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A DESCRIPTIVE STUDY OF THE DIET AND PHYSICAL ACTIVITY PRACTICES OF OVERWEIGHT AND OBESE COLLEGE STUDENTS ENROLLED IN A WEIGHT LOSS PROGRAM

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ABSTRACT OF THESIS

A DESCRIPTIVE STUDY OF THE DIET AND PHYSICAL ACTIVITY PRACTICES OF OVERWEIGHT AND OBESE COLLEGE STUDENTS ENROLLED IN A WEIGHT LOSS PROGRAM

The effect of weight gain on college students may lead to physical and emotional problems that could continue into adulthood. Identifying behavioral, demographic, and psychological factors that impact college student's weight status could aid in developing programs to help reduce weight and prevent weight gain in overweight and obese college students. This study evaluated the dietary habits, physical activity, and psychosocial characteristics of college students entering a university-sponsored weight loss program. Results suggest that the majority of participants have experienced weight gain in the past year and none have experienced weight loss. The student's diets tended to include less than the recommended amounts of fiber, calcium, vitamin A, fruits, and vegetables. Diets tended to include more than the recommended amounts of protein, carbohydrate, and sodium according to the USDA Dietary Reference Intakes (DRI) and the 2005 Dietary Guidelines for Americans. Students living on campus were found to participate in significantly greater amounts of strenuous physical activity than students living off campus. Self-efficacy for food consumption and physical activity was not found to have a significant effect on calories consumed or calories burned. A significant correlation was not found to exist between BMI and depression in this sample of college students.

KEY WORDS: College students, overweight, obesity, diet, physical activity

Laura Brooke Walters

November 2, 2009

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OVERWEIGHT AND OBESE COLLEGE STUDENTS ENROLLED IN A WEIGHT LOSS
PROGRAM

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THESIS

Laura Brooke Walters

The Graduate School

University of Kentucky

2009

A DESCRIPTIVE STUDY OF THE DIET AND PHYSICAL ACTIVITY PRACTICES OF
OVERWEIGHT AND OBESE COLLEGE STUDENTS ENROLLED IN A WEIGHT LOSS
PROGRAM

THESIS

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Sciences
College of Agriculture
at the University of Kentucky

By

Laura Brooke Walters

Lexington, KY

Director: Kelly Webber PhD, MPH, RD, LD

Lexington, Kentucky

2009

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ACKNOWLEDGEMENTS

The following thesis, while an individual work, benefited from the insights and direction of several people. First, my Thesis Chair, Dr. Kelly Webber, exemplifies the high quality scholarship to which I aspire. In addition, Dr. Webber provided timely and instructive comments and evaluation at every stage of the thesis process, allowing me to complete this project on schedule. Next, I wish to thank the complete Thesis Committee: Dr. Kelly Webber, Dr. Lisa Gaetke, and Dr. Janet Mullins. Each individual provided insights that guided and challenged my thinking, substantially improving the finished product.

In addition to the technical and instrumental assistance above, I received equally important assistance from family and friends. My parents, Jeff and Vicki Walters provided on-going support throughout the thesis process. They instilled in me, from an early age, the desire and skills to obtain the Master's. Additionally, I would like to thank Blake Curry who provided continuous encouragement, as well as the technical assistance critical for completing the project in a timely manner. Finally, I wish to thank the students who participated in my study (names will remain anonymous for confidentiality purposes). Their participation created an informative and interesting project that provided opportunities for future work.

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Chapter 1: Introduction

An estimated 66% of adults in the United States are overweight or obese (Centers for Disease Control and Prevention [CDC], 2009). Population weight gain trends indicate most obese individuals become so before the age of 35 (McTigue, Garrett, & Popkin, 2002). Young adults attending college are more vulnerable to weight gain than the general population (Strong, Parks, Anderson, Winett, & Davy, 2008). In addition, the weight gain of college students is more rapid than the weight gain of the general population. During the first year of college alone, the mean weight gain is 4 to 9 pounds (Strong, et al., 2008). Young adults with an increased body mass index (BMI; calculated as kg/m^2) are placed at a greater risk of developing cardiovascular disease and diabetes compared to those with a stable or decreased BMI (Lloyd-Jones et al., 2007). It is crucial that research be performed to further investigate the health behaviors of overweight and obese college students to obtain insight into what factors may affect weight gain.

Diet has been shown to be an important aspect in weight loss and weight maintenance (Franz et al., 2007). Data suggest that the majority of young adults consume excessive amounts of sugar-sweetened beverages and high-fat, high-sodium foods, and consume less than the recommended amounts of whole grains, fruits, vegetables, and calcium (Larson, Nelson, Neumark-Sztainer, Story, & Hannan, 2009). Factors related to unhealthy food consumption in college students include unhealthy food availability on campus, snacking, late night eating, alcohol-related eating, eating because of stress/boredom, and food in student dorm rooms (Nelson, Kocos, Lytle, & Perry, 2009).

It has been reported that 40% to 50% of college students are physically inactive (Keating, Guan, Pinero, & Bridges, 2005). Multiple interactions exist between lack of physical activity and obesity (Rippe & Hess, 1998). Physical activity is essential to achieve proper energy balance in order to prevent or reverse obesity (Rippe & Hess, 1998). Factors related to decreased physical activity include: negative experiences using campus recreation facilities, poor weather, lack of time/time management, motivation, increased time spent studying, and lack of social support for exercise (Nelson et al., 2009). Previous research suggests that female students of minority populations are less likely to be physically active (Lowry et al., 2000).

The purpose of this study is to evaluate the dietary habits, physical activity, and demographic characteristics of college students entering a university-sponsored weight loss program.

Chapter 2: Background Literature Review

Obesity rates have dramatically increased over the past two decades (Roach et al., 2003). The cause of obesity has traditionally been known to be excess energy (calories) consumed over energy expended in daily activities (Nestle, 2003). For treatment of obesity, a reduction in caloric intake of about 500 to 1000 kcal per day along with increased physical activity is recommended to produce a loss of approximately 8% to 10% of body weight over a period of about 6 months (NIH, 1998). Diet and physical activity have traditionally been emphasized as the main factors affecting weight. However, recent research has suggested that additional factors such as self-efficacy and mood may also impact weight.

College students particularly have the reputation of having poor dietary habits and low activity levels. Healthful eating and obtaining adequate physical activity were not found to be considered high priorities among college students (Strong et al., 2008). A national survey performed by the American College Health Association in 2005 found that 3 of 10 college students are either overweight or obese (American College Health Association (ACHA), 2005). College students have also been reported to gain weight more rapidly than the general population (Strong et al., 2008). The American College Health Association reported that 9 of 10 students eat fewer than five servings of fruits and vegetables per day, and 6 of 10 students participate in vigorous or moderate-intensity physical activity fewer than 3 days per week (ACHA, 2006).

Previous research has demonstrated that college students are particularly vulnerable to weight gain (Strong et al., 2008). Factors that may affect student's ability to practice diet and physical activity behaviors that promote weight loss include self-

efficacy and absence of depression. It has been found that eating and exercise self-efficacy is strongly associated with weight loss behaviors (Linde, Rothman, Baldwin, & Jeffery, 2006). Increased prevalence of mood and anxiety disorders has been reported among individuals who are overweight or obese (Barry, Pietrzak, & Petry, 2008). Identifying behavioral, demographic, and psychological factors that impact weight in college students could be important for the development of targeted weight loss interventions.

Aspects of Diet Related to Weight Status

A nutritious diet is essential to maintain a healthy weight. Increased knowledge of dietary guidelines and food-related knowledge are positively related to more healthful eating patterns (Larson, Perry, Story, & Neumark-Sztainer, 2006). High fiber foods such as whole grains, legumes, fruits, and vegetables have been linked to lower body weights (Byrd-Williams, Strother, Kelly, & Huang, 2009). Diets high in protein have been shown to provide a satiating effect that appears to be of vital importance for weight loss (Soenen & Westerterp-Plantenga, 2008). Studies have also demonstrated that diets low in calcium and dairy products are associated with increased body weight (American Dietetic Association [ADA] Evidence Analysis Library [EAL], 2009). Increased consumption of high-fat and high-energy foods provide extra calories that cause weight gain (Shiraev, Chen, & Morris, 2009). Intake of sugar sweetened beverages such as soda and fruit drinks has been cited as a likely contributor to growing obesity rates (West, Bursac, Quimby, Prewitt, Spatz, Nash, et al., 2006). Self-preparation of food is associated with less fast food consumption, and therefore a more healthful diet (Larson et al., 2006).

The combination of a reduced-energy diet and exercise are associated with moderate weight loss at 6 months (Franz et al., 2007). It is indicated that there is consistent agreement by college students that eating healthful diets is perceived to be a challenge in the transition to college (Cluskey & Grobe, 2009). Easy access to unhealthy food on a college campus has been cited as a barrier to weight management (Greaney et al., 2009).

Diets high in fiber provide bulk, are more satisfying, and have been linked to lower body weights (ADA, 2008). There are many benefits that may be gained as a result of consuming diets high in fiber. High-fiber foods include: whole grains, fruits, vegetables, and legumes (American Dietetic Association [ADA], 2008). In a cross-sectional analysis study, the individuals with the lowest BMI were in the highest quintiles of total and soluble fiber intake (Lairon et al., 2005). A study performed to identify health behavior change targets related to weight management in college students found that total fiber intake was half of the recommended amount for both men and women (Strong et al., 2008). The majority of studies with controlled energy intake reported an increase in post-meal satiety and a decrease in subsequent hunger with increased dietary fiber. It has been concluded that increasing dietary fiber intake from about 15g/day to 25-30g/day would be beneficial and may help reduce the prevalence of obesity (ADA EAL, 2008).

The results of previous research suggest that increased fiber consumption is related to decreased BMI (Lairon et al., 2005), and that the majority of college students do not consume enough fiber (Strong et al., 2008). As a result, it is questioned whether a significant correlation will exist between low fiber consumption and elevated BMI in the population of college students that comprises this study.

Fiber consumption is related to fruit and vegetable consumption. A study of college students found that average daily intake of fruits and vegetables were well below recommendations in both men and women (Strong et al., 2008). A survey of 557 undergraduate students aged 18-56 years found that 33% of the respondents were overweight or obese and that 33% of the students consumed 1 fruit in 3 days (Brunt, Rhee, & Zhong, 2007). A comparison of the effect of fruit consumption versus grain consumption on body weight found that energy densities of fruits, independent of their fiber amount can reduce energy consumption and body weight over time (De Oliveria, Sichieri, & Venturim Mozzer, 2008).

Previous research suggests that college students consume below the recommended amount of fruits and vegetables (Strong et al., 2008). It is also suggested that fruit consumption may be related to reduced energy consumption and body weight (De Oliveri et al., 2008). The college students that comprise this study have a BMI that is categorized as overweight or obese. As a result, it is questioned whether they consume below the recommended amount of fruits and vegetables.

Protein consumption has also been linked to lower BMI. Consumption of protein produces satiety. Satiety is broadly defined as the feeling of fullness and/or inhibition of hunger sensations after a meal resulting from the ingestion of food. Protein-induced satiety appears to be of vital importance for weight loss and weight maintenance (Veldhorst et al., 2008). It is proposed that foods such as protein that provide satiety may provide a way to help people consume fewer calories as a result of becoming satisfied more quickly and remaining satisfied for a longer period of time. This could result in

consumption of fewer calories and weight reduction (Murray & Vickers, 2009). There is a lack of research related to protein consumption in college students.

Previous research suggests that consumption of foods high in protein may increase satiety, which results in fewer calories consumed (Murray & Vickers, 2009). Since the college students comprising this study are categorized as overweight or obese according to BMI, it is believed that they may consume more calories each day than their body burns. As a result, it is questioned whether they consume the recommended amount of protein to produce satiety and hinder over-consumption of calories.

College students consume approximately half of the recommended amount of dairy servings per day (Poddar, Hosig, Anderson, Herbert, & Nickols-Richardson, 2008). Several studies have demonstrated that low intakes of calcium and dairy products are associated with increased body weight, body fat, BMI, waist circumference, and relative risk of obesity in adults. It is unclear if this is the result of a poor overall diet, or specifically a lack of calcium consumption (ADA EAL, 2009). However, several cross-sectional studies reported that children and adults with low reported consumption of dietary calcium have greater body weight, a higher degree of adiposity, and greater risk of developing metabolic syndrome than those who report consuming more calcium (Yanovski et al., 2009). Student subjects who maintained weight reported significantly higher low-fat dairy intake than students who gained weight. This led to the theory that low-fat dairy consumption may be associated with prevention of weight gain in college students (Poddar, Hosig, Nickols-Richardson, & Anderson, 2007). It may be difficult for students to obtain adequate amounts of dairy products on campus. There are many barriers to college students consuming more dairy. Barriers cited by a selected group of

students include: too expensive, might go bad, no where to store, soda or other beverages taste better, less accessible and visible on campus, more important for babies/children/old people, will worry about it later (Poddar et al., 2008).

Results of previous research suggest that calcium consumption may be associated with prevention of weight gain among college students. However, it may be difficult for college students to obtain adequate amount of dairy on campus (Poddar et al., 2008). It is questioned whether students comprising this study will consume the recommended amount of calcium. It is also questioned whether students living off-campus will consume more calcium due to greater availability and better storage options than students living in dorms.

A study performed to conduct a detailed, observational assessment of food and beverages available in college students dormitory rooms found some significant information. The study consisted of 100 dormitory-residing undergraduate students. It was found that fewer students had the following “healthy” items in their dorms: low-calorie beverages, fruit and vegetables, dairy products, tea/coffee, and 100% fruit/vegetable juice. Statistical results present that there may be some crude associations between dietary intake and the food available in students’ dorm rooms (Nelson & Story, 2009). This suggests that the availability of food and beverages in dorm rooms may have a role in determining dietary consumption patterns among college students. It is questioned whether students who live off-campus may have more healthy foods available due to better storage methods and more readily accessible grocery stores.

Previous studies have examined portion distortion among college students. As portion sizes increase, individuals consume more food and calories. A study determined

typical portion sizes that young adults select, how the portion sizes compare with reference portion sizes, and whether the size of typical portions has changed over time. It was found that portion sizes selected were larger than the recommended amount and significantly different than portion sizes selected by young adults in a similar study that was performed two decades ago (Schwartz & Byrd-Bredbenner, 2006). Portion distortion may especially have an effect on students who select meals in an all you can eat campus cafeteria. Studies report that individuals report consuming more calories as portion sizes increase (Diliberti, Bordi, Conklin, Roe, & Rolls, 2004). Portion distortion has the potential to hinder weight loss or weight maintenance, and may promote weight gain (Schwartz & Byrd-Bredbenner, 2006).

Many college students lead a busy lifestyle, and time is an issue that affects food choice. Many students choose to eat at fast-food restaurants to save time. Males reported eating at fast food restaurants more often than females. The BMIs of males were found to be significantly higher than those of females (Morse & Driskell, 2009). Research suggests that adolescents and young adults who spend more time preparing their own food have better quality diets (Larson, Story, Eisenberg, & Neumark-Sztainer, 2006). Eating on the run was found to be associated with higher intakes of soft drinks, fast food, total fat, saturated fat, and lower intake of several healthful foods. Having time to eat dinner with others was found to be significantly associated with higher intake of fruit and vegetables (Larson, Nelson, Neumark-Sztainer, Story, & Hannan, 2009).

The Relationship of Physical Activity and Weight Status

It is believed that a relationship exists between physical inactivity and obesity. Increased physical activity lowers the risk of obesity, may favorably influence distribution of body weight, and confers a variety of health-related benefits even in the absence of weight loss (Rippe & Hess, 1998). Current physical activity guidelines suggest that to prevent weight gain, 60 minutes per day of at least moderate-intensity physical activity should be performed. This is more than the amount that is recommended for general health and cardiovascular function (Haskell et al., 2007). It was found that there is lack of research related to college student's physical activity. Furthermore, there is a lack of multiple-level approaches such as personal, psychosocial, and environmental levels for examining physical activity behaviors in the college student population (Keating, Guan, Pinero, & Bridges, 2005).

Data from the 1995 National College Health Risk Behavior Survey found that the prevalence estimate for participation in vigorous physical activity among college students was 38%. This fell between the prevalence estimates for high school students (64%) and the general population (15%). It was also found that minority female students were less likely than white female students to use exercise to lose weight or keep from gaining weight (Lowry et al., 2000).

Proximity of exercise facilities may have an impact on the amount of physical activity performed by college students. Research suggests that physical proximity to an exercise facility may reduce psychological and physical barriers to exercise (McCormack, Giles-Corti, & Bulsara, 2007). It has also been suggested that intensity and duration of physical activity showed a significant relationship to the proximity of

exercise facilities (Reed & Phillips, 2005). One study found that freshmen and sophomore college students engage in more physical activity because they are more likely to live on campus, and as a result, be in relatively close proximity to exercise facilities. It was found that juniors and seniors participate in 3 fewer exercise bouts per week than freshmen and sophomores (Reed & Phillips, 2005). Reasons cited for juniors and seniors not getting as much physical activity were: perceived inconveniences, travel problems, and larger differences in the mean distances from where students initiated physical activity (Reed & Phillips, 2005). The frequency, intensity, and duration of physical activity was also found to be related to the quality of student's home exercise equipment. An individual who has exercise equipment at home may be more likely to participate in regular physical activity (Jakicic, Wing, Butler, & Jeffery, 1997).

Previous research has suggested that physical proximity to an exercise facility may increase chances of an individual to exercise (King, Jeffery, & Fridinger et al., 1995), and that it also may increase the intensity and duration of physical activity (Reed & Phillips, 2005). As a result, it is questioned whether students living in dorms will exercise more often and more intensively than students living off-campus due to close proximity of exercise facilities on campus.

Self-Efficacy

Self-efficacy is a construct of the social cognitive theory that has been shown to be a strong predictor of health behavior, including weight control behavior. Self-efficacy is defined as a person's confidence in his or her ability to perform a specific behavior (Roach et al., 2003). Self-efficacy is an important variable in many areas of health

change behaviors (Franko et al., 2008). One study found that students were confident in their ability to decrease fat and reduce sugar in their diet. However, these students were less confident in their ability to plan and track meals, as well as increase fiber, fruits, and vegetables (Strong et al., 2008). Students who report higher self-efficacy for positive dietary habits appear more likely to consume healthful diets (Strong et al., 2008).

Another study found that self-efficacy expectations are important to increasing fruit and vegetable intake among college students (Snelling & Job, 2007). Research also suggests students are fairly confident that they could work out more if necessary. When asked to rank confidence levels in their ability to work out more, they rated their confidence as 7 on a scale of 1 to 10. This study also found that most students believe they know how to improve their fitness (Strong et al., 2008). Both males and females in one study of college students cited lack of discipline and lack of ability to regulate food intake as being barriers to their ability to manage weight (Greaney et al., 2009).

There has been mixed success with attempts to link perceived self-efficacy with successful weight control. Definitive data on this subject is particularly sparse. Results from a study that examined relationships between self-efficacy beliefs, weight control behaviors, and weight loss found that cross-sectionally, eating and exercise self-efficacy were strongly associated with corresponding weight loss behaviors (Linde, Rothman, Baldwin & Jeffery, 2006). Self-efficacy helped predict weight control behavior and weight change during active treatment of a weight loss trial (Linde, Rothman, Baldwin, & Jeffery, 2006). A weight management intervention study was performed among young adults. This intervention consisted of 12 weekly sessions that lasted approximately 1 hour. Each session included nutrition education and activities to promote self-efficacy

for weight loss. It was found that a significant correlation exists between increased self-efficacy and weight loss (Roach et al., 2003). As a result of the outcomes of previous studies, level of confidence in consuming a healthy diet, as well as obtaining adequate physical activity, will be observed. It is questioned whether those participants who score the highest in levels of self-efficacy for controlling diet and exercise will actually consume healthier diets and participate in more physical activity.

Mood

Previous research suggests that individuals with mood disorders have higher rates of obesity than the general population (Taylor, Macdonald, McKinnon, Joffe, & MacQueen, 2008). Most previous research related to this topic has also found that the risk of major depression significantly increases with increasing BMI, even when controlling for demographic characteristics and other risk factors (Barry, Pietrzak, & Petry, 2008). It has been suggested that traditional behavioral weight loss programs may be more beneficial if additional variables such as emotional or stress-induced eating were addressed (Ozier, Kendrick, Leeper, Knol, Perko, & Burnham, 2008). Certain research has suggested that in both men and women, obesity is associated with elevated risk for mood and anxiety disorders. However, other research has produced results that women, but not men, who report a lifetime history of major depression or bipolar disorder have elevated odds of obesity (Barry, Pietrzak, & Petry, 2008). Some studies have actually even suggested that overweight may be associated with better mental health among men. Overweight and obese men are less likely to attempt to commit suicide compared to underweight or normal weight men. In contrast, women with an increased BMI have

higher rates of suicidal ideation compared to underweight or normal weight women (Barry, Pietrzak, & Petry, 2008).

There is little research related to depression and weight gain in college students. However, research based on other populations has suggested that there is a relationship between elevated BMI and depression. It is questioned whether results from this study will indicate that college students with elevated BMI will have a greater prevalence of depression.

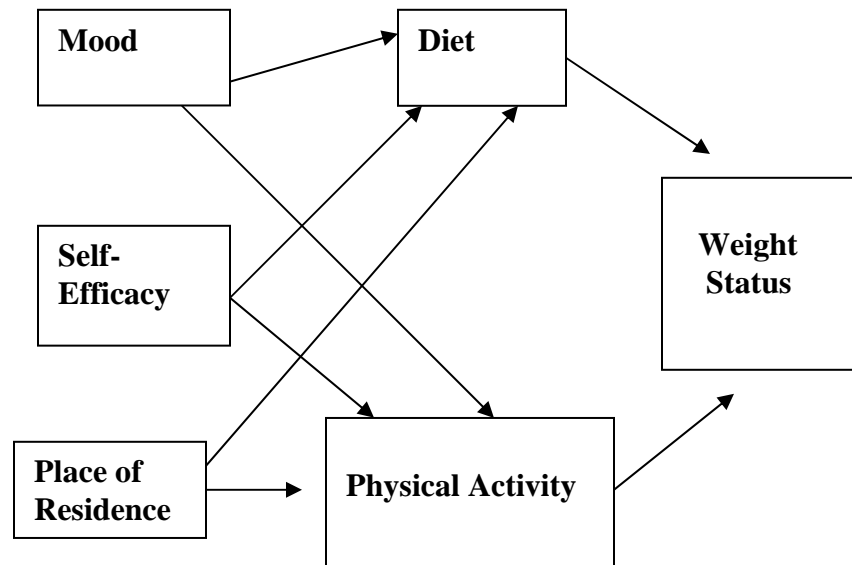
The research that has been reviewed provides numerous factors that may contribute to an elevated BMI in many college students. These factors include: diet, physical activity, self-efficacy, and depression level. In addition, it was found that race and gender may impact weight. The researcher aims to perform a descriptive study to gain insight into the health practices of college students. The information gathered will serve as groundwork for further research to better understand this population and acquire the ability to successfully provide programs and resources to improve their overall health.

Research Questions

This study seeks to answer the following questions:

1. What are the reported dietary consumption patterns and physical activity levels of overweight and obese students who enroll in a weight loss program?
2. What are the reported differences in dietary intake and physical activity between students who live on campus and those who live off campus?
3. What changes in weight have occurred in the past year in this sample of college students?
4. What relationship does self-efficacy have to reported dietary intake and physical activity levels in this sample of college students?
5. Is BMI correlated with level of depression in this sample of college students?

Figure 1: Conceptual Model of Factors Affecting Weight



Chapter 3: Methodology

Introduction

This is a study of college students at the University of Kentucky who volunteered to participate in Wildcat Fit Camp, a weight loss program conducted on campus. Wildcat Fit Camp was conducted in the Department of Nutrition and Food Science (NFS) in conjunction with University Health Services. All procedures were approved by the University of Kentucky Institutional Review Board (IRB). Baseline assessments were performed in the NFS assessment lab.

Wildcat Fit Camp was a 10 week weight-loss program designed for students. Originally scheduled to begin September, 2008, it did not begin until January, 2009 due to low interest by the student population in the fall semester.

This research is limited to students enrolled in the baseline section of Wildcat Fit Camp. Dietary habits, physical activity, and demographic factors were evaluated in relation to the student's weight. The intent of the study was to gain information to be utilized in the development of future weight loss programs targeting college students.

Design

An advertisement was run in the classified section of the campus newspaper and fliers were hung up in various buildings around campus beginning January, 2009. Students interested in participating in the study called and were screened to determine if they were in good health and eligible to participate. To qualify, the student must meet the following criteria:

- Full-time student
- Not participating in any other weight loss programs
- BMI between 25-40
- Not lost more than 10 lb in the last year
- Not currently breastfeeding
- Not have a child less than 9 months of age
- Not planning to become pregnant in the next 4-5 months
- Never diagnosed with HIV
- If diagnosed with cancer, it must be in remission at least 5 years
- Never diagnosed with anorexia or bulimia
- Never hospitalized for a psychiatric disorder
- Doctor has never diagnosed as having a heart condition **and** advised that only physical activity recommended by a doctor should be performed
- Has not felt chest pain while doing physical activity within the past month
- Does not lose balance due to dizziness or lose consciousness
- Does not have a bone or joint problem that could be made worse by a change in physical activity

Participants taking drugs prescribed for blood pressure or a heart condition were required to submit a physician's consent form before being allowed to participate.

Students qualifying to participate in the study were invited to come to a Fit

Camp information session that lasted approximately 1 hour. During the information session, the study was introduced and prospective participants were made aware of what was expected of them. Those students who desired to participate signed an informed consent form that had been previously approved by the Institutional Review Board (IRB).

Data Collection

A total of 11 students began the program at baseline. The sample was comprised of male and female students. Participants were asked to fill out the Center for Epidemiologic Studies Depression Scale (CES-D) at the time of the introductory meeting. The CES-D assessed how participants felt in the past week to help determine if they experience any amount of depression (Wadden & Stunkard, 1985). Participants were also given a packet of several other questionnaires that were to be completed and returned at the baseline assessment. The WHI Physical Activity Questionnaire assessed amounts and types of physical activity (Meyer A, Evenson K, Morimoto L, Siscovick D, & White E, 2009). The weight efficacy lifestyle questionnaire (WEL-Q) assessed participant's confidence levels in their ability to utilize self-control in different situations involving food and eating (Clark, Abrams, Niaura, Eaton, & Rossi, 1991). The Physical Activity and You Questionnaire assessed participant's confidence levels of being physically active in given scenarios (Marcus et al., 1992). The Demographic Questionnaire required participants to give their name, date of birth, race/ethnicity, marital status, number of children, where they live during the school year, and weight changes in the past month/six months/year.

Table 1: Measurement Instruments and What They Measured

Questionnaire	Measurement
CES-D Questionnaire	Determine participants' level of depression
WHI Physical Activity Questionnaire	Determine how much and what types of physical activity participants perform
WEL-Q Questionnaire	Assess confidence levels in ability to exhibit self-control in situations involving food
Physical Activity and You Questionnaire	Assess confidence levels in ability to be physically active
Demographic Questionnaire	Name, date of birth, race/ethnicity, marital status, number of children, where live during school year, and weight changes during the past month, 6 months, year

In addition to completing questionnaires, participants were required to keep a 3-day food journal. An instruction sheet and journal forms were included in the packet that was distributed at the introductory meeting. Participants were informed that the objective of the food journal was to collect information about their normal diet. They were encouraged to record intake on days that were good representatives of normal consumption. The food journal was to be completed for two week days and one weekend day. Participants were instructed to record the following: everything they ate and drank,

amount, how it was prepared, time/place eaten, hunger level, and observations related to food consumption.

Table 2: Food Journal Example

Food	Amount	Time/Place	Hunger Level	Observations
Frosted Flakes	½ cup; 2 fists full	6:45am; cafeteria	Not very hungry; tired	Rushed; overslept
M&Ms	¼ cup; 1 fist full	10:15am; friend's dorm room	Starving	Didn't really *need* to eat them; must be thoughtless eating
Chicken Nuggets-fried	8 pieces	1pm; Chick-Fil-A	Hungry	Grabbed a quick lunch between classes.

Instructions provided with the food journal also directed participants to attempt to record food or drinks as soon as they were consumed to avoid relying on memory. It was also noted that if participants did not know the exact amount of food eaten, they could record relative sizes such as “2 palm-sized slices” or “a scoop the size of a fist”. If relative measurements were given, the discretion of the researcher was used to choose the closest measurement provided in the MyPyramid Program. The food journal was submitted at baseline so that researchers could gain insight into aspects of food consumption before any type of intervention was accomplished.

Participants scheduled an appointment for the baseline assessment which was performed at the NFS assessment lab. The assessment consisted of obtaining the following measurements: height, weight, % fat mass, and waist circumference.

Percent fat mass and weight measurements were obtained through the use of a Bod Pod. The Bod Pod measures body mass through air displacement (LMI, 2009). All research assistants performing assessments through the use of the Bod Pod were trained in Bod Pod use.

Participants received 10 standard behavioral weight loss lessons based on the core weeks of the Diabetes Prevention Program materials. The weekly lessons consisted of the following topics:

- Week 1: Introduction to the study, self-monitoring, goal setting
- Week 2: Energy balance and a healthy diet
- Week 3: Importance of physical activity, suggestions, safety tips
- Week 4: Stress and time management
- Week 5: How to eat healthy on campus and at restaurants
- Week 6: Talk back to negative thoughts (cognitive restructuring)
- Week 7: Physical activity motivation, new ideas
- Week 8: Problem solving skills
- Week 9: How to live a “greener” life through diet and physical activity
- Week 10: Ways to stay motivated

This study analyzed baseline data from participants in the weight loss study. Once the 3-day food journals were collected from as many participants as possible, an analysis was performed using the MyPyramid Tracker (USDA, 2009). A total of 7 food journals were obtained. Foods and beverages consumed were entered into the MyPyramid Tracker by the researcher and analyzed. Nutrient intakes for each day were provided. Mean nutrient intakes for the three total days were calculated. Mean amounts of nutrients calculated included: total calories, protein, carbohydrate, fiber, calcium, sodium, vitamin A, and vitamin C. Amounts consumed were compared to the recommendations of the USDA Dietary Reference Intakes for males and females age 19-30 (USDA, 2009). Fruit and vegetable consumption was also evaluated. Amounts consumed were compared to

the serving recommendations by the USDA MyPyramid Program (USDA, 2009).

Recommendations were based on recommended calorie level for participants according to age, gender, and activity level. A mean intake was calculated for each student, as well as the percentage of the total recommended amount consumed.

Statistical Analysis

Statistical analysis was performed using SPSS statistical software program (version 16, SPSS Inc, Chicago, IL). All demographic, questionnaire, and food journal information was entered.

SPSS correlation tests were performed to determine if correlations exist between the participant's BMI and the following variables: total calories consumed, average waist circumference, kcal burned from walking, kcal burned from strenuous activity, kcal burned through moderate activity, total kcal burned, all nutrients that were analyzed, fruit and vegetable consumption, CES-D total, and WEL-Q total. Correlation tests were also performed to determine if correlations exist between the following: WEL-Q total and calories consumed from food; total kcal burned and the Physical Activity and You questionnaire total; average waist circumference and percent fat mass; Physical Activity and You Questionnaire total and age, percent fat mass, and CES-D total. A correlation was considered to be significant if $p \leq 0.05$. The Pearson Correlation (r-value) shows the relationship between the variables. It was used to show the trend of the relationship when a correlation was not significant.

Descriptive statistics were obtained for the following: age, number of children, BMI, percent fat mass, average waist circumference, total kcal consumed, protein

consumed, carbohydrates consumed, fiber consumed, total fat consumed, saturated fat consumed, calcium consumed, sodium consumed, vitamin A consumed, vitamin C consumed, fruits consumed, vegetables consumed, total kcal burned from walking, total kcal burned from strenuous activity, total kcal burned from moderate activity, total kcal burned, Physical Activity and You Questionnaire total, CES-D total and WEL-Q total.

Frequencies were obtained for the following variables: sex, race, marital status, where students live, weight change in the past month, weight change in the past 6 months, and weight change in the past year.

A t-test was performed to test the equality of means. T-tests were performed for the following factors: BMI and marital status; BMI and race; where students live and calories burned through physical activity; and where students live and nutrient consumption.

Chapter 4: Results

Demographics of Study Population

A total of 11 individuals ranging in age from 18-24 years old composed the study population. The average age was 21 (± 1.8) years. Nine of the participants were female (81.8%), and 2 of the participants were male (18.2%). Four of the participants were African American (36.4%), and 7 were Caucasian (63.6%). Nine of the participants were single (81.8%), and 2 were married (18.2%). None of the participants had children. It was found that 5 of the students live in a dorm (45.5%), and 6 of the students live off campus in Lexington, Kentucky (54.5%). These results are presented in Table 3.

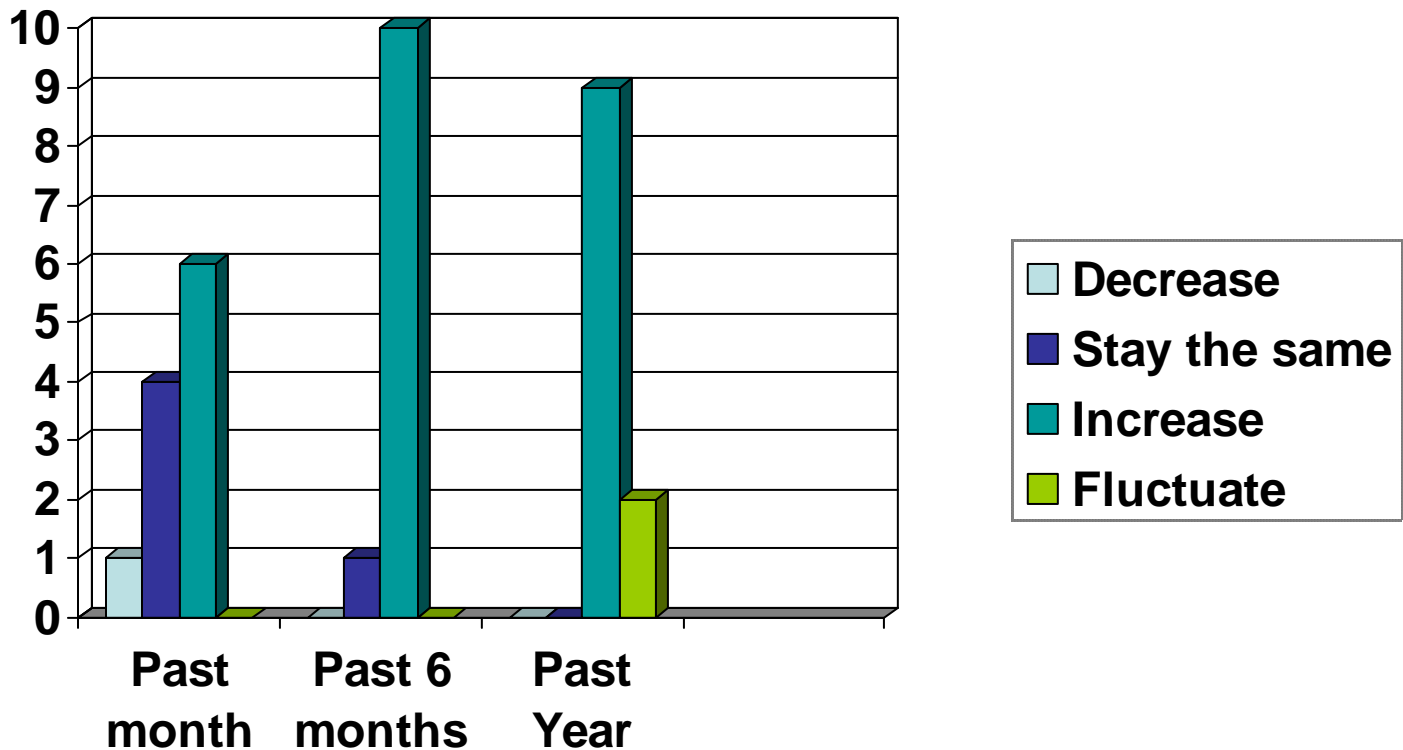
Table 3: Frequencies of Demographic Information Among Overweight College Students Participating in a Weight Loss Study (n=11)

Characteristic	n	%
Sex		
Female	9	81.8
Male	2	18.2
Race		
Black	4	36.4
White	7	63.6
Marital Status		
Single	9	81.8
Married	2	18.2
Place of Residence		
Dorm	5	45.5
Off-Campus	6	54.5
Weight Change in Past Month		
Decreased	1	9.1
Stayed the Same	4	36.4
Increased	6	54.5
Weight Change in Past 6 Months		
Decreased	0	0
Stayed the Same	1	9.1
Increased	10	90.9
Weight Change in Past Year		
Decreased	0	0
Stayed the Same	0	0
Increased	9	81.8
Fluctuated	2	18.2
Number of Children		
	0	0

Weight Status

The participants were questioned concerning the status of their weight over the past month, six months, and year. It was found that in the past month, 1 of the participants weight decreased (9.1%); 4 of the participants weight stayed the same (36.4%); and 6 of the participants weight increased (54.5%). It was found that in the past six months, none of the participants weight decreased; 1 of the participants weight stayed the same(9.1%); and 10 of the participants weight increased(90.9%). It was found that in the past year, none of the participants weight decreased; none of the participants weight stayed the same; 9 of the participants weight increased(81.8%); and 2 of the participants weight fluctuated (18.2%). These results are presented in Figure 2.

Figure 2: Participant's Weight Status in the Past Month, 6 Months, and Year (n=11)



Results related to the weight status of the participants were also calculated. The participant's BMI ranged from 25.75 to 39.12. The mean BMI was 31.73 (± 4.6). The percent fat mass of the participants ranged from 26.50% to 51.80%. The mean fat mass percentage was 38.24 (± 7.69)%. The waist circumference measurements ranged from 79cm to 121 cm. The average waist circumference was 97.46 (± 10.9) cm. These results are presented in Table 4.

Table 4: Weight Statistics of Students Entering Weight Loss Program (n=11)

Category	Range	Mean
BMI	25.75 to 39.12	31.73 (± 4.6)
% Fat Mass	26.50% to 51.80%	38.24 (± 7.69)%
Waist Circumference	79 to 121 cm	97.46 (± 10.9) cm

A significant correlation was found to exist between the student's BMI and average waist circumference ($r=0.755$; $p<0.05$).

Nutrient Consumption Status

Results for nutrient consumption were calculated. Seven of the eleven participants completed and submitted a 3-day food journal. The reported average daily caloric consumption among the participants was 1769.33 (± 989.2) kcal. The average protein consumption of the participants was 85.89 (± 48.8) grams per day. The average carbohydrate consumption of the participants was 195.5 (± 90.7) grams per day. The

average fiber consumption was 14.1 (± 3.1) grams per day. The average calcium consumption was 597.36 (± 183.8) milligrams. The average sodium consumption was 3677.64 (± 1783.2) milligrams. The average vitamin A consumption was 439.49 \pm 211.06 micrograms. The average vitamin C consumption was 84.09 (± 64.2) milligrams. Results of mean consumption are presented in Table 5.

Table 5: Results for Nutrient Consumption Compared to DRI (n=7)

Nutrient	Mean Amount	Range	DRI Female	DRI Male
Kcal	1769.3	994 – 3629.3	2403	3047
Protein	85.9 g	45 – 186.3(g)	38 g	46 g
Carbohydrate	195.9 g	98.5 – 352(g)	130g	130g
Fiber	14.1 g	10.5 – 18.6(g)	25g	38g
Calcium	597.4 mg	342.5 – 836.4(mg)	1000 mg	1000 mg
Sodium	3677.6 mg	1833.5 – 6379(mg)	1500 mg	1500 mg
Vitamin A	439.5 μ g	114.8 – 729(μ g)	700 μ g	900 μ g
Vitamin C	84.1 mg	28.1 – 203.7(mg)	75 mg	90 mg

Fruit and vegetable consumption was evaluated for each of the 7 participants who submitted a food journal. The total mean vegetable consumption for all students was 1.6 cups per day. The average recommended amount of vegetable consumption is 3.1 cups per day. Mean vegetable consumption ranged from 18% to 95% of the recommended amount. On average, the students consumed 51.3 (\pm .25%) of the total recommended amount of vegetables. The total mean fruit consumption for all students was 1.1 cups per day. The average recommended amount of fruit consumption is 2 cups per day. Mean fruit consumption ranged from 3% to 167 % of the recommended amount. On average, the students consumed 59.5% (\pm .56%) of the total recommended amount of fruit. Results of Fruit and Vegetable consumption compared to the recommended amount are shown in Table 6.

Table 6: Fruit and Vegetable Intake Compared to Amounts Recommended by MyPyramid (n=7)

Participant #	Mean Vegetable Intake	Recommend Vegetable Intake	Average % Vegetable Intake	Mean Fruit Intake	Recommend Fruit Intake	Average % Fruit Intake
1	2.1 cup	3 cup	69%	0.2 cup	2 cup	10%
2	1.7 cup	3.5 cup	49.7%	0.07 cup	2 cup	3.3%
3	3.3 cup	3.5 cup	95.3%	1.1 cup	2 cup	44%
4	0.9 cup	2.5 cup	36%	1.7 cup	2 cup	86.7%
5	1.6 cup	3 cup	54.3%	3.3 cup	2 cup	166.7%
6	0.53 cup	3 cup	17.7%	1.4 cup	2 cup	70%
7	1.1 cup	3 cup	36.5%	0.7 cup	2 cup	35%
Total Mean	1.6 cup	3.1 cup	51.2%	1.1 cup	2 cup	59.4%

A significant correlation was found to exist between average vegetable consumption and BMI ($r=0.820$; $p<0.05$). Those students with a lower BMI consumed greater amounts of vegetables. However, the correlation between average fruit consumption and BMI was not significant ($r=0.593$; $p>0.05$). BMI was not significantly correlated with reported calorie consumption ($r=-0.375$; $p>0.05$), fiber ($r=0.582$; $p>0.05$), protein ($r=-0.478$; $p>0.05$), and calcium intake ($r=0.061$; $p>0.05$).

Nutrient Consumption According to Student Residence

A t-test was also performed to determine if there were significant differences between students living on and off campus in nutrient consumption. There were no significant differences observed between the means of any of the nutrients analyzed. The means and p-values are shown in Table 7.

Table 7: Results from T-test of Student Residence and Nutrient Consumption

Where Live	Nutrient	mean	p=
On Campus (n=3)			
	Kcal	1990	0.653
	Protein	105.2 g	0.413
	Carbohydrate	175.1 g	0.645
	Fiber	3.1 g	0.230
	Calcium	582.2 mg	0.869
	Sodium	3402.5 mg	0.758
	Vitamin A	477.8 µg	0.716
	Vitamin C	127.9 mg	0.122
Off Campus (n=4)			
	Kcal	1603.8	0.653
	Protein	71.4 g	0.413
	Carbohydrate	211.5 g	0.645
	Fiber	15.4 g	0.230
	Calcium	608.7 mg	0.869
	Sodium	3883.9 mg	0.758
	Vitamin A	410.7 µg	0.716
	Vitamin C	51.2 mg	0.122

*Significance level if $p < 0.05$

Physical Activity Patterns

Amount of calories burned through physical activity was also calculated. The average number of calories burned through walking outside each week was 375.0 (± 116.2) kcal. The range was 75kcal to 525kcal. The average number of calories burned through moderate physical activity each week was 161.36 (± 131.0) kcal. The range was 0 to 500 kcal. The average number of calories burned through strenuous activity each week was 545.45 (± 623.1) kcal. The range was 0 to 2000 kcal. The average total calories burned by the participants through any type of physical activity each week was 1081.81 \pm 680.3 kcal. The range was 375.0 to 2600 kcal.

There was a significant difference found between the mean amounts of calories burned through strenuous activity by students living in on campus and students living off campus. The mean amount of kcal burned performing strenuous activity by students living on campus was 960 kcal, and for those living off campus in Lexington, Kentucky the mean was 200kcal. The p-value was 0.035.

Related to the total amount of kcals burned through strenuous activity was the total amount of kcals burned through any type of physical activity. The total kcals burned through physical activity by students living on campus was 1480kcal. Students living off campus in Lexington, Kentucky burned 750kcal ($p > 0.05$). Results were also obtained for the difference in mean amount of calories burned by students living on campus compared to students living off campus through walking outside the home ($p > 0.05$) and through performing moderate physical activity ($p > 0.05$). The results of physical activity according to residence are presented in Table 8.

Table 8: Amounts of Calories Burned Through Various Activities by Students According to Residence (n=11)

Residence	Type of Physical Activity			Total
	Walking	Moderate	Strenuous	
On Campus	315 kcal	205 kcal	960 kcal	1480 kcal
Off Campus	425 kcal	125 kcal	200 kcal	750 kcal
p-value	0.12	0.34	0.04	0.07

**Significance level if $p < 0.05$*

Self-Efficacy and Mood

Based on CES-D total, it was found that range was 2 to 18 and the mean was 9.81(± 5.86). Participants scoring 16 or above were defined as being depressed. Results showed that 3 participants scored 16 or above. Depression level did not correlate with any of the following: BMI ($r=0.037$; $p > 0.05$), WEL-Q total ($r=-0.301$; $p > 0.05$), or Physical Activity and You total ($r=-0.352$; $p > 0.05$).

There was no significant correlation between the WEL-Q total and the 3-day average of calories consumed ($r=-0.196$; $p > 0.05$). Nor was there a significant correlation between total calories burned through physical activity and results of the Physical Activity and You Questionnaire ($r=0.076$; $p > 0.05$).

Chapter 5: Discussion

The results of this examination of diet and physical activity habits of the college students surveyed revealed various results. The study population consisted of a total of 11 individuals. Due to the small sample size, a descriptive study was performed. Many of the results, although not significant, were analogous to results of previous studies. The majority of the participants were female. Results of previous studies have found that female students are more likely than male students to be trying to lose weight (Lowry, Galuska, Fulton, Wechsler, Kann, & Colling, 2000). Consequently, it was expected that there would be more female than male participants. Two of the students were married. Previous research found a modestly higher prevalence of overweight among married adults compared to those with another marital status (Schoenborn, Adams, & Barns, 2002). Future research studies of college students may examine the weight status of married students to determine if there is significant evidence that married students are more likely to be overweight.

Changes in participant's weight over the past month, 6 months, and year were recorded. It was found that 81.8% of participant's weight increased over the past year. In the past 6 months, 9.1 % of participant's weight had stayed the same and 90.9 % had increased. These results were comparable to results previous research that found college students are more vulnerable to weight gain than the general population, and during the first year of college alone, the mean weight gain is 4 to 9 pounds (Strong, et al., 2008). Although the sample size for this study was small, the results do provide further evidence that weight gain may be of concern among college students. The vast majority of students in this study had experienced weight gain, especially in the past 6 months and

year. In the past year, all participants' weight had increased or fluctuated. None of the participant's weight had stayed the same. Also, none of the participants recorded experiencing weight loss in the past 6 months or year. These results should be further investigated to determine why the weight gain and what steps can be taken to promote weight maintenance or loss (if necessary) among college students.

The BMI of the participants ranged from 25.75 to 39.13. An overweight BMI is defined as ranging from 25 to 29.9, and an obese BMI is defined as one of 30 or greater (CDC, 2009). The BMI of participants in this study ranged from being categorized as overweight to obese. The mean BMI was 31.74 ± 4.6 , which is categorized as obese. The requirement to participate in this study was a BMI ranging from 25-40. Therefore, it was expected that the mean BMI would be in the overweight or obese category.

The average waist circumference measurements of the participants ranged from 79 to 121 cm. The mean waist circumference was 97.46 ± 10.9 cm. Measures of waist circumference are indicative of visceral adipose tissue. Fat in this area may be more deleterious than overall overweight or obesity in some cases (Kumanyika, Obarzanek, Stettler, Bell, Field, & Fortmann, 2008). High waist circumferences are defined by cutoffs of >35 inches (>88 cm) for women and >40 inches (>102 cm) for men (NIH, 1998). The mean waist circumference of the participants was above the cutoff for women, and therefore categorized as high. The mean waist circumference of the participants was slightly below the cutoff for defining a high waist circumference for men. Therefore, it can be concluded that many of the female participants had a waist circumference that would be defined as high. This could place them at risk for serious health problems in the future.

There was no significant correlation between BMI and reported calorie consumption. Although a significant correlation does not exist between BMI and calorie consumption, results indicate that those students with a greater BMI report consuming fewer calories than would be expected based on BMI. This finding also supports previous studies that have found that underreporting during self-monitoring may be more prevalent among people who are overweight (Johnson, Friedman, Harvey-Berino, Gold, & McKenzie, 2005). These results indicate that overweight individuals tend to either underestimate the amount of food consumed, or be in denial about how much food they are consuming. This suggests that individuals may need to be given education related to portion sizes and accurate recording skills in future behavioral weight loss programs.

Food journal results indicate that students did not consume the recommended amount of fruits and vegetables. On average, the fruit and vegetable consumption was around half (59.4 and 51.2%, respectively) of the recommended amount. The results of this particular study indicate that students do consume less than the recommended amount of fruits and vegetables. The results also support previous research that found college students average daily intake of fruits and vegetables was well below recommendations for both men and women (Strong et al., 2008). It was also found that a significant correlation existed between vegetable intake and BMI. Results indicated that students with a lower BMI consumed more vegetables. No significant correlation exists between fruit consumption and BMI in this study. However, the Pearson Correlation (*r*-value) was positive indicating that students with a lower BMI consumed more fruits. Previous research has suggested that fruit consumption may be related to reduced energy consumption and body weight (De Oliveria, Sichieri, & Venturim Mozzer, 2008). This

indicates that efforts need to be made to improve fruit and vegetable intake among college students. Possible methods of improvement could include: education about benefits, more availability on campus, or tips on shopping for and storing produce.

The mean amount of fiber consumption for the participants was much less than the recommended DRI for both males and females. It was found that the mean fiber consumption among participants in this study was 14.1g. The range was from 10.5 g – 18.6 g. The DRI for females is 25g and for males is 38g. The results from this particular study imply that college students with an elevated BMI do not consume the recommended amount of fiber. Previous research supports these results by indicating that total fiber intake in college students is half of the recommended amount for both men and women (Strong et al., 2008). It has also been suggested that individuals with the lowest BMI were in the highest quintiles of total and soluble fiber intake (Lairon et al., 2005). Based on these results, it could be hypothesized that a significant correlation between BMI and fiber consumption would exist. Participants who consumed more fiber would have a lower BMI. However, the p-value was not high enough to indicate a significant correlation. Although the correlation was not significant, the Pearson Correlation was positive, indicating that participants who consumed more fiber did have a lower BMI. The most plausible explanation for these results is that the sample size was too small for an accurate representation.

It was found that protein consumption was greater than the recommended DRI for both males and females. The mean protein consumption was 85.9 g. The range was from 45 g – 186.3 g. The DRI for females is 38g and for males is 46g. The results indicate that the overweight/obese college students participating in this study consume more than

the recommended amount of protein. These results do not support previous research that suggests consumption of protein produces satiety and that this is linked with consuming fewer calories and weight reduction (Murray & Vickers, 2009). A possible explanation could be that the students in this sample did not eat according to hunger, but ate as a result of other triggers such as stress or boredom, and as a result, consumed more calories than required by their bodies. There is a lack of research related to protein consumption in college students.

Based on previous research of other populations, a hypothesis could be made that a significant correlation may exist between BMI and protein consumption in that students with a smaller BMI would consume more protein and fewer calories. When a statistical test was performed, this correlation was not found to be significant, and the Pearson Correlation was negative. The negative Pearson Correlation indicates that students with a greater BMI consumed less protein. These results do support previous research. Participants may have a greater BMI because excess calories are consumed as a result of lack of protein consumption to contribute to satiety. Although these results do support previous research, they are not significant. This could be attributed to the small sample size.

Results from this study indicate that all of the participants consumed less than the recommended amount of calcium. It was found that the mean calcium consumption was 597.4 mg. Consumption amounts ranged from 342.5 mg – 836.4 mg. The DRI for both males and females is 1000 mg. Calcium consumption for all participants was below the recommended amount. These results also support previous research that reported college students consume approximately half of the recommended amount of dairy servings and

calcium per day (Poddar et al., 2008). Several studies have found that low consumption of calcium is associated with increased body weight, body fat, BMI, waist circumference, and relative risk of obesity in adults (ADA EAL, 2009). As a result, it could be hypothesized that a significant correlation may exist between BMI and calcium consumption. The p-value for this correlation was not significant. However, the Pearson Correlation is positive. This means that participants with a smaller BMI consumed more calcium than did participants with a greater BMI. These results do correspond with previous research. If the sample size were larger, significant results may have been obtained.

The mean consumption of carbohydrates among participants in this study was 195.9 g. Amounts consumed ranged from 98.5g – 352 g. The DRI for both males and females is 130 g. The mean consumption among participants in this study was above the recommended amount. Participants were not required to specify if grain consumption was whole-grain in food journals. Therefore, researchers were not able to distinguish type of grain consumed. Previous research found that whole-grain intake in college students of normal weight was significantly higher than whole-grain consumption in overweight or obese students (Rose, Hosig, Davy, Serrano, & Davis, 2007). In future studies, it should be required of participants to distinguish if whole-grains were consumed in order to determine if self-efficacy or lower BMI was significantly correlated to whole-grain consumption.

Sodium consumption was observed among the participants in this study. Previous research has reported that college students consume excessive amounts of high-sodium foods (Larson et al., 2009). Much of the sodium consumed comes from fast food, which

college students are notorious for consuming in extreme amounts (Larson et al., 2009). Results from this study found that the mean sodium consumption was 3677.6 mg. Consumption ranged from 1833.5 mg – 6379 mg. The DRI recommended intake of sodium for both males and females is 1500 mg/day. The tolerable upper intake level (UL) of sodium is 2300 mg/day for both males and females. The mean consumption of the participants in this study was considerably greater than the DRI and UL. It also should be noted that the lowest amount consumed (1833.5 mg) is greater than the DRI. These results indicate that college students may consume a significantly greater amount of sodium than recommended. As a result, future weight loss programs should focus on ways to help students decrease sodium consumption.

Vitamin A and C consumption was reported in this study to obtain a general idea of the health of student's diets. The mean vitamin A consumption among participants was 439.5 µg. The range was from 114.8 – 729 µg. The DRI of vitamin A is 700 µg for females and 900 µg for males. The mean vitamin A consumption is well below the DRI for both males and females. Only the highest end of the range surpasses the DRI for females. These results indicate that overall, the college students in the study sample are deficient in vitamin A. The mean vitamin C consumption was 84.1 mg. The range was 28.1 – 203.7 mg. The DRI of vitamin C is 75 mg for females and 90 mg for males. The mean vitamin C consumption falls between the DRI for females and males. The range reaches from well below the DRI to well above the DRI. These results indicate that overall, the students in this study sample do consume enough vitamin C. Based on this information, future studies may need to educate students about the different vitamins and what foods are rich sources of the each vitamin.

Results indicate that the participants burned an average of 375 kcal/week from light activity, 161 kcal/week from moderate activity, 545 kcal/week from strenuous activity, and 1082 total kcal/week from all physical activity. It is recommended that individuals burn a minimum of 150 kcal/day or 1000 kcal/week from physical activity (Gordon, Heath, Holmes, & Christy, 2000). The average amount of kcal burned through physical activity was a little above the minimum recommended amount. This means that some of the participants burned less than the minimum recommended amount, and others burned more.

It was found that no significant correlation existed between student's place of residence (on or off campus) and what types of nutrients were consumed. Previous research suggests that adolescents and young adults who spend more time preparing their own food have better quality diets (Larson et al., 2009). Student dorm rooms usually do not offer a kitchen in which to prepare food. Students living off campus are likely to live in an apartment or house, which usually offers the availability of a kitchen. It could be hypothesized that students living off campus would be more likely to prepare their own food through the use of a kitchen, and as a result, have a healthier diet. However, it was found that no significant difference in the nutrient consumption between the two groups existed. A possible explanation of this result could be that students who live off campus are required to spend time driving to campus, and therefore consume more meals on-the-go.

One of the most notable results of this study was related to student residence and physical activity. A significant difference was found between the mean amounts of calories burned performing strenuous activity by students living on campus compared to

the mean amount of calories burned performing strenuous activity by students living off campus. The total amount of calories burned by students living on campus was not significantly greater than those burned by students living off campus. However, there was a significant difference in the amount of vigorous activity performed by these two groups. Previous research suggests that physical proximity to an exercise facility may reduce psychological and physical barriers to exercise (King et al., 1995). It has also been suggested that intensity and duration of physical activity showed a significant relationship to the proximity of exercise facilities (Reed & Phillips, 2005). It is likely that students living on campus are closer in proximity to an exercise facility. This information could be used to hypothesize that students living on campus are more likely to use campus exercise facilities, which would enable them to participate in more strenuous activities. This information could be useful to colleges and universities in determining the importance of making exercise facilities readily available to students.

The WEL-Q was designed to assess the participant's confidence levels in ability to exhibit self-efficacy in situations involving food. It was found that a significant correlation does not exist between WEL-Q total and calorie consumption. Although a significant correlation does not exist, the Pearson Correlation was negative which indicates that participants who did not have a high WEL-Q score, meaning they possessed less self-efficacy in situations involving food, actually consumed more calories. If the sample size was larger, the results may have been significant enough to indicate that greater self-efficacy to control food consumption will result in fewer calories consumed. Results of previous studies suggested that students reporting higher self-efficacy for positive dietary habits appear more likely to consume healthful diets (Strong

et al., 2008). It was also found that eating and exercise self-efficacy beliefs were strongly associated with corresponding weight loss behaviors (Linde et al., 2006). Knowing that research suggests that strong self-efficacy can increase an individual's ability to control food consumption could be useful to future weight loss studies to increase chances of positive results.

It was questioned whether greater amounts of self-efficacy for physical activity would result in participation in more physical activity. It was found that no significant correlation existed between total calories burned through physical activity and results of the Physical Activity and You Questionnaire. The Pearson Correlation was positive, which means that students who had a greater score on the Physical Activity and You Questionnaire did burn more calories through physical activity. If the sample size were larger, the correlation may have been significant. A previous study that examined relationships between self-efficacy beliefs, weight control behaviors, and weight loss found that eating and exercise self-efficacy were strongly associated with corresponding weight loss behaviors (Lind et al., 2006). As a result of information obtained from previous research, as well as the positive Pearson Correlation, it can be concluded that further research with a larger sample size may have produced significant results indicating that self-efficacy for physical activity can result in performance of more physical activity.

Previous research concerning depression and weight in college students is sparse. Results from the CES-D data revealed that the mean score was 9.81 ± 4.6 . A participant with a score of 16 or higher could be categorized as being depressed. The scores ranged from 2 to 18. Two of the participants scored 16, and one participant scored 18. The

correlation between BMI and CES-D sum was not found to be significant. Previous studies have found evidence that suggests increased prevalence of mood and anxiety disorders among individuals who are overweight or obese compared to those with weight in the normal range (Barry, Pietrzak, & Petry, 2008). Further research could be performed to examine the relationship between elevated BMI and mood in college students to determine whether a significant correlation exists.

Information was obtained from this study related to the diet, physical activity, and demographic factors that may contribute to the weight of college students. Results provide information that may be utilized in future weight loss studies or programs that are developed to target college students. The interest of overweight and obese students to participate in this weight loss study was very low. A number of factors such as denial of weight status, busy semester, or lack of desire to change lifestyle could have contributed. It was also found that the students who did participate in the program lacked commitment. Of the 11 students who participated, only 7 submitted a 3-day food journal. Possible factors contributing to these results could include: forgot to journal, embarrassed of types and/or amounts of food consumed, or did not feel like journaling.

Additionally, it was learned through the completion of this study that the college student population is a difficult group to target. Possible reasons could be that this population does not have time to participate, does not want to change, or embarrassed of weight. Although blame for low interest in the study can be placed on the students, the methods used to advertise the study may be to blame as well. The study was publicized by running an advertisement in the classified section of the campus newspaper and hanging fliers in various buildings around campus. It was believed that these methods

would reach a large number of students. It is not known how many students actually saw the advertisements. However, based on the amount of interest it could be assumed that either not many students saw the advertisements, or students saw them and were just not interested. It is recommended that future studies try other methods of advertisement such as radio, or allocate additional money to design and run more eye-catching ads. In addition, a title and description other than weight loss study may seem more appealing to students who might be embarrassed of their weight. Despite the reason that participation in this study was low, results indicated that all of the participants had gained weight or fluctuated in the past year, and none had lost weight or maintained weight. This information suggests that it is important that future studies and programs be developed to be able to successfully target this population and assist in weight loss.

Limitations

The initial intent of the researcher was to compare results of diet and physical activity practices collected at baseline to results collected at the end of the study to determine the success of the program and how influential the weekly lessons were in affecting the student's lifestyles. However, due to low interest and lack of commitment, a descriptive study was performed to assess what diet, physical activity, and demographic factors may contribute to the student's weight.

The primary limitation of this study was the small sample size due low interest and lack of commitment. As a result of having only 11 individuals participate, no long-term comparisons could be made. Another limitation was that the students sampled were representative of a single college campus. These limited results can not be assumed to be indicative of a national population of college students. The last notable limitation was that results that were obtained were considerably dependent on the accuracy of student responses to questionnaires and food journal recordings.

Chapter 6: Conclusion and Future Directions

The results of this study provide a descriptive summary of the demographics and diet and physical activity practices of a small sample of overweight and obese college students who enrolled in a weight loss study. The results suggest that the majority of participants have experienced weight gain in the past year. The dietary consumption patterns of this small sample population tended to include less than the recommended amounts of calories, fiber, calcium, vitamin A, fruits, and vegetables. Diets tended to include more than the recommended amounts of protein, carbohydrate, and sodium. The results of the study suggest that students living on campus tend to participate in significantly greater amounts of strenuous physical activity than students living off campus. It is recommended that future studies of college students participating in weight loss programs include a larger, more diverse sample size in order to obtain more accurate conclusions.

Appendix A: Questionnaire Examples

Visit: Baseline 3 6 12
 Date: ____/____/____

ID # _____

MOODS QUESTIONNAIRE

Please indicate how often you have felt this way DURING THE PAST WEEK: (check one for each statement)

		None or Rarely (less than 1 day)	Some of the time (1-2 days)	Occasionally (3-4 days)	Most of the time (5-7 days)
1.	I was bothered by things that usually don't bother me.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
2.	I did not feel like eating; my appetite was poor.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
3.	I felt that I could not shake off the blues even with help from my family or friends.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
4.	I felt that I was just as good as other people.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
5.	I had trouble keeping my mind on what I was doing.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
6.	I felt depressed.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
7.	I felt that everything I did was an effort.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
8.	I felt hopeful about the future.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
9.	I thought my life had been a failure.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
10.	I felt fearful.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
11.	My sleep was restless.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
12.	I was happy.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
13.	I talked less than usual.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
14.	I felt lonely.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
15.	People were unfriendly.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
16.	I enjoyed life.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
17.	I had crying spells.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
18.	I felt sad.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
19.	I felt that people disliked me.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄
20.	I could not get going.	<input type="checkbox"/> ₁	<input type="checkbox"/> ₂	<input type="checkbox"/> ₃	<input type="checkbox"/> ₄

Visit: Baseline
Date ____/____/____

ID # _____

WEL-Q

This form describes some typical eating situations. Everyone has situations which make it very hard for them to keep their weight down. The following are a number of situations relating to eating patterns and attitudes. This form will help you to identify the eating situations which you find the hardest to manage.

Read each situation listed below and decide how confident (or certain) you are that you will be able to resist eating in each of the difficult situations. In other words, pretend that you are in the eating situation right now. On a scale from 0 (not confident) to 9 (very confident), choose ONE number that reflects how confident you feel now about being able to successfully resist the desire to eat. Write this number down next to each item.

Not confident at all that you can resist the desire to eat

Very confident that you can resist the desire to eat

0 1 2 3 4 5 6 7 8 9

EXAMPLES

I AM CONFIDENT THAT:

CONFIDENCE NUMBER

1. I can control my eating on weekends.
2. I can say "no" to snacks.

8
6

I AM CONFIDENT THAT:

1. I can resist eating when I am anxious (nervous). _____
2. I can control my eating on the weekends. _____
3. I can resist eating even when I have to say "no" to others. _____
4. I can resist eating when I feel physically run down. _____
5. I can resist eating when I am watching TV. _____
6. I can resist eating when I am depressed (or down). _____
7. I can resist eating when there are many different kinds of food available. _____
8. I can resist eating when I feel it is impolite to refuse a second helping. _____
9. I can resist eating even when I have a headache. _____
10. I can resist eating when I am reading. _____
11. I can resist eating when I am angry (or irritable). _____

Visit: Baseline
Date ____/____/____

ID # _____

- 12. I can resist eating even when I am at a party. _____
- 13. I can resist eating even when others are pressuring me to eat. _____
- 14. I can resist eating when I am in pain. _____
- 15. I can resist eating just before going to bed. _____
- 16. I can resist eating when I have experienced failure. _____
- 17. I can resist eating even when high-calorie foods are available. _____
- 18. I can resist eating even when I think others will be upset if I don't eat. _____
- 9. I can resist eating when I feel uncomfortable. _____
- 0. I can resist eating when I am happy. _____

Visit: Baseline
Date ____/____/____

ID # _____

PHYSICAL ACTIVITY & YOU

Check the response that best indicates how confident you are that you could be physically active in each of the following situations.

1. When I am tired.

- ₁ Not at all confident
- ₂ Slightly confident
- ₃ Moderately confident
- ₄ Very confident
- ₅ Extremely confident

2. When I am in a bad mood.

- ₁ Not at all confident
- ₂ Slightly confident
- ₃ Moderately confident
- ₄ Very confident
- ₅ Extremely confident

3. When I feel I don't have time.

- ₁ Not at all confident
- ₂ Slightly confident
- ₃ Moderately confident
- ₄ Very confident
- ₅ Extremely confident

4. When I am on vacation.

- ₁ Not at all confident
- ₂ Slightly confident
- ₃ Moderately confident
- ₄ Very confident
- ₅ Extremely confident

5. When it is raining or snowing.

- ₁ Not at all confident
- ₂ Slightly confident
- ₃ Moderately confident
- ₄ Very confident
- ₅ Extremely confident

3. Not including walking outside the home, how often each week (7 days) do you usually do the exercises below?

a. Strenuous or very hard exercise (you work up a sweat and your heart beats fast.) For example: aerobics, aerobic dancing, jogging, tennis, swimming laps.

- a. 1 day per week
- b. 2 days per week
- c. 3 days per week
- d. 4 days per week
- e. 5 or more days per week

How long do you usually exercise like this at one time?

- Less than 20 minutes
- 20-39 minutes
- 40-59 minutes
- 1 hour or more

b. Moderate exercise (not exhausting). For example, biking outdoors, using an exercise machine (like a stationary bike or treadmill), calisthenics, easy swimming, popular or folk dancing.

- a. 1 day per week
- b. 2 days per week
- c. 3 days per week
- d. 4 days per week
- e. 5 or more days per week

How long do you usually exercise like this at one time?

- Less than 20 minutes
- 20-39 minutes
- 40-59 minutes
- 1 hour or more

Physical Activity Questionnaire

The following questions are about your usual physical activity and exercise over the **past month**. This includes walking and sports. Please circle the answer that best applies to you.

1. Think about the walking you do outside the home. How often do you walk outside the home for more than 10 minutes without stopping? (Mark only one answer.)
 - a. Rarely or Never (skip to question 3 on next page)
 - b. 1-3 times each **month**
 - c. 1 time each week
 - d. 2-3 times each week
 - e. 4-6 times each week
 - f. 7 or more times each week

2. When you walk outside the home for more than 10 minutes without stopping, for how many minutes do you usually walk?
 - a. Less than 20 minutes
 - b. 20-39 minutes
 - c. 40-59 minutes
 - d. 1 hour or more

What is your usual speed?

- a. Casual strolling or walking (less than 2 miles per hour)
- b. Average or normal (2-3 miles per hour)
- c. Fairly fast (3-4 miles per hour)
- d. Very fast (more than 4 mile per hour)
- e. Don't know

c. Mild exercise. For example: slow dancing, bowling, or golf.

- a. 1 day per week
- b. 2 days per week
- c. 3 days per week
- d. 4 days per week
- e. 5 or more days per week

How long do you usually exercise like this at one time?

- Less than 20 minutes
- 20-39 minutes
- 40-59 minutes
- 1 hour or more

Demographic Questionnaire

Fit Camp

1. Name _____

2. Date of Birth _____

3. Race/ethnicity _____

4. Marital Status:

Single

Married/Living with partner

Divorced

Widowed

5. Do you have children? _____ If so, how many? _____

6. Where do you live during the school year? _____

7. In the past month has your weight ? decreased stayed the same increased

8. In the past 6 months has your weight? decreased stayed the same increased

9. In the past year has your weight? decreased stayed the same increased

References:

- American College Health Association. (2006). American College Health Association National College Health Assessment (ACHA-NCHA). *Journal of American College Health, 55* (1), 5-16.
- Barry, D., Pietrzak, R., & Petry, N. (2008). Gender differences in associations between body mass index and dsm-iv mood and anxiety disorders: results from the national epidemiologic survey on alcohol and related conditions. *Ann Epidemiol, 18*, 458-466.
- Brunt, A., Rhee, Y., & Zhonog, L. (2008). Differences in dietary patterns among college students according to body mass index. *Journal of American College Health, 56* (6), 629-34.
- Byrd-Williams, C., Strother, M., Kelly, L., & Huang, T. (2009). Dietary fiber and associations with adiposity and fasting insulin among college students with plausible dietary reports. *Nurtition*.
- Centers for Disease Control. (2009). www.cdc.gov/healthyweight/assessing/bmi/
- Clark MM, Abrams DB, Niaura RS, Eaton CA, Rossi JS. (1991). Self-efficacy in weight management. *J Consult Clin Psychol, 59*(5):739-744.
- Cluskey, M., & Grobe, D. (2009). College weight gain and behavior transitions: male and female differences. *Journal of the American Dietetic Association, 109* (2), 325-9.
- De Oliveira, M., Sichieri, R., & Venturim Mozzer, R. (2008). A low-energy-dense diet adding fruit reduces weight and energy intake in women. *Appetite, 51* (2), 291-5.
- Diliberti, N., Bordi, P., Conklin, M., Roe, L., & Rolls, B. (2004). Increased portion size leads to increased energy intake in restaurant meals. *Obesity Res, 12*, 562-568.

Evidence Analysis Library of the American Dietetic Association. (2007). Dietary fiber from whole foods and obesity. <http://www.adaevidencelibrary.com>.

Evidence Analysis Library of the American Dietetic Association. (2008). Studies based on daily total calcium intake below recommended levels. <http://www.adaevidencelibrary.com>.

Franko, D., Cousineau, T., Trant, M., Green, T., Rancourt, D., Thompson, D., Ainscough, J., Mintz, L., & Ciccazzo, M. (2008). Motivation, self-efficacy, physical activity and nutrition in college students: randomized controlled trial of an internet-based education program. *Preventive Medicine, 47*, 369-377.

Franz, M., VanWormer, J., Crain, L., Boucher, J., Histon, T., & Caplan, W., et al. (2007). Weight-loss outcomes: a systematic review and meta-analysis of weight-loss clinical trials with a minimum 1-year follow-up. *Journal of the American Dietetic Association, 107* (10), 1755-1767.

Gordon, P., Heath, G., Holmes, A., & Christy, D. (2000). The quantity and quality of physical activity among those trying to lose weight. *American Journal of Preventative Medicine, 18* (1).

Greaney, M., Less, F., White, A., & Dayton, S., et al. (2009). College students' barriers and enablers for healthful weight management: a qualitative study. *Journal of Nutrition Education Behavior, 41* (4), 281-6.

Haskell, WL., Lee, I., Pate, R., Powell, K., Blair, S., & Franklin, B., et al. (2007). Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Med Sci Sports Exerc, 39*, 1423-1434.

- Jakicic, J., Wing, R., Butler, B., & Jeffery, R. (1997). The relationship between presence of exercise equipment in the home and physical activity. *American Journal of Health Promotion*,(5),363-365.
- Johnson, R., Friedman, A., Harvey-Berino, J., Gold, B., McKenzie, D. (2005). Participation in a behavioral weight-loss program worsens the prevalence and severity of underreporting among obese and overweight women. *Journal of the American Dietetic Association*, 105 (12), 1948-1951.
- Keating, D., Guan, J., Pinero, J., & Bridges, D. (2005). A meta-analysis of college students' physical activity behaviors. *Journal of American College Health*, 54 (2), 116-25.
- Kumanyika, S., Obarzanek, E., Stettler, N., Bell, R., Field, A., & Fortmann, S., et al. (2008). The need for comprehensive promotion of healthful eating, physical activity, and energy balance. A scientific statement from American Heart Association Council on epidemiology, prevention, interdisciplinary committee for prevention. *Circulation, Journal of the American Heart Association*.
- Larson, N., Nelson, M., Neumark-Sztainer, D., Story, M., & Hannan, P. (2009). Making time for meals: meal structure and associations with dietary intake in young adults. *Journal of the American Dietetic Association*, 109, 72-79.
- Larson, N., Perry, C., Story, M., & Neumark-Sztainer, D. (2006). Food preparation by young adults is associated with better diet quality. *Journal of the American Dietetic Association*, 106 (12), 2001-2007).
- Larson, N., Story, M., Eisenberg, M., & Neumark-Sztainer, D. (2006). Food preparation and purchasing roles among adolescents: associations with sociodemographic characteristics and diet quality. *Journal of the American Dietetic Association*, 106 (2), 211-218.

- Linde, J., Rothman, A., Baldwin, A., & Jeffery, R. (2006). The impact of self-efficacy on behavior change and weight change among overweight participants in a weight loss trial. *Health Psychology, 25* (3), 282-291.
- Life Measurement, Inc. (2007). *Bod Pod*. www.lifemeasurement.com.
- Lloyd-Jones, D., Liu, K., Colangelo, S., Yan, L., Klein, L., Loria, C., et al. (2007). Consistently stable of decreased body mass index in young adulthood and longitudinal changes in metabolic syndrome components: the coronary artery risk development in young adults study. *Circulation, 115*, 1004-1011.
- Lowry, R., Galuska, D., Fulton, J., Wechsler, H., Kann, L., & Collins, J. (2000). Physical activity, food choice, and weight management goals and practices among U.S. college students. *American Journal of Preventative Medicine, 18* (1).
- Marcus B, Selby VC, Niaura RS, Rossi JS. (1992). Self-efficacy and the stages of exercise behavior change. *Res Q Exerc Sport. 63* (1):60-66.
- McTigue, K., Garrett, J., Popkin, B. (2002). The natural history of the development of obesity in a cohort of young US adults between 1981 and 1998. *Ann Intern Med, 136*, 857-864.
- Meyer A, Evenson K, Morimoto L, Siscovick D, & White E. (2009). Test-retest reliability of the women's health initiative physical activity questionnaire. *Med Sci Sports Exerc, 41*:530-538.
- McCormack, G., Giles-Corti, B., & Bulsara, M. (2007). The relationship between destination proximity, destination mix and physical activity behaviors. *Preventive Medicine, 46*, 33-40.

- Morse, K.L., & Driskell, J.A. (2009). Observed sex differences in fast-food consumption and nutrition self-assessments and beliefs of college students. *Nutrition Research, 29* (3), 173-179.
- Murray, M., & Vickers, Z. (2009). Consumer views of hunger and fullness. A qualitative approach. *Appetite, 10*.
- MyPyramid Tracker. *United States Department of Agriculture- Center for Nutrition Policy and Promotion*. Retrieved 2009, from www.mypyramidtracker.gov.
- National Institutes of Health. (1998). Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults-the evidence report. *Obes Res., 6*, 51S-209S.
- National Institute of Health. (1998). *United States Department of Health and Human Services*. Bethesda, MD. www.nih.gov.
- Nelson, M., & Story, M. (2009). Food environments in university dorms. 20,000 calories per dorm room and counting. *American Journal of Preventive Medicine, 36* (6), 523-526.
- Nelson, M., Kocos, R., Lytle, L., & Perry, C. (2009). Understanding the perceived determinants of weight-related behaviors in late adolescence: a qualitative analysis among college youth. *Journal of Nutrition Education Behavior, 41* (4), 287-92.
- Nestle, M. (2003). Increasing portion sizes in American diets: more calories, more obesity. *Journal of American Dietetic Association, 103* (1), 39-40.
- Ozier, A., Kendrick, O., Leeper, J., Knol, L., Perki, M., & Burnham, J. (2008). Overweight and obesity are associated with emotion- and stress-related eating as measured by the eating and appraisal due to emotions and stress questionnaire. *Journal of the American Dietetic Association, 108* (1), 49-56.

- Poddar, K.H., Hosig, K.W., & Nickols-Richardson, E.S. (2007). Low-fat dairy intake and body weight and composition changes in college students. *Journal of the American Dietetic Association, 107*, A45.
- Poddar, K.H., Hosig, K.W., Anderson, E.S., Herbert, W.G., & Nickols-Richardson, S.M. (2008). Barriers, motivators and facilitators for consuming dairy products in college students. *Journal of the American Dietetic Association, 108*, A106.
- Position of the American Dietetic Association: Health implications of dietary fiber. (2008). *Journal of the American Dietetic Association, 108* (10), 1716-1730.
- Reed, J., & Phillips, A. (2005). Relationships between physical activity and the proximity of exercise facilities and home exercise equipment used by undergraduate university students. *Journal of American College Health, 53* (6), 285-290.
- Rippe, J., & Hess, S. (1998). The role of physical activity in the prevention and management of obesity. *Journal of the American Dietetic Association, 98* (10 Suppl 2), S31-8.
- Roach, J., Yadrick, K., Johnson, J., Boudreaux, J., Forsythe, W., & Billion, W. (2003). Using self-efficacy to predict weight loss among young adults. *Journal of The American Dietetic Association, 103* (10), 1357-1359.
- Rose, N., Hosig, K., Davy, B., Serrano, E., & Davis, L. (2007). Whole-grain intake is associated with body mass index in college students. *Journal of Nutrition Education Behavior, 39* (2), 90-4.
- Schoenborn, C. A., Adams, P. F., & Barnes, P. M. (2002). Body weight status of adults: United States, 1997-98. *Advance Data from Vital and Health Statistics, 330*, 1-16.
- Schwartz, J., & Byrd-Bredbenner, C. (2006). Portion Distortion: Typical portion sizes selected by young adults. *Journal of the American Dietetic Association, 106*, 1412-1418.

- Shirae, T., Chen, H., & Morris, M. (2009). Differential effects of restricted versus unlimited high-fat feeding in rats on fat mass, plasma hormones and brain appetite regulators. *Journal of Neuroendocrinology*, *21*, 602-609.
- Snelling, A.M., & Job, K. (2007). Fruit and vegetable intake, stages of change and self-efficacy: a comparison between German and American college students. *Journal of the American Dietetic Association*, *107*, A57.
- Soenen, S., & Westerterp-Plantenga, M. (2008). Proteins and satiety: implications for weight management. *Curr Opin Clin Nutr Metab Care*, *11* (6), 747-51.
- SPSS Statistics. Version 16.0. (2009), Chicago, IL.
- Strong, K., Parks, S., Anderson, E., Winett, R., & Davy, B. (2008). Weight gain prevention: identifying theory-based targets for health behavior change in young adults. *Journal of the American Dietetic Association*, *108* (10), 1708-1715.
- Taylor, V., Macdonald, K., McKinnon, M., Joffe, R., & MacQueen, G. (2008). Increased rates of obesity in first-presentation adults with mood disorders over the course of four-year follow-up. *Journal of Affective Disorders*, *109*, 127-131.
- United States Department of Agriculture. (2004). *National Academy of Sciences. Institute of Medicine. Food and Nutrition Board.* www.iom.edu.
- United States Department of Agriculture. (2009). Dietary Reference Intakes. *Food and Nutrition Information Center.* <http://fnic.nal.usda.gov>.
- Veldhorst, M., Smeets, A., Soenen, S., Hochstenbach-Waelen, A., Hursel, R., & Diepvens, K., et al. (2008). Protein-induced satiety: effects and mechanisms of different proteins. *Physiol Behav.*, *94* (2), 300-7.

Wadden TA, Stunkard AJ. (1985). Social and psychological consequences of obesity. *Ann Intern Med*, 103(6 (Pt 2)):1062-1067.

Yanovski, J., Parikh, J., Yanoff, L., Denkinger, B., Calis, K., & Reynolds, J., et al. (2009). Effects of calcium supplementation on body weight and adiposity in overweight and obese adults. *Annals of Internal Medicine*, 150 (12), 821-829.

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