-0000

SGT

1/4" = .25

1/2" = .50

3/4" = .75

HEIGHT (to nearest 0.50 inch)

WEIGHT (to nearest pound)

AGE

72.00

200

21

STEP

FIRST

SECOND

THIRD

AVERAGE (to nearest 0.50 in.)

1. Measure abdomen at the level of the navel (belly button). Round down to the nearest 0.50 inch. (Repeat 3 times.)

36.00

36.50

36.50

36.00

2. Measure neck just below level of larynx (Adam's apple). Round up to the nearest 0.50 inch. (Repeat 3 times.)

16.50

16.00

16.50

16.50

3. Enter the average abdominal circumference

36.00

4. Enter the average neck circumference

16.50

5. Enter circumference value (step 3 - step 4).

19.50

6. Find the height in Table 3-1 (Height Factor). Enter height in inches.

72.00

7. Find the Soldier's circumference value (step 5) and height (step 6) in figure B-5 (Percent Fat Estimation for Men). Enter the percent body fat value that intercepts with the circumference value and height. This is Soldier's Percent Body Fat.

18.00

REMARKS

CHECK ONE

☒ Individual is in compliance with Army Standards;

☐ is not in compliance with the standards.

☐ Recommended monthly weight loss is 3-8 lbs.

PREPARED BY (Signature)

RANK

DATE (YYYYMMDD)

APPROVED BY SUPERVISOR (Printed Name and Signature)

RANK

DATE (YYYYMMDD)

DA FORM 5500, AUG 2006

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APD v1.03

Figure B-1. Sample DA Form 5500

M TAB TAB TAB TAB

BODY FAT CONTENT WORKSHEET (Female)

For use of this form, see AR 600-9; the proponent agency is DCS, G-1.

NAME (Last, First, Middle Initial) DOE, JANE		SSN 432-00-0000		RANK SGT		NOTE: ¼" = .25 ½" = .50 ¾" = .75
HEIGHT (to nearest 0.50 inch) 63.00		WEIGHT (to nearest pound) 150		AGE 21		

STEP	FIRST	SECOND	THIRD	AVERAGE (to nearest 0.50 in.)
1. Measure neck just below level of larynx (Adam's apple) up to nearest 0.50 inch. Repeat three times, then average.	13.00	13.50	13.50	13.50
2. Measure waist (abdomen) at the point of minimal abdominal circumference. Round down to nearest 0.50 inch. Repeat three times, then average.	26.00	26.50	26.00	26.00
3. Measure hips at point where the gluteus muscles (buttocks) protrude backward the most. Round down to nearest 0.50 inch. Repeat three times, then average.	40.50	41.00	41.00	40.50

4. CALCULATIONS			REMARKS
A. Enter average waist circumference	26.00		
B. Enter average hip circumference	40.50		
C. TOTAL (4A + 4B)		66.50	
D. Enter average neck circumference	13.50		
E. Enter circumference value (4C - 4D)		53.00	
F. Find the height in Table 3-1 (Height Factor). Enter height in inches.	63.00		
G. Find the Soldier's circumference value (line 4E) and height (line 4F) in Figure B-6 (Percent Fat Estimation for Women). Enter the body fat value that intercepts with the circumference value and height. This is the Soldier's Percent Body Fat.		27.00	

CHECK ONE
☒ Individual is in compliance with Army standards; ☐ is not in compliance with the standards.
 Recommended monthly weight loss is 3-8 lbs.

PREPARED BY (Signature) RANK DATE (YYYYMMDD) APPROVED BY SUPERVISOR (Printed Name and Signature) RANK DATE (YYYYMMDD)

DA FORM 5501, AUG 2006

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APD v1.00

Figure B-3. Sample DA Form 5501

APPENDIX D

NON-SIGNIFICANT RESULT TABLES

1. Table 13 Analysis of Non-Significant Body Composition Measures
2. Table 14 Analysis of Non-Significant Dietary Measures
3. Table 15 Analysis of Non-Significant Metabolic Measures

Table 12
Analysis of Non-Significant Body Composition Measures^a

Variable	n	T1 mean ± SD	T2 mean ± SD	T3 mean ± SD
Height, in.				
Control	11	66.7 ± 2.7	-	-
Treatment	12	69.3 ± 4.5		
Weight, lbs				
Control	11	157.1 ± 26.6	156.5 ± 25.0	157.0 ± 26.8
Treatment	12	168.4 ± 30.7	167.8 ± 27.7	171.5 ± 21.2
BMI, kg/m²				
Control	11	23.7 ± 2.9	24.3 ± 2.8	24.2 ± 2.8
Treatment	12	24.3 ± 2.2	24.6 ± 2.5	24.3 ± 2.3
Fat-Free Mass, lbs				
Control	11	126.5 ± 20.6	130.5 ± 22.1	130.2 ± 22.7
Treatment	12	127.4 ± 42.0	145.0 ± 14.8	140.6 ± 16.8

Note: T1= baseline, T2= midpoint, T3= endpoint, BMI= Body mass index

^a Difference between the control group and the treatment group were not statistically significant.

Table 13
Analysis of Non-Significant Dietary Measures^a

Variable	n	T1 mean ± SD	T2 mean ± SD	T3 mean ± SD
Total Calories, kcal				
Control	12	2316 ± 622	2117 ± 563	2389 ± 717
Treatment	11	2465 ± 603	2324 ± 893	2347 ± 860
Total Fat, g				
Control	12	76.7 ± 29.4	64.1 ± 27.9	80.9 ± 28.7
Treatment	11	94.9 ± 27.9	80.4 ± 33.6	74.6 ± 39.2
Vegetables, cups				
Control	12	1.5 ± 0.9	1.2 ± 0.9	1.1 ± 0.6
Treatment	11	1.6 ± 0.8	1.8 ± 1.1	1.8 ± 1.7
Fiber, g				
Control	12	15.7 ± 5.8	15.6 ± 6.7	14.4 ± 4.2
Treatment	11	16.8 ± 7.7	20.9 ± 11.0	20.6 ± 9.5
Breakfast				
Control	12	2.5 ± 0.5	2.2 ± 1.0	2.3 ± 1.1
Treatment	11	2.2 ± 1.1	2.3 ± 1.0	2.8 ± 0.5

Note: T1= baseline, T2= midpoint, T3= endpoint

^a Difference between the control group and the treatment group were not statistically significant.

Table 14
Analysis of Non-Significant Metabolic Measures^a

Variable	n	T1 mean ± SD	T3 mean ± SD	Acceptable Range
Triglycerides, mg/dL				
Control	12	86.82 ± 28.96	96.42 ± 26.07	< 150
Treatment	11	101.17 ± 42.60	132.00 ± 106.34	
Cholesterol, Total, mg/dL				
Control	12	163.46 ± 33.71	159.00 ± 25.83	125-200
Treatment	11	176.00 ± 36.48	183.44 ± 33.53	
HDL Cholesterol, mg/dL				
Control	12	62.46 ± 17.26	59.17 ± 16.50	≥ 46
Treatment	11	55.83 ± 11.82	53.13 ± 9.28	
LDL Cholesterol, mg/dL				
Control	12	83.69 ± 31.86	80.50 ± 26.04	< 130
Treatment	11	99.83 ± 31.29	104.00 ± 28.34	
Glucose, mg/dL				
Control	12	89.15 ± 9.93	88.42 ± 5.73	65-99
Treatment	11	86.83 ± 8.71	80.44 ± 12.45	
BUN, mg/dL				
Control	12	14.69 ± 3.25	14.00 ± 3.10	7-25
Treatment	11	15.92 ± 4.25	14.36 ± 8.21	
Sodium, mmol/L				
Control	12	138.92 ± 1.66	139.08 ± 1.68	135-146
Treatment	11	139.00 ± 1.76	139.44 ± 1.45	
Potassium, mmol/L				
Control	12	4.38 ± 0.25	4.41 ± 0.22	3.5-5.3
Treatment	11	4.41 ± 0.22	4.19 ± 0.50	
Calcium, mg/dL				
Control	12	9.78 ± 0.43	9.58 ± 0.33	8.6-10.2
Treatment	11	9.74 ± 0.22	9.66 ± 0.29	

Note: T1= baseline, T3= endpoint, HDL= High-density lipoprotein; LDL= low-density lipoprotein;
 BUN= Blood urea nitrogen

^a Difference between the control group and the treatment group were not statistically significant.

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