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I, Krista Marie Mohl,

hereby submit this as part of the requirements for the degree of:

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It is entitled Do University Students' Involvement in Healthy Eating and Perceived Barriers to Healthy Eating Differ Based on Gender, Age, Physical Activity Status, and Reason for Engagement in Physical Activity?

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DO UNIVERSITY STUDENTS' INVOLVEMENT IN HEALTHY EATING AND PERCEIVED BARRIERS TO HEALTHY EATING DIFFER BASED ON GENDER, AGE, PHYSICAL ACTIVITY STATUS, AND REASON FOR ENGAGEMENT IN PHYSICAL ACTIVITY?

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Abstract

AN ABSTRACT OF THE THESIS FOR THE MASTER OF EDUCATION DEGREE IN HEALTH PROMOTION AND EDUCATION, PRESENTED ON JULY 29, 2004, AT THE UNIVERSITY OF CINCINNATI, OHIO

TITLE: Do University Students' Involvement in Healthy Eating and Perceived Barriers to Healthy Eating Differ Based on Gender, Age, Physical Activity Status, and Reason for Engagement in Physical Activity?

MASTERS COMMITTEE MEMBERS: Dr. Keith King (chair) and Dr. Amy Bernard

Poor diet plays a major role in morbidity and mortality in the United States. Specifically, heart disease, cancer, stroke, and diabetes have all been associated with poor diet. These conditions and therefore many of the deaths attributed to them could be prevented through simple lifestyle modifications such as the incorporation of physical activity and healthy eating into one's life.

For this research, a total of 204 undergraduate college students were surveyed regarding their involvement in healthy eating. The overall response rate was 100% (204/204). Participants in this study were college students at a midwestern university. More than half of the students were female and white. Most of the students were majoring in non-health related fields.

Results showed that fewer than 10% of the students met all of the recommendations for healthy eating based on the Food Guide Pyramid. In fact, fewer than half (46.1%) met the recommended guidelines for four or more of the categories. Overall, students were most likely to meet the recommendations for the grain group (68.6%) and least likely to meet the guidelines for the vegetable group (33.3%).

The top three barriers to healthy eating reported by the students were time, convenience, and availability of healthy foods. Results showed that there was no

significant difference in the number of perceived barriers to healthy eating based on gender. The gender of college students was also examined as a factor that could potentially affect one's overall involvement in healthy eating. Results showed that involvement in healthy eating did not significantly differ based on gender.

The majority of students surveyed reported being physically active on a regular basis. In fact, 40.3% of the students were physically active four or more times a week. However, being physically active did not appear to have a significant effect on healthy eating. Students who were physically active were no more likely to eat healthy than students who were not physically active.

A series of oneway analyses of variance (ANOVA) were conducted to test eight different hypotheses. More specifically, these ANOVAs examined whether involvement in eating a healthy diet and number of perceived barriers to eating a healthy diet differed significantly based on selected demographic variables. Results indicated that college students' involvement in physical activity, reason for involvement in physical activity, and gender had no significant effect on eating a healthy diet. It can also be noted that college students' involvement in physical activity, reason for involvement in physical activity, gender, and grade level had no significant effect on perceived barriers to healthy eating. However, the results of this study showed that grade level did have a significant effect on college students' involvement in healthy eating. Juniors and seniors were significantly more involved in healthy eating than freshmen and sophomores.

The following recommendations could be helpful in increasing college students' involvement in healthy eating: 1) incorporate nutrition education into the curriculum in elementary, junior high, and high schools; 2) teach young adults about the 5-A-Day

program, the Dietary Guidelines for Americans, and the Food Guide Pyramid; 3) stress the importance of parents and other adults as role models for healthy eating; 4) require nutrition and physical education classes in the college or university setting; 5) implement research-based programs such at the Right Bite Program to colleges and universities; 6) improve food selection and availability in university foodservice establishments; and 7) reduce perceived barriers to healthy eating by making healthier foods more convenient and less time consuming.

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Chapter One

The Problem

Poor food choices are among the leading causes of death and disease in the United States (Epstein, 2001). Poor diet contributes to over 300,000 deaths a year in the United States. About one-third of all cancer deaths are attributable to poor diet, and four of the top ten causes of death in the United States—heart disease, cancer, stroke and diabetes—are also associated with poor diet (Frazao, 1995). Obesity, currently the most prevalent morbid condition in the United States, is directly linked to poor diet. Dietetics professionals working with disease prevention are concerned about obesity because of its association with a greater risk of other health problems, including type 2 diabetes, hypertension, hyperlipidemia, some cancers, menstrual disturbances, pregnancy complications, osteoarthritis, dyspnea, and varicose veins (James, Nelson, Ralph, & Leather, 1997; Vuori, 2001).

The causes of obesity are complex and include genetics, lack of physical activity, and high-fat, energy-dense foods, which are readily accessible, inexpensive, heavily advertised, and palatable (Cohen, Scribner, & Farley, 2000; Schrauwen & Westerterp, 2000; Wadden, Brownell, & Poster, 2002). The environment in which we live today is also very conducive to the development and maintenance of poor diets. In fact, Wadden et al. (2002) have coined the term "toxic food environment," which includes gas stations, shopping malls, convenience stores, vending machines, ballparks, movie theaters, and restaurants, all tempting people with too much of the wrong foods. Obstacles to healthful eating reported in the recent American Dietetics Association (ADA) Nutrition and You: Trends 2000 were reluctance to give up favorite foods (44%), satisfaction with current

diet (39%), lack of time to keep track of diet (38%) and lack of understanding of nutrition guidelines (29%) (ADA, 2000).

Societal changes in the United States over the past 50 years have dramatically altered the eating behaviors of most Americans, including college students (Cassell, 2001). Food choices of young adults are not consistent with the Dietary Guidelines for Americans (Story, Neumark-Sztainer, & French, 2002). Nutrition-related concerns include unhealthful dieting; high intake of fast foods and other foods high in fat; low intake of fruits, vegetables, fiber, and dairy foods; and erratic eating behaviors, such as skipping meals (Centers for Disease Control and Prevention [CDC], 1996; Munoz, Krebs-Smith, Ballard-Barbash, & Cleveland, 1997; Neumark-Sztainer, Story, Resnick, & Blum, 1998). In fact, the National College Health Risk Behavior Survey (1997) reports that only 25% of college students surveyed, aged 18-24 years, ate five or more servings of fruits and/or vegetables the day preceding the survey.

Many factors affect a young adult's dietary choices. One factor is the lack of knowledge about proper nutrition and recommended servings of specific food groups (CDC, 1996). However, as Contento, Manning and Shannon (1992) assert, knowing how and why to eat healthfully is important, but knowledge alone does not equate to the consistent adoption of healthful eating behaviors. When choosing foods, nutrition information may not be as important as other variables (Health and Welfare Canada, 1990), such as taste (Bowman, McProud, Usiewicz, Gendreau, & Mitchler, 1995; Davis-Chervin, Rogers, & Clark, 1985; Joyce, Hanson, Ebro, Fair, & Warde, 1996; Kubena & Carson, 1988), cost, convenience (Kubena & Carson, 1988) and energy value. Perceived time constraints and convenience also strongly influence young adults' food choices

(California Project Lean, 1998; French et al, 1999; Neumark-Sztainer, Story, Perry, & Casey, 1999; Story & Resnick, 1986). In addition, growing independence and eating away from home, concern with physical appearance and body weight, the need for peer acceptance, and busy schedules all have an effect on eating patterns and food choices (Story et al., 2002). Other research by French et al. found that individuals rated taste as the most important factor to consider, followed by hunger and price. Taste and sensory perceptions of food studies with adolescents and adults have shown that taste is one of the most important influences on food choices (Barr, 1994; French et al., 1999; Glanz, Basil, Maibach, Goldbery, & Snyder, 1998; Horacek & Belts, 1998a; Neumark-Sztainer et al., 1999).

In an effort to remove many of these barriers to healthy eating, several strategies and interventions are being considered. At the individual level, interventions that emphasize the good taste of healthful foods and convenient ways to include them in the diet may be effective strategies (Story et al., 2002). At the interpersonal level, family and friends who are social influences proximal to the young adult should be targeted as means to assist in healthy eating behavior. Effective strategies create positive peer norms toward healthy eating and provide positive peer support for healthy eating (Story et al., 2002). At the community level, strategies are needed to reduce environmental barriers to healthful food choices and create more opportunities to engage in healthful eating behaviors (Story et al., 2002). Many young adults are aware that their diets are high in fat and low in fruits, vegetables, and calcium-rich foods and report that greater availability of good tasting, convenient and less-expensive foods would help them improve their food choices (Barr, 1994; California Project Lean, 1998; Neumark-Sztainer

et al., 1999; Story & Resnick, 1986). In response to students' demands, college and university food services now serve healthier foods (Belaski, 2001). However, Luquis, Garcia, and Ashford (2003) found that many students ate more junk food than they did prior to coming to college, and expressed a strong dissatisfaction with the food selection available in the dining halls. In addition, many students felt that the food was not nutritious and that there was not a good selection for those who wanted to eat healthy or follow a vegetarian diet (Luquis et al., 2003). It is important that these barriers to healthy eating continue to be addressed by university foodservice establishments. Evans and Sawyer-Morse (2002) stress the importance of the college campus setting as a critical setting for the development and maintenance of healthful behaviors.

In addition to eating a healthful diet, participation in regular physical activity is one of the most important influences on health (Koffman et al., 2001). Furthermore, an additive or synergistic relationship may occur in health promotion programs that incorporate both healthy eating and physical activity (Gillman et al., 2001). Exercise and sports participation have traditionally been regarded as a means of encouraging development of healthy habits and deterring health risk behaviors (Pate, Heath, Dowda, & Trost, 1996). Gillman et al. (2001) reported that increased amounts of physical activity were associated with more healthy food choices. Similarly, Eaton et al. (1995) showed that individuals with higher levels of activity consumed more dietary fiber, antioxidant vitamins, and calcium, while consuming less total and saturated fat.

Statement of the Problem

The present study was conducted to further the research by Eaton et al. (1995) in examining the effect of physical activity on healthy eating. However, unlike Eaton's research which examined adult behaviors, the present study examined a sampling of college students and their involvement in physical activity and healthy eating. Specifically, the purpose of the present study was to examine the extent of healthy eating among college students and assess whether involvement in healthy eating and perceived barriers to healthy eating differed based on exercise status, gender, age, and reason for exercise.

Research Questions

This study examined the following research questions:

1. To what extent are college students involved in healthy eating?
2. Does involvement in healthy eating differ based on exercise status, gender, age, and reason for exercise?
3. Do perceived barriers to healthy eating differ based on exercise status, gender, age, and reason for exercise?

Hypotheses

Hypothesis 1. College students who are physically active will be more likely to eat a healthy diet than college students who are not physically active.

Alternative Hypothesis 1. College students who are physically active will be less likely to eat a healthy diet than college students who are not physically active.

Null Hypothesis 1. There will be no difference between college students who are physically active and college students who are not physically active in regards to eating a healthy diet.

Hypothesis 2. Female college students will be more likely to eat a healthy diet than male college students.

Alternative Hypothesis 2. Female college students will be less likely to eat a healthy diet than male college students.

Null Hypothesis 2. There will be no difference between female college students and male college students in regards to eating a healthy diet.

Hypothesis 3. Seniors and juniors will be more likely to eat a healthy diet than freshmen and sophomores.

Alternative Hypothesis 3. Seniors and juniors will be less likely to eat a healthy diet than freshmen and sophomores.

Null Hypothesis 3. There will be no difference between seniors and juniors and freshmen and sophomores in regards to eating a healthy diet.

Hypothesis 4. College students who are physically active for health reasons will be more likely to eat a healthy diet than college students who are physically active for appearance reasons.

Alternative Hypothesis 4. College students who are physically active for health reasons will be less likely to eat a healthy diet than college students who are physically active for appearance reasons.

Null Hypothesis 4. There will be no difference between college students who are physically active for health reasons and college students who are physically active for appearance reasons in regards to eating a healthy diet.

Hypothesis 5. College students who are physically active will report fewer perceived barriers to healthy eating than college students who are not physically active.

Alternative Hypothesis 5. College students who are physically active will report more perceived barriers to healthy eating than college students who are not physically active.

Null Hypothesis 5. There will be no difference between college students who are physically active and college students who are not physically active concerning the number of perceived barriers to healthy eating.

Hypothesis 6. Male college students will report more perceived barriers to healthy eating than female college students.

Alternative Hypothesis 6. Male college students will report fewer perceived barriers to healthy eating than female college students.

Null Hypothesis 6. There will be no difference between male and female college students concerning the number of perceived barriers to healthy eating.

Hypothesis 7. Seniors and juniors will report fewer perceived barriers to healthy eating than freshmen and sophomores.

Alternative Hypothesis 7. Seniors and juniors will report more perceived barriers to healthy eating than freshmen and sophomores.

Null Hypothesis 7. There will be no difference between seniors and juniors and freshmen and sophomores concerning the number of perceived barriers to healthy eating.

Hypothesis 8. College students who are physically active for health reasons will report fewer perceived barriers to healthy eating than college students who are physically active for appearance reasons.

Alternative Hypothesis 8. College students who are physically active for health reasons will report more perceived barriers to healthy eating than college students who are physically active for appearance reasons.

Null Hypothesis 8. There will be no difference between college students who are physically active for health reasons and college students who are physically active for appearance reasons concerning the number of perceived barriers to healthy eating.

Delimitations

This study was delimited to current college students at the University of Cincinnati, Clifton Campus, who were enrolled in selected health promotion undergraduate courses. The study used a convenience sample which may not have been representative of all college students. Therefore, the results of this study may not be generalizeable to college students nationwide.

Limitations

The results of this study were based on self-reported responses and may reflect subject bias, honesty, and memory. Specifically, the participants provided information on personal characteristics such as gender, age, and weight, as well as exercise and dietary practices. Any inaccuracies in these self reports could have impacted the results

of the study. This study was further limited by the ability of the participants to read and understand the questions, as well as their willingness to complete the questionnaire.

Assumptions

During the course of this study it was assumed that the subjects read and understood all questions on the survey and that the subjects responded honestly and to the best of their ability.

Operational Definitions

The following definitions were critical and unique to this study:

1. Healthy Diet – Eating a healthy diet was defined as "choosing foods that provide one with nutrients the body needs to function at its optimal level." In this study, diet quality was measured using an instrument developed from the USDA's Healthy Eating Index (HEI) (Center for Nutrition Policy and Promotion, n.d.), which measures how well the diets of Americans conform to the recommendations of the Dietary Guidelines for Americans and the Food Guide Pyramid.
2. Physical Activity – In this study, being physically active was defined as "participation in activities that make the individual sweat and breathe hard for at least 20 minutes on $\geq$3 of the 7 days preceding the survey."
3. Physical Activity for Health Reasons – "Participation in activities that make the individual sweat and breathe hard for at least 20 minutes on $\geq$3 of the 7 days preceding the survey because of its known health benefits,

including reducing the risk for cardiovascular disease, diabetes, obesity, hypertension, osteoporosis later in life, and selected cancers."

4. Physical Activity for Appearance Reasons – "Participation in activities that make the individual sweat and breathe hard for at least 20 minutes on $\geq$3 of the 7 days preceding the survey because of the desire to improve or maintain one's physical appearance." In this study, this included weight loss, weight gain, and weight maintenance.
5. Perceived Barriers – "Potentially negative aspects of a health action which may act as impediments to undertaking a recommended, potentially beneficial behavior (Stretcher & Rosenstock, 1997)." This study measured perceived barriers to healthy eating with the survey instrumentation identified in Chapter 3.
6. Exercise Status – In this study, exercise status was determined via one of three categories: "does not exercise at all," "exercises 1-3 times a week," or "exercises 4 or more times a week."

Chapter Two

Review of Literature

The present study was conducted to further the research by Eaton et al. (1995) in examining the effect of physical activity on healthy eating. However, unlike Eaton's research which examined adult behaviors, the present study examined a sampling of college students and their involvement in physical activity and healthy eating. Specifically, the purpose of the present study was to examine the extent of eating among college students and assess whether involvement in healthy eating and perceived barriers to healthy eating differed based on exercise status, gender, age, and reasons for exercise.

Chapter one addressed the problem, purpose, research questions, hypotheses, delimitations, limitations, assumptions and operational definitions. Chapter two reviews the professional literature exploring the relationship between regular physical activity and healthy eating, particularly among college students.

Diet and its Role in Disease and Death

Our food choices are among the leading causes of death and disease in the United States (Epstein, 2001). Poor diet contributes to over 300,000 deaths a year in the United States. About one-third of all cancer deaths are attributable to poor diet, and four of the top ten causes of death in the United States—heart disease, cancer, stroke and diabetes—are also associated with poor diet (Frazao, 1995).

In fact, a recent report from the World Health Organization (WHO) (2003) recognized that the growing epidemic of chronic disease afflicting developed countries was related to dietary and lifestyle changes. According to officials, these changes

occurred simultaneously with industrialization, urbanization and economic development. Dietary patterns shifted to increased consumption of energy-dense diets high in fat, particularly saturated fat, and low in unrefined carbohydrates. The WHO believes that it is this type of diet, coupled with a decline in energy expenditure that is associated with the development of noncommunicable chronic diseases, such as obesity, diabetes mellitus, cardiovascular disease, hypertension, stroke and some types of cancer.

However, nutrition has come to the fore as a major modifiable determinant of chronic disease, with scientific evidence increasingly supporting the view that alterations in diet have strong effects, both positive and negative, on health through life. Most importantly, dietary adjustments may not only influence present health, but may determine whether or not an individual will develop such diseases as cancer, cardiovascular disease and diabetes much later in life (WHO, 1990).

Many other researchers have built onto the idea that a healthy diet and physical activity can help to prevent chronic disease. Several studies have shown that people who did not get cancer tended to eat more vegetables, more fruits and more varieties of both than those who skipped the salad course and rarely grabbed an apple (McCarthy, 2001). Fruits and vegetables tend to help because both foods are natural sources of polyphenols and other chemicals that act as anti-cancer agents. In addition, fruits and vegetables may enhance the body's own cancer-fighting defenses, according to preliminary findings from Johns Hopkins University Bloomberg School of Public Health in Baltimore (McCarthy, 2001). McCarthy also noted that some health experts feel that the biggest nutritional problem in the United States today is not what we eat but how much. Dr. Peter Greenwald stated, "Americans simply eat too much, which is leading to an epidemic of

obesity that, in turn, raises the risk of cancer—especially colorectal cancer and breast cancer—as well as heart disease and diabetes (McCarthy, 2001, para.31)."

Similarly, Stables et al. (2002) reported that as many as thirty to forty percent of all cancer cases may be associated with suboptimal diet and related lifestyle factors such as lack of physical activity. The evidence that a variety of vegetables and fruit may contribute to the prevention of cancer and heart disease was drawn from hundreds of epidemiological and biological studies (Stables et al., 2002). In fact, Stables et al. believe that as many as 20% or more of all cancers could be prevented by diets high in vegetables and fruits alone.

However, cancer is not the only disease that is thought to be preventable through dietary changes. Heart disease, currently the leading cause of death in the US, is thought to be preventable as well. According to Stamler (1993), "We've known that severe atherosclerosis—the underlying disease—is a reflection of the Western lifestyle in the 20th century." Too much saturated and trans fat and cholesterol, largely from meat, dairy products, pastries, and eggs, raise blood cholesterol. Too many calories lead to obesity. Too little fiber, folate, and possibly omega-3 fatty acids and antioxidants leave the heart unprotected. Too much sodium and too little potassium and magnesium raise blood pressure (Liebman, 1999). Stamler also asserted that sedentary living compounds our nutritional problems and that cigarette smoking raises coronary risk.

Stroke, the third leading cause of death in the US, is also a preventable disease in many instances. Regular physical activity and a diet low in saturated fat and rich in fruits and vegetables are recommended for both primary and secondary prevention of stroke (Goldstein et al., 2001; Gorelick et al., 1999). They are recommended for the overall

reduction in risk as well as reduction in risk through their association with risk factors for stroke, including hypertension, diabetes, adverse lipid levels, and overweight/obesity (Greenlund, Giles, Keenan, Croft, & Mensah, 2002). Medical research showing that persons with stroke also are likely to have multiple cardiovascular disease risk factors reinforced the need for comprehensive preventive actions, including behavioral lifestyle changes (Greenlund et al., 2002). Specifically, experts recommended following the DASH (Dietary Approaches to Stop Hypertension) diet, which is a lower-fat diet with eight to ten servings a day of fruits and vegetables and two or three servings of low-fat dairy products, to reduce blood pressure (Liebman, 1999). The National High Blood Pressure Education Program Working Group Report on Primary Prevention of Hypertension (1993) has indicated that diets, interventions and lifestyle changes that lower blood pressure also tend to lower the risk of cancer, heart disease, and diabetes. Therefore, all individuals should adopt healthy behaviors as a means to preventing diseases.

Diabetes mellitus is another disease in the top ten causes of death directly linked to diet. Research studies have found that lifestyle changes can prevent or delay the onset of type 2 diabetes among high-risk adults (National Institute of Diabetes and Digestive and Kidney Diseases, 2003). These studies included people with impaired glucose tolerance (IGT) and other high-risk characteristics for developing diabetes. Lifestyle interventions included diet and moderate-intensity physical activity (National Institute of Diabetes and Digestive and Kidney Diseases, 2003). One study by Salmeron et al. (1997) suggested that foods higher in fiber may help to prevent the disease because they are less likely to raise blood sugar. Salmeron et al. stated that whole-grain foods are

associated with a lower risk of developing diabetes. The Diabetes Prevention Program (DPP) (2003), a research study conducted to determine whether diet and exercise could prevent or delay the onset of type 2 diabetes in people with IGT, recently reported its results. The DPP concluded that millions of high-risk people can use diet, exercise, and behavior modification to avoid developing type 2 diabetes.

Another concern that has garnered much attention is the growing incidence of overweight and obesity. Overweight is a major public health problem in the United States that has reached epidemic proportions (Allison, Fontaine, Manson, Stevens, & VanItallie, 1999; Coulston, 1998, Mokdad et al., 1999; Rippe, 1998; Stamler, 1993). According to Koplan (Liebman, Schardt, & Jones, 2001, para. 11), our lifestyles, including inactivity and poor nutrition, are largely responsible. The prevalence of overweight and obesity among US adults has increased dramatically during the past two decades (Kuczmarski, Flegal, Campbell, & Johnson, 1994; Mokdad et al., 1999). A recent report from the American Dietetic Association (ADA) (2002) on weight management concluded that a sedentary life coupled with access to an abundance of energy-dense food has lead to an increase in chronic disease. According to Quatromoni, Copenhafer, D'Agostino, and Millen (2002), overweight and obesity are associated with numerous adverse health outcomes, including cardiovascular disease, hypertension, diabetes, gallbladder disease, cancer, arthritis, and pulmonary dysfunction.

Factors Contributing to Obesity and Poor Diet

The causes of obesity are complex and include genetics, lack of physical activity, and high-fat, energy-dense foods, which are readily accessible, inexpensive, heavily

advertised, and palatable (Cohen et al., 2000; Schrauwen & Westerterp, 2000; Wadden et al., 2002). The environment in which we live today is also very conducive to the development and maintenance of poor diets. In fact, Wadden et al. have coined the term "toxic food environment," which includes gas stations, shopping malls, convenience stores, vending machines, ballparks, movie theaters, and restaurants, all tempting people with too much of the wrong foods.

Many other factors also contribute to poor diet. Obstacles to healthful eating reported in the recent American Dietetics Association (ADA) Nutrition and You: Trends 2000 were reluctance to give up favorite foods (44%), satisfaction with current diet (39%), lack of time to keep track of diet (38%) and lack of understanding of nutrition guidelines (29%) (ADA, 2000). The authors also reported that 77% of Americans believe the myth that there are "good" and "bad" foods. The ADA noted that this pessimistic attitude may impede dietary change if Americans are tired of messages from nutrition experts that everything that tastes good is bad for them.

According to ADA, research studies done to determine why Americans eat what they do suggest the need for a total diet approach. Research has shown that what we eat is influenced by the diversity of individual tastes and food preferences, concerns about nutrition and weight control, physiology, lifestyle influences on food selection, environment, and perceptions of food product safety (ADA, 2002).

Another factor that has been investigated is the trend of eating more meals outside of the home. In 1978, Americans ate 18% of their calories away from home, compared to 34% in 1995 (Liebman et al., 2001). Liebman, Schardt, and Jones (2001), noted that serving sizes for many foods have grown in the last few decades. Meals from fast-food

restaurants, as well as prepackaged foods such as single-serve potato chip bags, soft drinks, candy bars, bagels, bread slices, and muffins—are larger than ever (Liebman et al., 2001). Wansink (2004) examined the effect of serving size of popcorn, candy, chips, and soft drinks on consumption and found that in every case, the larger the serving size, the more individuals consumed.

However, the trouble is not solely in the serving size. An additional problem is the fact that when restaurants prepare and cook foods, the food is usually prepared and cooked in a less healthy manner (Liebman et al., 2001). Studies by Roberts and Leibel (1998) have shown that people who eat out more often are more likely to be overweight. McCrory et al. (1999) noted that restaurant food has more fat, saturated fat, sodium, refined carbohydrates, and calories and less calcium than food prepared at home. Other studies have shown that the more kinds of foods people have to choose from, the more they will eat (Liebman et al., 2001).

Physical Inactivity

Physical inactivity has also been noted in many studies as a contributing behavioral factor to disease and death. Being physically inactive can lead to serious health repercussions, according to an April 2002, news release from the WHO (2002). According to the WHO (2002), such a lifestyle is known to increase all causes of mortality; double the risk of cardiovascular diseases, diabetes, and obesity; and increase the risk of colon cancer, high blood pressure, osteoporosis, lipid disorders, depression, and anxiety. No longer is there any serious doubt about the strong impact of physical activity on promoting health and preventing disease, or achieving and maintaining a healthy body weight (McInnis, Franklin, & Rippe, 2003). McInnis et al. (2003) have

noted that despite the well-known benefits of regular physical activity, only about 15 percent of American adults regularly engage in the modest amount of activity required to obtain health benefits, while more than one fourth of adults are sedentary.

There are many reasons why people are not getting enough physical activity. Bell, Mock, and Slutkin (2002) have noted that environmental issues such as neighborhood safety and reliance on motorized transportation have a strong impact on physical activity in the United States. Similarly, Dowda, Ainsworth, Addy, Saunders, and Riner (2001) concluded that compared to years past, more time today is spent using computers, watching television, and playing video games, particularly among children and adolescents.

Nutrition Knowledge

Lack of knowledge about nutrition and healthy eating is another factor that is known to contribute to disease and death. Individuals receive information about nutrition from many different sources. Unfortunately, as Main and Wise (2002) have noted, public knowledge of nutrition is not always correct and there are many misconceptions that have incorrectly lead individuals into thinking that they are actually following nutritional principles when they are not. In 2002, ADA recognized that the public is bombarded with an overwhelming amount of food and nutrition information and it is not always clear how to distinguish nutrition facts from nutrition misinformation. In addition, dietary studies have shown that subjects' estimates of portion size are a major source of error (Cypel, Guenther, & Petot, 1997). Consumers and patients who are unable to estimate food portions accurately lack a basis for evaluating or improving their dietary intake because they do not know how much they have eaten (Brown & Hsing-Kuan Oler, 2000).

Healthy Eating Among College Students

Societal changes in the United States over the past 50 years have dramatically altered the eating behaviors of most Americans, including college students (Cassell, 2001). Food choices of most adolescents are not consistent with the Dietary Guidelines for Americans (Story et al., 2002). In fact, a recent national study by the US Department of Agriculture (2000) showed that only 1% of adolescent males and females met national recommendations for all of the Food Guide Pyramid groups.

Nutrition-related concerns of college students include unhealthful dieting; high intake of fast foods and other foods high in fat; low intake of fruits, vegetables, fiber, and dairy foods; and erratic eating behaviors, such as skipping meals (CDC, 1996; Munoz et al., 1997; Neumark-Sztainer et al., 1998). In fact, the National College Health Risk Behavior Survey (NCHRB) (1997) reported that only 25% of college students surveyed, aged 18-24 years, ate five or more servings of fruits and/or vegetables the day preceding the survey. Additionally, the NCHRB Survey found that 22% of college students had eaten three or more high-fat foods and only 30% reported receiving information from their college or university on nutrition and dietary practices that contribute to disease.

Story et al. (2002) have also found that growing independence and eating away from home, concern with physical appearance and body weight, the need for peer acceptance, and busy schedules all have an effect on eating patterns and food choices. According to Luquis et al. (2003), many students felt that because they were in college it was acceptable for them to "let themselves go," that is engage in unhealthy behaviors

such as excessive drinking and poor eating habits. In addition, Luquis et al. found that many students believe they eat more junk food now than before coming to college.

Barriers to Healthy Eating

College students comprise a group whose dietary practices and nutritional status are of concern to nutrition professionals (Binger, 1999; Marietta, Welshimer, & Anderson, 1999). Many factors affect a young adult's dietary choices. Many young adults lack knowledge about good nutrition, including recommended servings of specific food groups (CDC, 1996). However, as Contento et al. (1992) have pointed out, knowing how and why to eat healthfully is important, but knowledge alone does not enable individuals to adopt healthful eating behaviors. When choosing foods, nutrition information may not be as important as other aspects (Health and Welfare Canada, 1990), including taste (Bowman et al., 1995; Davis-Chervin et al., 1985; Joyce et al., 1996; Kubena & Carson, 1988), cost, convenience (Kubena & Carson, 1988) and energy value. Additionally, perceived time constraints and convenience strongly influence adolescent food choices (California Project Lean, 1998; French et al, 1999; Neumark-Sztainer et al., 1999; Story & Resnick, 1986).

In fact, lack of time is also perceived as a major barrier to eating more healthfully (Story et al., 2002). In a study by Neumark-Sztainer et al. (1999), individuals discussed wanting to sleep longer in the morning instead of taking time to eat or prepare breakfast, not wanting to wait in a long lunch line, eating at fast-food restaurants because the food is served quickly, and choosing foods at home that can be prepared quickly.

Other research by French et al. (1999) found that individuals rated taste as the most important factor to consider, followed by hunger and price. Taste and sensory perceptions of food studies with adolescents and adults have shown that taste is one of the most important influences on food choices (Barr, 1994; French et al., 1999; Glanz et al., 1998; Horacek & Belts, 1998a; Neumark-Sztainer et al., 1999).

Research on the dietary practices of college students has identified several behaviors that are associated with the consumption of poor quality diets (McArthur, Grady, Rosenberg, & Howard, 2000). Horwath (1991), Hendricks and Herbold (1998), and Marietta et al. (1999) have reported that college students frequently skip meals, consume large amounts of fast foods and alcohol, snack on high-calorie foods, avoid certain nutritious foods, and adopt unsound weight loss techniques. Marietta et al. and Huang, Hoerr, and Song (1997) have observed that college students make more food selection and food preparation decisions after moving away from home while simultaneously adapting to an unfamiliar environment and lifestyle. During this transition phase several influential factors can contribute to the adoption of poor dietary practices. These factors include availability of low nutrient density, preoccupation with weight, financial restrictions, limited food preparation skills, restricted food storage and cooking facilities, difficulty with time management, and nutritional misconceptions (Betts, Amos, Keim, Peters, & Stewart, 1997; Harris & Murray, 1997; Horacek & Betts, 1998a; Horacek & Betts, 1998b; Koszewski & Kuo, 1996).

Belaski (2001) has noted that even when college students are aware of good nutrition, for the most part they see weight gain as the only consequence of unhealthy eating habits. Similarly, Evans and Sawyer-Morse (2002) report that even those people

with greater nutrition knowledge frequently make poor dietary choices. As a result, these poor dietary choices and patterns formed during childhood and early adult years may result in health conditions that increase the risk for certain chronic diseases later in life (Evans & Sawyer-Morse, 2002).

Health education theories suggest that health behaviors are influenced in part by the perceived benefits of and barriers to a specified action (O'Dea, 2003; Rosenstock, 1990). Specifically, O'Dea (2003) identified barriers to healthful eating, including lacking a sense of urgency about personal health; undesirable taste, appearance and smell of healthful food; lack of time; limited availability of choice; and convenience. Furthermore, DiGioacchino Debate, Topping, and Sargent (2001) noted that the failure of college students to eat healthful diets could be due to frequent meal skipping, inadequate variety of foods, frequent consumption of fast foods, lack of awareness and understanding of the food recommendations and guidelines, and decreased self-efficacy in making healthful food choices.

Strategies to Overcome Barriers to Healthy Eating

In an effort to remove many of these barriers to healthy eating, several strategies and interventions are being considered. Story et al. (2002) have noted that at the individual level, interventions that emphasize the good taste of healthful foods and convenient ways to include them in the diet may be effective strategies. At the interpersonal level, family and friends are social influences that are proximal to the adolescent and should be targets for intervention change. Effective strategies create positive peer norms toward healthy eating and provide positive peer support for healthy

eating (Story et al., 2002). At the community level, strategies are needed to reduce environmental barriers to making more healthful food choices and create more opportunities to engage in more healthful eating behaviors.

Other research has shown that many adolescents are aware that their diets are high in fat and low in fruits, vegetables, and calcium-rich foods (California Lean Project, 1998; Neumark-Sztainer et al., 1999; Story et al., 1986) and report that greater availability of good tasting, convenient and less-expensive foods would help them improve their food choices (Barr, 1994; California Project Lean, 1998; Neumark-Sztainer et al., 1999; Story & Resnick, 1986). In response to students' demands, college and university food services now serve healthier foods (Belaski, 2001). However, Luquis et al. (2003) found that many students reported that they were eating more junk food than before coming to college, and expressed a strong dissatisfaction with the food selection available at the dining halls. In addition, many students felt that the food was not nutritious and that there was not a good selection for those who want to eat healthy or follow a vegetarian diet.

It is important that these barriers to healthy eating continue to be addressed by university foodservice establishments. Evans and Sawyer-Morse (2002) have stressed the importance of the college campus setting as a critical setting for the development and maintenance of healthful behaviors.

Hampl, Anderson, and Mullis (2002) reported another strategy to overcome these barriers. They suggested adjusting the conditions in which people live and thus influencing the health behaviors and health outcomes of populations. Specifically they

recommended exposing consumers to healthy foods at the point-of-purchase in grocery stores or restaurants and offering price incentives promoting the use of healthy items.

Mittelmark (1999) stated that dietetics professionals who become involved in setting policy at the local level can reap many benefits, including a quicker impact on the community, personal gratification, and opportunities to network with other policy-oriented professionals. One example of successful policy change at the local level was the Child and Adolescent Trial for Cardiovascular Health (CATCH) study, which demonstrated improvements in both diet and exercise among youth enrolled at participating schools (Luepker et al., 1996).

Social marketing is another approach used to provoke change in individuals. Hampl et al. stated that reaching every individual in a population with an individual level intervention is difficult and costly. Social marketing programs can reach a specific audience, satisfy consumers' needs, and meet organizational objectives. Building on this, Reger, Wootan, and Booth-Butterfield (1999) used a six-week media campaign to promote consumption of 1% fat milk and found that 34% of high fat milk drinkers reported switching to low fat milk. This campaign by Reger et al. supported the notion that social marketing impacts the practice of dietetics by boosting consumer awareness of health issues and healthy foods and that it is able to move consumers toward behavioral change.

In addition, researchers noted the importance of the two nutrition education tools issued jointly by the US Departments of Agriculture and Health and Human Services to assist health consumers two years and older make optimum food choices. These tools were the Dietary Guidelines for Americans and the Food Guide Pyramid. The Dietary

Guidelines for Americans are a set of brief messages focusing primarily on food constituents of public health concern, i.e., total and saturated fat, cholesterol, sodium, sugar, and fiber (Johnson & Kennedy, 2000). The Food Guide Pyramid, first published in 1992, is the graphic depiction of the Dietary Guidelines for Americans (Welsh, Davis, & Shaw, 1992). Welsh et al. (1992) further stated that the Pyramid assigns foods to five food groups and recommends the number of servings from each group to comprise a healthful daily diet.

However, McArthur et al. (2000) measured and compared the knowledge of male and female college students about three nutrition topics closely related to the 2000 Dietary Guidelines for Americans and the Food Guide Pyramid, i.e., food composition, healthful eating, and the relationship between diet and health. Their findings suggested that college students have a low level of awareness about the three nutrition topics related to the 2000 Dietary Guidelines for Americans and Food Guide Pyramid. McArthur et al. further suggested a need for health educators to develop more nutrition messages and experiential learning opportunities about the public health nutrition tools that aim to help consumers select healthful daily diets. Such health promotion interventions should further stress the long-term benefits of making desirable dietary changes and the health risks associated with the types of poor quality diets often consumed by college students (McArthur et al., 2000).

Another program developed to improve the health of Americans was the 5 A Day for Better Health Program. The 5 A Day for Better Health Program was established in 1991 as a nutrition education campaign designed to increase awareness of the need to consume more vegetables and fruit, and to increase average vegetable and fruit

consumption in the United States to five or more daily servings (Stables et al., 2002). Several trials conducted by the National Cancer Institute to evaluate the effect of the 5 A Day Program reported positive changes in vegetable and fruit consumption (Stables et al., 2002). However, there are still barriers to overcome to increase fruit and vegetable consumption. While messages abound encouraging individuals to eat five servings of fruits and vegetables each day, the average American eats only three and a half servings (ADA, 2000). According to the ADA (2000), expense and perishability were both reported as barriers for not consuming more fruits and vegetables. These factors are particularly important when addressing a college-aged population that site financial restrictions and restricted food storage and cooking facilities as major barriers to healthy eating.

Another strategy to overcome some of the barriers to healthy eating was the development of National Nutrition Month. National Nutrition Month was developed by ADA to offer the public the basic nutrition knowledge they need to make informed food choices and develop sound eating habits (White & Tate, 2001). ADA has noted that National Nutrition Month is a unique vehicle that allows them the opportunity to increase public awareness of dietetics professions.

On a smaller scale, other nutrition interventions have been developed to address the lack of nutrition knowledge and the unhealthful dietary patterns of college students. One example of this was The Right Bite Program: A theory-based nutrition intervention at a minority college campus. Researchers at University of the Incarnate Word (1997) developed a three-year nutrition intervention program to increase healthful eating behaviors among college students through the use of trained student peer educators and

by providing an overall campus approach to a healthful eating environment (Evans & Sawyer-Morse, 2002). Researchers used Social Cognitive Theory as the theoretical framework for the intervention. Results suggested that this intervention was effective for increasing knowledge and consumption of fruit, juice and vegetables and decreasing fat intake among this specific group of college students. Furthermore, the researchers noted that future plans in regard to this intervention include a formal evaluation of the effectiveness, the development of a training implementation manual, and the dissemination of the Right Bite Program to other campuses.

Correlation Between Regular Physical Activity and Healthy Eating

In addition to eating a healthful diet, participation in regular physical activity is one of the most important influencers on health (Koffman et al., 2001). In fact, it was the position of the ADA (2002) that successful weight management to improve overall health for adults requires lifelong commitment to healthful lifestyle behaviors emphasizing sustainable and enjoyable eating practices and daily physical activity. Furthermore, an additive or synergistic relationship may occur in health promotion programs that incorporate both healthy eating and physical activity (Gillman et al., 2001). Wankel and Sefton (1994) concluded that physical activity also acted as a catalyst for other behavior changes. Individuals who were more active often consumed healthier diets and smoked less. The opposite also appeared to be true. Utter, Neumark-Sztainer, Jeffery, and Story (2003) reported that high television/video use, and therefore less physical activity, among boys and girls was associated with more unhealthful dietary behaviors such as increased consumption of soft drinks, fried foods, and snacks.

Exercise and sports participation has traditionally been regarded as a means of encouraging development of healthy habits and deterring health risk behaviors (Pate et al., 1996). O'Dea found an overlapping link between healthful eating and physical performance. Participants reported that the benefits of healthful eating enabled physical fitness, endurance, and physical well-being, whereas the impact of "junk food" reversed the beneficial physical effects and subsequently resulted in more physical inactivity (O'Dea, 2003). Gillman et al. (2001) reported that increased amounts of physical activity were associated with more healthy food choices. Similarly, Eaton et al. (1995) showed that individuals with higher levels of activity consumed more dietary fiber, antioxidant vitamins, and calcium, while consuming less total and saturated fat.

The present study was conducted to further the research by Eaton et al. (1995) in examining the effect of physical activity on healthy eating. However, unlike Eaton's research which examined adult behaviors, the present study examined a sampling of college students and their involvement in physical activity and healthy eating. Specifically, the purpose of the present study was to examine the extent of healthy eating among college students and assess whether involvement in healthy eating and perceived barriers to healthy eating differed based on exercise status, gender, age, and reason for exercise.

This study was unique because after a review of the literature, no other study was identified as specifically examining the combined effects of physical activity and perceived barriers to healthy eating on the involvement in healthy eating among college-aged students.

Summary

Poor diet plays a major role in morbidity and mortality in the United States. Specifically, heart disease, cancer, stroke, and diabetes have all been associated with poor diet. These conditions, and therefore many of the deaths attributed to them, could be prevented through simple lifestyle modifications such as incorporation of physical activity and healthy eating into one's life.

There are many reasons why people do not get enough physical activity. Environmental issues such as neighborhood safety and reliance on motorized transportation have a strong impact on physical activity in the United States. In an effort to remove many of these barriers to physical activity and healthy eating, several strategies and interventions have been considered. One strategy, utilized at the individual level, is to emphasize the good taste of healthful foods and the convenient ways to include them in the diet. It is also important to reduce environmental barriers to making more healthful food choices and create more opportunities to engage in more healthful eating behaviors. Additional strategies are also needed to help change peer norms around healthful eating and provide and encourage peer support for these healthy behaviors.

Furthermore, a synergistic relationship is likely to occur in health promotion programs that incorporate both healthy eating and physical activity. Physical activity is thought to act as a catalyst for other health behavior changes; individuals who are more active often consume healthier diets and smoke less. Research on the topic has concluded that encouraging participation in physical activity could have a positive effect on eating choices. More studies need to be conducted to examine involvement in physical activity and its effects on healthy eating among a college-aged population.

Chapter Three

Methods

The present study was conducted to further the research by Eaton et al. (1995) in examining the effect of physical activity on healthy eating. However, unlike Eaton's research which examined adult behaviors, the present study examined a sampling of college students and their involvement in physical activity and healthy eating. Specifically, the purpose of the present study was to examine the extent of healthy eating among college students and assess whether involvement in healthy eating and perceived barriers to healthy eating differed based on exercise status, gender, age, and reason for exercise.

Chapter one addressed the problem, purpose, research questions, hypotheses, delimitations, limitations, assumptions, and operational definitions. Chapter two reviewed the professional literature exploring the relationship between regular physical activity and healthy eating, particularly among college students. Chapter three discusses the participants, instrumentation, procedures, and data analysis in the present study.

Participants

Students in physical activity, health promotion, and education classes (N= 11 sessions, N= 204 students) at a midwestern university served as the participants of this study. All students voluntarily agreed to participate in this study. Confidentiality and anonymity of responses were ensured.

Instrumentation

After a comprehensive review of the literature on physical activity and its effects on healthy eating, a two-page, 22-item instrument was developed. The instrument used for this study examined four sections: 1) college students' involvement in healthy eating, 2) perceived barriers to healthy eating, 3) exercise behavior and reasons for exercising, and 4) demographics (i.e. gender, age, race, weight, height, and major).

Section 1, "Involvement in Healthy Eating," consisted of 11 items that assessed college students' involvement in healthy eating. The first nine items of this section required the students to record the number of days in the past seven days they ate certain amounts and types of foods (i.e., "On how many days of the past 7 days have you eaten at least 3 servings of vegetables?"). The remaining two questions addressed frequency of meals eaten away from home and amount of pop consumption. Individual item scores were calculated for the first seven items of this scale to achieve an overall healthy eating score. Healthy eating guidelines were established based on the Food Guide Pyramid. The following criteria were used to determine whether a student followed a healthy diet: 1) ate at least 3 servings of vegetables on at least 4 of the past 7 days; 2) ate at least 2 servings of fruits on at least 4 of the past 7 days; 3) ate at least 2 servings of low-fat or non-fat dairy products or other calcium source on at least 4 of the past 7 days; 4) ate between 6 and 11 servings from the grain group on at least 4 of the past 7 days; 5) ate more complex carbohydrates than simple sugars on at least 4 of the past 7 days; and 6) ate at least 2 servings of lean meat or other protein source on at least 4 of the past 7 days. Individuals received one point for each of the criteria that they met, thus totaling a maximum potential score of 7 points (range = 0 to 7).

The second section of the instrument consisted of one question that dealt with perceived barriers to healthy eating (i.e., "Which of the following are barriers to eating healthy for you?"). Participants selected from a list of seven potential barriers and selected all that applied.

The third section consisted of three questions regarding exercise behavior. The first two questions assessed the degree of involvement in physical activity. Specifically, participants were asked to record the number of days and the duration (in minutes) that they typically exercise per week. The third question addressed the main reason participants exercise (i.e., "What is the main reason you exercise?"). Participants selected their main reason from a list of eight options and were asked to select only one response.

The demographic section required participants to provide demographic/background information on seven questions by checking the appropriate answer. The demographic/background items included gender, age, race, year of college, height, weight, and major.

Content validity of the instrument was established by means of a panel of four experts: one registered dietitian, one exercise physiologist, and two health promotion and education professors with expertise in the areas of survey design and survey research. These individuals were selected based on their knowledge of proper nutrition/dietary practices and physical activity and their expertise in survey research. Each member of the panel was mailed a copy of the survey and was instructed to complete the survey and offer comments or suggestions regarding the instrument and its scoring system. The

panel members were then asked to return the survey so the instrument could be revised to reflect the suggestions offered by the panel of experts.

Stability reliability of the instrument was established via a test-retest of a convenience sample of 15 college students in one undergraduate class. Students completed the survey on two consecutive occasions seven days apart. Data from these students was excluded from the final study. Pearson r correlations on the sections for healthy eating and exercise behavior yielded .717 and .958, respectively. Internal consistency reliability on the healthy eating subscale yielded a Cronbach alpha of .721, ensuring that the survey was reliable.

Procedures

Surveys were distributed to students in physical activity, health promotion, and education courses during regularly scheduled class times. Students were informed of the study purpose, the voluntary nature of the study, and assured that all responses would be kept anonymous and confidential. Students were also informed that by completing the survey they granted their consent to participate in the study. Students who opted to not complete the surveys were instructed to sit quietly until all surveys were completed and then to turn in their blank survey along with the completed survey, as a means to avoid any feelings of discomfort or embarrassment.

Data Analysis

Descriptive statistics including frequencies and percentages were used to describe the demographic characteristics of the respondents and each variable. Analyses of

variance were conducted to determine whether college students' involvement in healthy eating differed based on the college students' age, gender, involvement in physical activity, and/or reason for involvement in physical activity. The data was analyzed using the Statistical Package for the Social Sciences (SPSS) Version 10.1.4 for Windows. An alpha level of .05 was utilized for all data analyses.

Chapter Four

Results and Discussion

The present study was conducted to further the research by Eaton et al. (1995) in examining the effect of physical activity on healthy eating. However, unlike Eaton's research which examined adult behaviors, the present study examined a sampling of college students and their involvement in physical activity and healthy eating. Specifically, the purpose of the present study was to examine the extent of healthy eating among college students and assess whether involvement in healthy eating and perceived barriers to healthy eating differed based on exercise status, gender, age, and reason for exercise.

Chapter one addressed the problem, purpose, research questions, hypotheses, delimitations, limitations, assumptions, and operational definitions. Chapter two reviewed the professional literature exploring the relationship between regular physical activity and healthy eating, particularly among college students. Chapter three discusses the participants, instrumentation, procedures, and data analysis in the present study. Chapter four addresses the results of this study.

Response Rate

Survey instruments were distributed to students (N=204) in 11 physical activity and health promotion and education classes at a midwestern university. A total of 204 surveys were completed, resulting in an overall response rate of 100% (204/204). All of the returned surveys were included in the final data analysis.

Demographic and Background Characteristics

More than half of the students were female (54.4%) and white (62.4%). One in three students was African American (32.2%). There was a fairly even distribution among freshmen (30.7%), sophomores (26.2%), juniors (13.4%), and seniors (29.7%). Most of the students were majoring in non-health related fields (75.9%). The overall mean age of the college students was 21.1 years (SD=3.06) with an age range of 18 to 44 years. The mean height of the students was 67.8 inches (SD=4.09) with a height range of 59 to 77 inches. The mean weight of the students was 159.9 pounds (SD=32.62) with a weight range of 93 to 260 pounds. The study sample was representative of the university as a whole.

Table 4.1. Demographic and Background Characteristics

Characteristic	Frequency	Valid Percent
Sex		
Female	111	54.4
Male	93	45.6
Race		
African American	65	32.2
Asian	5	2.5
Hispanic	0	0
White	126	62.4
Other	6	3.0
Year of College		
Freshman	62	30.7
Sophomore	53	26.2
Junior	27	13.4
Senior	60	29.7
Major		
Health-Related Field	49	24.1
Non Health-Related Field	154	75.9

N=204; Missing values excluded from analyses

Table 4.2. Demographic and Background Characteristics

Characteristic	Mean	Standard Deviation
Age Ranges of Age (18-44)	21.1	3.06
Height Range of Height in Inches (59-77)	67.8	4.09
Weight Range of Weight in Pounds (93-260)	159.9	32.62

N=204; Missing values excluded from analyses

Nutrition Behavior

Results indicated that during the seven days prior to the survey, students on average reported that they had eaten: at least 3 servings of vegetables on 2.7 days (SD=1.93); at least 2 servings of fruit on 3.4 days (SD=1.99); at least 2 servings of low-fat or non-fat dairy products or other calcium source on 4.4 days (SD=2.28); between 6 and 11 servings from the grain group on 4.5 days (SD=2.20); more complex carbohydrates than simple sugars on 3.3 days (SD=2.25); and at least 2 servings of lean meat or other protein source on 4.0 days (SD=2.21) (Table 4.4). Healthy eating guidelines were established based on the Food Guide Pyramid. The following criteria were used to determine whether a student followed a healthy diet: 1) ate at least 3 servings of vegetables on at least 4 of the past 7 days; 2) ate at least 2 servings of fruits on at least 4 of the past 7 days; 3) ate at least 2 servings of low-fat or non-fat dairy products or other calcium source on at least 4 of the past 7 days; 4) ate between 6 and 11 servings from the grain group on at least 4 of the past 7 days; 5) ate more complex

carbohydrates than simple sugars on at least 4 of the past 7 days; and 6) ate at least 2 servings of lean meat or other protein source on at least 4 of the past 7 days.

Two out of three students met the healthy eating criteria for the grain group (68.6%) and the dairy/calcium group (65.5%) (Table 4.3). More than half of the students (55.7%) met the healthy eating criteria for the lean meat/protein group. Slightly more than 40% of the students surveyed met the healthy eating criteria for complex carbohydrates (46.5%) and fruits (42.2%). Only one in three students (33.3%) met the healthy eating criteria for vegetables.

Table 4.3. Student Involvement in Healthy Eating by Food Group

Student Involvement in Healthy Eating by Food Group	Frequency	Valid Percent
Grain group (eaten at least 6-11 servings on at least 4 of the past 7 days)	140	68.6
Dairy/calcium group (eaten at least 2 servings on at least 4 of the past 7 days)	133	65.5
Lean meat/protein group (eaten at least 2 servings on at least 4 of the past 7 days)	113	55.7
Complex carbohydrates (eaten more complex carbohydrates than simple sugars on at least 4 of the past 7 days)	94	46.5
Fruit group (eaten at least 2 servings on at least 4 of the past 7 days)	86	42.2
Vegetable group (eaten at least 3 servings on at least 4 of the past 7 days)	68	33.3

N=204; Missing values excluded from analyses

On average, students ate 6.1 meals (SD=5.23) away from home each week. Half (n=104, 51.2%) reported that they drink pop each day. Of those students that reported drinking pop, three out of four (n=81, 77.9%) reported drinking regular, as apposed to diet pop. One out of four students (n=23, 22.1%) reported drinking diet pop. On average, students drank 28.7 ounces (SD=21.90) of pop per day.

Table 4.4. Nutrition Behavior

Nutrition Behavior in the Past 7 Days	Mean Days	Standard Deviation
Eaten between 6-11 servings from the grain group	4.5	2.20
Eaten at least 2 servings of low-fat or non-fat dairy products or other calcium source	4.4	2.28
Eaten at least 2 servings of lean meat or other protein source	4.0	2.21
Eaten at least 2 servings of fruit	3.4	1.99
Eaten more complex carbohydrates than simple sugars	3.3	2.25
Eaten at least 3 servings of vegetables	2.7	1.93

N=204; Missing values excluded from analyses

Barriers to Healthy Eating

More than half of the students reported convenience (56.9%) and time (57.8%) as barriers to healthy eating (Table 4.5). Slightly fewer than half (43.6%) of the students reported availability as a barrier to healthy eating. Results also indicated that one out of three students reported taste (32.4%) and cost (39.2%) as barriers to healthy eating. One in five (21.6%) reported lack of knowledge regarding what is healthy as a barrier to healthy eating. Peer influence was reported as a barrier to healthy eating by only 16.2% of the students.

Table 4.5. Barriers to Healthy Eating

Barriers to Healthy Eating	Frequency	Valid Percent
Time	118	57.8
Convenience	116	56.9
Availability	89	43.6
Cost	80	39.2
Taste	66	32.4
Lack of knowledge	44	21.6
Peer influence	33	16.2

N=204; Missing values excluded from analyses

Exercise Behavior

Results indicated that students reported exercising an average of 3.4 days (SD=1.68) per week and 56.4 minutes (SD=42.30) per exercise session (range=10-280 minutes). Fewer than half (40.3%) of the students exercised four days or more a week. One in four (24.2%) reported exercising for at least 60 minutes per exercise session. Only 2.9% of the students surveyed reported that they do not currently exercise.

Main Reason for Exercising

The top three reasons for exercising, as reported by the students, were to improve physical appearance (21.1%), improve health (12.7%), and lose weight (8.3%) (Table 4.6). One in three students (39.2%) reported more than one main reason for exercising.

Table 4.6. Main Reason for Exercising

Main Reason for Exercising	Number	Valid Percent
Improve my physical appearance	43	21.1
To improve my health	26	12.7
Weight loss	17	8.3
Weight management/control	13	6.4
Weight gain	4	2.0
Increase my energy	3	1.5
I do not exercise	6	2.9
Other reason not provided	12	5.9
More than one reason	80	39.2

N=204; Missing values excluded from analyses

Hypothesis Testing

Null Hypothesis 1. There will be no difference between college students who are physically active and college students who are not physically active regarding eating a healthy diet.

A oneway analysis of variance (ANOVA) was conducted to examine the effect of physical activity on involvement in eating a healthy diet. Results showed no significant difference between college students who exercised 4 days or more a week (M=3.4, SD=1.81) and college students who exercised three days a week or less (M=2.93, SD=1.71) regarding healthy eating, F(1,199)= 3.488, p= .063. Therefore, the null hypothesis failed to be rejected. It was therefore concluded that college students' involvement in physical activity had no effect on eating a healthy diet.

Null Hypothesis 2. There will be no difference between female college students and male college students regarding eating a healthy diet.

An ANOVA was conducted to examine the effect of gender on eating a healthy diet. Results showed no significant difference between female college students (M=3.26, SD=1.72) and male college students (M=2.92, SD=1.82) regarding healthy eating, F(1,202)=1.844, p=.176. Therefore, the null hypothesis failed to be rejected. It was therefore concluded that college students' gender had no effect on eating a healthy diet.

Null Hypothesis 3. There will be no difference between freshmen/sophomores and juniors/seniors regarding eating a healthy diet.

An ANOVA was conducted to examine the effect of year of college on eating a healthy diet. Year of college was dichotomized into two levels: 1) freshmen/sophomores; and 2) juniors/seniors. Results showed a significant difference between juniors/seniors (M=3.41, SD=1.60) and freshmen/sophomores (M=2.83, SD=1.84) regarding healthy eating, F(1,200)=5.490, p=.020. Juniors/seniors were significantly more involved in healthy eating than freshmen/sophomores. Therefore, the null hypothesis was rejected.

Null Hypothesis 4. There will be no difference between college students who are physically active for health reasons and college students who are physically active for appearance reasons regarding eating a healthy diet.

An ANOVA was conducted to examine the effect of reason for exercise on eating a healthy diet. Results showed no significant difference between those who exercised for health reasons (M=3.19, SD=1.78) and those who exercised for non-health reasons (M=3.15, SD=1.63) regarding healthy eating, $F(1,116)$=.012, p=.914. Therefore, the null hypothesis failed to be rejected. It was therefore concluded that college students' reason for physical activity had no effect on eating a healthy diet.

Null Hypothesis 5. There will be no difference between college students who are physically active and college students who are not physically active regarding the number of perceived barriers to healthy eating.

An ANOVA was conducted to examine the effect of physical activity on the number of perceived barriers to healthy eating. Results showed no significant difference between college students who were physically active (M=2.72, SD=1.37) and college students who were not physically active (M=2.62, SD=1.24) regarding the number of perceived barriers to healthy eating, $F(1,199)$=.286, p=.594. Therefore, the null hypothesis failed to be rejected. It was therefore concluded that college students' involvement in physical activity had no effect on the number of perceived barriers to healthy eating.

Null Hypothesis 6. There will be no difference between male and female college students regarding the number of perceived barriers to healthy eating.

An ANOVA was conducted to examine the effect of gender on the number of perceived barriers to healthy eating. Results showed no significant difference between

male college students (M=2.78, SD=1.41) and female college students (M=2.59, SD=1.23) regarding the number of perceived barriers to healthy eating, F(1,202)=1.159, p=.283. Therefore, the null hypothesis failed to be rejected. It was therefore concluded that college students' gender had no effect on the number of perceived barriers to healthy eating.

Null Hypothesis 7. There will be no difference between freshmen/sophomores and juniors/seniors regarding the number of perceived barriers to healthy eating.

An ANOVA was conducted to examine the effect of year of college on the number of perceived barriers to healthy eating. Results showed no significant difference between freshmen/sophomores (M=2.70, SD=1.40) and juniors/seniors (M=2.63, SD=1.22) regarding the number of perceived barriers to healthy eating, F(1,200)=.146, p=.702. Therefore, the null hypothesis failed to be rejected.

Null Hypothesis 8. There will be no difference between college students who are physically active for health reasons and college students who are physically active for appearance reasons regarding the number of perceived barriers to healthy eating.

An ANOVA was conducted to examine the effect of reason for physical activity on the number of perceived barriers to healthy eating. Results showed no significant difference between college students who were physically active for health reasons (M=2.54, SD=1.15) and college students who were physically active for non-health reasons (M=2.63, SD=1.45) regarding the number of perceived barriers to healthy eating, F(1,116)=.124, p=.726. Therefore, the null hypothesis failed to be rejected. It was therefore concluded that college students' reason for physical activity had no effect on the number of perceived barriers to healthy eating.

Discussion

A total of 204 undergraduate college students were surveyed regarding their involvement in healthy eating. The overall response rate was 100% (204/204). Participants in this study were college students at a midwestern university. More than half of the students were female and white. Most of the students were majoring in non-health related fields.

Results showed that fewer than 10% of the students met all of the recommendations for healthy eating based on the Food Guide Pyramid. In fact, fewer than half (46.1%) met the recommended guidelines for four or more of the categories. Overall, students were most likely to meet the recommendations for the grain group (68.6%) and least likely to meet the guidelines for the vegetable group (33.3%).

The top three barriers to healthy eating reported by the students were time, convenience, and availability of healthy foods. Results showed that there was no significant difference in the number of perceived barriers to healthy eating based on gender. The gender of college students was also examined as a factor that could potentially affect one's overall involvement in healthy eating. Results showed that involvement in healthy eating did not significantly differ based on gender.

The majority of students surveyed reported being physically active on a regular basis. In fact, 40.3% of the students were physically active four or more times a week. However, being physically active did not appear to have a significant effect on healthy eating. Students who were physically active were no more likely to eat healthy than students who were not physically active.

A series of oneway analyses of variance (ANOVA) were conducted to test eight different hypotheses. More specifically, these ANOVAs examined whether involvement

in eating a healthy diet and number of perceived barriers to eating a healthy diet differed significantly based on selected demographic variables. Results indicated that college students' involvement in physical activity, reason for involvement in physical activity, and gender had no significant effect on eating a healthy diet. It can also be noted that college students' involvement in physical activity, reason for involvement in physical activity, gender, and grade level had no significant effect on perceived barriers to healthy eating. However, the results of this study showed that grade level did have a significant effect on college students' involvement in healthy eating. Juniors and seniors were significantly more involved in healthy eating than freshmen and sophomores.

Chapter Five

Conclusions and Recommendations

Poor diet plays a major role in morbidity and mortality in the United States. Specifically, heart disease, cancer, stroke, and diabetes have all been associated with poor diet. These conditions and therefore many of the deaths attributed to them could be prevented through simple lifestyle modifications such as the incorporation of physical activity and healthy eating into one's life.

There are many reasons why people do not get enough physical activity. Environmental issues such as neighborhood safety and reliance on motorized transportation have a strong impact on physical activity in the United States. In an effort to remove many of these barriers to physical activity and healthy eating, several strategies and interventions have been considered. One strategy, utilized at the individual level, is to emphasize the good taste of healthful foods and the convenient ways to include them in the diet. It is also important to reduce environmental barriers to making more healthful food choices and create more opportunities to engage in more healthful eating behaviors. Additional strategies are also needed to help change peer norms around healthful eating and provide and encourage peer support for these healthy behaviors.

Furthermore, a synergistic relationship is likely to occur in health promotion programs that incorporate both healthy eating and physical activity. Physical activity is thought to act as a catalyst for other health behavior changes; individuals who are more active often consume healthier diets and smoke less. Research on the topic has concluded that encouraging participation in physical activity could have a positive effect

on eating choices. More studies need to be conducted to examine involvement in physical activity and its effects on healthy eating among a college-aged population.

The purpose of this study was to further the research by Eaton et al. (1995) in examining the effect of physical activity on healthy eating. However, unlike Eaton's research which examined adult behaviors, the present study examined a sampling of college students and their involvement in physical activity and healthy eating. Specifically, the purpose of the present study was to examine the extent of healthy eating among college students and assess whether involvement in healthy eating and perceived barriers to healthy eating differed based on exercise status, gender, age, and reason for exercise. This chapter addresses the conclusions and discussion of the main findings of this study. Recommendations for practice and future research are also offered.

Conclusions

The college students in this study demonstrated an overall lack of involvement in healthy eating. The present study found that fewer than 10% of the college students surveyed met all of the recommendations for healthy eating based on the Food Guide Pyramid. More than half of the students met fewer than three out of the six guidelines surveyed. In addition, the results of this study indicated that students were most likely to meet the recommended guidelines for the grain group and least likely to meet the guidelines for the vegetable group.

Results of this study also showed that meals eaten away from home are an issue for college students. On average, students ate approximately one meal a day away from their home, dorm, or apartment.

The results of this study also indicate that pop consumption is common among college students. More than half (51.2%) of the students surveyed reported drinking pop. Regular pop was particularly common among college students, with more than three out of four (77.9%) students drinking it, compared to just 22.1% drinking diet pop.

This study found that the majority of college students experience certain barriers or obstacles that can make healthy eating a challenge. In fact, only 3% of the students surveyed reported that they experience no barriers to healthy eating. The most commonly reported barriers were time and convenience, with more than half of the students identifying them as factors that affect their ability to eat healthfully.

The results of this study also showed that most college students reported being involved in physical activity. However, only 40.3% were physically active on four or more days a week. On average, students reported exercising for at least 55 minutes three days a week. The main reasons that students identified exercising were to improve physical appearance, improve health, and for weight loss.

This study looked at college students' involvement in healthy eating and perceived barriers to healthy eating and tried to determine whether they differed based on gender, age, physical activity status, and reason for engagement in physical activity. Overall findings indicated that college students' involvement in physical activity, reason for involvement in physical activity, and gender had no significant effect on eating a healthy diet. It can also be noted that college students' involvement in physical activity, reason for involvement in physical activity, gender, and grade level had no significant effect on perceived barriers to healthy eating. However, the results of this study did show that grade level had a significant effect on college students' involvement in healthy

eating. Juniors and seniors were significantly more likely to be involved in healthy eating than freshmen and sophomores.

Discussion

Societal changes in the United States over the past 50 years have dramatically altered the eating behaviors of most Americans, including college students (Cassell, 2001). In agreement with the present study, other studies have shown that the food choices of most adolescents are not consistent with the Dietary Guidelines for Americans (Story et al., 2002). In fact, a recent study conducted by the US Department of Agriculture (2000) showed that only 1% of adolescent males and females met national recommendations for all of the Food Guide Pyramid groups.

Nutrition-related concerns of college students include unhealthful dieting; high intake of fast foods and other foods high in fat; low intake of fruits, vegetables, fiber, and dairy foods; and erratic eating behaviors, such as skipping meals (CDC, 1996; Munoz et al., 1997; Neumark-Sztainer et al., 1998). In fact, the National College Health Risk Behavior Survey (1995) reported that only 25% of college students surveyed, aged 18-24 years, ate five or more servings of fruits and/or vegetables the day preceding the survey. The present study supports the contention that this is a continuing problem, with only one in three students reporting that they eat at least 3 servings of vegetables a day and less than half (42.2%) reporting that they eat at least 2 servings of fruit a day. Also in agreement with previous studies, this study showed that dairy intake tends to be low among college students. Only two in three students (65.5%) reported consuming at least two servings of dairy a day, the minimum amount recommended for this age group.

Many factors affect a young adult's dietary choices. According to the CDC (1992), many young adults lack the knowledge about good nutrition, including information on recommended servings of specific food groups. However, as Contento et al. (1992) have asserted, knowing how and why to eat healthfully is important, but knowledge alone does not enable individuals to adopt healthful eating behaviors. Other factors, such as taste, cost, convenience, and energy value can also play a role in the decision. Several studies have shown that perceived time constraints and convenience also strongly influence adolescent food choices (California Project Lean, 1998; French et al., 1999; Neumark-Sztainer et al., 1999; Story & Resnick, 1986). The present study confirms this, with more than half of the students reporting time (57.8%) and convenience (56.9%) as the most common barriers to healthy eating that they experience. The other three barriers that were mentioned frequently by students in this study were availability (43.6%), cost (39.2%), and taste (32.4%) of healthy foods. In addition, Main and Wise (2002) have noted that public knowledge of nutrition is not always correct and there are many misconceptions that have incorrectly lead individuals into thinking that they are actually following nutrition principles when in fact they are not. However, the present study found that only one in five (21.6%) students felt that a lack of knowledge regarding what is healthy and what is not healthy was a barrier they experienced to healthy eating.

There are many reasons why students may consistently report time as one of the most common barriers to healthy eating. Neumark-Sztainer et al. (1999) reported that students want to sleep longer in the morning instead of taking time to eat or prepare

breakfast, do not want to wait in a long lunch line, and prefer eating at fast food because the food is served quickly.

The trend of eating meals away from home continues to increase. In 1978, Americans ate 18% of their calories away from home, compared to 34% in 1995 (Liebman, Schardt, & Jones, 2001). Liebman et al. (2001) noted that serving sizes for many foods have grown in the last few decades. Another problem is that when restaurants prepare and cook foods, the food is usually prepared and cooked in a less healthy manner (Liebman et al., 2001). McCrory et al. (1999) noted that restaurant food has more fat, saturated fat, sodium, refined carbohydrates, and calories and less calcium than food prepared at home. The present study found that students, on average, ate at least one meal a day away from their home. This is yet another reason why the diet of college students concerns nutrition professionals.

In addition to diet, physical inactivity has also been noted in many studies as a contributing behavioral factor to disease and death. One study found that slightly more than half (52%) of college students were physically inactive or only exercised irregularly. About one third (31%) had exercised regularly for six months or longer and the remainder (17%) had exercised regularly for less than six months (Silver Wallace, Buckworth, Kirby, & Sherman, 2000). The present study found that fewer than half (40.3%) of college students exercised four days a week or more. The majority of students exercised three days a week or less. Dowda et al. (2001) suggested that the lack of physical activity among children and young adults is partially due to the increased time spent using the computer, watching television, and playing video games.

Recommendations

Recommendations for practice. The purpose of the present study was to examine the extent of healthy eating among college students and assess whether involvement in healthy eating and perceived barriers to healthy eating differed based on exercise status, gender, age, and reason for exercise.

Poor food choices have been directly linked as a cause of death and disease in the United States (Epstein, 2001). In fact, a recent report from the WHO (2003) recognized that the growing epidemic of chronic disease afflicting developed countries was related to dietary and lifestyle changes. Dietary patterns shifted to increased consumption of energy-dense diets high in fat, particularly saturated fat, and low in unrefined carbohydrates. The WHO believes that it is this type of diet, coupled with a decline in energy expenditure that is associated with the development of noncommunicable chronic diseases, such as obesity, diabetes mellitus, cardiovascular disease, hypertension, stroke, and some types of cancer.

This study found that 97% of college students surveyed experienced at least one barrier to healthy eating. Other studies have reported similar findings. In an effort to remove many of these barriers to healthy eating, several strategies and interventions are already being considered. Story et al. (2002) have noted that at the individual level, interventions that emphasize the good taste of healthful foods and convenient ways to include them in the diet may be effective strategies. At the interpersonal level, family and friends are social influences that are proximal to the adolescent and should be targets for intervention change. Effective strategies create positive peer norms toward healthy eating and provide positive peer support for healthy eating (Story et al., 2002). At the

community level, strategies are needed to reduce environmental barriers to making more healthful food choices and create more opportunities to engage in more healthful eating behaviors.

Other research shows that greater availability of good tasting, convenient and less expensive foods would help college students improve their food choices (Barr, 1994; California Project Lean, 1998; Neumark-Sztainer et al., 1999; Story & Resnik, 1986). In response to students' demands for healthier foods, college and university food services now offer healthier foods (Belaski, 2001). However, Luquis et al. (2003) found that many students still report a strong dissatisfaction with the food selection available in dining halls. In addition, many students feel that the food is not nutritious and that there is not a good selection for those who want to eat healthy. The present study demonstrated that freshmen and sophomores were significantly less likely than juniors and seniors to be involved in healthy eating. One possibility is that many freshmen and sophomores live in dorms and rely on dorm food or fast food as their main source of food.

If this is the case, it is important that these barriers to healthy eating continue to be addressed by university foodservice establishments. Evans and Sawyer-Morse (2002) have stressed the importance of the college campus setting as a critical setting for the development and maintenance of healthful behaviors. One way to encourage more healthful choices in a dorm cafeteria is to make healthy foods more visible and accessible to students. Hampl, Anderson, and Mullis (2002) recommended exposing consumers to healthy foods at the point-of-purchase and offering price incentives promoting the use of healthy items.

In addition, other nutrition interventions have been developed to address the lack of nutrition knowledge and the unhealthful dietary patterns of college students. One example of this was The Right Bite Program. Researchers at University of the Incarnate Word developed a three-year nutrition intervention program to increase healthful eating behaviors among college students through the use of trained student peer educators and by providing an overall campus approach to a healthful eating environment (Evans & Sawyer-Morse, 2002).

The following recommendations could be helpful in increasing college students' involvement in healthy eating: 1) incorporate nutrition education into the curriculum in elementary, junior high, and high schools; 2) teach young adults about the 5-A-Day program, the Dietary Guidelines for Americans, and the Food Guide Pyramid; 3) stress the importance of parents and other adults as role models for healthy eating; 4) require nutrition and physical education classes in the college or university setting; 5) implement research-based programs such at the Right Bite Program to colleges and universities; 6) improve food selection and availability in university foodservice establishments; and 7) reduce perceived barriers to healthy eating by making healthier foods more convenient and less time consuming.

Recommendations to improve this research. This study utilized a sample of college students who were enrolled in physical activity, health promotion, and education classes (N= 11 sessions, N= 204 students) at a midwestern university. While the students enrolled in these classes consisted of a wide array of majors, this study may have been more generalizeable if a wider variety of classes were surveyed. Also, using a larger sample size could have improved the power of this study.

The survey instrument for this study addressed nutrition behavior, barriers to healthy eating, exercise behavior, and demographic information. However, students were not asked how long they have been engaging in physical activity, which could have been an interesting statistic to report. Also, students were asked to report one main reason for exercising. However, almost 40% of the students reported more than one answer, thereby denoting that there may not be a primary reason for exercising but instead a combination of reasons. The majority of participants were white or African American. A more diverse racial group may have provided different results. Students were also asked how many meals they eat away from their home or apartment each week, but they were not asked where they typically ate these other meals. A question that probed deeper to find out whether they were eating at fast food restaurants, sit-down restaurants, friend's houses, etc. could have been included. In addition, students were not asked the type of environment where they currently lived. Nutritional intake may certainly vary depending on whether one lives in an apartment, dorm, or at home with one's parents.

Recommendations for future research. More studies need to be conducted in this area of research. Studies that address nutrition behavior by using a 24 hour food recall method or a food diary system may provide more accurate information on college students' eating habits. In addition, comparing nutritional intake of college students based on their living arrangements (dorm vs. off campus) would make an interesting study and could provide more insight into potential areas of nutritional improvement. Future studies could also identify college students' level of understanding of healthy eating by asking questions regarding general nutrition knowledge (i.e., Name two foods that are high in fiber) and understanding of portion/serving sizes. The new Food Guide

Pyramid is also set to be unveiled in the next year (American Dietetic Association, 2004). A future study could address college students' understanding of the new Food Guide Pyramid and their ability to recognize changes between it and the old version.

Furthermore, an additive or synergistic relationship may occur in health promotion programs that incorporate both healthy eating and physical activity (Gillman et al., 2001). Future studies should continue to explore this possible relationship to help develop more health promotion and disease prevention strategies geared towards college students.

Researchers' and scientists' knowledge of nutrition continues to improve with the advancement of technology. However, the mode of communication between nutrition and other health professionals and the general public needs to parallel these improvements. An array of strategies needs to be utilized to effectively relay important health messages to the public.

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Appendix A

STUDENT SURVEY

Directions: Please answer each question. All responses will be kept confidential. By completing this survey you grant your consent to participate in this study.

NUTRITION BEHAVIOR: Please circle the appropriate number.

On how many days of the past 7 days have you...	Number of days (in past 7 days)
• Eaten at least 3 servings of vegetables?	0 1 2 3 4 5 6 7
• Eaten at least 2 servings of fruit?	0 1 2 3 4 5 6 7
• Eaten at least 2 servings of low-fat or non-fat dairy products (i.e. yogurt, milk, cheese) or other calcium source?	0 1 2 3 4 5 6 7
• Eaten between 6-11 servings from the grain group (i.e. bread, cereal, pasta, rice)?	0 1 2 3 4 5 6 7
• Eaten more complex carbohydrates (i.e. whole wheat bread, bran cereal) than simple carbohydrates (i.e. white bread, white pasta, baked potato)?	0 1 2 3 4 5 6 7
• Eaten at least 2 servings of lean meat (i.e. skinless chicken) or other protein source (i.e. peanut butter, nuts)?	0 1 2 3 4 5 6 7
• Eaten foods that are high in sugar – candy, sweet desserts, soft drinks, etc.?	0 1 2 3 4 5 6 7
• Eaten foods that are low in fat?	0 1 2 3 4 5 6 7
• Consumed at least 8 eight ounce glasses of water?	0 1 2 3 4 5 6 7

How many meals do you eat away from your home/apartment each week? ___meals

In a typical day, do you drink pop (i.e. Coke, Diet Coke, Mt. Dew)? ___Yes ___No

If YES, how many ounces of pop do you drink in a typical day? ___ounces

If YES, what type of pop do you drink most often? ___Regular ___Diet

BARRIERS TO HEALTHY EATING

Which of the following are barriers to eating healthy for you? (Check all that apply)

___Taste – I do not like the way healthy foods taste

___Cost – Healthy foods cost too much

___Convenience – Eating healthy foods is not convenient

___Time – Buying and preparing healthy foods takes too long

___Peer influences/pressure – My friends like to eat a lot of fast food and high fat food

___Availability – Healthy foods are not easily available to me

___Lack of knowledge – I am sometimes not sure what is healthy and what is not

EXERCISE BEHAVIOR

Typically, how many days per week do you exercise for at least 20 minutes to the point of sweating and breathing hard? Please circle the appropriate answer.

0 1 2 3 4 5 6 7

Typically, when you exercise, how many minutes do you exercise? ___minutes

___I do not exercise

What is the **MAIN REASON** you exercise? (Please check only one answer)

___To improve my health (i.e. prevent heart disease, diabetes, high blood pressure, etc.)
___Weight management/control
___Weight loss
___Weight gain
___Improve my physical appearance
___Increase my energy
___Other (specify) _____
___I do not exercise

DEMOGRAPHIC INFORMATION

What is your sex? ___Male ___Female

What is your age? ___years

What is your race? ___African American ___Asian ___Hispanic ___White ___Other

What year of college are you in? ___Freshman ___Sophomore ___Junior ___Senior ___Graduate Student

What is your height? _____

What is your weight? _____

What is your major? _____

THANK YOU ☺