A STUDY OF WEIGHT CHANGES DURING THE FRESHMAN YEAR OF COLLEGE

A thesis submitted to the Kent State University College of Education, Health, and Human Services in partial fulfillment of the requirements for the degree of Masters of Science

By

Amanda J. Woodhall

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Thesis written by

Amanda J. Woodhall

B.S., The University of Toledo, 2012

M.S., Kent State University, 2014

Approved by

_____________________, Director, Master’s Thesis Committee
Karen Lowry Gordon

_____________________, Member, Master’s Thesis Committee
Natalie Caine-Bish

_____________________, Member, Master’s Thesis Committee
Tanya Falcone

Accepted by

_____________________, Director, School of Health Sciences
Lynne E. Rowan

_____________________, Dean, College of Education, Health and Human Services
Daniel F. Mahony
A STUDY OF WEIGHT CHANGES DURING THE FRESHMAN YEAR OF COLLEGE (127 pp.)

Director of Thesis: Karen Lowry Gordon, Ph.D., R.D., L.D.

This study investigated self-reported weight changes in 358 Kent State University freshmen college students throughout their first year of college. Data regarding diet, exercise, sleep, and stress and their relationship to freshmen weight changes were also collected. An online questionnaire developed by the researcher was used to test the three hypotheses that there would be a difference in weight changes for freshmen based on residential status (1), a difference based on gender (2), and that there would be a relationship between weight changes and diet, exercise, sleep, and stress (3). Additionally, the EAT-26 survey was used to gather information about eating attitudes and disordered eating behaviors to determine the number of participants who were at risk for disordered eating behaviors. Participants gained an average of 3.69 lbs. between the beginning and end of freshman year. No significance was found for weight changes based on gender (p = 0.147) or residential status (p = 0.139). Changes in diet quality, sleep, and stress levels may have attributed to the weight gain observed in participants. Results of the EAT-26 survey indicated that 17% (n = 61) of respondents were “at risk for an eating disorder,” with the majority being female.
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CHAPTER I
INTRODUCTION

Over the past 50 years the prevalence of obesity has more than doubled in the United States, which has become a major public health concern (Ogden, Carroll, Curtin, McDowell, Tabak, & Flegal, 2006). Obesity and overweight are associated with a number of health conditions including hypertension, heart disease, type 2 diabetes, and adverse lipid concentrations (National Institutes of Health, 1998). The young adult population is one group that needs more focus on with regards to obesity and prevention. The National College Health Risk Behavior Survey estimated that as many as 35% of college students are overweight or obese (Huang, Kempf, Strother, Li, Lee, & Harris, 2004). Rates of overweight and obesity appear to be dramatically increasing in young adults ages 18-29 years old, as well as those having some college education (Mokdad, Serdula, Dietz, Bowman, Marks, & Koplan, 1999). Obesity in the college age population can cause complications similar to what adults may experience (Huang, Kempf, Strother, Li, Lee, & Harris, 2004). For example, dyslipidemia and hypertension have been reported as significant problems in the college age population (Spencer, 2002). Not only does obesity and overweight cause physical health problems in the college age population, but it also lowers self-esteem and may hinder academic performance (Gortmaker, Must, Perrin, Sobol, & Dietz, 1993; Must, Spadano, Coakley, Field, Colditz, & Dietz, 1999).

One strategy for obesity prevention is to identify the critical periods of weight
gain across the life span (Anderson, Shapiro, & Lundren, 2003). Identifying high risk time periods for weight gain throughout the life cycle would allow for a better understanding of factors that contribute to weight gain (Lloyd-Richardson, Bailey, Fava, & Wing, 2009). Interventions could then be targeted for individuals at these critical periods (Anderson, Shapiro, & Lundren, 2003). One critical period that research has identified is the young adult transition to college (Lloyd-Richardson, Bailey, Fava, & Wing, 2009). Weight gain during the first year of college has been observed in several studies (Wengreen & Moncur, 2009; Delinsky & Wilson, 2008; Holm-Denoma, Joiner, Vohs & Heatherton, 2008). Additionally, overweight or obesity during young adulthood has been found to continue into the adult years (Guo, Huang, Maynard, Demerath, Towne, & Chumlea, 2000).

The “Freshman 15” refers to the idea that the first year of college is associated with a 15 pound weight gain (Lloyd-Richardson, Bailey, Fava & Wing, 2009). In the U.S., the media and popular literature commonly mention the idea of the “Freshman 15.” The term the “Freshman 15” first appeared in an article in Seventeen Magazine in 1989, and continued to be a frequently used phrase (Watkins, 1989). After a thorough review, no research supports the popular belief that freshmen students gain around 15 pounds throughout their first year of college. Research shows that it is rare for freshmen students to gain 15 lbs or more; in a study conducted by Delinsky & Wilson (2008), only nine out of 147 college freshmen participants (6.1%) gained 15 lbs. or more. Past studies that have examined weight gain in freshmen students have shown that there is an average weight gain of three to six pounds that occurs during the first year of college (Wengreen &
Moncur, 2009; Delinsky & Wilson, 2008; Holm-Denoma, Joiner, Vohs & Heatherton, 2008). Although most freshmen are not gaining a large amount of weight, the small weight gain that many students do experience may still be significant and impact their weight status in the future (Guo, Huang, Maynard, Demerath, Towne, & Chumlea, 2000).

The proposal that freshmen students may gain weight is associated with the behavioral changes that occur during the first year of college (Hoffman, Policastro, Quick, & Soo-Kyung, 2006). Increases in energy intake due to poor dietary habits and decreases in physical activity level during the first year of college are the main behavior changes that may cause weight gain in freshmen students (Hoffman, Policastro, Quick, & Soo-Kyung, 2006). Other factors that may cause an increase in weight include increased alcohol consumption (Kasparek, Corwin, Valois, Sargent, & Morris, 2008); high stress levels (Weidner, Kohlmann, Dotzauer, & Burns, 1996); and changes in sleep patterns (Melton, Langdon, & McDaniel, 2013).

Disordered eating is another important problem that freshmen students may face. The National Eating Disorders Association (2006) conducted a national survey of college students and found that 20% of respondents reported that they suspected they had suffered from an eating disorder at some point in their lives. Anxiety about weight gain during the first year of college may lead to disordered eating practices, especially in females (Karasu, 2013). Additionally, the pressure to attain the thin-ideal body image created by Western culture and the media may lead to body dissatisfaction, which is common among college students (Grabe, Ward, & Hyde, 2008).

Statement of the Problem
In the United States, the obesity rates have more than doubled in the past fifty years, and this is an important public health concern (Ogden, Carroll, Curtin, McDowell, Tabak, & Flegal, 2006). Numerous research studies focus on obesity prevalence and prevention in children and adults, but not as much attention is placed on the young adult population. However, this group should not be overlooked. Rates of overweight and obesity appear to be increasing most dramatically among young adults, ages 18-29 (Mokdad, Serdula, Dietz, Bowman, Marks, & Koplan, 1999). Therefore, the college population is a particularly important group to study with regards to weight gain. The college years are also important, because they set the foundation for dietary intake and eating behaviors in the future. This is often the first time in one’s life when he or she is no longer living at home, and decisions regarding nutrition and exercise are made completely on their own. The health habits that young adults make during these years will likely carry over into adulthood (Guo, Huang, Maynard, Demerath, Towne, & Chumlea, 2000).

It is a common notion in U.S. media and popular literature that first year college students gain the “Freshman 15,” but actual research regarding how much weight is really gained is still lacking. The literature has proposed possible reasons for why weight gain occurs during the first year of college. Changes in diet and exercise (Hoffman, Policastro, Quick, & Soo-Kyung, 2006); an increase in alcohol consumption (Kasparek, Corwin, Valois, Sargent, & Morris, 2008); lack of sleep (Melton, Langdon, & McDaniel, 2013); and stress during the first year of college are some of the possible reasons for weight gain (Weidner, Kohlmann, Dotzauer, & Burns, 1996). However, more research is
needed on this subject. Additionally, the literature is in need of more contemporary studies regarding freshmen weight gain and nutrition related behaviors. Most research papers on the subject of weight changes in freshmen college students are five years old or greater. A great deal of the data used by research on this topic was based off of the 1995 National College Health Risk Behavior Survey (Lowry, Galuska, Fulton, Wechsler, Kann, & Collins, 2000). Therefore, more current data is needed in order to better assess the weight changes observed in the college freshmen population.

In addition to the concern of freshmen weight gain, the issue of disordered eating must also be addressed in the college population. The prevalence of eating disorders has grown over the past 50 years (Franco, 2012), and body dissatisfaction is common among college students (Pingitore, Spring, & Garfieldt, 1997). Disordered eating practices may be more common than past literature has suggested, therefore more research regarding this topic is needed.

**Purpose Statement**

The purpose of this quantitative study was to determine the changes in weight status for freshmen college students at Kent State University based on residential status and gender. Additional data regarding diet, exercise, sleep, and stress and their relationship to freshmen weight changes were assessed. Data with regards to the symptoms and concerns characteristic of disordered eating for freshmen students were also obtained.
Hypotheses

Hypothesis #1: There is a difference in weight changes for freshmen students based on residential status.

Hypothesis #2: There is a difference in weight changes for freshmen students based on gender.

Hypothesis #3: There is a relationship between the weight changes of freshmen students and diet, exercise, sleep, and stress.

Operational Definitions

College freshman: Traditional students who are enrolled in their first year of college at Kent State University. These students have graduated high school in the last two years and are ages 18-20 years old.

College age population: Adults 18-24 years old. This is the age representative of the traditional college student.

Weight changes: Self-reported weight gain or loss since from the beginning of the school year until the end of the school year (August 2013-April 2014).

Residential status: There are three possible residential situations for college freshmen: living on-campus in university housing, living at home with parents, or living off-campus without family members.

Disordered eating behaviors: Characterized as extreme weight control strategies, such as fasting, vomiting, engaging in excessive exercise, and the use of diet pills, laxatives, and diuretics.
Eating Attitudes Test (EAT-26): A screening instrument used to measure the standardized symptoms and concerns characteristic of eating disorders. The EAT-26 alone does not diagnose an eating disorder, however scoring 20 or above on the EAT-26 indicates one is at risk of an eating disorder and should see a mental health professional.
CHAPTER II
REVIEW OF LITERATURE

Definition of Normal Weight, Overweight, and Obese Based on BMI Measurements

According to the Centers for Disease Control and Prevention (2011), Body Mass Index (BMI) is used as a screening tool to help identify possible weight problems. The BMI number is calculated from one’s height in meters and weight in kilograms, using the equation $kg/(m^2)$. It acts as an indicator of body fatness and increased risk of chronic disease. BMI is considered an alternative for direct measures of body fat (Centers for Disease Control and Prevention, 2011). For adults, BMI is interpreted by using standard weight status categories that are the same for all ages and both men and women (Centers for Disease Control and Prevention, 2011). A BMI below 18.5 is considered underweight; a BMI of 18.5 to 24.9 is normal weight; a BMI of 25.0 to 29.9 is overweight; and a BMI of 30 or higher is considered obese (Centers for Disease Control and Prevention, 2011).

Overview of the Obesity Concern in the United States

Obesity continues to be a leading public health concern in the United States (Mokdad, Ford, Bowman, Dietz, Vinicor, & Bales, 2003). According to current data from the Centers for Disease Control and Prevention, the percent of adults age 20 years and over who are obese is 35.9%, and the percent of adults age 20 years and over who are overweight, including obesity is 69.2%. The prevalence of adults who were extremely obese (BMI $\geq$40) in 2004 was 2.8% in men and 6.9% in women (Ogden, Carroll, Curtin, McDowell, Tabak, & Flegal, 2006). The percent of people who are either overweight or
obese has been steadily increasing throughout the last few decades (Mokdad, Serdula, Dietz, Bowman, Marks, & Koplan, 1999). Between 1980 and 2002, obesity prevalence doubled in adults 20 years or older, and overweight prevalence tripled in children and adolescents six to 19 years old (Hedley, 2004).

Obesity is an important public health concern, because it is a major cause of morbidity and mortality in the U.S. (Must, Spadano, Coakley, Field, Colditz, & Dietz, 1999; Mokdad, Serdula, Dietz, Bowman, Marks, & Koplan, 1999). Studies have shown that obesity and overweight are associated with a number of health conditions including hypertension, heart disease, type 2 diabetes, and adverse lipid concentrations (National Institutes of Health, 1998). Each year it is estimated that 300,000 U.S. adults die of causes related to obesity (Allison, Fontaine, Manson, Stevens, & VanItallie, 1999).

**Obesity and Health Concerns for Young Adults**

Obesity is a major health concern for young adults (Mokdad, Serdula, Dietz, Bowman, Marks, & Koplan, 1999). According to the Centers for Disease Control (2013), the percent of adolescents ages 12-19 years who are obese is 18.4%. Mokdad, Serdula, Dietz, Bowman, Marks, & Koplan (1999) monitored obesity trends from 1991 to 1998 and found that obesity rates have increased rapidly in young adults ages 18-29 and those with some college education. The National College Health Risk Behavior Survey estimated that as many as 35% of college students are overweight or obese (Huang, Kempf, Strother, Li, Lee, & Harris, 2004). Obesity in the college age population can cause complications similar to what adults may experience (Huang, Kempf, Strother, Li, Lee, & Harris, 2004). For example, dyslipidemia and hypertension have been reported as
significant problems in the college population (Spencer, 2002). Huang, Kempf, Strother, Li, Lee, & Harris (2004) examined the prevalence of the components of metabolic syndrome in a sample of college students. Their study found that 10% of the sample had abnormal total cholesterol and more than 6% had pre-diabetes. Being overweight increased the risk of experiencing at least one of the components of metabolic syndrome by almost three times (Huang, Kempf, Strother, Li, Lee, & Harris, 2004).

Costs Generated by Obesity in the U.S.

Obesity and related chronic diseases generate immense healthcare costs (Colditz, 1999). Medical costs associated with obesity and productivity costs (absenteeism, disability, and premature mortality) are the main contributors to costs related to obesity (Hammond & Levine, 2010). In the late 1990s direct costs for obesity were 70 billion dollars. Direct costs of inactivity and obesity accounted for 9.4% of the national health care expenditure in the U.S. (Colditz, 1999). The cost that obesity is generating has only been increasing throughout the years. Data from 2010 indicates that medical costs associated with obesity may amount to as much as $147 billion annually for adults and $14.3 billion annually for children in the U.S. (Hammond & Levine, 2010). Total obesity-related productivity costs are estimated to be as high as $66 billion annually in the U.S (Hammond & Levine, 2010). Wang, Beydoun, Liang, Caballero, & Kumanyika (2008) conducted a study that estimated future obesity-related health care costs for adults in the U.S. The authors projected that the total health-care costs attributable to obesity and overweight would double every decade to reach 860.7-956.9 billion U.S. dollars by
2030, accounting for 16-18% of total U.S. health care costs (Wang, Beydoun, Liang, Caballero, & Kumanyika, 2008).

**Social, Economical, and Academic Consequences of Obesity/Overweight in Adolescence and Young Adulthood**

Not only does being obese or overweight affect one’s physical health, but it may also affect their social and economical well-being (Gortmaker, Must, Perrin, Sobol, & Dietz, 1993). Research shows that being overweight in adolescence and young adulthood can affect performance at school or work and psychological functioning (Stein, Perrin, Pless, Gortmaker, Perrin, Walker, & Weitzman, 1987). Obese or overweight adolescent girls are especially vulnerable to adverse social, psychological, and educational outcomes (Falkner, Neumark-Sztainer, Story, Jeffery, Beuhring, & Resnick, 2001). Gortmaker, Must, Perrin, Sobol, & Dietz (1993) found that overweight young adults married less often and had lower household incomes in their adult life than their non overweight counterparts. Obese or overweight people may have associated health problems that limit their employment and socioeconomic status (Roe & Eickwort, 1976). Also, poor physical quality of life for obese adolescents can translate into missed school days, causing them to suffer academically (Daniels, 2008). Gortmaker, Must, Perrin, Sobol, & Dietz (1993) proposed that there is also a social stigma and discrimination against those who are overweight or obese. This discrimination can greatly impact the self-esteem of overweight young adults and affect their academic or work performance (Gortmaker, Must, Perrin, Sobol, & Dietz, 1993). According to Daniels (2008), poor nutrition and a sedentary lifestyle may impair attention and retention of knowledge, which may also
affect one’s behavior and grades. Lastly, Loke (2002) proposed that sleep apnea, which is related to overweight and obesity, may contribute to poor quality of sleep in children and young adults and thus negatively affect their ability to pay attention in class or retain information.

**Young Adulthood/the College Years as a Critical Period in the Lifespan for Weight Gain**

Young adults who gain weight during their college years are at a higher risk for being overweight or obese later in life (Anderson, Shapiro, & Lundgren, 2003; Guo, Huang, Maynard, Demerath, Towne, & Chumlea, 2000). Excess weight gain is associated with chronic diseases such as cardiovascular disease, type 2 diabetes mellitus, stroke, dyslipidemia, osteoarthritis, and some cancers (Must, Spadano, Coakley, Field, Colditz, & Dietz, 1999). One strategy for obesity prevention, proposed by Anderson, Shapiro, & Lundren (2003), is to identify the critical periods of weight gain across the life span. Interventions could then target individuals in these critical periods. After studying the weight changes of freshmen college students, Anderson, Shapiro, & Lundren (2003) identified the freshman year of college as a critical period for weight gain.

A study conducted by Guo, Huang, Maynard, Demerath, Towne, & Chumlea (2000) used longitudinal data to examine BMI during childhood, adolescence, and young adulthood in relation to adult overweight/obesity. Their research found that young adults gain an average of slightly less than 1 kilogram each year, but the majority of this weight gain occurs during the early 20s, which are the college years for many people. Guo, Huang, Maynard, Demerath, Towne, & Chumlea (2000) determined that in females, the
BMI at approximately 21 years old is a strong predictor of adulthood BMI, total body fat and body fat percentage. In males, the BMI at approximately 14 years old and 24 years old are significant predictors of adult BMI, total body fat, and body fat percentage (Guo, Huang, Maynard, Demerath, Towne, & Chumlea, 2000).

**Defining the “Freshman 15”**

Hovell, Mewborn, Randle, & Fowler-Johnson, 1985) was first to introduce the notion that a significant weight gain is observed in freshmen after their first year of college based on a small study done at a private university. It was not until 1989 that the idea of freshmen weight gain started to become more common when the term the “Freshman 15” first appeared in an article in *Seventeen Magazine* (Watkins, 1989). The “Freshman 15” refers to the belief that the first year of college is associated with a fifteen pound weight gain (Lloyd-Richardson, Bailey, Fava & Wing, 2009). Behavioral changes during the freshman year leave open the possibility that students may passively increase their energy intake and/or decrease their physical activity, giving rise to the “Freshman 15” (Hoffman, Policastro, Quick, & Soo-Kyung, 2006).

**Popular Literature’s View on the “Freshman 15”**

In the U.S., the media and popular literature commonly mention the idea of the “Freshman 15.” During the 1980s, only a handful of articles about the “Freshman 15” appeared every year, but starting in the late 1990s the number of publications about the “Freshman 15” significantly increased (Brown, 2008). These articles generally used the “Freshman 15” concept to give advice on how to avoid gaining weight, but many of these articles did not refute or question the reality of the “Freshman 15” (Zagorsky & Smith,
A study conducted by Brown in 2006 aimed to determine the similarities and differences between the information about freshmen weight gain found in peer reviewed research articles and in popular literature articles, such as newspapers and university magazines. Brown (2006) used 23 databases to search for any article that discussed university freshman weight gain. After examining all the articles Brown (2006) found that the media articles mirrored the peer-reviewed research articles, but the information did not reliably depict the research. The research articles found that there is about a five pound weight gain during the first year of college, but popular press articles proposed a 15 pound weight gain (Brown, 2006).

After reviewing several recent media articles, it appears that the opinions of the “Freshman 15” seem to be mixed. One article from the Huffington Post discussed reasons why the “Freshman 15” is a lie (Breene, 2013). The author felt that the “Freshman 15” was a myth, and mentioned several research articles that found that the actual weight gain of college freshmen is around five pounds, not 15 (Breene, 2013). Another article from Psychology Today, shared similar opinions with the Huffington Post article with regards to the proposed 15 pound weight gain in the first year of college. The Psychology Today article wrote that while weight gain should still be of concern to freshmen college students, it is unlikely that students will actually gain 15 pounds (Karasu, 2013). Karasu (2013) also mentioned the fact that freshmen should not worry too much about weight gain, because anxiety about weight changes may lead to eating disorders. On the contrary, an article written in The Denver Post discussed ways in which freshmen can avoid gaining the potential 15 pounds (Martin, 2013). The article
gave a number of reasons for why freshmen gain weight, and featured an interview about a student who gained over the “common” 15 pound weight gain. At the end of the article, the author provided tips on how to avoid gaining weight and also gave calorie counts of popular alcoholic beverages that students might consume (Martin, 2013).

**Pop Culture, Dieting, and the “Freshman 15”**

Young adults often seek the advice of magazines and celebrities to obtain much of their information regarding weight loss plans and how to obtain the “perfect” body (Lawrie, Sullivan, Davies, & Hill, 2006). It is important to understand what young adults are reading about dieting and the “Freshmen 15” in order to better understand how this population can be targeted when discussing subjects such as maintaining a healthy weight and body image (Malinauskas, Raedeke, Aeby, Smith, & Dallas, 2006). The fashion magazine *Harpar’s Bazaar* discussed the most current celebrity diets in their May 2014 issue. The article listed celebrity diets such as the vegan diet, the “Ancient Grains Diet,” the “Alkaline Diet,” the “Beauty Detox Solution,” and the “Mushroom Diet” that were currently being followed by well-known celebrities, like Beyonce and Angelina Jolie (Kosin, 2014). The article stressed the benefits of these diets, such as helping maintain a slim frame, glowing skin and hair, and detoxing benefits. Some of the diet plans involved healthy habits, such as consuming a wide variety of fruits, vegetables, and whole grains. However, a few of the diets, like the “Mushroom Diet,” involved some weight loss strategies that may be harmful (Kosin, 2014).

The popular young women’s magazine, *Cosmopolitan* featured an article about the Dukan diet that was created by a physician (Ruderman, 2011). The diet was modeled
from the diet of French women, and has been made popular by celebrities, such as Kate Middleton. The article boasts that followers of the diet “do not have to go to the gym everyday or avoid delicious foods in order to lose weight” (Ruderman, 2011). The article explains the Dukan diet’s four phases and what one needs to do to follow the diet. However, the article fails to mention the risks or challenges associated with the diet (Ruderman, 2011).

Some articles from the web or magazines specifically discuss the “Freshman 15” and how to avoid weight gain during college (“Healthy eating tips for avoiding the Freshman 15”, 2010). An online pop culture magazine called “Popsugar” specifically mentions how freshmen students are at risk for weight gain and what they can do to prevent this weight gain throughout college. Tips such as drinking a lot of water, not skipping meals, portion control, limiting alcohol, and stocking up on healthy snacks are mentioned in the article (“Healthy eating tips for avoiding the Freshman 15”, 2010).

Although males may not look magazines and celebrities for weight loss advice as much as females, studies have shown that the males are also influenced by the media with regards to body size and body image (Agliata & Tantleff-Dunn, 2004). Men’s magazines do not mention the “Freshman 15” specifically, but they do have an abundant amount of articles on diet and weight loss tips (Cannon, 2014; Rider, 2014). One article in Men’s Health lists “easy to follow weight-loss tips” such as, consuming caffeine before workouts, exercising portion control, trying interval training, increasing intensity of workouts, consuming protein-filled snacks, and training large muscles (Cannon, 2014). An article in Men’s Fitness, also discussed the importance of eating foods high in protein
as well as foods high in fiber in order to stay full and lose weight (Rider, 2014). This article focused on reducing body fat and included a list of “fat-burning foods” that readers should be consuming. Overall, the men’s magazine articles tended to focus on exercise and work-out routines, as well as eating an abundant amount of protein in order to lose weight (Cannon, 2014; Rider, 2014).

**Cultural Attitudes and Obesity**

Portraits of the “thin is in” ideology are omnipresent in Western cultures (Klaczynski, Goold, & Mudry, 2004). There is a negative stigma and prejudice against those who are obese in the U.S. Research has found that individualistic cultures, such as the United States and other Western societies, are more prejudiced against obese people than collective culture, such as India (Crandall, 1994). The belief that people are responsible for their weight contributes to the cultural prejudice against obesity (Crandall, 1994). Thinness has been used as a marker of success in our society, and obesity is to be avoided and feared both because of its impact on attractiveness and the character flaws associated with it (Klaczynski, Goold, & Mudry, 2004). Lack of self-control and laziness are often associated with those who are obese (Saguy & Almeling, 2008). Klaczynski, Goold, & Mudry (2004) argue that society and the media hold a high standard for thinness and no amount of personal effort will allow the attainment of the “perfect” body.

Over the last few decades, scientific, medical, and public health interest in obesity has skyrocketed (Boero, 2007). Some literature has blamed the media for making the obesity epidemic look worse than it actually is (Boero, 2007; Saguy & Almeling, 2008). Boero (2007) argued that the term “epidemic” is being over used with regards to obesity
in the media and medical journals. The use of the term “epidemic” when referring to obesity may create a panic similar to that of the “traditional” epidemics (Boero, 2007). A study by Saguy & Almeling (2008) examined the intersection of scientific reporting and news reporting with regards to obesity. The study found that the media often inflates the issue of obesity while simultaneously highlighting individual blame for weight. Compared to scientific literature, the news media used more evocative metaphors and language when discussing obesity, which suggested that the press tends to foster dramatization with the topic of obesity (Saguy & Almeling, 2008). Additionally, Saguy & Almeling (2008) found that the media often blamed childhood obesity on parents, schools, and society, with women usually holding more responsibility and blame as the parent.

*Media’s Influence on Young Adults and Body Image*

Numerous studies have shown that the media plays a significant role in body image and body satisfaction in young adults (Cattarin, Thompson, Thomas, & Williams, 2000; Rozin, & Fallon, 1988; Van Den Berg, Paxton, Keery, Wall, Guo, & Neumark-Sztainer, 2007). Exposure to media images that depict the thin-ideal body has been linked to young women’s dissatisfaction with their own bodies (Grabe, Ward, & Hyde, 2008). One study found that in females, body comparison to what was seen in the media was positively associated with body dissatisfaction (Van Den Berg, Paxton, Keery, Wall, Guo, & Neumark-Sztainer, 2007). A study by Groesz, Levine, & Murnen (2002) concluded that body image for females was significantly more negative after viewing thin media images than after viewing images of either average size models, plus size models,
or inanimate objects. Similarly, research by Cattarin, Thompson, Thomas, & Williams (2000) demonstrated that college women participants who were instructed to focus on thin, attractive models in televised commercials reported more immediate appearance dissatisfaction as compared to participants who were instructed to focus on some other aspect in the commercials.

Television and magazines often present artificial, airbrushed image as real (Agliata & Tantleff-Dunn, 2004). This is problematic because society regards media images as realistic representations of beauty and appropriate comparison targets for appearance (Jasper, 1993). It may be impossible to reach these ideal images that the media portrays. Consequently, thin-ideal media exposure has also been linked to more frequent bulimic and anorexic attitudes and behaviors (Grabe, Ward, & Hyde, 2008). Results of a study conducted by Field, Camargo, Taylor, Berkey, & Colditz (1999) indicated that the more effort a girl reported that she made to look like females on television, in movies, or in magazines, the higher her risk of beginning to use vomiting or laxatives to control her weight. Additionally, Grabe, Ward, & Hyde (2008) found that young women exposed to thin-ideal media scored higher on measures that assess bulimia, purging, and anorexic attitudes and behaviors.

The vast majority of the research on body image has focused on females, but attention to males’ body image has slowly been increasing (Garner, 1997). Over the years, men have increased their efforts to build muscle and stay lean (Pope, Olivardia, Gruber, & Borowiecki, 1999). This is known as the “Adonis complex of attractiveness” (Pope, Olivardia, Gruber, & Borowiecki, 1999). One study by Agliata & Tantleff-Dunn
(2004) exposed 158 young men of the average age of 20 years to television advertisements that contained either ideal male image or neutral images that were inserted between segments of television programs. Results of the study demonstrated that participants exposed to ideal image advertisements became significantly more depressed and had higher levels of muscle dissatisfaction than those exposed to the neutral ads. Their finding suggest that exposure to media images of the ideal male body, defined as lean and muscular, can have harmful effects on mood and body satisfaction in men (Agliata & Tantleff-Dunn, 2004).

Lawrie, Sullivan, Davies, & Hill, (2006) studied media influence on both adolescent boys and girls. Their findings indicated that both boys and girls feel that the media and society does not encourage weight gain and that there is a negative stigma associated with being overweight. The researchers concluded that the apparent negative stigma associated with increased body weight is most likely perpetuated by the thinness ideal promoted by Hollywood, music videos, and magazines (Lawrie, Sullivan, Davies, & Hill, 2006). A study by Field, Austin, Camargo, Taylor, Striegel-Moore, Loud, & Colditz (2005) found that both males and females that were trying to make an effort to look like individuals in the media were more likely than their peers to use unhealthful products to achieve their desired physique. Contrary to other studies that researched both male and females with regards to media influence on body image, Van Den Berg, Paxton, Keery, Wall, Guo, & Neumark-Sztainer (2007) failed to find a relationship between media body comparison and body dissatisfaction in males. Body dissatisfaction related to the media was only found in females in this study. The authors in the study concluded
that research indications regarding female body image and media will not necessarily
generalize to males in this area (Van Den Berg, Paxton, Keery, Wall, Guo, & Neumark-
Sztainer, 2007).

**Body Perception and Satisfaction of Young Adults**

Several studies suggest a discrepancy between perception of body size and actual
body size among young adults (Harring, Montgomery, & Hardin, 2010; Sciacca, Melby,
Femea (1991) obtained Body Mass Index (BMI) of 1,123 college students. Of these
students, 17% of the females and 20% of the males were considered overweight
according to the BMI standard. However, 40% of women and 24% of men considered
themselves to be overweight. These findings were similar to that of Harring,
Montgomery, & Hardin (2010), who used data from the 2006 National College Health
Assessment to study perceptions of body weight in U.S. college students. Among male
and female respondents, 36.2% perceived themselves to be overweight or obese, whereas
31.3% were actually overweight or obese according to BMI. Additionally, 28% of
participants suffered from inaccurate body weight perception. The study found that
females were more likely to perceive themselves as being more overweight than they
actually were, and males were more likely to perceive themselves as being less
overweight than they actually were (Harring, Montgomery, & Hardin, 2010).

Young adults and adolescents also may overestimate their body size in addition to
their body weight (Bergström, Stenlund, & Svedjehäll, 2000). A Swedish study
measured perceived body size in adolescents without anorexia nervosa, and found that
95% of males and 96% of females overestimated their body size. Overestimations were greatest in females, and the waist, buttocks, and thighs were the areas of the body where overestimations were the greatest (Bergström, Stenlund, & Svedjehäll, 2000).

Mikolajczyk, Maxwell, El Ansari, Stock, Petkeviciene, & Guillen-Grima (2010) conducted an international study regarding weight perceptions in of students attending universities located in various European countries. The results of the study indicated that around 20% of females with a BMI of 20 kg/m\(^2\) considered themselves "a little too fat" or "too fat", and the percentages increased to 60% for a BMI of 22.5 kg/m\(^2\). However, male students rarely felt "a little too fat" or "too fat" below a BMI of 22.5 kg/m\(^2\), but most felt too thin with a BMI of 20 kg/m\(^2\) (Mikolajczyk, Maxwell, El Ansari, Stock, Petkeviciene, & Guillen-Grima, 2010). Interestingly, most female students described their weight as "just right" at a BMI <20 kg/m\(^2\), which is in the low range of a normal BMI, whereas most male students described their weight as "just right" at a BMI around 24 kg/m\(^2\), which is in the upper range of a normal BMI (Mikolajczyk, Maxwell, El Ansari, Stock, Petkeviciene, & Guillen-Grima, 2010).

According to Pingitore, Spring, & Garfieldt (1997), as BMI increased for both college aged males and females, they experienced increasing levels of body dissatisfaction. The pressures young adults feel to maintain a certain body weight and/or size can lead to serious consequences to their health (Malinauskas, Raedeke, Aeby, Smith, & Dallas, 2006; McCabe & Ricciardelli, 2004). Body dissatisfaction in males has been associated with poor psychological adjustment, eating disorders, steroid use, and exercise dependence (McCabe & Ricciardelli, 2004). Engaging in unhealthy physical
activity and food restriction behaviors as well as eating disorders has been associated with body dissatisfaction in females (Malinauskas, Raedeke, Aeby, Smith, & Dallas, 2006).

**Eating Disorders**

The National Institute of Mental Health (NIMH) defines an eating disorder as an illness that causes serious disturbances to one’s everyday diet, such as eating extremely small amounts of food or severely overeating (National Institute of Mental Health, 2011). Eating disorders are real, treatable medical illnesses that often coexist with other illnesses such as depression, substance abuse, or anxiety disorders. Eating disorders are serious and can be life-threatening if left untreated (National Institute of Mental Health, 2011). Anorexia nervosa, bulimia nervosa, and binge eating disorder are the most common types of eating disorders (National Institute of Mental Health, 2011). Anorexia nervosa is a psychiatric disorder characterized by an unrealistic fear of weight gain, self-starvation, and conspicuous distortion on body image (Medical Dictionary, 2008). One with anorexia nervosa is obsessed with becoming increasingly thinner and limits food to the extreme point where health is compromised (Medical Dictionary, 2008). Bulimia nervosa is characterized by consuming large amounts of food (binging) and then purging the food and calories by vomiting, fasting, using laxatives, or engaging in excessive exercise (Medical Dictionary, 2008). Binge eating disorder is characterized by recurrent binge eating (consuming very large amounts of food) without the regular use of compensatory measures to prevent weight gain, such as self-induced vomiting, to counter the binge eating (National Eating Disorders Association, 2013).
It is believed that the prevalence of eating disorders has grown over the past 50 years (Franco, 2012). Eating disorders have been reported in up to 4% of adolescents and young adults (Franco, 2012). The mid teenage years is the most common age of onset for anorexia nervosa (Fairburn, Harrison, & Brownell, 2003). The onset of bulimia nervosa is usually in adolescence but may be as late as early adulthood (Fairburn, Harrison, & Brownell, 2003). The exact prevalence of eating disorders in young children is unknown. However, children as young as five years have reported awareness of dieting and understand that vomiting can produce weight loss (Franco, 2012). In a national survey of college students, 20% of respondents reported that they suspected they had suffered from an eating disorder at some point in their lives (National Eating Disorders Association, 2006). Results of the American College Health Association’s National College Health Assessment (2008) stated that 3% of females and 0.4% of males reported ever receiving diagnosis of anorexia; 2% of females and 0.2% of males reported a previous diagnosis of bulimia; and 4% of females and 1% of males reported vomiting or taking laxatives to lose weight in the previous 30 days.

Both anorexia nervosa and bulimia nervosa are more commonly seen in females and estimates of female-to-male ratio range from 6:1 to 10:1 (Franco, 2012). Females involved in running, gymnastics, or ballet and males involved in body building or wrestling are at an increased risk for eating disorders (Franco, 2012). Eating disorders are most common in industrialized societies where being thin, especially for women, is considered attractive (Fairburn, Harrison, & Brownell, 2003). Although eating disorders are most common in western societies, such as the United States, the prevalence of eating
disorders in non-Western countries is growing. In some Asian countries, especially Japan and China, rates of eating disorders have been increasing (Lee, Ng, & Kwok, 2010). In the U.S., eating disorders are seen in all racial groups, but the highest prevalence of eating disorders occurs in white women (Franco, 2012).

**Anorexia Nervosa**

The fundamental elements of anorexia nervosa include refusal to maintain a minimally normal body weight, an intense fear of gaining weight, and significant disturbance in the perception of shape or size of one’s body (Franco, 2012). The American Psychiatric Association (2000) provides the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM IV) as criteria for eating disorders. According to the DSM IV criteria, the criteria for anorexia nervosa include the following (American Psychiatric Association, 2000):

1. Refusal to maintain body weight at or above a minimally normal weight for age and height: Weight loss leading to maintenance of body weight less than 85% of that expected or failure to make expected weight gain during period of growth, leading to body weight less than 85% of that expected.
2. Intense fear of gaining weight or becoming fat, even though underweight.
3. Disturbance in the way one’s body weight or shape are experienced, undue influence of body weight or shape on self evaluation, or denial of the seriousness of the current low body weight.
4. Amenorrhea (at least three consecutive cycles) in postmenarchal girls and women. Amenorrhea is defined as periods occurring only following hormone administration.

Anorexia nervosa contains two subtypes. The first is the restricting type: during the current episode of anorexia nervosa, the person has not regularly engaged in binge-eating or purging behavior, such as self-induced vomiting or misuse of laxatives, diuretics, or enemas. The second subtype is the binge-eating-purging-type: during the current episode of anorexia nervosa, the person has regularly engaged in binge-eating or purging behavior (American Psychiatric Association, 2000). Many patients have a combination of eating disorder symptoms that cannot be strictly categorized as either anorexia nervosa or bulimia nervosa and are technically diagnosed as eating disorder not otherwise specified (Franco, 2012).

The reported lifetime prevalence of anorexia nervosa among women ranges from 0.9% to 2.2%, and ranges from 0.2% to 0.3% in men (American Psychiatric Association, 2000). Swanson, Crow, Le Grange, Swendsen, & Merikangas (2011) studied 10,123 adolescents ages 13 to 18 years in the U.S., and estimated the prevalence of anorexia nervosa to be 0.3%. Eisenberg, Nicklett, Roeder, & Kirz (2011) studied the prevalence of eating disorders in college students in the U.S. and found that 2.2% of female undergraduates and 0.1% of male undergraduates had previously been diagnosed with anorexia nervosa. Similarly, Yager & O’Dea (2008) reported that the prevalence of anorexia nervosa on college campuses is between 1 and 4.2% among females.
**Bulimia Nervosa**

The fundamental features of bulimia nervosa are binge eating followed by inappropriate compensatory behaviors, such as fasting, vomiting, the use of laxatives, or exercising to prevent weight gain. According to the DSM-IV criteria, the criteria for bulimia nervosa include the following (American Psychiatric Association, 2000):

1. Recurrent episodes of binge eating characterized by both: eating, in a discrete period of time (e.g., within any 2-hour period), an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances; and a sense of lack of control over eating during the episode, defined by a feeling that one cannot stop eating or control what or how much one is eating.

2. Recurrent inappropriate compensatory behavior to prevent weight gain: self-induced vomiting, misuse of laxatives, diuretics, enemas, or other medications, fasting, and excessive exercise.

3. The binge eating and inappropriate compensatory behavior both occur, on average, at least twice a week for 3 months.

4. Self evaluation is unduly influenced by body shape and weight.

5. The disturbance does not occur exclusively during episodes of anorexia nervosa.

Similar to anorexia nervosa, bulimia nervosa contains two subtypes. The first, the purging type, is when the person has regularly engaged in self-induced vomiting or the misuse of laxatives, diuretics, or enemas during the current episode of bulimia nervosa.
The second type, the nonpurging type, is when the person has used inappropriate compensatory behavior but has not regularly engaged in self-induced vomiting or misused laxatives, diuretics, or enemas during the current episode of bulimia nervosa (American Psychiatric Association, 2000). Binge eating is usually triggered by feelings of unhappiness, interpersonal stressors, intense hunger following dietary restraints, or negative feelings related to body weight, shape and food. Binge eating usually occurs in secrecy, and unlike anorexia nervosa, patients with bulimia are typically within the normal weight range (Franco, 2012).

The reported estimates of lifetime prevalence of bulimia nervosa among women range from 1.5% to 2% and 0.5% in men (American Psychiatric Association, 2000). The prevalence of bulimia nervosa among adolescents in the U.S. ages 13 to 18 years old is 0.9% (Swanson, Crow, Le Grange, Swendsen, & Merikangas, 2011). Hoek & Van Hoeken (2003) determined that the prevalence rates of bulimia nervosa for young women were 1% and 0.1% for young men. Similarly, in a study of 2,822 undergraduate college students in the U.S., 1.7% of females and 0% of males reported that they had been diagnosed with bulimia sometime in their life (Eisenberg, Nicklett, Roeder, & Kirz, 2011). A study by Favaro, Ferrara, & Santonastaso (2003) indicated higher prevalence of bulimia nervosa in young women than that of the other studies. This study measured the prevalence of eating disorders in young women ages 18-25, and their data showed that 4.6% of the subjects had been diagnosed with bulimia nervosa at some point in their life (Favaro, Ferrara, & Santonastaso, 2003). These studies show that bulimia nervosa was more prevalent than anorexia nervosa in adolescents ages 13 to 18 years old (Swanson,

**Binge Eating Disorder**

A fairly new eating disorder, called binge eating disorder has been defined as uncontrolled binge eating without emesis or laxative abuse (Franco, 2012). Binge eating disorder criteria are classified by the DSM-IV as “criteria for further studies” (Franco, 2012). It is often associated with obesity, but not always. People who struggle with binge eating disorder can be of normal or heavier than average weight (National Eating Disorders Association, 2013). Symptoms of binge eating disorder include frequent episodes of consuming very large amounts of food but without behaviors to prevent weight gain, such as self-induced vomiting; a feeling of being out of control during the binge eating episodes; feelings of strong shame or guilt regarding the binge eating; and eating to the point of discomfort or eating alone because of shame about the behavior (National Eating Disorders Association, 2013). Binge eating disorder is often associated with symptoms of depression, and those struggling with the disorder often express distress, shame, and guilt over their behaviors (National Eating Disorders Association, 2013).

Data for the prevalence of binge eating disorder has varied. The National Comorbidity Survey Replication reported binge eating disorders in 3.5% of women and 2% of men. Of patients requesting treatment for obesity, 5% - 10% may have binge eating disorders (Franco, 2012). The National Eating Disorders Association (2013) reported that the prevalence of binge eating disorder is estimated to be 1-5% of the
general population. Like other eating disorders, binge eating disorder affects women more often than men; it is estimated that about 60% of people with binge eating disorder are female, while about 40% are male (National Eating Disorders Association, 2013). In a study of over 10,000 adolescents ages 13 to 18, lifetime prevalence of binge eating disorder was 1.6%, which was higher than the prevalence of anorexia and bulimia in this population (Swanson, Crow, Le Grange, Swendsen, & Merikangas, 2011). Hoek & Van Hoeken (2003) found the prevalence of binge eating disorder to be around 1% in young adults. Desai, Miller, Staples, & Bravender (2008) did not research the prevalence of binge eating disorder directly, but assessed eating perceptions and behaviors in undergraduate college students. Of the 2,825 students who participated in the survey, 28.7% were at an increased risk for binge eating disorder. Also, participants who were overweight were more likely to display an increased fear of binging and preoccupation with food (Desai, Miller, Staples, & Bravender, 2008).

The EAT-26 Survey as a Measurement of Disordered Eating

The Eating Attitudes Survey-26 (EAT-26) is the most widely used assessment of eating disorder tendencies, and was first designed to be administered in practical, nonclinical settings by health care professionals (Garner & Garfinkel, 1979). The survey can also be self-administered. The survey started out as a 40 question survey, but was later condensed to being 26 questions (Garner & Garfinkel, 1979). The EAT-26 has been proved to be a valid and reliable indicator for screening persons at risk for the development of an eating disorder, especially in high school, college, and other special risk populations (Garner, Olmsted, Bohr, & Garfinkel, 1982).
The EAT-26 survey asks questions regarding diet behavior, bulimia, food preoccupation, and oral control (Garner, Olmsted, Bohr, & Garfinkel, 1982). These factors that are measured are an indicator of different types of eating disorders. The survey is measured on a six-point Likert scale, ranging from “Always”, “Usually”, “Often”, “Sometimes”, “Rarely”, to “Never”. A high score on the EAT-26 may indicate disordered eating habits; however, this test alone does not yield a specific diagnosis of an eating disorder (Garner & Garfinkel, 1979). Individuals who score a 20 or more on the test should be interviewed by a qualified professional to determine if they meet the diagnostic criteria for an eating disorder (Garner & Garfinkel, 1979).

Results of Past EAT-26 and Similar Surveys

Several studies have used the EAT-26 survey as a means to evaluate eating attitudes and disordered eating habits in the college population. Desai, Miller, Staples, & Bravender (2008) used the EAT-26 questionnaire to assess 4,201 undergraduate and graduate students from three different universities in the U.S. Results of the study demonstrated that 15% of students scored a 20 or higher on the EAT-26, which indicates disordered eating habits and an increased risk for eating disorders (Desai, Miller, Staples, & Bravender, 2008). Studies have shown that more females than males score a 20 or higher on the EAT-26 survey (Hoerr, Bokram, Lugo, Bivins, & Keast, 2002; Nelson, Hughes, Katz, & Searight, 1999). In a study of 1620 college students, 10.9% of women and 4.0% of men were at risk for eating disorders as evidenced by a score of 20 or higher on the EAT-26 (Hoerr, Bokram, Lugo, Bivins, & Keast, 2002) Nelson, Hughes, Katz, &
Searight (1999) conducted a smaller study of undergraduate students (n=471) and found that 10% of males and 20% of females scored a 20 or higher on the EAT-26.

Along with the use of the EAT-26 survey, Desai, Miller, Staples, & Bravender (2008) asked participants in their study of 4,201 college students to answer additional questions regarding eating disorder behaviors. The study found that 5.7% of students with a normal BMI (18.5-24.9), and 5.9% of students with a BMI considered overweight or obese (25 or higher) reported that they had engaged in purging behaviors before. Additionally, 7.9% of normal weight students and 11.4% of overweight/obese students reported that they always, usually, or often binge eat with fear of not stopping (Desai, Miller, Staples, & Bravender, 2008). Eisenberg, Nicklett, Roeder, & Kirz (2011) did not use the EAT-26 survey in their study, but asked 2,822 university students similar questions about eating disorder behaviors. Results of the study indicated that that nine percent of undergraduate students and 9.4% of graduate students answered yes to “do you make yourself sick because you feel uncomfortably full;” 17.3% of undergraduate students worried that “they have lost control over how much they eat;” and five percent of undergraduates reported that they had lost more than 14 lbs. in three months (Eisenberg, Nicklett, Roeder, & Kirz, 2011).

**Recommended Calorie and Nutrient Intake for Young Adults**

Calorie intake recommendations for young adults differ depending on gender and activity level. Calorie needs for females ages 18-24 range from 1800-2400 calories per day. For males, ages 18-24, calorie needs range from 2400-3000 calories per day (USDA Dietary Guidelines for Americans, 2010). With each range, the low end of the range is
for sedentary individuals and the high end of the range is for active individuals. The 2010 Dietary Guidelines suggest that young adults should consume 25-35% of their daily calories from fat (with ≤10% of calories coming from saturated fat), 45-65% of their total calories from carbohydrates, and 12-20% of their total calories from protein. Sodium should be limited to no more than 2,300 mg/day and dietary cholesterol should be limited to ≤300 mg/day (USDA Dietary Guidelines for Americans, 2010). According to the 2010 Choose MyPlate Dietary Guidelines, young adults should consume two cups of fruit, two and a half to three cups of vegetables, six to eight oz. of grains, five to six and a half oz. of protein foods, and three cups of dairy foods daily. Higher consumption of fruits, vegetables, high-fiber whole grains, omega-three fatty fish, and low-fat dairy is encouraged. Foods high in saturated fats, sodium and added sugars should be limited (Choose MyPlate Dietary Guidelines, 2010).

**Actual Nutrient Intake and Diet of College Students**

Research has shown that the diet of college students often do not adhere to the national dietary guidelines (Lowry, Galuska, Fulton, Wechsler, Kann, & Collins, 2000; Racette, Deusinger, Strube, Highstein, & Deusinger (2005). A diet abundant in high fat foods and lacking in fruits and vegetables is not uncommon among freshmen college students (Lowry, Galuska, Fulton, Wechsler, Kann, & Collins, 2000; Racette, Deusinger, Strube, Highstein, & Deusinger (2005). Lowry, Galuska, Fulton, Wechsler, Kann, & Collins (2000) used data from the 1995 National College Health and Risk Behavior Survey to determine that only one in four college students ate five or more servings/day of fruits of vegetables, and three in four students ate two or less servings/day of high-fat
foods. A study conducted by Racette, Deusinger, Strube, Highstein, & Deusinger (2005), found that only 30% of freshmen students consumed at least five fruits and vegetables daily. The study also found that 41% of students ate three or more fried foods during a one week period and 46% consumed three or more high-fat fast foods during a one week period (Racette, Deusinger, Strube, Highstein, & Deusinger, 2005). Dinger (1999) also observed similar findings with regards to fruit/vegetable and high fat foods consumption in college students. Her data demonstrated that the mean fruit and vegetable intake of students was only 2.9 servings per day, which is much less than the USDA recommendation of five or more servings/day. Dinger (1999) also observed that college students consumed on average 2.41 servings of high fat meats, snacks, and/or desserts compared to the CDC recommendation of two or fewer servings/day. One study done by Morse & Driskell (2009) found that most college students eat at fast-food restaurants one to three times per week. However, less than seven percent of students typically ate both lunch and dinner at a fast food restaurant (Morse & Driskell, 2009).

A decline in dairy intake in young adults has been observed in the last few years (Poddar, Hosig, Nickols-Richardson, Anderson, Herbert, & Duncan, 2009). Poddar, Hosig, Nickols-Richardson, Anderson, Herbert, & Duncan (2009) studied the dairy intake of 76 college students and found that total dairy, low-fat dairy, and calcium intakes were low among this population. In the study, the majority of participants (76%) consumed less than two servings per day of total dairy. Low-fat dairy intake ranged from 0 to 1.9 servings per day (Poddar, Hosig, Nickols-Richardson, Anderson, Herbert, & Duncan, 2009). Similar to low-fat dairy intake, the consumption of whole grains in young adults
is still lower than the recommended amount of three servings per day (Nettleton, Steffen, Loehr, Rosamond, & Folsom, 2008). Young adult males consume an average of around 0.68 servings of whole grains per day, and females consume 0.58 servings (Nettleton, Steffen, Loehr, Rosamond, & Folsom, 2008). Availability of whole grain bread and preference for the taste of whole grains were associated with higher whole grain intake in young adulthood. Also, fast-food intake was associated with lower intake of whole grains (Nettleton, Steffen, Loehr, Rosamond, & Folsom, 2008). On the contrary, protein intake in both male and female young adults is adequate (Fulgoni, 2008). The 2003-2004 National Health and Nutrition Examination Survey found that the young adult male population who consumed less than the estimated average requirement of protein was very low, and only seven percent of young adult females consumed protein below their estimated average requirement (Fulgoni, 2008).

Huang, Song, Schemmel, & Hoerr (1994) examined the dietary habits and foods commonly consumed by college students. The study by Huang, Song, Schemmel, & Hoerr (1994) found that popular food items included skim or low fat milk, low fat meats, pizza, hamburgers, and sandwiches. The potato was the most common vegetable consumed and various forms of the potato were eaten. The most frequently consumed non-starch vegetable was tossed salad, and common fruits included apples, oranges, and bananas (Huang, Song, Schemmel, & Hoerr, 1994). Huang, Song, Schemmel, & Hoerr (1994) also found that frequently consumed snacks were diet and regular carbonated beverages, popcorn, chips, candy bars, cookies, apples, and pizza. A study by Ferrara, Nobrega, & Dulfan (2013) suggested that dietary intake in college students may differ
based on major. Their study found that students who were studying health-related professions had a healthier diet intake, and were more likely to consume the recommended amount of five or more servings per day of fruits and vegetables (Ferrara, Nobrega, & Dulfan, 2013).

**Physical Activity Recommendation for Young Adults**

All young adults need some type of physical activity and all individuals who participate in at least some physical activity will receive health benefits (USDA Dietary Guidelines for Americans, 2010). According to the Centers for Disease Control (2011), adults need two and a half hours of moderate-intensity aerobic activity per week and should do muscle-strengthening activities on two or more days a week that work all major muscle groups. Instead one may also choose to do 75 minutes of vigorous-intensity aerobic activity each week plus muscle-strength activities on two or more days a week that work all major muscle groups (Centers for Disease Control and Prevention, 2011). For additional and more extensive health benefits, young adults should increase their physical activity to five hours a week of moderate-intensity activity or 150 minutes a week of vigorous-intensity aerobic physical activity (USDA Dietary Guidelines for Americans, 2010).

**Types and Frequency of Physical Activity Observed in College Students**

A study by Racette, Deusinger, Strube, Highstein, & Deusinger (2005) used questionnaires to assess the physical activity habits of college freshmen. Their data showed that only about half of the participants engaged in regular aerobic exercise, and 30% did not engage in any exercise on a regular basis. Pinto, Cherico, Szymanski, &
Marcus (1998) also had similar findings; their data indicated that 58% of freshmen participants were active (exercised at or above criterion levels), and 42% were sedentary (inactive or exercised below recommended levels). Another study conducted by Pinto (1995) involving undergraduate and graduate students found that 54% of students exercised regularly (more than three times/week), 28% exercised irregularly (one-two times/week), and 18% were inactive (less than once/week). Lowry, Galuska, Fulton, Wechsler, Kann, & Collins (2000) analyzed data from the 1995 National College Health Risk Behavior Survey and found that among all undergraduate college students, 37.6% of students participated in vigorous physical activity three or more days/week, 29.9% of students participated in muscle strengthening exercises (exercises such as push-ups, sit-ups or weight lifting) three or more days/week, and 19.5% of students participated in moderate physical activity (walking or bicycling at least 30 minutes at a time) five or more days/week. Racette, Deusinger, Strube, Highstein, & Deusinger (2005) and Lowry, Galuska, Fulton, Wechsler, Kann, & Collins (2000) observed differences in the physical activity choices for males and females. Female students were less likely than male students to participate in vigorous physical activity (Lowry, Galuska, Fulton, Wechsler, Kann, & Collins, 2000), and more male students engaged in strength training (Racette, Deusinger, Strube, Highstein, & Deusinger, 2005).

**Weight Changes in Freshmen College Students after their First Year of College**

Several studies have shown that there is a small, but significant weight gain in freshmen college students after they complete their first year (Wengreen & Moncur, 2009; Delinsky & Wilson, 2008; Holm-Denoma, Joiner, Vohs & Heatherton, 2008). The
colloquial notion of the “Freshman 15,” refers to the idea that freshmen gain weight after their first year of college, and that the weight gain is around 15 pounds (lbs.). However in the research, it is rare to see many freshmen students actually gaining 15 lbs. In a study done by Delinsky & Wilson (2008), only nine out of 147 participants (6.1%) gained 15 or more lbs. An average weight gain of three to six lbs. is seen after the first year of college (Wengreen & Moncur, 2009; Delinsky & Wilson, 2008; Holm-Denoma, Joiner, Vohs & Heatherton, 2008). However, higher numbers of weight gain has also been observed in college freshmen. According to Wengreen & Moncur (2009), clinically significant weight gain is defined as being five percent or more of an individual’s baseline body weight. A study conducted by Wengreen & Moncur (2009), observed that 23% of participants gained an amount of weight five percent or more of their body weight. The average amount of weight gained for those who gained five percent or more of their body weight was 9.9 lbs (Wengreen & Moncur, 2009). Holm-Denoma, Joiner, Vohs & Heatherton (2008) studied the weight changes of freshmen three, six, and nine months into their first year and found that most of the participants appeared to gain weight early in the year (i.e. by November), and after that the weight gain was maintained. Much of the research has only examined weight change in terms of BMI or pounds gained; however, Hajhosseini, Holmes, Mohamadi, Goudarzi, McProud, & Hollenbeck (2006) studied the body composition changes in freshmen students and found that percent fat mass significantly increased, while lean body mass decreased.

After reviewing the weight changes, it is important to understand how the weight gain affects the number of people who are overweight or obese. In one study done by
Delinsky & Wilson (2009), the small weight gain that was observed in the participants did not result in significant increases in the classification of overweight or obesity. The changes in frequency of overweight and obesity were an increase of 2.4% for overweight and 0.8% for obese. On the contrary, Anderson & Lundgren (2003) found that the proportion of students classified as overweight or obese in their study increased significantly after the first year of college. In their study, 10.8% of the participants that were originally classified as normal weight in September were reclassified as overweight or obese in May. The total number of freshmen who were classified as overweight or obese at the end of freshmen year was 22%, which was almost double the amount of those who were defined as overweight or obese in the beginning of the year (Anderson & Lundgren, 2003). Thus the study concluded that the freshmen year of college could be considered a critical period for weight gain for some students (Anderson & Lundgren, 2003).

**Overview of Causes for Weight Changes in Freshmen College Students**

Diet change in freshmen students is one of the main causes of weight change that is observed (Kasparek, Corwin, Valois, Sargent, & Morris, 2008; Hoffman, Policastro, Quick, & Soo-Kyung Lee, 2006). Many universities require students to live on campus and purchase a meal plan. A large part of these meal plans is often similar to an all-you-can-eat-buffet, which results in students consuming larger portions than normal (Kasparek, Corwin, Valois, Sargent, & Morris, 2008). Freshmen students tend to decrease their fruit and vegetable intake after coming to college, and this may be a factor that causes weight gain (Kasparek, Corwin, Valois, Sargent, & Morris, 2008). The
significant weight gain observed in freshmen in a study by Hoffman, Policastro, Quick, & Soo-Kyung Lee (2006) suggests that calorically, students who gained weight had a steady positive energy balance during their 7-month study period. Physical activity change is another major factor that impacts freshmen weight changes (Kasperek, Corwin, Valois, Sargent, & Morris, 2008). Kasperek, Corwin, Valois, Sargent, & Morris (2008) found that students with low-frequency physical activity were twice as likely to be overweight. Data from the Kasperek, Corwin, Valois, Sargent, & Morris (2008) study also showed that students categorized as high frequency for low-intensity physical activities were more likely to have lower follow-up BMI scores than those who were categorized as moderate and low frequency for high/moderate-intensity physical activity.

Other factors besides diet and physical activity may affect weight changes for freshmen students. Alcohol consumption is one of the selected behaviors that influence college freshmen weight gain in the study conducted by Kasperek, Corwin, Valois, Sargent, & Morris (2008). Weidner, Kohlmann, Dotzauer, & Burns (1996) proposed that academic stress affects health behaviors in young adults, and Melton, Langdon, & McDaniel (2013) studied the link between obesity and sleep trends in college students. Additionally, weight changes can be caused by increasing age. Age is one of the most important factors in energy metabolism, and the basal metabolic rate (BMR) decreases almost linearly with age (Shimokata & Kuzuya, 1993). BMR is the energy expenditure of an individual after a 12 to 14 hour overnight fast during a period of mental and physical rest in a thermoneutral environment and reflects energy use of the body for such basic functions (Roberts & Rosenberg, 2006). As people age, their metabolism slows
down and their needs decrease. An increase in fat tissue and decrease in muscle mass take place in the body as age increases (Shimokata & Kuzuya, 1993). Decline in metabolism combined with continuation of poor lifestyle habits as in one’s younger years could contribute to weight gain.

**Meal Patterning During the First Year of College**

Low fruit and vegetable intake along with higher intakes of fried foods and high-fat fast foods was observed in one study by Racette, Deusinger, Strube, Highstein, & Deusinger (2005). Butler, Black, Blue, & Gretebeck (2004) studied diet changes in female college freshmen. The authors found that caloric intake significantly decreased by 348 kcal per day. A decreased amount of fats, carbohydrates, and proteins were consumed by the female freshmen students, however an increase in calories from alcoholic beverages was observed (Butler, Black, Blue, & Gretebeck, 2004). They also observed a decrease in the vegetable, bread/pasta, milk, and meat food groups. The study compared the participants’ nutrient intake to the Dietary Guidelines and found deficiencies in intake of daily fruits, vegetables, breads and pastas, and meats (Butler, Black, Blue, & Gretebeck, 2004). A 1994 study by Huang, Song, Schemmel, & Hoerr examined the eating practices of college students and found that breakfast was the most frequently skipped meal. Approximately one in four to five college students in the study skipped breakfast. The consumption of eating breakfast is important, because it has been linked to maintaining a healthy weight and having a lower BMI (Cho, Dietrich, Brown, Clark, & Block, 2003). Huang, Song, Schemmel, & Hoerr (1994) also determined that 80% of participants stated that they snacked at least once a day.
Physical Activity Patterns during the First Year of College

Butler, Black, Blue, & Gretebeck (2004) suggested that a reduction in physical activity during the freshman year is primarily responsible for the changes in body weight that are often observed in first year students. The study by Butler, Black, Blue, & Gretebeck (2004) saw an increase in body weight in freshmen students, but dietary intake had actually decreased throughout the first year. These observations allowed the authors to come to the conclusion that the decline in physical activity was largely responsible for weight gain, as well as fat mass increase and fat-free mass decrease (Butler, Black, Blue, & Gretebeck, 2004). Although many freshmen students still participate in physical activity throughout their first year, the types of physical activity they engage in changes (Butler, Black, Blue, & Gretebeck, 2004; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005). Racette, Deusinger, Strube, Highstein, & Deusinger (2005) found that exercise participation was consistent throughout the year for students, but an increase in stretching exercises was observed in the data. Butler, Black, Blue, & Gretebeck (2004) observed significant decreases in total physical, occupational, and sport activities, but saw a significant increase in leisure activities. A study done by Dinger (1999) determined that most students were not meeting the general current physical activity guidelines. Dinger (1999) measured the amount of participation per week for college freshmen in various types of physical activity; vigorous, moderate, flexibility, and muscular strength and/or endurance activities. The data indicated that the mean average for weekly participation in all types of physical activities were lower than public health recommendations, especially in vigorous and moderate physical activity (Dinger, 1999).
Alcohol Consumption of College Students and its Effects on Weight Gain

Numerous studies have shown that the prevalence of alcohol consumption is high among college students (Ham & Hope, 2003; Wechsler, Lee, Nelson, & Kuo, 2002). A study conducted by Wechsler, Lee, Nelson, & Kuo (2002) found that 63% of college students reported drinking alcohol in the past 30 days, and 42% reported drinking to excess, or binge drinking. Another study conducted in the United Kingdom by Morton & Tighe (2011) found that an alarmingly high number of university students (92.5%) in their study were classified as binge drinkers and exceeded the weekly guidelines for sensible drinking. Their study also determined that 90% of the students were not aware of the sensible drinking guidelines (Morton & Tighe, 2011). Research by Kasparek, Corwin, Valois, Sargent, & Morris (2008) specifically studied the alcohol consumption increase during the first year of college. Kasparek, Corwin, Valois, Sargent, & Morris (2008) found that in the beginning of the school year, 35.2% of freshmen participants reported never having consumed alcohol, but at the end of their freshmen year, only 27.5% reported never having consumed alcohol.

A study conducted by Lloyd-Richardson, Lucero, DiBello, Jacobson, & Wing, (2008) researched the effects that alcohol consumption had on eating patterns before, during, and after drinking in college freshmen. Those who were moderate-risk drinkers were more likely than low-risk drinkers to eat more food after drinking, make less healthy food choices, and indicate that alcohol increased their appetite (Lloyd-Richardson, Lucero, DiBello, Jacobson, & Wing, 2008). One-third of students in the study who reported drinking in the past 30 days indicated that alcohol increased their
appetite; 36.1% of these students described eating larger amounts of food after consuming alcohol, and 39% said their food choices were less healthy after drinking (Lloyd-Richardson, Lucero, DiBello, Jacobson, & Wing, 2008). This study also found that the moderate drinkers were more likely to be overweight (Lloyd-Richardson, Lucero, DiBello, Jacobson, & Wing, 2008). Continued exposure to the excess calories obtained from alcohol and consumption of high-fat foods after a drinking episode can lead to weight gain (Tremblay, Wouters, Wenker, St-Pierre, Bouchard, & Despres, 1995). The study by Lloyd-Richardson, Lucero, DiBello, Jacobson, & Wing (2008) suggests that students may not realize the relationship between weight gain and excess drinking. Among the students who reported drinking in the past month, 65.7% were unaware of the calorie content of the alcoholic beverages that they typically consumed (Lloyd-Richardson, Lucero, DiBello, Jacobson, & Wing, 2008).

However, some college students are very aware of the relationship between weight gain and drinking alcohol and may engage in disordered eating because of this fact. A fairly new phenomena known as “drunkorexia” was studied by Burke, Cremeens, Vail-Smith, & Woolsey (2010). The term “drunkorexia” was coined by popular media in 2008 to describe the practice of restricting calories prior to drinking so that more alcohol can be consumed without gaining weight (Kershaw, 2008). The results of the study showed that 14% of first year university students reported restricting their calories prior to drinking. Six percent reported that their reason for doing this was to avoid weight gain and 10% reported doing this to enhance alcohol effects (Burke, Cremeens, Vail-Smith, & Woolsey, 2010).
Stress Levels of College Students and Effects on Health Behaviors

Freshmen college students are particularly prone to stress due to the transitional nature of college life (Ross, Niebling, & Heckert, 1999). Stress levels may have a direct affect on the dietary and physical activity habits of college students (Humphrey & McCarthy, 1998; Serlachius, Hamer, & Wardle, 2007; Wiedner, Kohlmann, Dotzauer, & Burns, 1996). Wiedner, Kohlmann, Dotzauer, & Burns (1996) measured changes in health behaviors in college students during low stress and high stress periods and compared the two. Decreases in the quality of nutrition were linked to periods of high stress time (Wiedner, Kohlmann, Dotzauer, & Burns, 1996). Dissatisfaction with diet in college students has been linked to an increase in stress (Humphrey & McCarthy, 1998). A study conducted in the United Kingdom also found that stress was associated with a greater risk of weight gain in first year college students, especially in women (Serlachius, Hamer, & Wardle, 2007). High workloads for adults are associated with higher energy and saturated fat and sugar intake (Wardle, Steptoe, Oliver, & Lipsey, 2000). Because of the increase in energy, saturated fat, and sugar intake when stress is high, if work stress is high or frequent, then adverse dietary changes could result, increasing the likelihood of weight gain (Wardle, Steptoe, Oliver, & Lipsey, 2000).

The results of the study done by Wiedner, Kohlmann, Dotzauer, & Burns (1996) indicated that exercise was the most likely health behavior to decline during high periods of stress for students. Wiedner, Kohlmann, Dotzauer, & Burns (1996) concluded that because exercise was the most time consuming of all the health behaviors, it was one of the first health behaviors to be affected by higher periods of stress for students.
Humphrey & McCarthy (1998) determined that there was a link between stress levels and the amount one exercised. Students who found time to engage in some sort of physical activity reported being less stressed than students who were not regularly physically active (Humphrey & McCarthy 1998).

**Sleep Patterns in College Students and Possible Link to Weight Gain**

Lack of sleep or sleep disturbances is not unusual to observe in college students (Buboltz, Brown, & Soper, 2001; Lund, Reider, Whiting, & Prichard, 2010). Bubolz, Brown, & Soper (2001) studied the sleep patterns and habits of 191 undergraduate students and found that only 11% had good sleep quality. A large majority of the students (73%) indicated that they had at least occasional sleep problems, and 15% of the students had sleep patterns that was rated as poor (Bubolz, Brown, & Soper, 2001). A similar study conducted by Lund, Reider, Whiting, & Prichard (2010) found that 60% of college students in their study were categorized as poor-quality sleepers according to Sleep Quality Index measurement scale that was used.

Elevated BMI has been linked to poor sleep behaviors as well as habitual sleep amounts below seven to eight hours of sleep per night (Kripke, Garfinkel, Wingard, Klauber, & Marler, 2002). Taheri, Lin, Austin, Young, & Mignot (2004) observed that an increase BMI was proportional to decreased sleep. Taheri, Lin, Austin, Young, & Mignot (2004) also examined the relationship between short sleep and two hormones that affect appetite regulation, leptin and ghrelin. Leptin is a hormone that suppresses appetite (Zigman & Elmquist, 2003), while ghrelin is a peptide that stimulates appetite.
Lower leptin levels were associated with shorter habitual sleep (5 hours versus 8 hours) and higher ghrelin was also associated with shorter sleep (Taheri, Lin, Austin, Young, & Mignot, 2004). The differences observed in leptin and ghrelin are likely to increase appetite, which may explain the increased BMI observed with short sleep duration (Taheri, Lin, Austin, Young, & Mignot, 2004).

Although a lot of literature has shown that there is an association between sleep duration and body weight, some research on this topic has not demonstrated this. Melton, Langdon, & McDaniel (2013) studied whether there was a possible link between obesity and sleep trends in college students and found that neither BMI or abdominal fat were related to sleep duration. In another study by Wengreen & Moncur (2009), college students who gained five percent or more body weight in their first year of college slept more than students who did not gain five percent or more body weight.

The Effects of On-Campus Living on the Diets of College Freshmen

Research has found that living on-campus may affect the diet of college freshmen (Jackson, Berry, & Kennedy, 2009; Levitsky, Halbmaier, & Mrdjenovic, 2004). A study by Levitsky, Halbmaier, & Mrdjenovic (2004) examined the relationship between on-campus living and possible weight gain in college freshmen. Many college dining halls serve large portions or offer all-you-can-eat dining services. This greater abundance and variety of food available in dining halls on-campus may promote excess intake of energy needs (Levitsky, Halbmaier, & Mrdjenovic, 2004). Easy accessibility of junk foods in dormitories and classrooms as well as more frequent snacking are other factors that may
contribute to weight gain for those living on-campus (Levitsky, Halbmaier, & Mrdjenovic, 2004).

According to Jackson, Berry, & Kennedy (2009), students that live at home during their freshman year have healthier eating behaviors than students who live on-campus. Students living on-campus consume more fast foods and drink nearly twice as much alcohol per week than those living at home (Jackson, Berry, & Kennedy, 2009). Brevard & Ricketts (1996) compared the dietary intake and serum lipid levels of college students living on and off campus. Their data showed that dietary intake of protein is higher in those living off-campus, especially men, but more kilocalories were consumed by students living on-campus (Brevard & Ricketts, 1996). Interestingly, serum triglyceride levels were higher in individuals living off-campus. Brevard & Ricketts (1996) proposed that university food service directors are challenged to offer low-fat foods for students, therefore the students living on campus had lower serum triglyceride levels. According to Brunt & Rhee (2008), students who live on-campus engage in healthier dietary behaviors than those who live off-campus (without parents). Students living on-campus also consume a larger variety of fruits, vegetables, and dairy products, and consume less alcohol than those living in off-campus housing (Brunt & Rhee, 2008). Overall, students living at home have the best diet, but those living on-campus still have better dietary habits than those living in off-campus housing (Brunt & Rhee, 2008; Jackson, Berry, & Kennedy, 2009).
**Dorm Foods and Dining Halls**

Many universities require freshmen to live on campus and purchase a meal plan. The nutritional quality of college dining halls may not necessarily be unhealthy; however these dining halls are often set up similar to an all-you-can-eat buffet, making it easy for students to overeat (Kasparek, Corwin, Valois, Sargent, & Morris, 2008). Many on-campus students also keep food in their dorm rooms to eat in between meals or when dining halls are closed. Nelson & Story (2009) assessed the types of food and beverages that students kept in their dorm rooms. The researchers found that most common food items that students had were salty snacks and other savory items (88%), cereal or granola bars (78%), main dishes (78%), desserts or candy (75%), and sugar-sweetened beverages (71%) (Nelson & Story, 2009). Low-calorie beverages, fruits and vegetables, dairy products, tea/coffee, and 100% fruit/vegetable juice were other items present in the dorm room, but they were not as common (Nelson & Story, 2009). The average number of food and beverage items that students had in their dorm room was 47, and the average number of kilocalories from all the items per dorm room was 22,888 kcals (Nelson & Story, 2009).

**Knowledge, Attitudes, and Perceptions of College Students Regarding Possible Weight Changes and the “Freshman 15”**

Although many college freshmen tend to gain weight during their first year of college, a number of college students are worried about gaining weight and want to prevent this possible weight gain (Delinksy & Wilson, 2008; Wharton, Adams, & Hampf, 2008). Research has shown that about half of all college freshmen are trying to lose
According to a study done by Delinsky & Wilson (2008), 96% of freshmen participants had heard of the “Freshman 15” and could accurately define it. When asked about their level of concern regarding the “Freshman 15,” 15% reported they were “extremely concerned” about it, 21% answered “a lot,” 24% answered “moderately,” 24% answered “somewhat,” and 18% were not at all concerned about the “Freshman 15” (Delinsky & Wilson, 2008). Studies have shown that many college freshmen, especially women, will perceive themselves as being overweight even though they are not (Delinsky & Wilson, 2008; Wharton, Adams, & Hampl, 2008). Although they did not meet criteria for overweight or obesity, the participants in the Delinsky & Wilson study (2008) were more likely to describe themselves as overweight at the end of their first year of college. In April of their first year of college, 37% of the sample described themselves as overweight, but only 18% of the sample were actually overweight or obese (Delinsky & Wilson, 2008).

Research has demonstrated that female college students are much more concerned about weight loss or maintenance than male college students, despite the fact that males students were more likely to be overweight (Davy, Benes, & Driskell, 2006; Lowry, Galuska, Fulton, Wechsler, Kann, & Collins, 2000; Wharton, Adams, & Hampl, 2008). One study showed that women were significantly more likely to be attempting to lose or maintain weight and were more likely than men to be involved in exercise, diet, vomiting, use of laxatives, or use of diet pills for weight loss (Wharton, Adams, & Hampl, 2008). According to Davy, Benes, & Driskell (2006), college women were much
more likely than college men to have tried a low-fat or low-carbohydrate diet, and were also more likely to be concerned about the amount of fats or sugars in their diets. Even though college women tend to worry about diet and weight changes more than college men, women are more likely than men to have inaccurate body weight perceptions about themselves (Wharton, Adams, & Hampl, 2008).

**Prior Knowledge of College Students Regarding Proper Nutrition and Physical Activity Needs**

Eating habits tend to become worse during college (Grace, 1997). It is important to assess the knowledge that college students have regarding proper nutrition in order to recognize whether lack of nutrition knowledge is a reason for poor dietary intake (Kolodinsky, Harvey-Berino, Berlin, Johnson, & Reynolds, 2007). According to Davy, Benes, & Driskell (2006), college students have a wide range of sources that they look to obtain nutrition information from. Family members, classes, and magazines/newspapers were the top sources that college students go to for nutrition information. Friends, television, books, and health professionals were also some of the other source that students may use (Davy, Benes, & Driskell, 2006).

The study done by Davy, Benes, & Driskell (2006) asked college students questions about their nutrition knowledge. The study found that 94.4% of the participants agreed that it is important to eat a variety of foods for good health; three-quarters of participants agreed that the nutritional content of foods is important and that the right ratio of carbohydrates, fats, and proteins in necessary to achieve/maintain health; and two-thirds of participants thought that the best method for weight management is to
control energy intake (Davy, Benes, & Driskell, 2006). Nurliyana, Norazmir, & Anuar (2011) also studied the level of nutrition knowledge of over 300 Malaysian university students and determined that 55% of students had a high level of basic nutrition knowledge, 35% of students had a medium level of knowledge, and nine percent of participants had low basic nutrition knowledge. Female students scored slightly higher than male students with regards to basic nutrition knowledge (Nurliyana, Norazmir, & Anuar, 2011). It is important for college students to have a good understanding of nutrition, because according to Kolodinsky, Harvey-Berino, Berlin, Johnson, & Reynolds (2007), increased knowledge of dietary guidance is positively related to more healthful eating patterns and meeting the *Dietary Guidelines for Americans*.

A qualitative study by Behrens, Dinger, Heessch, & Sisson (2005) found that most college students understand the definition of physical activity, but are confused about the frequency and duration of the physical activity recommendations. Morrow, Jackson, Bazzarre, Milne, & Blair (1999) had similar finding in their study and found that only 32% of Americans and 16% of those in the college age range (18-25) had heard of the physical activity recommendations. The student participants in the study conducted by Behrens, Dinger, Heessch, & Sisson (2005) study gave a wide range of answers when asked how many days per week they should engage in moderate physical activity, and only female students correctly identified the recommended duration of physical activity per day.

College students are aware of the health benefits of engaging in regular physical activity, but they tend to focus on the immediate benefits of physical activity, rather than
the long term benefits (Behrens, Dinger, Heessch, & Sisson, 2005). Behrens, Dinger, Heessch, & Sisson (2005) suggest that college students may feel invulnerable to chronic disease. A study done by Anand, Tanwar, Kumar, Meena, & Ingle (2011) in New Delhi supports the findings of Behrens, Dinger, Heessch, & Sisson (2005). Anand, Tanwar, Kumar, Meena, & Ingle (2011) studied the knowledge that medical undergraduate university students had regarding the physical activity recommendations. The results of the study showed that while nearly all participants (96%) knew the benefits of regular physical activity, only 9.3% of students were aware of the recommended amounts of physical activity for adults (Anand, Tanwar, Kumar, Meena, & Ingle, 2011).

**College Students’ Knowledge and Attitudes about Cooking and Food Preparation**

Food preparation at home is associated with better diet quality (Larson, Perry, Story, & Neumark-Sztainer, 2006). A study conducted by Soliah, Walter, & Antosh (2006) researched the food preparation knowledge and practices of college women. Most of the women (90% or more) knew how to make basic foods such as hamburgers and scrambled eggs, but only around 25% were able to make items that were not as basic, such as quiche and pizza sauce (Soliah, Walter, & Antosh, 2006). Larson, Story, & Neumark-Sztainer (2006) studied the food preparation behaviors and cooking skills of young adults and found that the majority of young adults bought fresh vegetables and prepared meals at least once per month. However, weekly reports of these types of behaviors were not common. Females were nearly two times more likely to be involved with food preparation than males, and young adults living with their parents or campus
housing were less involved in food preparation (Larson, Perry, Story, & Neumark-Sztainer, 2006).

According to Larson, Perry, Story, & Neumark-Sztainer (2006), the majority (almost 79%) of young adults think that their skills and resources for food preparation are adequate. The two dominant reasons that college women were unable to prepare basic foods were that they had never been taught (knowledge barrier) and that they did not have an interest in learning (attitude barrier) (Soliah, Walter, & Antosh, 2006). Lack of time is another barrier to being able to prepare meals (Larson, Perry, Story, & Neumark-Sztainer, 2006). In addition to these reasons, other barriers to food preparation included money to buy food, home appliances needed, and a selection of acceptable food in local stores (Betts, Amos, Keim, Peters, & Stewart, 1997). Soliah, Walter, & Antosh (2006) also found that the ability to prepare certain foods decreased when eating out frequency increased.

National health objectives from Healthy Campus 2010 stated that there was a need for more nutrition education in colleges and universities including cooking and food preparation education (Healthy Campus 2010 Manual, 2002). One study by Clifford, Anderson, Auld, & Champ (2009) used a weekly television series about cooking to determine whether the cooking program improved cooking self-efficacy, knowledge, attitudes, and behaviors in college students living off-campus. The intervention group in the study watched one episode of the cooking series each week for four weeks (Clifford, Anderson, Auld, & Champ, 2009). The study found that watching the cooking series did increase the students’ knowledge about cooking and healthy eating, but it did not change
their attitudes and behaviors (Clifford, Anderson, Auld, & Champ, 2009). However, a study by Levy & Auld (2004) suggest that hands-on learning is more advantageous for improving self-efficacy in cooking and meal planning rather than watching a cooking program.

**Attitudes and Perceptions of College Students Regarding Diet, Weight and Regular Physical Activity and their Willingness to Change these Behaviors**

Overall American undergraduates understand that diet has a substantial effect on health (Rozin, Bauer, & Catanese, 2003). Many college students also seem to be concerned about their weight. Rozin, Bauer, & Catanese (2003) found that in a sample of over 2000 undergraduates, 20% were on a diet and 43% were concerned about their weight. Wharton, Adams, & Hampl (2008) also found that college students were concerned about weight, and in their study half of the participants were trying to lose weight even though only 28% of the participants were actually overweight or obese. Although weight loss was attempted by half of the participants, only 38% of the students who were trying to lose weight used both diet and exercise to lose weight (Wharton, Adams, & Hampl, 2008). Studies also show that college women are much more concerned about their weight status, appearance, and eating habits than college men (Rozin, Bauer, & Catanese, 2003). Lastly, research has shown that college students who participate in some type of nutrition intervention or education care more about their diet and weight status than those who do not go through nutrition education or intervention (Lin & Dali, 2012; Matvienko, Lewis, & Schafer, 2001).
The stages of change approach has been used to measure the willingness of college students to change their dietary habits and physical activity habits (Pinto, 1995; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005). The changes of change include precontemplation (not ready to make a change), contemplation (considering making a change), preparation (will make small changes), action (engaging in the new behavior change), and maintenance (maintaining the change over time) (Pinto, 1995). Racette, Deusinger, Strube, Highstein, & Deusinger (2005) assessed the readiness of college freshmen and sophomores to engage in healthy dietary behaviors such as eating five or more fruits and vegetables each day, limiting consumption of fried foods, and drinking at least 64 ounces of non-caffeinated, nonalcoholic beverages per day. The study found that the majority of students (almost 60%) were in either the precontemplation or contemplation stage (Racette, Deusinger, Strube, Highstein, & Deusinger, 2005). Racette, Deusinger, Strube, Highstein, & Deusinger (2005) also assessed the readiness of students to engage in physical activity, such as aerobic exercise, strength training, and stretching. These results greatly differed from the readiness to change dietary habits. The majority of students were in the action or maintenance stages for aerobic exercise, and most students were at least in the contemplation stage for strength training and stretching (Racette, Deusinger, Strube, Highstein, & Deusinger, 2005). Pinto (1995) also assessed the stages of change of college students for physical activity participation. In this study, 18% of the student participants were in the precontemplation or contemplation stages, 28% were in the preparation stage, and 54% were in the action stage (Pinto, 1995).
Nutrition Intervention and Education for College Students and their Outcomes

College students may experience significant changes in their dietary habits after participating in some type of nutrition intervention or education (Lin & Dali, 2012). According to Lin & Dali (2012), three major forms of nutrition education interventions are used: web-based education, lectures, and supplement provisions. Web-based education and interventions seem to be the most popular intervention strategy and have shown to produce good outcomes (Franko, Cousineau, Trant, Green, Rancourt, & Thompson, 2008; Gow, Trace, & Mazzeo, 2010; Poddar, Hosig, Anderson-Bill, Nickols-Richardson, & Duncan, 2012). Gow, Trace, & Mazzeo (2010) created a 6 week online intervention course that aimed to prevent the “Freshman 15” and promote healthy diet and other health behaviors in college students. One experimental group of participants participated in the online sessions and also received feedback on their weekly weight changes and caloric intake via email. The experimental group who received the six week online intervention as well as the feedback had lower BMIs at post test than the other groups who did not receive both the combined online course and the feedback (Gow, Trace, & Mazzeo, 2010).

Franko, Cousineau, Trant, Green, Rancourt, & Thompson (2008) also found an online nutrition intervention to be effective. College students who participated in an online nutrition and physical activity education program reported an increased fruit and vegetable intake and reported that the intervention improved their motivation to change eating behaviors (Franko, Cousineau, Trant, Green, Rancourt, & Thompson, 2008). Although the online intervention program did not increase physical activity in the
participants, the intervention did improve the participants’ attitude towards exercise (Franko, Cousineau, Trant, Green, Rancourt, & Thompson, 2008). Another study by Poddar, Hosig, Anderson-Bill, Nickols-Richardson, & Duncan (2012) used online nutrition education intervention to help increase the dairy consumption in college students. After the eight week intervention course, participants reported consuming a higher intake of dairy foods and reported better self-regulation strategies to consume three servings of dairy a day (Poddar, Hosig, Anderson-Bill, Nickols-Richardson, & Duncan, 2012).

Matvienko, Lewis, & Schafer (2001) studied the effects that a college nutrition science course had on female freshmen students. After the semester long course was over, students who participated in the class reported lower fat, carbohydrate, protein and total kcal intakes than students that did not take the class. The students who took the nutrition course also were able to maintain their baseline body weight for one year, while the students who did not take the class gained weight throughout their first year of college (Matvienko, Lewis, & Schafer, 2001). Matvienko, Lewis, & Schafer (2001) concluded that nutrition education that emphasizes human physiology and energy metabolism is an effective strategy to prevent weight gain in at-risk college students.
CHAPTER III

METHODOLOGY

Purpose Statement

The purpose of this quantitative study was to determine the changes in weight status for freshmen college students at Kent State University based on residential status and gender. Additional data regarding diet, exercise, sleep, and stress and their relationship to freshmen weight changes were assessed. Data with regards to the symptoms and concerns characteristic of disordered eating for freshmen students were also obtained.

Research Design and Variables

This quantitative study was a post-test only design. For hypotheses one and two, the independent variables were residential status (one) and gender (two), and the dependent variable was the weight changes that occur in the freshmen students during their first year of college. For hypothesis three, the independent variables were diet, exercise, sleep, and stress, and the dependent variable was the weight changes that occur in the first year.

Participants

Kent State University freshmen students attending classes at the main campus were eligible to participate in this study (n= 3,810). A total of 358 participants were used for the study. Students from any gender or racial group were included in the study. Students who lived on-campus, off-campus (without family members), or living at home
with their parents were included in the study, and those with or without a meal plan were included. It was desired that the data strictly reflected the lifestyle and weight changes of first year traditional students, therefore inclusion criteria included full-time, first-year students at Kent State University who were 18-20 years of age, had graduated high school within the past two years, were not married, and did not have children.

**Measurement Tool**

The measurement tool used was an online survey that contained four sections (Appendix A). The first two sections of the questionnaire were developed by the researcher. The first section asked the participants questions about their demographics, class standing, residential status, height, and whether they were on a university meal plan or not.

The second section asked the participants to fill out a chart that compared their self-reported body weight and lifestyle habits before they started their first year of college (August 2013) and at the end of their first year of college (April 2014). These data were used to determine possible weight changes freshmen students experienced at the end their first school year of college. The rest of the chart consisted of questions regarding diet, eating habits, physical activity, sleep, and stress.

The last two sections of the online survey consisted of the Eating Attitudes Test, also known as the EAT-26. Permission was granted to use the EAT-26 survey by the original author (Appendix B). The EAT-26 survey is a widely used standardized self-reported measure of symptoms and concerns characteristic of eating disorders (Garner, Olmsted, Bohr, & Garfinkel, 1982). However, the EAT-26 alone is not meant to be
utilized as a diagnostic tool. The first component of the EAT-26 contained 26 questions regarding diet behavior, bulimia, food preoccupation, and oral control (Garner, Olmsted, Bohr, & Garfinkel, 1982). The second part of the EAT-26 contained the EAT-26 behavioral questions, which asked five questions regarding eating behaviors in the last six months. The two components of the EAT-26 survey were scored separately.

**Procedures**

This study was approved by the Kent State University Institutional Review Board. Convenience sampling was used to obtain participants. Eligible participants were recruited via email by the researcher. The email addresses of freshmen students who took First Year Experience (FYE) classes at Kent State University during the 2013-2014 school year were obtained from the department of Research, Planning and Institutional Effectiveness (RPIE) at Kent State University. The emails from the researcher sent to the freshmen students explained the research study and asked the students to participate in a volunteer online survey via a link that was provided in the email. The link opened up the online survey that was created through the Qualtrics survey builder. The survey was open from April 7, 2014 through May 1, 2014. The students first received an email about the survey on April 7, and also received a second reminder email on April 21. All data from the survey were sent to Qualtrics and stored there. A copy of the consent form is included in Appendix C.

**Analysis of Data**

The EAT-26 survey was scored using the tables provided by the original author, Dr. Gardner (Appendix D). The first component of the EAT-26 contained 26 questions
which were measured on a six-point Likert scale, ranging from “Always”, “Usually”, “Often”, “Sometimes”, “Rarely”, to “Never”. “Always” indicated a score of “3”, “Usually” indicated a score of “2”, “Often” indicated a score of “1”, and “Sometimes”, “Rarely”, and “Never” indicated a score of “0”. A score of 20 or more on the EAT-26 may indicate disordered eating habits (Garner & Garfinkel, 1979).

The second component of the EAT-26 test asked five additional questions related to eating behaviors that was scored separately (Appendix D). The first four questions were measured using a Likert Scale, ranging from “Never”, “Once a month or less”, “Two to three times a month”, “Once a week”, “Two to six times a week”, and “Once a day or more”. The fifth question was a “yes” or “no” response question.

Statistical analysis was completed by using Statistical Packaging for the Social Sciences (SPSS) version 21. Descriptive statistics were used for demographics, background information, and the EAT-26 survey components. An independent t-test was used to compare weight changes between genders. An analysis of variance was used to compare weight changes in relation to living situation, and a correlation analysis was used to determine if there was a relationship between weight changes and having a university meal plan. A significance of \( p \leq 0.05 \) was set.

The data from the “lifestyle habits comparison” chart in the second section of the survey were measured in different ways depending on the question. Descriptive statistics were used to measure the number of students who ate breakfast, lunch, and dinner. Descriptive statistics were also used to measure the number of students who were on a weight loss diet and the way stress affected eating amounts. Paired-samples t-tests were
used to analyze number of meals eaten per day, number of meals eaten out at a restaurant per week, number of days per week engaged in physical activity, number of minutes per day engaged in physical activity, and number of hours of sleep per night. The Wilcoxon Sign-Rank test was used to examine if there was a difference in the way students rated their diet quality before coming to college compared to the end of their first year of college, and was also used to compare the way participants ranked their stress levels before and after starting their first year of college.
CHAPTER IV

JOURNAL ARTICLE

Introduction

The obesity rates have more than doubled in the past fifty years in the United States, and this has become a public health concern (Ogden, Carroll, Curtin, McDowell, Tabak, & Flegal, 2006). Obesity is associated with a number of serious health conditions and is responsible for generating immense health care costs (Colditz, 1999). Numerous studies have focused on obesity prevalence and prevention in children and adults, but not as much attention has been placed on the young adult population. Rates of overweight and obesity appear to be increasing most dramatically among young adults, ages 18-29 (Mokdad, Serdula, Dietz, Bowman, Marks, & Koplan, 1999), and the National College Health Risk Behavior Survey estimate that as many as 35% of college students are overweight or obese (Huang, Kempf, Strother, Li, Lee, & Harris, 2004).

One strategy for obesity prevention is to identify the critical periods of weight gain across the life span (Anderson, Shapiro, & Lundren, 2003). Identifying high risk time periods for weight gain throughout the life cycle would allow for a better understanding of factors that contribute to weight gain (Lloyd-Richardson, Bailey, Fava, & Wing, 2009). Interventions could be targeted for individuals at these critical periods (Anderson, Shapiro, & Lundren, 2003). The young adult transition to college is one critical period that research has identified (Lloyd-Richardson, Bailey, Fava, & Wing, 2009). When young adults come to college this is often the first time in their lives that
they are no longer living at home, and are able to make their own choices regarding nutrition and other lifestyle habits. These lifestyle habits made throughout the college years are likely to be carried over into adulthood (Guo, Huang, Maynard, Demerath, Towne, & Chumlea, 2000). Additionally, research has shown that weight gained in college is most likely not lost later in life (Anderson, Shapiro, & Lundren, 2003).

The “Freshman 15” is a term commonly mentioned in popular literature and in the media in the U.S., and refers to the idea that the first year of college is associated with a 15 pound weight gain (Lloyd-Richardson, Bailey, Fava & Wing, 2009). However, the literature does not support the popular belief of the “Freshman 15.” Although it is possible for some students to gain 15 pounds or more in their first year, research shows this amount of weight gain is rare (Delinksy & Wilson, 2008). Several past studies have examined weight gain in first year college students, and have determined that freshmen students gain an average of three to six pounds during their first year of college (Anderson, Shapiro, & Lundren, 2003; Butler, Black, Blue, & Gretebeck, 2004; Hoffman, Policastro, Quick, & Soo-Kyung, 2006; Levitsky, Halbmaier, & Mrdjenovic, 2004). Proposed reasons for weight gain in the freshman year include changes in diet and exercise (Hoffman, Policastro, Quick, & Soo-Kyung, 2006); an increase in alcohol consumption (Kasparek, Corwin, Valois, Sargent, & Morris, 2008); lack of sleep (Melton, Langdon, & McDaniel, 2013); and an increase in stress (Weidner, Kohlmann, Dotzauer, & Burns, 1996). Although most freshmen are not gaining the “Freshman 15,” the small weight gain that many students do experience may have a significant impact on
their weight status in the future (Guo, Huang, Maynard, Demerath, Towne, & Chumlea, 2000).

In addition to the concern of freshmen weight gain, disordered eating is another significant problem that freshmen students may face. The anxiety about weight gain during the first year of college may lead to disordered eating practices, especially in females (Karasu, 2013). The pressure to be thin has also been created by Western culture and the media (Malinauskas, Raedeke, Aeby, Smith, & Dallas, 2006). The prevalence of eating disorders has grown over the past 50 years (Franco, 2012), and body dissatisfaction is common among college students (Pingitore, Spring, & Garfieldt, 1997).

The purpose of this quantitative study was to determine the changes in weight status for freshmen college students at Kent State University based on residential status and gender. Additional data regarding diet, exercise, sleep, and stress and their relationship to freshmen weight changes were assessed. Data with regards to the symptoms and concerns characteristic of disordered eating for freshmen students were also obtained.

**Methodology**

This investigation was a post-test only, quantitative study. The Institutional Review Board at Kent State University approved this study.

**Sample Design**

Kent State University freshmen students attending classes at the main campus were eligible to participate in this study (n= 3,810). Students from any gender or racial group were included in the study. Students who lived on-campus, off-campus without
family members, or at home with their parents were included in the study. Those with or without a meal plan were included. It was desired that the data strictly reflected the lifestyle and weight changes of first year traditional students, therefore inclusion criteria included full-time, first-year students at Kent State University who were 18-20 years of age, had graduated high school within the past two years, were not married, and did not have children.

**Measurement Tool**

The measurement tool used was an online survey that contained four sections (Appendix A). The first two sections of the questionnaire were developed by the researcher. The first section asked the participants questions about their demographics, class standing, residential status, height, and whether they were on a university meal plan or not.

The second section asked the participants to fill out a chart that compared their self-reported body weight and lifestyle habits before they started their first year of college (August 2013) and at the end of their first year of college (April 2014). These data were used to determine possible weight changes freshmen students experienced at the end their first school year of college. The rest of the chart consisted of questions regarding diet, eating habits, physical activity, sleep, and stress.

The last two sections of the online survey consisted of the Eating Attitudes Test, also known as the EAT-26. Permission was granted to use the EAT-26 survey by the original author (Appendix B). The EAT-26 survey is a widely used standardized self-reported measure of symptoms and concerns characteristic of eating disorders (Garner,
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The second component of the EAT-26 test asked five additional questions related to eating behaviors that was scored separately (Appendix D). The first four questions were measured using a Likert Scale, ranging from “Never”, “Once a month or less”, “Two to three times a month”, “Once a week”, “Two to six times a week”, and “Once a day or more”. The fifth question was a “yes” or “no” response question.

Statistical analysis was completed by using Statistical Packaging for the Social Sciences (SPSS) version 21. Descriptive statistics were used for demographics, background information, and the EAT-26 survey components. An independent t-test was used to compare weight changes between genders. An analysis of variance was used to compare weight changes in relation to living situation, and a correlation analysis was used to determine if there was a relationship between weight changes and having a university meal plan. A significance of $p \leq 0.05$ was set.

The data from the “lifestyle habits comparison” chart in the second section of the survey were measured in different ways depending on the question. Descriptive statistics were used to measure the number of students who ate breakfast, lunch, and dinner. Descriptive statistics were also used to measure the number of students who were on a weight loss diet and the way stress affected eating amounts. Paired-samples t-tests were
used to analyze number of meals eaten per day, number of meals eaten out at a restaurant per week, number of days per week engaged in physical activity, number of minutes per day engaged in physical activity, and number of hours of sleep per night. The Wilcoxon Sign-Rank test was used to examine if there was a difference in the way students rated their diet quality before coming to college compared to the end of their first year of college, and was also used to compare the way participants ranked their stress levels before and after starting their first year of college.

Results

Characteristics of the Sample

Three thousand eight hundred and ten Kent State University freshmen students were emailed a link to the online survey in April 2014. The survey was completed by 383 students, representing a 10.1% response rate. Participants who did not fully fit the criteria for the study were not used as part of the data. Of the 383 surveys that were completed, 358 were used in the study. Response rate among females was much higher than males; females represented 80.4% of the total participants (N=288), and males represented 19.6% (N=70). With regards to living situation, a total of 300 participants lived in a dorm or in other on-campus housing, representing 83.8% of participants, and 15.4% of participants (N=55) lived at home with their parents or other family members. Only 3 students (0.8%) lived in an off-campus apartment or house without family members. A total of 84.9% of students (n=304) were on a university meal plan.

Weight Changes among Freshmen Students
The average weight gain of the 358 participants after their first year of college was 3.69 lbs (SD = 11.91) (Table 1). The range for the weight changes among participants was large; the greatest weight loss among participants was 37 lbs., and the largest weight gain was 41 lbs. Male participants gained an average of 5.5 lbs ($M = 5.54, SD = 14.12$), while females gained an average of 3.2 lbs. ($M = 3.24, SD = 11.29$) (Table 1). The difference of weight changes between genders was not significant ($p > 0.05$). Therefore, the hypothesis that there would be a difference in weight changes for freshmen students based on gender was rejected. With regards to residential status, average weight gain among students living in a dorm or other on-campus housing was 4.17 lbs. ($SD = 11.84$), and 0.85 lbs. ($SD = 12.23$) for those living at home with parents or other family members (Table 1). Only three students reported that they lived in an off-campus apartment or house, and their average weight gain was 7.67 lbs. ($SD = 4.62$). Weight gain ranged from five to 13 lbs. for these three students. A difference of weight changes depending on residential status for freshmen students was not significant, ($p > 0.05$). Therefore, the hypothesis that there would be a difference in weight changes for freshmen students based on residential status was rejected. The majority of students ($N = 304, 84.9\%$) were on a university meal plan, but there was no relationship between weight changes and being on a university meal plan.

**Comparison Chart of Lifestyle Habits Before and After Freshman Year**

Hypothesis three stated that there would be a relationship between the weight changes of freshmen students and diet, exercise, sleep, and stress variables. This
hypothesis was supported by the data regarding the variables diet quality, sleep and stress, but was not supported by the data concerning exercise.

There was a significant difference in rankings of how students rated their diet on a scale from 1-5 between before and after freshmen year \((p < 0.001)\). According to the results, most students \((N = 199, 56\%)\) rated their diet worse after their first year of college than before starting college. About a quarter of students \((N= 86, 24\%)\) rated their diet the same, indicating that they felt no there were no changes in their diet quality. Only 20\% \((N = 71)\) of students gave their diet a better rating after the first year of college than before.

The number of meals per day that students consumed did not change significantly before their freshman year of college compared to after that year \((p > 0.05)\) (Table 2). On average, students consumed 2.90 meals per day \((SD = 0.83)\) before their first year of college, and 2.82 meals per day \((SD = 0.98)\) at the end of their first year. Results showed that 65.63\% \((N = 212)\) of students reported they ate breakfast every day in April 2014, while 60.68\% \((N = 196)\) of students said they ate breakfast daily in August 2013 (Table 2). The percentage of students who ate breakfast after their freshman year, but not before starting college was 18.8\% \((N = 61)\).

Freshmen students ate out at a restaurant more often before coming to college than at the end of their first year of college \((p < 0.001)\) (Table 2). Participants ate out at a restaurant on an average of 2.02 \((SD = 1.60)\) times per week in August 2013, compared to eating out 1.13 \((SD = 1.34)\) times per week in April 2014. This indicates that respondents ate about one more meal \((M = 0.89, SD = 1.80)\) out per week before coming to college.
Frequency of physical activity did not change between the time before participants started their freshman year and at the end of the year ($p > 0.05$) (Table 2). Students engaged in physical activity roughly as many times per week in August 2013 ($M = 3.37$, $SD = 2.16$) than they did in April 2014 ($M = 3.18$, $SD = 2.02$). Duration of physical activity (minutes per day) also did not change between the two time intervals ($p > 0.05$) (Table 2). Participants engaged in physical activity for a duration of 71.56 minutes per day ($SD = 103.54$) in August 2013, as compared to 64.19 minutes per day ($SD = 60.45$) in August 2014.

Along with diet and exercise, hours of sleep per night and stress levels of freshmen students were assessed (Table 2). On average, participants slept almost one hour more (.844 hour) before coming to college than at the end of their first year of college ($p < 0.001$). The reported average number of hours of sleep per night in August 2013 was 7.77 hours ($SD = 1.44$), as compared to 6.93 hours ($SD = 1.47$), the average number of hours of sleep per night in April 2014. There was a significant change in the way students ranked their stress levels for August 2013, before students came to college, as compared to at the end of their freshman year in April 2014 ($p < 0.001$). More students ($N = 283$, 79.6%) ranked their stress level higher at the end of their freshmen year than before coming to college in August 2013. Forty-five students (12.6%) ranked their stress level the same for both time intervals, and 27 students (7.8%) ranked their stress level higher for August 2013. Lastly, eating habits in relation to stress was assessed. For August 2013, 23.15% ($N = 78$) of students reported they ate less when stressed or anxious; 39.46% ($N = 133$) reported they ate the same amount; and 37.39%
(N = 126) reported that they ate more. For April 2014, 30.27% (N = 102) of participants reported that they ate less when stressed or anxious; 30.56% (N = 103) reported that they ate the same amount; and 39.17% (N = 132) ate more when stressed. The majority of participants (74.48%) reported the same answer for both August 2013 and April 2014, indicating that eating habits in relation to stress did not change much between the two time intervals.

Table 1

<table>
<thead>
<tr>
<th>Weight Gain of College Freshmen after Freshman Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondents</td>
</tr>
<tr>
<td>All Respondents</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gendera</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Females</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Residential Statusb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dorm/On-campus Housing</td>
</tr>
<tr>
<td>Living at home</td>
</tr>
<tr>
<td>Off-campus apartment or house</td>
</tr>
</tbody>
</table>

a No significant weight change between genders was found, p = 0.147
b No significant weight change between residential status was found, p = 0.139
### Table 2

**Lifestyle Habits Comparison Chart for Pre-Freshman Year and Post-Freshman Year**

<table>
<thead>
<tr>
<th>Lifestyle Statement Question</th>
<th>N</th>
<th>Pre-Freshman Year</th>
<th>Post-Freshman Year</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>On a weight loss diet</td>
<td>355</td>
<td>8.45%</td>
<td>18.59%</td>
<td></td>
</tr>
<tr>
<td>Meals per day</td>
<td>355</td>
<td>2.90±0.83</td>
<td>2.82±0.98</td>
<td>0.018</td>
</tr>
<tr>
<td>Consumed breakfast</td>
<td>323</td>
<td>60.68%</td>
<td>65.63%</td>
<td></td>
</tr>
<tr>
<td>Consumed lunch</td>
<td>341</td>
<td>92.0%</td>
<td>87.39%</td>
<td></td>
</tr>
<tr>
<td>Consumed dinner</td>
<td>345</td>
<td>99.16%</td>
<td>95.07%</td>
<td></td>
</tr>
<tr>
<td>Times per week students ate out (not including meal plan)</td>
<td>353</td>
<td>2.02±1.60</td>
<td>1.13±1.34</td>
<td>0.001</td>
</tr>
<tr>
<td>Days per week engaged in physical activity</td>
<td>356</td>
<td>3.37±2.15</td>
<td>3.18±2.02</td>
<td>0.141</td>
</tr>
<tr>
<td>Minutes per day engaged in physical activity</td>
<td>352</td>
<td>71.56±103.54</td>
<td>64.19±60.45</td>
<td>0.184</td>
</tr>
<tr>
<td>Hours slept each night</td>
<td>356</td>
<td>7.77±1.44</td>
<td>6.93±1.47</td>
<td>0.001</td>
</tr>
</tbody>
</table>

*Note.* Significance was set at $p < 0.05$. Significance was found for times per week students ate out and hours slept each night.

### EAT-26 Scores

A score of 20 or more on the EAT-26 survey indicates a respondent is “at risk for an eating disorder.” After scoring the responses, 61 participants out of 358 (17%) scored a 20 or higher on the EAT-26, demonstrating that they are at high concern for having an eating disorder (Table 3). More females scored a 20 or higher on the EAT-26 survey than males; of the 288 females who participated in the survey, 54 (18.75%) scored a 20 or
higher, and of the 70 males who participated in the survey, 7 (10.0%) of them scored a 20 or higher on the EAT-26 (Table 3). The second component of the EAT-26 asked questions regarding behavioral indicators of eating disorders (Table 4). The number of participants who reportedly had gone on eating binges “two to three times per month” or more within the last six months was 48, or 14.4%. Twenty-five participants, or 7.5%, reported that they had made themselves sick (vomited) “once a month” or more in the past six months to control their weight or shape. The use of laxatives, diet pills, or diuretics (water pills) to control weight or shape “once a month” or more within the past six months was reported by 46 participants, or 13.8%. The number of respondents who exercised more than 60 minutes per day to lose or control weight “once a day or more” in the past six months was 14, or 4.2%. Twenty-two out of 334 respondents, or 6.6%, reported that they had lost 20 lbs. or more in the last six months.

Table 3

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Not at risk (%)</th>
<th>At risk (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>288</td>
<td>234 (81.25%)</td>
<td>54 (18.75%)</td>
</tr>
<tr>
<td>Male</td>
<td>70</td>
<td>63 (90%)</td>
<td>7 (10.0%)</td>
</tr>
<tr>
<td>Total participants</td>
<td>358</td>
<td>297 (83.0%)</td>
<td>61 (17.0%)</td>
</tr>
</tbody>
</table>

*Note.* Score of 20 or more on the EAT-26 is assessed as at risk of an eating disorder.

Table 4

<table>
<thead>
<tr>
<th>In the past six months have you gone on eating binges where you feel that you may not be able to stop?</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>209</td>
<td>62.6%</td>
</tr>
<tr>
<td>Once a month or less</td>
<td>77</td>
<td>23.1%</td>
</tr>
<tr>
<td>2-3 times a month</td>
<td>24</td>
<td>7.2%</td>
</tr>
</tbody>
</table>
In the past six months have you ever made yourself sick (vomited) to control your weight or shape?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>309</td>
<td>92.5%</td>
</tr>
<tr>
<td>Once a month or less</td>
<td>13</td>
<td>3.9%</td>
</tr>
<tr>
<td>2-3 times a month</td>
<td>5</td>
<td>1.5%</td>
</tr>
<tr>
<td>Once a week</td>
<td>2</td>
<td>0.6%</td>
</tr>
<tr>
<td>2-6 times a week</td>
<td>1</td>
<td>0.3%</td>
</tr>
<tr>
<td>Once a day or more</td>
<td>4</td>
<td>1.2%</td>
</tr>
</tbody>
</table>

In the past six months have you used laxatives, diet pills, diuretics (water pills) to control your weight or shape?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>287</td>
<td>86.2%</td>
</tr>
<tr>
<td>Once a month or less</td>
<td>16</td>
<td>4.8%</td>
</tr>
<tr>
<td>2-3 times a month</td>
<td>11</td>
<td>3.3%</td>
</tr>
<tr>
<td>Once a week</td>
<td>4</td>
<td>1.2%</td>
</tr>
<tr>
<td>2-6 times a week</td>
<td>6</td>
<td>1.8%</td>
</tr>
<tr>
<td>Once a day or more</td>
<td>9</td>
<td>2.7%</td>
</tr>
</tbody>
</table>

In the past six months have you exercised more than 60 minutes a day to lose or control your weight?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>N</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>134</td>
<td>40.1%</td>
</tr>
<tr>
<td>Once a month or less</td>
<td>51</td>
<td>15.3%</td>
</tr>
<tr>
<td>2-3 times a month</td>
<td>39</td>
<td>11.7%</td>
</tr>
<tr>
<td>Once a week</td>
<td>28</td>
<td>8.4%</td>
</tr>
<tr>
<td>2-6 times a week</td>
<td>68</td>
<td>20.4%</td>
</tr>
<tr>
<td>Once a day or more</td>
<td>14</td>
<td>4.2%</td>
</tr>
</tbody>
</table>

**Discussion**

A study by Hovell, Mewborn, Randle, & Fowler-Johnson (1985) was first to introduce the idea that weight gain is observed in freshmen after their first year of college. A few years after this study, the media began using the term the “Freshmen 15,”
referring to the belief that the first year of college is associated with a 15 pound weight gain (Lloyd-Richardson, Bailey, Fava & Wing, 2009). However, research has shown that the actual weight gain in freshmen students is actually less than 15 lbs. (Wengreen & Moncur, 2009; Delinsky & Wilson, 2008). The current study provides further evidence to refute the idea of the “Freshman 15.” This investigation found that the average weight gain of the participants after their first year of college was 3.69 lbs. This average weight gain is consistent with that of current research, which has demonstrated that there is an average weight gain of three to six lbs. in freshmen (Wengreen & Moncur, 2009; Delinsky & Wilson, 2008; Holm-Denoma, Joiner, Vohs & Heatherton, 2008). Even though this weight gain appears small, it is still relevant. Past studies have shown that young adults who gain weight during their college years are at a higher risk for being overweight or obese later in life (Anderson, Shapiro, & Lundgren, 2003; Guo, Huang, Maynard, Demerath, Towne, & Chumlea, 2000). Anderson, Shapiro, & Lundren (2003) identified the critical periods of weight gain across the life span as a strategy for obesity prevention. The authors identified the freshman year of college as being one of the critical periods for weight gain. Weight gained in the college years is not likely to be lost later in life (Anderson, Shapiro, & Lundgren, 2003). Also, the proportion of students classified as overweight or obese has been shown to increase after the first year of college (Anderson & Lundgren, 2003).

Weight changes among freshmen students in the current investigation ranged from a weight loss of 37 lbs. to a weight gain of 41 lbs. This demonstrates that while most students do not lose or gain a substantial amount of weight throughout their first
year of college, it is possible for some students to experience a larger weight loss or to gain more weight than the average observed in this study. These outliers in weight gain and loss are of concern. Although this study did not evaluate the exact reasons why participants lost or gained weight, there are possible explanations for why these outliers in weight gain or loss occurred. The students who experienced weight loss may have been overweight when coming into their first year of college, and may have been trying to lose weight throughout their first year. Others may have lost weight due to the changes of coming to college, being in a new environment and the stress that is associated with this. The change of coming to college for the first time may have also been a factor for those who gained a larger amount of weight. Drastic lifestyle changes, such as changes in diet or exercise patterns, may have been the cause of this larger weight gain. Past studies have shown that while it is rare to see freshmen gain 15 lbs. or more in their first year of college, a small percentage (6.1%) do gain 15 lbs. or more during their first year (Delinsky & Wilson, 2008).

Results from the current study showed that males gained an average of 5.5 lbs., and females gained an average of 3.2 lbs. The difference of weight change between genders was not significant; therefore the hypothesis that there would be a difference of weight changes based on gender was not supported by the data. Research has demonstrated that female college students are more concerned about weight loss or maintaining their weight than their male counterparts, despite the fact that males are more likely to be overweight (Davy, Benes, & Driskell, 2006; Lowry, Galuska, Fulton, Wechsler, Kann, & Collins, 2000; Wharton, Adams, & Hampl, 2008). Wharton, Adams,
& Hampl (2008) found that college women were significantly more likely to be attempting to lose or maintain weight and were more likely than men to be involved in exercise, diet, vomiting, use of laxatives, or use of diet pills for weight loss. Females are also under more pressure by the media and popular culture to be thin (Grabe, Ward, & Hyde, 2008). Additionally, females are more likely than males to perceive themselves as being overweight when they are not (Harring, Montgomery, & Hardin, 2010). Contrary to past research, the current study did not find a significant difference in weight changes between males and females. However, it is important to note that the current study represented a smaller sample of males than females, therefore males may have been misrepresented.

The current investigation found that the average weight gain among students living in a dorm or other on-campus housing was 4.17 lbs., and the average weight gain for those living at home with parents or other family members was 0.85 lbs. Three students reported that they lived in an off-campus apartment or house, and average weight gain for these students was 7.67 lbs. Although those living on-campus appear to have gained more weight than those who lived at home, the difference in weight changes depending on residential status was not significant. Therefore, the results of this study did not support the hypothesis that stated there would be a difference in weight changes for freshmen based on residential status. The findings in the current study were unexpected. According to Jackson, Berry, & Kennedy (2009), students that live at home during their freshman year have healthier eating behaviors than students who live on-campus. Levitsky, Halbmaier, & Mrdjenovic, (2004) determined that the greater
abundance and variety of food available on-campus may promote excess energy intake as well as easy accessibility of junk foods and more frequent snacking. Students living on-campus consume more fast foods and drink nearly twice as much alcohol per week than those living at home, which could contribute to weight gain (Jackson, Berry, & Kennedy, 2009). In the current study, those who lived off-campus may not have been as well represented as those who lived on-campus, because 83.8% of the participants lived on-campus.

The current study did not find a relationship between weight gain and being on a university meal plan. Freshmen in the current study who chose to live on-campus during their first year of college were required to purchase a university meal plan. Dining halls are often set up similar to an all-you-can-eat buffet, making it easy for students to overeat (Kasparek, Corwin, Valois, Sargent, & Morris, 2008). This frequent overconsumption may contribute to weight gain. Freshmen may also choose the more energy-dense items that are often available at dining halls every day (Levitsky, Halbmaier, & Mrdjenovic, 2004). With these reasons, being on a university meal plan may contribute to weight gain in freshmen students. However, in the current study participants who had a university meal plan did not have the option of an all-you-can-eat buffet, and had to pay for each item they bought. Because participants on this meal plan had to pay for each item, they had to be more financially responsible. Participants may have made unhealthy choices with what they were buying, however they were likely not eating as much food as compared to if they were eating in dining halls with all-you-can-eat buffets. Therefore, being on a meal plan was not related to weight gain in the current study.
The main purpose of the current study was to determine the weight changes that freshmen students experienced. However, the study also used a chart comparing lifestyle habits pre-freshman year and post-freshman year in order to assess possible reasons why weight changes may have occurred, which relates to hypothesis three. Hypothesis three stated that there would be a relationship between the weight changes of freshmen students and diet, exercise, sleep, and stress variables. This hypothesis was supported by the data regarding the variables diet quality, sleep and stress, but was not supported by the data concerning exercise.

The current study demonstrated that there was an overall significant difference between the before and after rankings of diet quality. Fifty-six percent of the freshmen students rated their diet worse after the first year of college than before coming to college. This outcome was not unexpected. The majority of participants (84.9%) had a university meal plan, which may be linked with frequent unhealthy choices. When students come to college, it is likely the first time they are able to make their own choices regarding what they eat. Choices that students make on their own may not be as healthy as what they were eating when they were living at home, which may cause students to gain weight during their first year. Additionally, a study by Kasparek, Corwin, Valois, Sargent, & Morris (2008) demonstrated that freshmen students tend to decrease their fruit and vegetable intake after coming to college. Similarly, Racette, Deusinger, Strube, Highstein, & Deusinger (2005) observed low fruit and vegetable intake along with higher intakes of fried foods and high-fat fast foods in freshmen students. These findings of the current study regarding diet quality provide support for the part of hypothesis three that
stated there would be a relationship between the weight changes of freshmen students and diet.

The number of meals per day that students consumed before coming to college as compared to at the end of their first year did not change significantly. Students ate close to three meals per day before coming to college and at the end of college. This indicates that freshmen are most likely making a set schedule of meal patterning for themselves when in college. Breakfast was the most frequently skipped meal for participants at both time intervals; 60.68% of participants reported they consumed breakfast before coming to college, and 65.63% ate breakfast at the end of their first year. The consumption of eating breakfast is important, because it has been linked to maintaining a healthy weight and having a lower BMI (Cho, Dietrich, Brown, Clark, & Block, 2003). Research demonstrates that breakfast is often the most frequently skipped meal. Huang, Song, Schemmel, & Hoerr (1994) found that around one in four to five college students skipped breakfast. The current study found that an even larger number of students skip breakfast, which was close to two in five students. Interestingly, 18.8% of students who ate breakfast at the end of their first year reported they did not eat breakfast before coming to college. Having a different schedule in college may have allowed some students to have time to eat breakfast in the morning. Often times, their classes may not start until later in the day, which would allow more time to eat in the morning.

In the current study, freshmen reported that they ate out at a restaurant (not including their meal plan) more often before coming to college than at the end of their first year of college. Respondents ate approximately one more meal out per week before
coming to college. The current study found that students ate out at a restaurant close to once per week at the end of their first year of college. Results of the current study were not consistent to that of other research. Jackson, Berry, & Kennedy (2009) found that students living on-campus consumed more fast foods than when previously living at home. Also, a study by Racette, Deusinger, Strube, Highstein, & Deusinger (2005) demonstrated that 46% of students consumed three or more high-fat fast foods during a one week period. However, the difference in the findings of the current study with that of past literature may be due to the fact that on-campus dining has changed throughout the years. Campus dining plans provide more options than ever before and meal plans may also include items purchased at restaurants. Foods that are available on-campus are similar to foods that are available at restaurants. Students may choose to make unhealthy eating choices whether they are eating at an on-campus dining hall or at a restaurant. Therefore, the choices regarding the types of foods the students make when purchasing food may be more likely to have caused weight changes in their first year, rather than where they were eating.

Decrease in physical activity has been proposed as another possible reason for freshmen weight gain (Butler, Black, Blue, & Gretebeck, 2004). The current investigation determined that on average, students engaged in physical activity close to the same amount of days per week after their freshmen year of college as compared to before coming to college, and differences were not significant. Therefore, the data in the current study did not support the part of hypothesis three that stated there would be a relationship between weight changes and exercise. Duration of physical activity per day
also did not change between the two time intervals. This demonstrates that students who frequently engaged in physical activity before college were most likely continuing to do so throughout their first year of college. Physical activity is important with regards to weight gain prevention. A study by Kasparek, Corwin, Valois, Sargent, & Morris (2008) found that students with low-frequency physical activity were twice as likely to be overweight. Butler, Black, Blue, & Gretebeck (2004) observed an increase in body weight in freshmen students and a decrease in total physical, occupational, and sports activities. Additionally, a study by Dinger (1999) demonstrated that the mean average of weekly participation in a number of different types of physical activities in freshmen students were lower than public health recommendations.

On average, students were engaging in physical activity 3.13 days per week at the end of their first year of college. Average duration of physical activity was 64.19 minutes per day at the end of freshman year. This means that freshmen students were engaging in physical activity for approximately 204 minutes per week at the end of their first year. According to the Centers for Disease Control (2011), adults need two and a half hours of moderate-intensity aerobic activity per week along with muscle-strengthening activities on two or more days a week. The current study demonstrates that on average, freshmen students are meeting the guidelines for the amount of physical activity per week that adults need. Data from another section of the current study also provide further information about exercise duration and frequency of the participants. One question from the EAT-26 behavioral section of the survey asked participants if they “have exercised 60 minutes a day or more in the past six months to lose or control
Almost 45% of respondents reported that they had done this at least two to three times per month or more. These results demonstrate that many freshmen are using exercise as a healthy and acceptable way to lose or control weight.

Although it appears that freshmen students in the current study are meeting the recommendations for the proper amount of physical activity per week, the types and intensities of physical activities engaged in were not determined in the current study. Knowing the types and intensities of the physical activity that students engaged in allows for a better understanding of how physical activity relates to weight changes in the first year of college. Butler, Black, Blue, & Gretebeck (2004) found that although many freshmen students still participate in physical activity during the first year of college, the types of physical activity they participate in changes. Butler, Black, Blue, & Gretebeck (2004) observed significant decreases in total moderate to high-intensity physical, occupational, and sports activities, but saw an increase in leisure activities that were less intense. Racette, Deusinger, Strube, Highstein, & Deusinger (2005) determined that there was an increase in low-intensity stretching exercise throughout the first year of college for freshmen students. Research has also shown that college students, especially males, participate in strength training (Racette, Deusinger, Strube, Highstein, & Deusinger, 2005). A study by Lowry, Galuska, Fulton, Wechsler, Kann, & Collins (2000) demonstrated that approximately 30% of college students participated in muscle strengthening exercises three or more days per week. It is important to note that strength training can increase muscle mass, which can increase body weight. If participants in the current study were frequently engaging in strength training exercises, this may have
contributed to weight gain. However, the current study did not assess body fat percentage changes and only determined changes in body weight. It is unclear whether weight gained in the current study was as a result of muscle or fat gained.

Lack of sleep or sleep disturbances is common to observe in college students (Buboltz, Brown, & Soper, 2001; Lund, Reider, Whiting, & Prichard, 2010). The current study found that participants slept almost one hour more before coming to college than at the end of their first year. Quality and duration of sleep is important, because elevated BMI has been linked to poor sleep behaviors as well as habitual sleep amounts below seven to eight hours of sleep per night (Kripke, Garfinkel, Wingard, Klauber, & Marler, 2002). In the current study, the reported average number of hours of sleep per night before college was 7.77 hours, while the average number of hours slept per night at the end of freshman year was 6.93 hours. A study by Bubolz, Brown, & Soper (2001) did not evaluate the number of hours students slept per night, but did demonstrate that only 11% of the 191 undergraduate students in their study had good sleep quality. The results of the current study demonstrate that freshmen students were not getting enough sleep at the end of their first year. On average, freshmen were sleeping durations below seven to eight hours, which may be linked to an elevated BMI. It is possible that lack of sleep may be one of the factors that contributed to weight gain in the current study. This data provides further support for part of hypothesis three which stated that there would be a relationship between weight changes and sleep.

Freshmen college students are particularly prone to stress due to the transitional nature of college life (Ross, Niebling, & Heckert, 1999). The current study illustrated
that there was a significant change in rankings of stress levels between pre-freshman year and post-freshman year. The majority of participants reported that they were more stressed at the end of their freshmen year than before coming to college. A total of 79.6% of participants ranked their stress levels higher for the end of their freshmen, while only 7.8% of students ranked their stress levels higher for before coming to college. The results of the current study were consistent with what was anticipated. The freshman year of college is often the first time that most students are away from home and they must adjust to the new social environment. In addition, freshmen students need to maintain a high level of academic achievement and must start thinking about their future careers (Ross, Niebling, & Heckert, 1999). The current study demonstrates that college students are likely to experience more stress than they felt before coming to college, which is probably associated with the new changes they must face. The changes in stress levels that students experienced in their first year supports part of hypothesis three that there would be a relationship between weight changes and stress.

Stress may have a direct affect on the dietary habits of college students (Wiedner, Kohlmann, Dotzauer, & Burns, 1996). Eating habits in relation to stress were assessed in the current study, and results were mixed. The results reported for post-freshman year showed that 39.17% of participants ate more when stressed, while 30.56% of students ate the same amount, and 30.27% ate less when stressed. Students reported similar results regarding stress and eating for pre-freshman year. The majority of participants (74.48%) reported the same answer for both time intervals, indicating that their eating habits in relation to stress did not change much between these two periods. The current study
demonstrated that about two in five participants reported they ate more when stressed. Although the majority of the participants may not be eating more when stressed, diet quality when stressed may still be affected which could contribute to weight gain. A study by Wiedner, Kohlmann, Dotzauer, & Burns (1996) measured changes in health behaviors in college students during low stress and high stress periods and compared the two, and found decreases in the quality of nutrition were linked to periods of high stress time. Serlachius, Hamer, & Wardle (2007) also determined that stress was associated with a greater risk of weight gain in first year college students, especially in women.

Although a great deal of emphasis is put on the prevention of weight gain during the freshman year of college, disordered eating is another significant problem that freshmen students, especially females, face. Malinauskas, Raedeke, Aeby, Smith, & Dallas (2006) argued that the notion of the “Freshman 15” may create significant problems for freshmen students. The media and culture often make it seem that excessive weight gain is inevitable during the college years. For those who are already struggling with disordered eating, the idea of the “Freshman 15” may be terrifying (Malinauskas, Raedeke, Aeby, Smith, & Dallas, 2006). The fear of gaining the “Freshman 15” may make symptoms worse for those who are already struggling with disordered eating, or may lead to the development of disordered eating throughout college.

It is also important to consider the emphasis that the media and popular culture place on striving for the “perfect body.” Thinness has been used as a marker of success in Western society, and obesity is often avoided and feared both because of its impact on
attractiveness and the character flaws associated with it (Klaczynski, Goold, & Mudry, 2004). Television and magazines often present artificial, airbrushed image as real (Agliata & Tantleff-Dunn, 2004), which is problematic because society often regards media images as realistic representations of beauty and appropriate comparison targets for appearance (Jasper, 1993). Past research has shown that the media plays a significant role in body image and body dissatisfaction in young adults. Exposure to media images that depict the thin-ideal body has been linked to young women’s dissatisfaction with their own bodies (Grabe, Ward, & Hyde, 2008). Additionally, several studies have shown that young adults and adolescents often overestimate their body weight and size (Harring, Montgomery, & Hardin, 2010; Sciacca, Melby, Hyner, Brown, & Femea, 1991). This demonstrates that even when one is at a healthy weight, one may still perceive him or herself to be overweight and may be unhappy with their size. Body dissatisfaction can be dangerous, because it may lead to disordered eating and serious health consequences, especially in females (Malinauskas, Raedeke, Aeby, Smith, & Dallas, 2006).

The current study measured the percentage of respondents who were “at risk for disordered eating” using the EAT-26 questionnaire. Those who score a 20 or higher on the EAT-26 questionnaire are of high concern for having disordered eating habits (Garner & Garfinkel, 1979). The current study’s results demonstrated that 17% of participants scored a 20 or higher on the EAT-26 survey. Females were more likely than males to score a 20 or higher on the survey; 54 out of 288 females (18.75%) scored a 20 or higher, while seven out of 70 males (10%) scored a 20 or higher on the EAT-26. Results of the
current study were similar to that of other research. Desai, Miller, Staples, & Bravender (2008) conducted a larger study of 4,201 undergraduate and graduate students from three different universities in the U.S. and used the EAT-26 survey to assess the risk of disordered eating in the college population. Results of their study demonstrated that 15% of students scored a 20 or higher on the EAT-26, which were comparable to the results of the current study. Nelson, Hughes, Katz, & Searight (1999) conducted a study of 471 undergraduate students and found that 10% of males and 20% of females scored a 20 or higher on the EAT-26 survey. This study yielded results that were very similar to the results of the current study, and it also used a sample size that was closer to that of the current study than other investigations were.

The second component of the EAT-26 survey asked participants questions regarding behavioral indicators of disordered eating. Forty-eight (14.4%) participants reported that they had gone on eating binges “two to three times per month” or more within the last six months. The prevalence of binge eating disorder has been increasing. The National Eating Disorders Association (2013) estimates that 1-5% of the general population has binge eating disorder, but the prevalence may be even higher than this. Desai, Miller, Staples, & Bravender (2008) found that 28.7% of a sample of 2,825 undergraduate students were at an increased risk for binge eating disorder. Similarly, a study by Eisenberg, Nicklett, Roeder, & Kirz (2011) demonstrated that 17.3% of undergraduate students worried that they “have lost control over how much they eat.” The results of the current study as well as results of past research that studied binge
eating in college students suggest that binge eating behaviors may be more prevalent in the college-age population than the general population.

Thin-ideal media exposure has also been linked to more frequent bulimic and anorexic attitudes and behaviors (Grabe, Ward, & Hyde, 2008). A study by Field, Camargo, Taylor, Berkey, & Colditz (1999) indicated that the more effort a girl reported that she made to look like females on television, in movies, or in magazines, the higher her risk of engaging in bulimic behaviors to control weight. Hoek & Van Hoeken (2003) reported that the prevalence rates of bulimia nervosa for young women were 1% and were 0.1% for young men. In the current study, 25 (7.5%) participants reported that they had made themselves sick (vomited) “once a month” or more in the past six months to control their weight or shape. Results of the current study were similar to that of other research. Desai, Miller, Staples, & Bravender (2008) also asked participants about purging behaviors, and found that 5.7% of students with a normal BMI (18.5-24.9), and 5.9% of students with a BMI considered overweight or obese (25 or higher) had engaged in purging behaviors before. Additionally, the Eisenberg, Nicklett, Roeder, & Kirz (2011) study determined that nine percent of undergraduate students answered yes to “Do you make yourself sick because you feel uncomfortably full?”

The current investigation found that some students engaged in other unhealthy behaviors to control their weight. Forty-six (13.8%) participants reportedly used laxatives, diet pills, or diuretics (water pills) to control their weight or shape “once a month” or more in the past six months. A smaller percentage of students (4.2%) reported that they exercised more than 60 minutes per day to lose or control weight “once a day or
more” in the past six months. Engaging in these types of “purging” behaviors following a binge episode is considered part of the DSM-IV diagnostic criteria for bulimia nervosa (American Psychiatric Association, 2000). The prevalence of vomiting as well as these other “purging” behaviors found in the current study demonstrates that the prevalence of bulimia nervosa may be higher in the current sample and possibly the college-age population than what research has demonstrated thus far.

The current study also asked respondents to report if they had lost 20 lbs. or more in the last six months, which would be considered a significant weight loss (Garner & Garfinkel, 1979). Twenty-two out of 334 participants (6.6%) reported they had lost 20 lbs. or more. It was not clear if the participants intended to lose weight over this time period or if they did so in an unhealthy manner. The starting BMI and weight was also not assessed for those who lost weight, therefore it is unclear whether those who lost weight were overweight or obese to start with. Since these factors are unknown, it is uncertain whether the weight loss that some of the participants experienced is indicative of disordered eating or unhealthy weight loss practices.

Limitations

The present study was limited by use of a convenience sample. Also, this study assessed a fairly small sample of students from one university. The sample consisted of mostly females (80.4%), which may have given a misrepresented view regarding some of the results. Body weight was self-reported by participants, and the self-reported weights may not have been as accurate as weights taken in person. The participants had to report their weights from the beginning of the school year. It is possible that they may not have
remembered what their weights were, or their reported starting weights may have been inaccurate. This study only compared weight changes, and did not measure body fat percentage changes. It is possible that some freshmen students gained weight, because they were still growing. Therefore, diet and other health habit changes may not have been the cause for their weight changes. Additionally, the EAT-26 may not have given a valid representation of those who exhibited disordered eating behaviors, especially if participants felt uncomfortable reporting such personal information.

**Strengths**

This study offered a high level of confidentiality for the respondents. Respondents were able to take the survey online and on their own time in private. Therefore, this may have allowed the participants to be more honest about their weight and when answering questions regarding their lifestyle and eating behaviors. The weight obtained from participants was self-reported, which prevented possible feelings of embarrassment associated with being weighed in person. Additionally, students who were interested in the topic of “The Freshman 15” may have been more likely to participate in the online survey.

**Application**

The current study provides information regarding the actual weight gain that college freshmen experience. Although this weight gain is small, it is still relevant. Weight that is gained in college will likely not be lost, and it is important for young adults to understand this. It is also important for universities to be educated on the facts about freshman weight gain and to set up intervention programs that help prevent weight
gain. Because many students who come to college are away from home for the first time, they may need to be educated about how to make healthy lifestyle choices. Colleges should provide classes and resources for freshmen students that teach them about healthy eating and other lifestyle habits. Requiring new students to take an introductory level nutrition course sometime in their first year may also be another prevention strategy that universities could use.

Although it is important to educate students about a healthy lifestyle, colleges should be sure to educate students in a way that does not make students feel anxious about gaining weight in their first year. If too much emphasis is placed on the possible weight gain that occurs during the first year of college, some students may develop disordered eating habits. The topic of disordered eating is another subject that new students should be educated about. All interventions that promote a healthy lifestyle should also include information about disordered eating. Students need to be educated about disordered eating definitions, symptoms, and prevention. Also, discussions concerning positive body image should be included with regards to disordered eating prevention. Students also need to be provided with information about how to seek help if they engage in disordered eating behaviors, and they need to be aware of counseling that is available to them. It may also be a good idea to provide support groups on campus for those with disordered eating. Additionally, university health centers should provide screening for disordered eating and have health professionals on staff who can provide treatment for students with disordered eating. Future research should evaluate education
and intervention strategies at universities that focus on the prevention of weight gain and promotion of a healthy lifestyle as well as the prevention of disordered eating.

**Conclusion**

In summary, participants in the current study gained an average of 3.69 lbs., which is consistent with past literature and provides further evidence that the “Freshman 15” concept is a myth. The results of the current study found no significance of weight changes based on residential status or based on gender, which did not support the first two hypotheses. Additionally, there was no relationship between weight gain and being on a university meal plan. Changes in diet quality, sleep, and stress levels between pre-freshman year and post-freshman year may have attributed to the weight gain observed in participants, which provided support to the third hypothesis. There was no significant difference of the frequency and duration of physical activity between the two time intervals, which did not provide support to the third hypothesis. Results of the EAT-26 survey indicated that 17% of respondents are “at risk for disordered eating,” with the majority being female. Additionally, the results of the behavioral questions component of the EAT-26 survey demonstrated that binge eating disorder and bulimia nervosa may be more prevalent in the college-age population than the general population.
APPENDICES
APPENDIX A

ONLINE QUESTIONNAIRE
Appendix A

Online Questionnaire

Weight Changes Questionnaire

What is your class standing?

- Freshman
- Sophomore
- Junior
- Senior

Are you doing Post Secondary now?

- Yes
- No

Are you a full-time student?

- Yes
- No

What is your age?

- Under 18
- 18-20
- 21 or over
Are you married?

- Yes
- No

Do you have children?

- Yes
- No

What year did you graduate high school?

- Have not yet graduated high school
- 2013
- 2012
- 2011 or before 2011

What is your gender?

- Male
- Female

Which of the following best describes your living situation?

- Dorm/On-campus housing
- Living at home with parents or other family members
- Off-campus apartment or house
Are you on a University meal plan?

☐ Yes

☐ No

What is your Height? Please write in terms of Feet/Inches __________
Please fill out the following chart comparing your body weight and lifestyle habits before coming to college and your current body weight and lifestyle habits:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Body weight (lbs.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Please rate your diet on a scale from 1-5 (1 meaning your diet is very poor and 5 meaning your diet is very good)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are/were you on a weight loss diet (yes or no)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meals per day you eat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you eat Breakfast?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you eat Lunch?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you eat Dinner?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snacks per day you eat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Times per week that you eat out (not including using your meal plan)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of days/week that you engage in physical activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minutes/day that you engage in physical activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approximate number of hours you sleep each night</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Please rate your stress level on a scale from 1-5 (1 meaning you are not at all stressed and 5 meaning you are extremely stressed)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When you are stressed or anxious, do you eat more, less, or the same amount?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Eating Attitudes Test (EAT-26)

<table>
<thead>
<tr>
<th>Please check a response for each of the following:</th>
<th>Always</th>
<th>Usually</th>
<th>Often</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am terrified about being overweight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoid eating when I am hungry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Find myself preoccupied with food</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have gone on eating binges where I find that I may not be able to stop</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cut my food into small pieces</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aware of the calorie content of foods that I eat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Particularly avoid food with high carbohydrate content (i.e. bread, rice, potatoes, etc.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feel that others would prefer if I ate more</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Vomit after I have eaten</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feel extremely guilty after eating</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Am preoccupied with a desire to be thinner</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Think about burning calories when I exercise</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other people think that I am too thin</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Am preoccupied with the thought of having fat on my body</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Take longer than others to eat my meals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoid foods with sugar in them</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavior</td>
<td></td>
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<tr>
<td>-------------------------------------------------------------------------</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Eat diet foods</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feel that food control my life</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display self-control around food</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feel that others pressure me to eat</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Give too much time and thought to food</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feel uncomfortable after eating sweets</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engage in dieting behavior</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Like my stomach to be empty</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have the impulse to vomit after meals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enjoy trying rich new foods</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
EAT-26 Behavioral Questions

Please check a response for each of the following:

<table>
<thead>
<tr>
<th>In the past 6 months have you:</th>
<th>Never</th>
<th>Once a month or less</th>
<th>2-3 times a month</th>
<th>Once a week</th>
<th>2-6 times a week</th>
<th>Once a day or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gone on eating binges where you feel that you may not be able to stop?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever made yourself sick (vomited) to control your weight or shape?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever used laxatives, diet pills or diuretics (water pills) to control your weight or shape?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercised more than 60 minutes a day to control your weight?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Have you lost 20 pounds or more in the past 6 months?

- [ ] Yes
- [ ] No
APPENDIX B

PERMISSION TO USE THE EAT-26 SURVEY
Appendix B

Permission to use the EAT-26 Survey

Thank you for your permission request to reproduce and use the EAT-26. The EAT-26 is protected under copyright; however, all fees and royalties have been waived because it has been our wish for others to have free access to the test.

Please consider this e-mail as granting you permission to reproduce the test for the purpose suggested in your request as long as the EAT-26 is cited properly. The correct citation is: "The EAT-26 has been reproduced with permission. Garner et al. (1982). The Eating Attitudes Test: Psychometric features and clinical correlates. Psychological Medicine, 12, 871-878."

You can download a copy of the scoring instructions and the test on the homepage of the EAT-26 website. If you use the written version of the test, it is recommended that you provide respondents with the link to the EAT-26 website (www.eat-26.com) so that they can learn more about the test.

Again, thank you for requesting permission to reproduce and use the EAT-26. If you intend on publishing your work, please send me your results so that they can be included in a research database being developed on the EAT-26 website (www.eat-26.com).

Best wishes,

David M. Garner, Ph.D.
Administrative Director
River Centre Clinic
5465 Main Street
Sylvania, OH 43560
dm.garner@gmail.com
APPENDIX C

CONSENT FORM
Appendix C

Consent Form

Welcome to "Freshman Year Weight Changes," a web-based experiment that examines some of the finer points of weight changes during the freshman year of college. Before taking part in this study, please read the consent form below and click on the "I Agree" button at the bottom of the page if you understand the statements and freely consent to participate in the study.

This study involves a web-based experiment designed to understand the weight changes that occur during the freshman year of college. The study is being conducted by Dr. Gordon and Amanda Woodhall of Kent State University, and it has been approved by the Kent State University Institutional Review Board. No deception is involved, and the study involves no more than minimal risk to participants (i.e., the level of risk encountered in daily life).

Participation in the study typically takes 15 minutes and is strictly anonymous. Participants begin by answering a series of questions about demographics. Once the participants clear the exclusion criteria, a series of questions regarding weight changes during the freshman year will be asked. Additionally, questions about diet, other health habits, and eating attitudes will be asked.

All responses are treated as confidential, and in no case will responses from individual participants be identified. Rather, all data will be pooled and published in aggregate form only. Participants should be aware, however, that the experiment is not being run from a "secure" https server of the kind typically used to handle credit card transactions, so there is a small possibility that responses could be viewed by unauthorized third parties (e.g., computer hackers).

Many individuals find participation in this study enjoyable, and no adverse reactions have been reported thus far. Participation is voluntary, refusal to take part in the study involves no penalty or loss of benefits to which participants are otherwise entitled, and participants may withdraw from the study at any time without penalty or loss of benefits to which they are otherwise entitled.

If participants have further questions about this study or their rights, or if they wish to lodge a complaint or concern, they may contact the principal investigator Dr. Gordon at (330) 672-2248 or Amanda Woodhall at (330) 635-3852; or the Kent State University Institutional Review Board, at (330) 672-2704.
If you are 18 years of age or older, understand the statements above, and freely consent to participate in the study, click on the "I Agree” button to begin the experiment.
APPENDIX D

EAT-26 SCORING
Appendix D

EAT-26 Scoring

Scoring System for the EAT-26:

<table>
<thead>
<tr>
<th>EAT-26 Score</th>
<th>Always</th>
<th>Usually</th>
<th>Often</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score for questions 1-25</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Score for question # 26</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Scoring System for the Behavioral Questions:

Participants who scored in any of the checked boxes (√) are at risk for disordered eating and should seek evaluation from a trained mental health professional:

<table>
<thead>
<tr>
<th>In the past 6 months have you:</th>
<th>Never</th>
<th>Once a month or less</th>
<th>2-3 times a month</th>
<th>Once a week</th>
<th>2-6 times a week</th>
<th>Once a day or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gone on eating binges where you feel that you may not be able to stop?</td>
<td>□</td>
<td>□</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Ever made yourself sick (vomited) to control your weight or shape?</td>
<td>□</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Ever used laxatives, diet pills or diuretics (water pills) to control your weight or shape?</td>
<td>□</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Exercised more than 60 minutes a day to control your weight?</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>√</td>
</tr>
</tbody>
</table>
REFERENCES
REFERENCES


Boero, N. (2007). All the news that’s fat to print: The American “obesity epidemic” and the media. *Qualitative sociology, 30*(1), 41-60.


Better eaters have higher knowledge of dietary guidance. *Journal of the American Dietetic Association, 107*(8), 1409-1413.


Spencer, L. (2002). Results of a heart disease risk-factor screening among traditional


