DISSERTATION

An Analysis of Health Risk Behaviors Among College Students Enrolled in a Required Health Course

Submitted by

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WE HEREBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY JOHN L. GINES ENTILED: AN ANALYSIS OF HEALTH RISK BEHAVIORS AMONG COLLEGE STUDENTS ENROLLED IN A REQUIRED HEALTH COURSE BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

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ABSTRACT OF DISSERTATION

AN ANALYSIS OF HEALTH RISK BEHAVIORS AMONG COLLEGE STUDENTS ENROLLED IN A REQUIRED HEALTH COURSE

The purpose of this study was to examine the role of a required health course and the impact on students as an intervention for making proper lifestyle choices. Specific research questions examined students' health behaviors and the choices they make in order to live a healthy lifestyle. A healthy lifestyle is generally characterized as a "balanced life" in which one makes "wise choices"; however, the array of choices is influenced by many factors.

Poor health behavior choices in college-age students can lead to health complications. In pre-test and post-test analysis, students answered the Personal Wellness Profile (PWP). The PWP was administered to a sample size of 409 students enrolled in a health and wellness course. This tool assessed the students' lifestyles and was administered over the course of eight semesters. Physical activity, nutritional choices, and drugs and alcohol use were used as variables from the PWP to assess the students' lifestyles.

Frequencies, *t*-tests, and analysis of variance (ANOVA), were used to examine the premise that an intervention such as a health and wellness class may affect health behavior choices in college age students. Frequency data showed that the majority of the students were in general physically active. In addition, the results indicated that the students made some poor choices in nutrition and in alcohol intake. Means outcomes showed that both genders participated equally in physical activities, had about the same

nutritional choices but that males drank more often than females. In ANOVA results, there was no significant change from the pre-test to post-test results.

Although the results of this study did not show statistical differences between the pre and post test, the study may hold some practical significance if even one student makes healthier choices as a result of the intervention. Curriculum implications are also included for future course revision.

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"May the heavens open up and the angels bless each and every one of you with a deeper awareness of your own light." Carlos Santana

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CHAPTER 1: INTRODUCTION

Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention (US Public health services, 1979) was published to reflect a national commitment to improve health through disease prevention and promote positive health choices. This report describes certain behaviors and conditions that affect the health of Americans and lists measurable goals for changing these factors.

In 1985, the American College Health Association (ACHA) joined this national effort to make higher education institution populations healthier. Two years later, the ACHA assembled a task force that included medical professionals, college health educators, and residence hall staff. This task force analyzed key health issues facing the college-aged adolescent population (17 to 24 years old) in higher education.

In 1991, the United States Public Health Services (USPHS) released *Healthy People 2000: The National Health Promotion and Disease Objectives* which outlined the goals and objectives designed to improve the health of all Americans. The broad public health goals for the ten year period included: a) increasing the span of healthy life for Americans, b) reducing health disparities among Americans, and c) achieving access to preventive services for all Americans (USPHS, 1991). Within this document, the concept of lifestyle choices became relevant. Lifestyle choices impact personal health and can significantly affect morbidity and mortality.

There are several factors that show how personal choices can influence health. If the use of tobacco were eliminated, an estimated 390,000 Americans would not die each year (USPHS, 1991). If an individual were to decrease fat consumption and increase exercise, his/her quality of life would be affected (USPHS, 1991). Further, each year, 12 million people in the US are infected with sexually transmitted diseases (Centers for Disease Control and Prevention, 1991). Alcohol use is a leading risk factor in the three leading causes of death among youth: unintentional injuries (including motor vehicle crashes, and drowning), suicides, and homicides. Other adverse consequences of underage drinking include risky sexual behavior and poor school performance (CDC, YRBS, 2001). Zero tolerance laws, which make it illegal for youth under age 21 years to drive with any measurable amount of alcohol in their system (i.e., with a blood alcohol concentration (BAC) $\geq$0.02 g/dL), have reduced traffic fatalities among 18 to 20 year olds by 13% and saved an estimated 21,887 lives from 1975 through 2002 (NHTSA, 1997).

A healthy lifestyle is generally characterized as a "balanced life" in which one makes "wise choices"; however, the array of choices is influenced by many factors. People can learn to adopt good health practices. When a person has the ability to understand, make self-assessments, and make voluntary changes, one can prevent, delay or reverse many of the health problems of today and the future (Payne & Hahn, 1995).

Guyton, Corbin, Zimmer, O'Donnell, Chervin, Sloan, and Chamberlain (1989) indicated that the majority (90%) of the experts rank sexual health concerns as the primary threat to both the physical and emotional well-being of college students. Other areas of concern included substance abuse (alcohol, drugs, tobacco, and food), mental

health, stress, anxiety, low self-esteem, the need for the provision of low-cost, quality health services for students, the need for direct prevention efforts toward the onset of cardiovascular disease (CVD), and the avoidance of injuries. Alarmed about the effects these factors have on the college-age population, the ACHA published *Healthy Campus 2000: Making It Happen* (ACHA, 1994). This text offered insight about the key health factors of greatest importance to the college-age student.

Americans today are taking a more active role in individual health choices than previous generations (Lavin, Shapiro, & Weill, 1992). Individuals are taking charge and making decisions about diet, exercise, stress reduction, sexual behaviors, drug use, seat belt use, and other health behavior choices that greatly affect and benefit their health.

Health behavior change can be a very complex and challenging process. There are different theories of health behavior and health behavior change, of which not one has been universally accepted by health professionals. Bandura's (1986) social learning theory addresses both the psychosocial dynamics underlying health behavior and the methods of promoting behavioral change. Social learning theory can best be described as a process of reciprocal determinism, including the behavioral, environmental, and cognitive factors that interact to determine an individual's behavior. Among the crucial personal factors are the individual's capabilities to understand the meaning of a behavior, to foresee the outcomes of a given behavioral pattern, to learn by observing others, to self-determine or self-regulate behavior, and to reflect and analyze an experience (Bandura, 1986).

Self-efficacy, as described by Bandura (1977), is the expectation that one has the ability to perform any action successfully. A social cognitive approach to behavior would

suggest behavioral, physiological, cognitive factors and environmental influences all operate as interacting causal determinants of each other (Bandura, 1985, 1997). This interacting process, referred to as *reciprocal determinism*, proposes that behavior is determined by the interrelated influences of individuals' physiological states, behaviors, cognitions, and the environment. Self-efficacy theory focuses on the role of self-referent thought and provides a common mechanism through which people demonstrate control over their own motivation and behavior. Self-efficacy cognitions have been consistently shown to be important determinants of sport (Feltz, 1992) and exercise behavior (McAuley, Peña, & Jerome, 2001) as well as social, clinical, and health-related behaviors (Bandura, 1997). It is important to realize that self-efficacy is not concerned with the skills of an individual but rather with the judgments of what an individual can do with the skills he or she possesses (Bandura, 1997).

Earlier reviews (McAuley, 1992) concluded that despite the use of diverse populations, sometimes despite inadequate operational definitions of exercise behaviors and a variety of methods for assessing personal expectations for success, the exercise-physical activity relationship appeared remarkably consistent. Physical activity was defined as an activity that involves movement of the body for a extended period of time, e.g., walking a total of 5,000 steps in a day. In essence, self-efficacy was reported to play a significant role in the adoption of and adherence to exercise regimens. Self-efficacy frequently has been identified as an important determinant of physical activity in problem populations.

According to Bandura's (1977) social learning theory, personal assessments of self-efficacy are based on four sources of information: 1) performance attainment, 2)

vicarious experiences, 3) verbal persuasion, and 4) the physiological state which influences one's judgment of capabilities. The theoretical rationale for identifying goals, outcomes or expectations is based on self-efficacy theory. Bandura (1997) has also proposed that behavior change requires the belief that the changes will result in the desired outcomes (outcome expectancies). In addition, behavior change requires the belief that one is capable of making the change. The initiation and maintenance of behavior change are mediated by a change in belief about one's ability to execute a given action successfully (efficacy expectations). It is the strength of perceived self-efficacy which predicts behavioral change. The stronger the sense of self-efficacy, the more dedicated people are to successfully completing their task, including changing a detrimental behavior (Bandura, 1977). Accepting personal responsibility for one's behavior demonstrates the characteristics of internal locus of control. Locus of control helps determine whether individuals tend to see what happens to them as a product of their own efforts (internal) or as the result of forces outside of themselves (external). Thus, when individuals exhibit healthy lifestyle behaviors, they demonstrate the action of control over their own efforts (internal locus of control). Healthy lifestyles for college-age students are developed in several different ways; most prominent is the use of a wellness course to affect behavior modification.

The Health Belief Model (HBM) is one of the most widely used conceptual frameworks for understanding health behavior. Developed in the early 1950s by Hochbaum, Rosenstock, and Kegels, the model has been used with great success for almost half a century to promote greater condom use, seat belt use, medical compliance, and health screening use, to name a few behaviors.

The Health Belief Model is a framework for motivating people to take positive health actions that uses the desire to avoid a negative health consequence as the prime motivation. For example, HIV is a negative health consequence, and the desire to avoid HIV can be used to motivate sexually active people to practice safe sex. Similarly, the perceived threat of a heart attack can be used to motivate a person with high blood pressure to exercise more often.

It is important to note that avoiding a negative health consequence is a key element of the HBM. For example, a person might increase exercise to look good and feel better. That example does not fit the model because the person is not motivated by a negative health outcome, even though the health action of getting more exercise is the same as for the person who wants to avoid a heart attack. The HBM can be an effective framework to use when developing health education strategies.

The Theory of Planned Behavior (Ajzen, 1982) provides a framework to study attitudes toward behaviors. According to the theory, the most important determinant of a person's behavior is behavior intent. The individual's intention to perform a behavior is a combination of attitude toward performing the behavior and subjective norm. The individual's attitude toward the behavior includes behavioral belief, evaluations of behavioral outcome, subjective norm, normative beliefs, and the motivation to comply.

If a person perceives that the outcome from performing a behavior is positive, she/he will have a positive attitude toward performing that behavior. The opposite can also be stated if the behavior is thought to be negative. If relevant others see performing the behavior as positive, and the individual is motivated to meet the expectations of relevant others, then a positive subjective norm is probable. If relevant others see the

behavior as negative, and the individual wants to meet the expectations of these "others", then the experience is likely to be a negative subjective norm for the individual. Attitudes and subjective norm are measured on scales (as an example the Likert Scale) using phrases or terms such as like/unlike, good/bad, and agree/disagree. The intent to perform a behavior depends upon the product of the measures of attitude and subjective norm. A positive product indicates behavioral intent (Glanz, Lewis, & Rimer, 1997). The Theory of Planned Behavior (TPB) was developed to predict behaviors in which individuals have little control over their own behavior.

The Transtheoretical Model is an innovative theory that offers an integrative view of intentional change behavior. It is a model that focuses on the decision making of the individual. Given the challenges of altering long-standing unhealthy behaviors, many health educators are calling for dynamic theoretical models to encourage programs to change behavior. The Transtheoretical Model represents a comprehensive example of such a dynamic model. This approach has been used to understand the stages people progress through and the processes they use while changing unhealthy behaviors.

The belief is that behavior change is a multi-step process that involves progression through a series of stages from precontemplation (not considering the behavioral change) to termination (no longer susceptible to behaviors that would revert back to the original state of inactivity). Other important constructs in this model include decisional balance (which is the weighting that occurs between the pros and cons of changing the behavior) and self-efficacy. Each stage has a specific task that must be accomplished before progressing to the next stage, and certain tools, called *Stages of Change*, play a primary role in accomplishing these stage-specific tasks by helping to

develop skills and/or attitudes needed to progress along the continuum. *Stages of Change* is the core construct of the model, and the model is commonly referred to as Stages of Change (Prochaska & Velicer, 1996).

Prochaska and DiClemente (1983) suggested that individuals who adopt new behaviors move through the stages of pre-contemplation (not intending to make changes), contemplation (considering making changes), preparation (making small changes), action (engaging in the new behavior), and maintenance (sustaining the behavior change over time). Individuals are believed to progress through these stages at various rates, and they may leave and reenter the continuum of change at various points. The model suggests that movement through the stages is not always linear but, instead, is cyclical, because many individuals must make several attempts at behavior change before they attain their goals. This model also takes into account actual behavior and intention to change and predicts that the amount of progress people will make as a result of an intervention is a function of the stage at which they are before treatment begins.

Healthy Campus 2000: Making It Happen (ACHA, 1994) indicated that to reduce college-age student health problems by the year 2000, higher learning institutions need to include prevention in their educational philosophy. This study demonstrated that college-age students who were enrolled in a general health course made better decisions than students not enrolled in a health course (control group). The students in the general health course acquired health knowledge, obtained the ability to make self-assessments and developed the skills to change their own behaviors.

Statement of the Research Problem

The purpose of this study was to measure the current health risk behaviors among the undergraduate college students enrolled in a health and wellness course at the beginning of the semester and to analyze any changes by measuring the health risk behaviors again at the end of the semester.

Using analysis of variance (ANOVA), this research examined the premise that low physical activity, poor nutrition, and drugs and alcohol use are not only contributing factors, but also may be used to show that an intervention, e.g. a health and wellness class, may or may not affect health behavior choices in college age students. Poor health behavior choices in college-age students can lead to health complications, and improper choices would be reduced if young people would choose a healthier lifestyle.

Research Questions

The research questions consisted of the following:

1. When introducing an intervention such as a health and wellness course (EX 145), what is the likelihood that a student would change his or her behavior to reflect a healthy lifestyle?
2. Which gender is more likely to change behavior to reflect a healthy lifestyle?
3. Of the three variables: physical activity, nutritional choices, or substance abuse; which will have the greatest behavioral change due to the class as an intervention?
4. Do ethnicity and a person's personal history influence the level of behavior change?

Significance of the Study

The relationship between health behaviors and health status has been established. Lifestyle is related to health status. College students have exhibited many unhealthy behaviors.

Physical Activity

Results from the 1999-2002 National Health and Nutrition Examination Survey (NHANES) using measured heights and weights, indicate that an estimated 16% of children and adolescents ages 6-19 years are overweight. Results show a 45% increase from the overweight estimates of 11% obtained from NHANES III (1988-94).

Despite the proven benefits of physical activity, more than 50% of American adults do not get enough physical activity to provide health benefits. Twenty five percent of adults are not active at all in their leisure time. Activity decreases with age and is less common among women than men and among those with lower incomes and less education. Furthermore, there are racial and ethnic differences in physical activity rates, particularly among women.

Regular physical activity is good for overall health. Physical activity decreases the risk for colon cancer, diabetes, and high blood pressure. It also helps to control weight; contributes to healthy bones, muscles, and joints; reduces falls among the elderly; and helps to relieve the pain of arthritis. Physical activity does not have to be strenuous to be beneficial. Moderate physical activity, such as 30 minutes of brisk walking five or more times a week, also has health benefits.

The *Healthy People 2000* Objectives outline a national strategy to improve the health of Americans. Embedded in the report are health promotion objectives that relate

to both nutrition and physical activity and fitness. Specifically, the national goals call for an increase in physical activity and the adoption of healthy dietary practices. Achievement of goals such as these will rely in part on education. Professionals trained in health science, health education, exercise science, physical education, and nutrition will be key players in such education. As professionals, these individuals will be concerned with helping the lay public to identify both appropriate health behaviors and strategies to change undesirable health behaviors, as well as helping individuals monitor their progress toward better health. In addition, it has been recommended that health professionals serve as role models. By serving as role models, it is suggested that they not only provide examples for those who seek their professional guidance, but they develop competence in the self-management skills that they are trying to impart to others.

Substance Abuse

Alcohol use and misuse have been documented in a number of college-specific surveys, including the College Alcohol Study (CAS), the Center for Alcohol and other Drug Studies (CORE), the National College Health Assessment, as well as in population-based surveys such as *Monitoring the Future* and the *National Household Survey of Drug Abuse*. Findings from these surveys provide substantial evidence that alcohol consumption is prevalent among college students and that many students experience a plethora of academic, psychosocial, and health consequences, some of which are fatal. Although considerable attention has been given to identifying high-risk drinking groups and risk factors among college students, scant attention has been paid to identifying the protective behaviors in which students engage to prevent or minimize alcohol-related harm.

Alcohol and other drug use among college students continue at an alarming rate, even though many prevention programs have targeted this group. According to the Monitoring the Future Study (O'Malley, Johnston, and Bachman, 1998), 87.3% of college students have tried alcohol, 82.4% had used in the past year, 65.8% had used in the last 30 days, and 40.7% had binge drunk in the past two weeks. Additionally, 43.6% had smoked in the past year, and 28.3% had smoked in the past 30 days.

In regards to marijuana and cocaine, this study found that 31.6% and 17.7% of college students had used marijuana in the past year and in the past 30 days respectively and 3.4% and 1.6% of students had used cocaine in the past year and in the past 30 days. Thus, substance use is still a major problem in the college population that has yet to be dealt with in a manner that has proven to be highly effective. Trends indicate there has been almost no change in the amount of alcohol, cigarette, marijuana, and cocaine use over the past 10 years (Johnston et al., 1998). Exercise or athletic participation may be a possible means in which to reduce or prevent substance abuse.

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), yet the literature to date has not always validated the perception that exercise or athletic participation reduces risky behaviors. Additionally, only a few studies have investigated the relationship between physical activity and substance use among college students, and these studies have usually looked at inter-collegiate athletics rather than recreational physical activity.

In 1998, an estimated 400,000 college students between the ages of 18 and 24 had unprotected sex after drinking, and an estimated 100,000 had sex when they were so

intoxicated they were unable to consent (Hingson & Howland, 2002). Among adults aged 18 to 30, binge drinkers were twice as likely as those who did not binge drink to have had two or more sex partners (Leigh, 1994).

A study by Leichliter, Meilman, Presley, & Cashin (1998) found that both males and females who participated in college athletics consumed more alcohol per week, engaged in binge drinking more often, and suffered more adverse consequences from their substance use compared to non-athletes. Other studies have also found that a high level of physical activity was associated with heavy alcohol use among college students (Kokotailo, Henry, Koscik, Fleming, & Landry, 1996; Wechsler, Dowdall, Davenport, & Castillo, 1995; Skolnick & Winker, 1992; Nattiv & Puffer, 1991). Another study found that college students involved in athletics were more likely to binge drink and use smokeless tobacco compared to students not involved in athletics, but they were less likely to use cigarettes or marijuana (Wechsler, Davenport, Dowdall, Grossman, & Zanakos, 1997). On the other hand, Koss and Gaines found that alcohol and drug use was lower among college athletes compared to non-athletes (1993).

Another study found few differences between athletes and non-athletes regarding their alcohol consumption (Overman & Terry, 1991). A more recent study found that adolescents who participated in organized group activities were less likely to smoke, drink, and use marijuana compared to non-participating peers (Elder, Leaver-Dunn, Wang, Nagy, & Green, 2000). Page, Hammermeister, Scanlan, and Gilbert (1998) found that both male and female adolescents who participated on one or more athletic teams were significantly less likely to use cigarettes, marijuana, cocaine, and other illegal drugs. A greater percentage of those engaging in sports participation were, however, more likely

to have consumed alcohol at all, to have binge drunk in the past 30 days, and to have used steroids than those not engaging in sports participation. Thus, the relationship between physical activity and substance use at this time is uncertain. It is uncertain if exercise or athletic participation is truly a protective factor for substance use. As such, the purpose of this study was to assess the relationship between level of recreational physical activity and substance use among college students.

Nutrition

Campus health providers should consider directing nutrition education efforts toward the student population. The nutritional status and weight reduction efforts of college students are of special concern because many effects of students' eating habits during the college years continue into adulthood.

Consuming a healthful diet is known to help prevent chronic disease such as coronary heart disease, non-insulin-dependent diabetes mellitus, and some types of cancers, strokes, and osteoporosis. Both diet and exercise play an important role in decreasing the prevalence of these chronic diseases. In one study among college students, researchers found that the students consumed higher than recommended quantifies of total fat, saturated fat, cholesterol, and sodium; ate inadequate amounts of fruits and vegetables; and reported poor exercise habits (Brevard & Ricketts, 1996).

The US Department of Health and Human Services has identified a series of objectives for improving health behavior in the areas of physical activity, fitness, and nutrition (Healthy People 2000). High-priority issues for campus settings include nutritional and psychological relationships with food. Psychological relationships might include such issues as eating or not eating as a reaction to stress or eating for comfort and

not for nutritional reasons. Nutritional choices might also be made based on financial limitations. Our purpose was to develop a profile of nutritional habits and behaviors among college students that could be used to design and target student health promotion programs more effectively.

Students who have a high degree of self-efficacy engage in more healthy behaviors than those who do not and are more likely to make more positive behavioral changes (Kaplan, Atkins, & Reunsch, 1948). The prevalence of unhealthy behaviors among college-age students has prompted large-scale efforts to promote healthy habits. It has raised questions as to how health educators can influence behavior and encourage students to improve their health. The typical college-age student (17 to 24 years of age) needs encouragement and skills to assume greater responsibility for themselves.

Delimitations

This study used participants in a required Health and Wellness Class. This requirement was to fulfill requirements in order to graduate from Colorado State University. The questionnaire was administered at the beginning and the end of the fall and spring semesters of 2001-2002, 2002-2003, and 2003-2004.

Potential Difficulties and Limitations

A primary challenge with all human studies, including the one reported here, is subject recall bias of all self-reported data. Subjects may not know their full family histories, and, given that they are young in age (mean age = 19.5 years), they may not know much of their own medical histories. Young people in general do not have regular doctor visits, unless major medical complications arise. Until this happens, recall bias may exist when answering certain medical questions on the Personal Wellness Profile

(PWP), the survey instrument used in this study. Also a potential limitation may exist when the subjects report their current heights and weights since self-reporting could result in inaccurate data. The investigators can achieve the proposed goals, however, due to the fact that the student population is a representation of the state of Colorado. Colorado is considered one of the more healthy states in the country, and its population is one of the more physically active due to its general proximity to the Rocky Mountains (CDC, 2001). Also, since the completion of the PWP is a prerequisite of the class, students may take their responses more seriously than they would if it were not connected to one of their university courses. Lastly the statistical analysis will control for such confounders in the data.

There are limits when using the Body Mass Index. It may overestimate body fat in athletes and in others who have a muscular build. It may also underestimate body fat in older persons and in others who have lost muscle mass.

Another potential challenge would be the recruitment of the subjects and the acceptance of the intervention by the students. Many of the subjects would have a bias toward the information given during the intervention, e.g., the EXCC 145 class, and may not accept the information given them. Subjects' opinions and current lifestyle choices might lead to a lifestyle that is contrary to the information given in class during the intervention. I have utilized a cross-sectional approach to address my hypothesis. Thus it is possible that recall bias may have limited detection of significant differences of the pretest and posttest data. The investigators will attempt to control as much as possible factors that may potentially confound the interpretation of the data. For example, all subjects who exhibit the confounders listed above will be excluded from the research

design. Since most are generally young and in good health, the potential for confounders to skew the data will be at a minimum.

A limited bias would be the role of the instructor. Instructor's teaching methods vary, and some may relay the information in a better way. This should not have a significant impact on the intervention. I would not consider this to be a major limitation since all instructors who teach the EXCC 145 class teach from the same material.

Researcher's Reflection

Having battled obesity for most of my life, this area of study is an important subject to me. I was not very active as a child, and while growing up I was teased often about my weight. When I entered high school, I played football, tennis, and swam. Even then I was still overweight and had to struggle just to keep up with other children of my age. Having emigrated from the Philippines, my family brought over the cooking and eating habits of our culture. This included frying foods in animal fats and eating foods heavy in saturated fats, and physical activity was not a priority in our family. This led to many unhealthy behaviors that I had to break over my adult life.

When I left home for college, I lived in an area that promoted many outdoor activities such as surfing, bike riding, beach volleyball, and weight training. After graduation, I increased my physical activity by doing a few triathlons. Along with the workouts typical of triathlons, my regimen included weight training. After giving up triathlons, I still continued weight training and decided to go back to school for my graduate degree in the exercise field.

As I continued my studies, my interests grew and became more focused on the behaviors of people and the choices they make when it comes to living a healthy lifestyle.

This interest eventually led me to my doctorate degree and my research interest in health promotion. This dissertation is just a stepping stone that will hopefully lead me down the road to a full understanding of health behaviors and to helping people make proper choices for a healthier lifestyle.

CHAPTER 2: REVIEW OF LITERATURE

The review of literature regarding the college age population includes a wealth of information on developing healthy lifestyles using health education as an intervention. It also addresses the concepts of self-efficacy and locus of control, how these concepts influence health behaviors and their relationship to behavioral change. Also reviewed are the Health Belief Model and the Transtheoretical Model as constructs to affect changes in behavior. In addition, the review of research addresses college student behavior change in each of the following areas: a) physical activity, b) dietary intake, and c) substance abuse. College-age students are at risk of developing unhealthy lifestyles and often need to make behavioral changes to create a positive lifestyle change. Green, Kruter, Deeds, and Partridge (1980) defined health education as a combination of learning experiences designed to facilitate changes in behavior that are enhancing.

Young Adults as a Sample Population

The practice of healthy habits in young adulthood is associated with reduced risk for chronic disease later in life (Raitakari, Parkka, Taimela, Rasanen, & Viikari, 1994). Establishing good habits early makes it easier to maintain good behaviors as an adult rather than to have to change later (Lau, Quadrel, & Hartman, 1990). Therefore, targeting healthy change intervention during this time should be cost effective in the long term. People's lifestyle habits do not change easily, but changing behavior is possible even though behavior typically changes slowly (Gifft et al., 1972). Furthermore, while

preadolescent children likely do not have the cognitive development to have concerns about future health risks (Domel and Baranowski et al., 1995), young adults have the necessary mental processing equipment to do so, at least biologically. Young adults in college are usually also in a transitional period between living at home and living on their own (Lau et al., 1990).

Unfortunately, young adults' healthy habits have been reported to be poor although college students and graduates have more healthful habits than non-students (Georgiou et al., 1997). Important factors influencing young adults' healthy vs. unhealthy habits are reported as time and convenience, health concerns, and money (Betts & Betts, 1995). However, habit is also an important factor (Betts & Betts, 1995).

Rates of Physical Activity

Rates of physical activity in college students are surprisingly low. Rates of inactivity ranged from 40-55% in college students (Petosa, Suminski, & Hortz, 2003; Suminski, Petosa, Utter, & Zhang, 2002). This means that roughly half of all college students are not getting adequate physical activity. In the College Health Risk Behavior Survey, only 19.5% of college students engaged in five or more days of moderate activity (Douglas & Collins, 1997). The same survey found that 37.6% engaged in at least three days of vigorous physical activity per week. Another study of college students at one large university found that only 22% of students exercised vigorously three days per week (Petosa et al., 2003). Clearly, there is a need to increase physical activity in this population.

Petosa et al. (2003) used a prospective study to predict vigorous physical activity in college students using Social Cognitive Theory constructs. The results of the

regression analysis are reported in the next section. In the sample of 350 college students, the investigators collected physical activity data for four weeks using a seven-day recall of physical activity. Over the course of four weeks, roughly 45% if the sample averaged one day or less of physical activity, and 78% of the sample did not meet the current ACSM recommendation for vigorous physical activity. This is defined as exercise bouts lasting from 30 to 45 minutes.

Douglas and Collins (1997) completed a health risk behavior survey of college students in 1995. Of the 7,442 students that were mailed the questionnaire, 4,838 students completed it. Another 229 student questionnaires were excluded, since the students identified themselves as graduate students. Students were asked questions regarding various health behaviors. The results of the physical activity portion of the questionnaire are reported. The article did not detail the validity and reliability of each set of questions, but it mentioned that prior reliability data for many of the questions was established on the youth risk behavior survey.

Vigorous activity was assessed by asking students if they participated in activities that made them sweat and breathe hard for at least 20 minutes on at least three out of the past seven days. According to the study, 37.6% of college students reported exercising vigorously on 3 of the past 7 days. Males reported vigorous exercise more than females (43.7% versus 33%), and white students reported more vigorous activity (38.7%) than black (36.6%) or Hispanic (35.4%) students. Moderate activity, assessed by asking students if they walked or biked for at least 30 minutes on five of the last seven days, was less promising. Only 19.5% of college students reported moderate activity on at least 5 of the last 7 days. Males reported slightly more moderate activity than females (19.7%

versus 19.3%). Black students reported the highest amount of moderate activity (27.6%), followed by Hispanics (21.4%), while whites reported the least amount of moderate activity (18.2%).

Lowry et al. (2000) presented further findings from the national college health risk behavior survey. Strength training was assessed in the survey by asking students if they had completed strengthening or toning exercises on at least three of the last seven days. The researchers found that 29.9% of students reported strength training on at least 3 of the last seven days. Males reported more strength training than females (33.9% versus 26.8%).

There seems to be a drop in activity from high school to college. Using the same question to assess vigorous activity, the Youth Risk Behavior Surveillance, reporting on youth ages 13-19, has reported a relatively stable rate of vigorous activity, roughly 64%, for the past several years (Grunbaum et al., 2002; Kann, 2000). The college survey, reporting on students ages 19-24, found that rates of vigorous activity among college students were appreciably lower, around 38% (Douglas &Collins, 1997).

In a study investigating ethnic differences in physical activities, it was found that, using the Self-Report of Physical Activity Questionnaire, 40-55% of the men and women in the study did not report any vigorous physical activity in previous month (Suminski et al., 2002). Between 11 and 20% of the men and women did not engage in any activity in the previous month. The researchers found that rates of physical activity among women differed according to ethnicity. Asian women reported the least amount of activity, followed by African American women, White women, and Hispanic women. Asian men

reported the least amount of activity, followed by African American men, White men, and Hispanic men.

Adame, Johnson, Nowicki, Cole, and Matthiasson (2001) examined self-report physical activity among college students in 1987 and in 1997. Freshmen students enrolled in a health education course in a mid-sized, southeastern university formed the sample. In 1987, 243 students participated in the study, while 250 freshmen in 1997 participated in the study. Physical fitness and amount of exercise were assessed. Amount of exercise was assessed using a 9-point Likert scale that asked students how much time they spent doing activity (examples were brisk walking, jogging, etc), from no regular exercise to 10 or more hours per week. From this instrument, researchers categorized physical activity levels into three groups; less than two hours, two to 4.9 hours, and five or more hours per week. Reliability for the measure ranged from r=.8 for women to r=.70 for men. Men's hours of exercise in the 1987 and 1997 samples were not significantly different. However, women in 1987 reported two hours or less of activity per week to a greater degree (51.7%) than women in the 1997 sample (19.5%). In 1987, 10.8% of women exercised five hours or more. In 1997, 32.5% of women reported five or more hours per week of exercise.

A few differences in this study, as compared to the previous study, need to be addressed. First, the researchers in this study grouped both moderate and vigorous activity together. As shown in the first study, it is more likely that these two levels of activity are quite different. Second, this study categorized hours of physical activity. The previous study measured how many students completed a certain amount of days per week. Other studies look at hours per day or days per week, but as continuous variables.

Although all of the situations mentioned claim to measure physical activity, it is easy to see that different measures are likely to produce different results.

Brown and Trost (2003) examined rates of physical activity among women through life transitions. Baseline data was collected from 14,779 women of college age. A follow-up was conducted four years later, where only 9657 women completed the follow-up. Life-events that were focused on were marriage, having a first baby, having a subsequent baby, divorce, becoming a single parent, returning to college, beginning to work, changing jobs, and working full-time. The study found that, although the proportion of women who were considered active was similar between baseline and follow-up, there was a drop in physical activity among participants who were considered active at baseline. The life events that were related to inactivity were marriage, having a child, becoming a single parent, or beginning work.

Care must be taken, however, when comparing rates of physical activity over the lifespan. If researchers are using different measures of physical activity, they may be measuring a different type of physical activity than another study. Sarkin, Nichols, Sallis, and Calfas (2000) looked at the discrepancies between physical activity measures. The study compared the Youth Risk Behavior Survey (YRBS), the National Health Interview Survey (NHIS), and the Physical Activity Recall Interview (PAR) in satisfying the national guidelines for physical activity. Roughly 30% of students met the recommendation for vigorous physical activity (3 days per week for at least 20 minutes per bout) according to the NHIS instrument. Roughly 40% of students met the recommendation according to PAR interview. Using the YRBS instrument, roughly 37% of people met the guideline. For moderate activity, 39% of people met the guideline (5

days per week, 30 minutes per bout) according to the PAR interview. Roughly 34% met the guideline according to the NHIS. A variation also occurred when total minutes per week, 120 minutes, of physical activity, not a specific number of days, was considered. In this instance, participation was over 20 percentage points higher than when frequency e.g. number of days of physical activity, was used. Occupational activity can also change estimates. It is imperative, therefore, that researchers are clear what type of activity they are measuring, how they are measuring it, and how they are analyzing the data. The researchers recommend standardizing measures so that different populations, such as adolescents, adults, etc, can be compared.

Correlates of Physical Activity

Currently, there is little literature available on college students and the predictors of physical activity in this population. The following section reviews the existing literature on college students. Many of the studies included below investigated several variables. For clarity, the studies are arranged by variable. Only the information relevant to each specific variable will be included under each variable heading. If studies are mentioned under more than one variable, the sample information and basic study design is repeated for each mention to assist in interpreting the results.

Self-regulation

Two studies were located that investigated the relationship between self-regulation and physical activity (Petosa et al., 2003; Rovniak, Anderson, Winett, & Stephens, 2002). Both found that the variable was a significant predictor; one predicted days of vigorous physical activity, and the other predicted stage of change. Both studies are reviewed below.

Rovniak et al (2002) completed a prospective study on college students (Rovniak et al., 2002). Using Social Cognitive Variables such as social support, self-regulation, self-efficacy, and outcome expectations, the researchers aimed to create a model that would predict physical activity 8 weeks from beginning the activity. Subjects were college age students (mean age of 19.56, SD = 1.39) that were registered for psychology courses at Virginia Tech, who were offered extra course credit for participating in the study. Self-regulation was measured using two scales developed for the study. On each 10-item scale, students rated their level of agreement to statements on a 5-point Likert scale with 0 being "does not describe" to 5 being "describes completely." Internal consistency for these two scales ranged from .87-.89, and test-retest reliability was in the same range (.87-.89). Physical activity was measured in three ways: stage of change, energy expenditure, and mode of activity. Stage of change was assessed by stage basing the student. Energy expenditure was assessed by the intensity level of the activity and mode of activity was assessed by asking the student what physical activity they participate in. The test-retest reliability for the energy expenditure measure was .75. The other physical activity measures were not reported. The results of the study indicated that self-regulation had significant total effects on physical activity (β=.71). Self-regulation mediated the effect of self-efficacy, where the indirect effect was β=.57. The authors reported that the total model, including self-regulation, accounted for 55% of the variance in physical activity.

Petosa et al. (2003) investigated the role of Social Cognitive theory constructs in predicting vigorous physical activity in 350 college students. Variables that were included in the study were self-regulation, outcome expectancy value, exercise role

identity, positive exercise experience, family and friend social support, and self-efficacy. Self-regulation was assessed using a 43-item instrument with acceptable validity and reliability (test-retest r=.92, Cronbach's alpha = .88). Vigorous physical activity was measured through a seven day recall that had been validated through expert panel review, and was found to be reliable (test-retest reliability, r=.72 for supervised activity). The researchers used a hierarchical multiple regression analysis to assess predictive capacity of the constructs on vigorous physical activity. Results of the study showed that the total model, consisting of all of the Social Cognitive Theory variables, accounted for 27.2% of the variance in vigorous physical activity.

Self-Efficacy

Self-efficacy is described by Bandura (1977) as people's judgment of their capabilities to organize and execute courses of action required to attain designated types of performances. Green and Kreuter (1991) stated that self-efficacy is a perception of one's own capacity for success in organizing and implementing a pattern of behavior that is new, based largely on experience with similar actions or circumstances encountered or observed in the past. Research has shown a link between self-efficacy and a variety of health behavior outcomes, from smoking cessation to career choices and athletic performance (Schunk, 1995). Bandura (1997) hypothesized that self-efficacy is learned in a variety of ways, from personal experiences to modeling others. In order for self-efficacy to impact behavior, the individual must have the requisite skill and incentive to perform the behavior. Perceived self-efficacy affects choice, effort, and persistence at a task even in the face of obstacles. Self-efficacy theory (Bandura, 1977) distinguishes between expectations of efficacy and outcome (Godin, 1994). Outcome expectancy

involves a person's belief that a behavior will lead to a particular outcome regardless of whether the person is capable of performing the behavior (Rodgers & Brawley, 1991). Self-efficacy and outcome expectancy are related in that efficacious learners expect and usually receive positive outcomes for their actions (Schunk, 1995). In this context Self-efficacy and Outcome expectancy exist together in the individual's mind prior to the behavior being attempted.

Prochaska, Norcross, and DiClemente (1994) related the concept of self-efficacy to self-esteem and self-confidence. Self-efficacy can be an aid to evaluating one's sense of control. Self-efficacy affects how much effort is invested in a given task and what level of performance is attained.

Williams (1988) emphasized performance accomplishment or self-efficacy, as opposed to fear reduction or habituation. Bandura and Wood (1989) stated that when people believed that the environment was controllable on matters of importance to them, the motivated person fully realizes his or her own self-efficacy, which enhances the likelihood of success.

A number of researchers have shown the utility of Self-Efficacy Theory in the exercise context. McAuley (1992) reviewed the research that has examined self-efficacy and exercise in terms of primary prevention (using self-efficacy to alter problematic behaviors and/or preventing them from developing), and secondary prevention (adopting behaviors once morbidity exists). Among studies that support self-efficacy as a significant predictor of exercise behavior are Sallis, Haskell, Fortmann, Taylor, and Solomon (1986), and Desharnais, Bouillon, and Godin (1986). In addition, McAuley and Jacobson (1991) found that self-efficacy to overcome barriers to exercise significantly

predicted exercise behavior in sedentary adult women. McAuley summarizes the research in primary prevention as supporting self-efficacy theory, even though definitions of exercise differ, measurement remains an issue, and populations in the studies varied.

Bandura (1977) indicated that a previously learned behavior enhances reinforcement and thus acts as a motivational device for continued change. Bandura (1976, 1977) also stated that a second cognitively based source of motivation operates through the intervening influences of goal setting and self-evaluation. Self-motivation involves standards against which to evaluate performance. By making self-rewarding reactions conditional on attaining a certain level of behavior, individuals create self-inducements to persist in their efforts until their performances match self-prescribed standards.

People with high levels of self-efficacy have been found to perform better on health related tasks than those with low levels of perceived self-efficacy (Bandura, 1977). Efficacy is more than just the motivation to try harder or a matter of strong "will power". It is created through a successful experience. Perceived self-efficacy is hypothesized to form a mediating link between knowledge and behavior.

In terms of secondary prevention (primarily with cardiac rehabilitation programs), there is empirical evidence that the perception of physical capability is a more accurate predictor of subsequent physiological functioning than actual physical capabilities (Ewart, Taylor, Reese and Debusk, 1983). Also, McAuley, Duncan, Wraith, and Lettunich (1991) showed the positive effects of motivational thinking on aerobic exercise performance in middle-aged men and women.

Poag-DuCharme and Brawley (1993) used self-efficacy theory to examine exercise compliance of beginners and experienced participators in a community based exercise setting. They found that self-efficacy played an important role in health endeavors and physical activity (Bandura, 1977). According to Dzewaltowski (1989), self-efficacy is a reliable predictor of exercise determination and exercise behavior. He found that college students with high efficacy continued to participate in an exercise program over a longer period of time. Regardless of the barriers, college students were found to exercise more days per week and to have a higher level of self-efficacy than college students without self-efficacy. Individuals with higher self-efficacy also reported lower levels of stress during exercise than those with lower self-efficacy.

Flay, D'Avernas, Best, Kersall, and Ryan (1983) suggested that intentions to perform behaviors will only be effective if the person has high self-efficacy and available behavioral alternatives. Not only can perceived self-efficacy have direct influence on choice of activities and settings, but through expectations of eventual success, it can affect coping efforts once the activities are initiated.

Efficacy expectations determine how much effort people will expend and how long they will persist in the face of obstacles and adverse experiences. The stronger the perceived self-efficacy, the greater the changes in behavior (Bandura, 1977).

Perry, Baranowski, and Parcel (1990) found that the repetition of the performance of a single task built a person's self-efficacy, which in turn affected task persistence, initiation, and endurance, which in turn then promoted behavior change. To make use of self-efficacy in promoting behavior change, goals should be set in increments that approximate a given behavior and that are each possible to achieve, thereby allowing

people to build self-efficacy each time they perform the desired behavior successfully. When individuals become successful at each step of the process, they can progressively put the steps together and build a greater sense of self-efficacy.

Five studies were found that investigated the role of self-efficacy in predicting physical activity. One was the Rovniak et. al. study (2002) reported on earlier in the review that looked at the self-efficacy of college students. Four of the remaining studies also found that self-efficacy was related to physical activity.

Wallace, Buckworth, Kirby, and Sherman (2000) examined the relationship between Social Cognitive Theory variables in predicting stage of change for exercise. The sample consisted of 937 college students with a mean age of 22 (SD=5.6 years), where roughly 60% were female. In the sample, males reported more hours of sedentary activity than females. The internal consistency for the stage of change measure was .71. Self-efficacy for exercise was assessed using 5-point Likert scale for barriers to physical activity. The internal consistency for the instrument in a pilot study was .74, and test-retest reliability was .94. Roughly 52% of the sample described themselves as being inactive, or in precontemplation or contemplation. Self-efficacy was a significant discriminating variable for females. A Tukey's post-hoc analysis showed that self-efficacy increased through the stages significantly. For males, self-efficacy was a significant discriminating function for males. After completing a Tukey's post-hoc test for males, it was found that self-efficacy was found to be more important when comparing males in different stages.

Petosa et al. (2003) investigated the role of Social Cognitive theory constructs in predicting vigorous physical activity in 350 college students (Petosa et al., 2003).

Variables that were included in the study were self-regulation, outcome expectancy value, exercise role identity, positive exercise experience, family and friend social support, and self-efficacy. Self-efficacy for physical activity was assessed using a 14-item measure that has been previously validated and found to be reliable. Physical activity was measured through a seven day recall that had been validated through an expert panel review, and was found to be reliable (test-retest reliability, r=.72 for supervised activity). The researchers used a hierarchical multiple regression analysis to assess predictive capacity of the constructs on vigorous physical activity. Results of the study showed that the total model, consisting of all of the Social Cognitive Theory variables, accounted for 27.2% of the variance in vigorous physical activity.

McAuley and Coureya (1994) investigated the determinants of the frequency, intensity, and duration of activity in 170 college students. Self-efficacy for physical activity was measured using three scales, one for frequency, one for duration, and one for intensity. The Cronbach's alpha for the three scales were .89, .93, and .87, respectively. The frequency scale assessed the level of participation of students who were physically active at least three days per week. The duration scale, from McAuley and Coureya (1994), assessed the ability of students to complete activity from 15 to 105 minutes. The intensity scale ranged from very, very light to very, very hard. Physical activity was assessed by asking students to list the frequency, duration, and intensity of their exercise. Frequency was assessed by asking students to list the number of exercise sessions that they completed in the past month. Duration was assessed by averaging the number of minutes per exercise session. Intensity of physical activity was assessed by using the average rate of perceived exertion. In a regression model, it was found that self-efficacy

accounted for 15% of the variance in frequency of activity, 15% of the variance in duration, and 8% of the variance in intensity of physical activity.

Leslie, Owen, and Salmon (1999) completed a study on the characteristics of sufficiently active versus insufficiently active college students in Australia. The sample consisted of 2,729 college students. A survey containing instruments related to environment, exercise enjoyment, social support, self-efficacy, and a two-week physical activity recall was administered to students. Self-efficacy was assessed through a modified instrument that addressed barriers to exercise. A five-point scale ("sure I cannot" to "sure I can") was used. Results were categorized into average self-efficacy (score ≤ 3) or high self-efficacy (score > 3). Physical activity was assessed using a 2-week physical activity recall that assessed the following types of physical activity: physical activity as a mode of transportation, moderate activity, and vigorous activity. Duration of activity was converted to energy expenditure. Students were considered sufficiently active if they expended 800 kcals/week or more. Students were insufficiently active if they expended less than 800 kcals/week. Odds ratios for being insufficiently active were calculated through logistic regression. Self-efficacy was not found to increase odds ratios of being either sufficiently or insufficiently active.

Outcome Expectations and Expectancies

Two studies were located that investigated the relationship of outcome expectations and expectancies on physical activity. One study found a significant relationship between the variable and physical activity (Petosa et al., 2003). The other did not find a significant relationship between the variable and physical activity (Rovniak et al., 2002).

Outcome expectancy value was assessed using a 19-item instrument with reported validity and reliability (test-retest reliability on the three subscales ranged from .66 to .89). Physical activity was measured through a seven day recall that had been validated through expert panel review, and was found to be reliable (test-retest reliability, r=.72 for supervised activity). The researchers used a hierarchical multiple regression analysis to assess predictive capacity of the constructs on vigorous physical activity. Results of the study showed that the total model, consisting of all of the Social Cognitive Theory variables, accounted for 27.2% of the variance in vigorous physical activity.

Rovniak et al (2002) completed a prospective study on college students. Using Social Cognitive Variables such as social support, self-regulation, self-efficacy, and outcome expectations, the researchers aimed to create a model that would predict physical activity at 8 weeks. Subjects were college age students (mean age of 19.56, SD = 1.39) that were registered for psychology courses at Virginia Tech, who were offered extra course credit for participating in the study. Outcome expectations were measured using a modified version of two scales. These scales included measures of positive and negative outcomes of physical activity and enjoyment of physical activity. The internal consistency (α=.81-.88) and test-retest reliability (r=.81-.85) on the positive and negative outcomes scale were found to be sufficient. The enjoyment scale included 18 items, where students rated their level of liking (I enjoy it to I hate it) on a 7-point Likert scale. Physical activity was measured in three ways: Stages of Change, energy expenditure, and mode of activity. The test-retest reliability for the energy expenditure measure was .75.

Motivation

One study investigated the relationship between motivation and physical activity. Frederick, Morrison, and Manning (1996) found that body-related motivation or appearance was related to physical activity. They studied 118 students (80 women and 38 men) from Southern Utah University. The researchers measured motivation to participate in physical activity, exercise enjoyment, adherence to exercise, and attitude toward exercise. Motivation to participate was indicated by the answers to questions involving five motivations to exercise-interest or enjoyment, development of skill, improving fitness, appearance, and social interests. Of these five motivations, two were considered intrinsic motivations (development of skill and interest or enjoyment), while the other three were considered extrinsic motivations. Results of the study showed that body-related motivation for men, including fitness and appearance, was a significant predictor of days per week of exercise (β=.74, $p<.05$). For women, adherence to exercise was not predicted by such factors.

Attitude

Two studies included attitude in their investigation of correlates of physical activity. One study found that there was no relationship between attitude and physical activity (Frederick et al., 1996). The other study found that there was a relationship between attitude and physical activity (Courneya & McAuley, 1994).

In Courneya and McAuley's study, physical activity was assessed by asking students to list the frequency, duration, and intensity of their exercise. Frequency was assessed by asking students to list the number of exercise sessions that they completed in the past month. Duration was assessed by averaging the number of minutes per exercise

session. Intensity of physical activity was assessed by averaging the rate of perceived exertion. In a regression model, the author's related that the participants' attitude accounted for 5% of the variance in frequency and 2% of the variance in duration. Attitude was measured by a Likert scale with 0 corresponding to "does not enjoy exercise" to 5 "enjoys exercise immensely."

Benefits versus Barriers

One study used the Health Belief Model to investigate the relationship of benefits versus barriers to physical activity. The study, reviewed below, found a significant relationship between benefits and barriers. Grubbs and Carter (2002) used the health promotion model to investigate perceived benefits and barriers to exercise among college students. One-hundred, forty-seven college students from a large southeastern university served as the sample. Perceived benefits and barriers were measured using a 43-item, 4-point Likert scale (strongly disagree to strongly agree). The reported internal consistency of the measure was .95, and test-retest reliability was .89. Current exercise habits were assessed by asking students if they exercised using large muscle groups for at least 20 minutes, on three or more days per week, where the intensity was at least 60% of their maximum heart rate. If students reported doing so, they were considered to be exercisers. Of the total sample, 68.8% of students reported exercising at this level, while 31.2% did not. The researchers found that students who were considered exercisers were more likely to score higher on the benefits scale and lower on the barriers scale.

Interventions

There has only been one published physical activity intervention study in a college population. The theory and model employed to change physical activity in the

intervention were Social Cognitive Theory and the Transtheoretical Model. The only significant predictor at one-year follow-up was processes of change. There was an increase in strength training in women. At two years, there was no difference in physical activity. Kahn and colleagues (2002) reviewed the effectiveness of interventions in different settings in increasing physical activity (Kahn et al., 2002). Only those studies using college students are included in this section. Interventions in college-based health and physical activity courses typically include a knowledge component and an application of skills component. In their review, Kahn et al. found that although there were significant changes in physical activity during two interventions, the two-year follow-up showed that physical activity levels returned to baseline levels. It was concluded the there was insufficient evidence to evaluate the effectiveness of this type of intervention, since there were only two studies that qualified for the review.

Calfas, Sallis, and Nichols (2000) presented the two-year results of Project GRAD (graduate ready for activity daily). The sample consisted of 338 students, of which 185 were male. At two years, 93% of the total sample (314 students) provided useable data. Students who volunteered to participate in the study were randomly assigned either to the intervention or to a general health course. The intervention, based on both the Transtheoretical Model and Social Cognitive Theory, targeted variables such as self-efficacy, social support, perceived benefits, barriers, enjoyment of physical activity, and use of the processes of change. The intervention, which included a lecture and a lab, lasted one semester. During the lecture, two faculty members led a discussion of the benefits of and recommendations for physical activity as well as the process of exercise

management. The lab sessions were peer-led, and students were expected to participate in physical activity while applying the behavioral skill they learned in the lecture. Follow-up measures were collected both through mail and phone surveys. Physical activity was measured using the 7-day Physical Activity Recall. Psychosocial measures that were assessed were social support, self-efficacy, benefits and barriers, enjoyment, and processes of change.

At one year, strength training activities were significantly different in the intervention group than in the control group for women. There was no significant difference in physical activity for either sex at two years. Women in the intervention group did show an increase in their processes of change from baseline to one year ($F3,142 = 3.74$, $p<.02$). This change was maintained at two years. For men, there were no significant changes in mediators at one or two-year follow-up.

Construct Change

As mentioned by Baranowski (1998), the physical activity intervention research is woefully inadequate in presenting process evaluations including construct validations of the treatment. A construct validation of a treatment involves developing an intervention around constructs, and then assessing whether or not those constructs changed from pretest to post-test. It is difficult to say, therefore, which variables, let alone the doses of the variables, are important in physical activity behavior change. A literature search was conducted on process evaluations and construct validations of the treatment. This review was not limited to physical activity alone; other health behavior interventions were included if a process evaluation was conducted.

Physical Activity

A review of physical activity interventions that measured mediating variables found that family social support, knowledge, self-efficacy, self-monitoring/regulation, and outcome expectations are amenable to change during intervention. Unfortunately, there was no clear relationship between variable change and change in physical activity. The following section summarizes the studies that were located that measured mediating variables. Marcoux et al. (1999) completed a process evaluation of the SPARK intervention for children.. The process evaluation was conducted on the self-management portion of the program. The self-management program included goal-setting, reward, monitoring, planning, and problem solving skills. Students in the fourth and fifth grades received the intervention. Their school was randomly assigned to the treatment or the control condition. The self-management portion of the intervention was aimed at increasing the students' physical activity levels outside of school (as opposed to the physical education portion that attempted to increase students' physical activity levels during physical education).

The process evaluation showed that the majority of the lessons were delivered as planned by the physical education specialists. The percent of classroom teachers that delivered the lessons was lower. Lesson length was similar between the groups, and was similar to the projected time for each lesson.

In a regression analysis on participation in physical activity, it was found that 30% of the variance was accounted for by experimental condition, personal characteristics, and parental support in boys, and that 36.5% of the variance in participation in physical activity was accounted for by experimental condition and

personal characteristics for girls. The authors did not report on the change in the mediating variables from the beginning to the end of the intervention. Instead, the researchers chose to report the relationship of the mediating variables to participation in physical activity. Though the latter is important, it is also necessary to know if the mediating variables changed as a result of the intervention.

Perry et al., (1989) conducted a pilot test of the "Slice of Life" curriculum on both physical activity and on dietary behaviors. During the intervention, knowledge, value, locus of control, modeling, barriers, social support, self-monitoring, and reinforcement were used to change the behaviors. The girls in the intervention had increased knowledge of healthy behaviors at post-test ($p<.05$), while boys did not. There was no significant change in physical activity for boys or girls. Theoretical variables were not measured.

Edmundson, Parcel, Feldman, and Elder (1996) reported on the effects of CATCH, an intervention aimed at increasing physical activity and promoting healthy eating habits. Ninety-six schools were randomly assigned to treatment groups. For the physical activity intervention, the determinants that were the focus of the program were family and friends' support and self-efficacy. At the end of the intervention, there were no differences in support for physical activity. There was an initial increase in self-efficacy, but the difference was not significant at the end of the intervention. As reported by McKenzie and Feldman (1996), there was a significant change in moderate to vigorous physical activity at the end of the intervention.

Parcel et al. (1989) reported the impact of the "Go for Health" program on dietary and physical activity behaviors. The intervention, based on behavioral capabilities, self-efficacy, and expectations was given to students in grades three and four. There was a

significant time and treatment interaction for students in grade four for exercise self-efficacy. There were no effects for behavioral capabilities. There was, however, a significant increase in aerobic activities in both the intervention and control groups from pre-test to follow-up.

Madsen et al. (1993) investigated the relationship of self-monitoring to risk factor change in children and adults. Families were assigned to a control or an intervention condition. The intervention, to modify diet and exercise, was based on Social Learning Theory, specifically self-monitoring. Each session included aerobic exercise, information specifically for the children or adults, time for adults to set family goals related to diet and exercise, and then a healthy snack session. The researchers found that several physiological markers were related to self-monitoring for dietary consumption. There were no significant physiological markers that correlated with self-monitoring of exercise in adults, but children's cholesterol levels were significantly related to their self-monitored exercise changes.

Hallam and Petosa (1998) conducted a worksite intervention to increase exercise adherence in adults. Social Cognitive Theory variables such as self efficacy, self-regulation, and outcome expectancy value were the focus of the intervention. Subjects were initially screened for their stage of change. Those that were in contemplation, preparation or action were included in the study. Subjects in the treatment group attended four one-hour sessions that focused solely on increasing knowledge and skills for the constructs. The authors found that self-regulation and outcome expectancy values changed from pretest to post test in the intervention group.

Specifically, the mean change for self-regulation was 23.95, and the mean change for outcome expectancy value was 16.14. The possible range on the self-regulation instrument was from 5 to 25, and the possible range on the outcome expectancy value instrument was 9. This would seem to indicate that social cognitive theory variables are modifiable in interventions. But the study did not measure physical activity change. Thus, it is unknown how much of a change is required in constructs to influence physical activity behavior.

Neumark-Sztainer, Story, Hanna, and Rex (2003) conducted an obesity prevention program for adolescent girls during physical education. "New Moves" is a curriculum based on Social Cognitive Theory which aims to increase skills for physical activity and dietary behaviors in an attempt to prevent obesity. Four activity sessions were completed each week, and nutritional and social support sessions were also included. There were no post-test differences between groups on any of the measures, including physical activity, healthy food intake, perceived benefits of physical activity and nutrition, enjoyment of physical activity, self-efficacy, and social support.

Dietary Habits

Many of the studies reviewed in this section were also included in the previous section. The interventions were aimed at changing both physical activity and diet. The mediating variables that were significantly changed in the following interventions were knowledge of the importance of physical activity and a healthy diet, behavioral capabilities to make healthy changes in lifestyle, outcome expectations for a healthier lifestyle, and self-efficacy. The majority of the following studies did not produce a change in dietary behaviors. In the one study that did change dietary behavior, knowledge

of the importance of physical activity and a healthy diet was the only significant mediating variable. The following section reviews intervention studies that measured mediating variables.

Perry et al. (1987), as described above, conducted a process evaluation of an intervention aimed at increasing physical activity and changing unhealthy eating patterns of adolescents. During the intervention, knowledge, value, locus of control, modeling, barriers, social support, self-monitoring, and reinforcement were used to change the behaviors. Girls and boys in the intervention group increased their knowledge of healthy eating habits. Females in the intervention group increased their healthy eating habits significantly ($p<.05$).

Edmundson et al. (1996) report on the effects of CATCH, an intervention aimed at increasing physical activity and healthy eating habits. Ninety-six schools were randomly assigned to treatment groups. For the dietary intervention, the determinants that were the focus of the program were dietary intention or what participants thought they should be eating, usual food choices, dietary knowledge, reinforcement for food choices, and dietary self-efficacy.

There was a significant change in dietary selections, usual food choices, and dietary knowledge at post-test. There was also a significant change in reinforcement for food choice from friends, parents, and teachers. Change in dietary self-efficacy was not significant at post-test.

Parcel et al. (1989) reported the impact of the *Go for Health* program on dietary and physical activity behaviors. The intervention, based on behavioral capabilities, self-efficacy, and expectations was given to students in grades three and four. Diet behavioral

capability, diet self-efficacy, and dietary expectations were all significantly different from pre-test to post-test. Students did not, however, increase their consumption of healthy foods during the intervention.

Miller et al. (2002) evaluated a nutrition intervention for older adults suffering from diabetes. This intervention, based on Social Cognitive Theory, included lessons on outcome expectations, observational learning, self-regulation, social support, and self-efficacy.

Ten sessions, lasting 1-2 hours each were offered to participants. Outcome measures included self-efficacy, outcome expectations, knowledge, and relevant criteria to make healthy selections. The intervention group had greater positive outcome expectations, self-efficacy measures, and knowledge at post-test than the control group. The intervention group also used more relevant criteria to select healthy foods at posttest.

Smoking

One smoking prevention intervention was found that measured mediating variable change. Langlois, Petosa, and Hallam (1999) conducted an intervention for smoking prevention among six graders. Five treatment and five comparison schools were utilized. The intervention focused on behavioral capability, self-efficacy, and refusal expectations. The intervention was conducted twice per week over three weeks. Each session lasted 30 minutes. Refusal self-efficacy and refusal expectations both were higher in the treatment than in the comparison group at the end of the intervention. Behavioral capabilities did not change. The authors concluded that at least two 40 minutes sessions should be used to adequately address refusal skills to increase refusal self-efficacy. Though only 10-12 minutes was spent on positive outcomes of refusal, it seemed to produce a change in the

intervention group. The same amount of time was spent on negative outcomes of refusal, yet no change occurred in the variable. Behavioral capability was the focus of 62 minutes of the intervention, and yet it produced no change in the variable.

Locus of Control

Locus of control, from Social Learning Theory (Rotter, 1966), contends that people learn or are conditioned operantly on the basis of their history of positive or negative reinforcement. Locus of control theory hypothesizes that behavior is a function of the expectancy that a certain action will lead to a particular goal, combined with the reinforcement value of that goal. The concept of locus of control has been applied to the area of health for the last 25 years.

People who develop a sense of internal locus of control are likely to self-initiate change, whereas those who are externally controlled are likely to initiate change as a result of influence from others. Internal locus of control beliefs have been linked to the ability to lose weight (Balch & Ross, 1975), to quit smoking (James, Woodruff, & Werner, 1965), to use seat belts (Williams, 1976), to engage in physical exercise (Sonstroem & Walker, 1974), and to use contraceptives (Lundy, 1972).

The psychosocial construct of locus of control proposed that a relationship exists between an individual's perceptions of control over outcomes and the likelihood of taking specific actions. People who possess internal locus of control perceive rewards, punishments, or results as a means of self-control. Externally controlled persons can be influenced by other powerful forces, such as family, friends, physicians, or people in authority; an individual's locus of control orientation is an enduring and stable characteristic.

Social learning theory takes into account the self-control and performance type of human behavior that focuses on achievement of a goal (Bandura, 1977). One of the goals of health education is to bring the performance of health behaviors under the control of the individual. Self-control of behavior enhances the learning and maintenance of that behavior. Goal setting is the most important factor in the achievement of self-control.

Strickland's (1978) review is the most positive. People who possess internal locus of control, in contrast to those who possess external locus of control, tend to be more sensitive to health messages. Internal locus of control people also have an increased knowledge about health conditions, will attempt to improve their physical function through their own efforts and are less susceptible to physical and psychological dysfunctions.

Wallhagen, Strawbridge, Kaplan, and Cohen (1994) showed that internal locus of control was strongly related to change in physical functioning and to the importance placed on good health behaviors. When dealing directly with young adults, results indicated that internal locus of control was positively related to one's ability to self-manage health behaviors and health values. On the other hand, people with an external locus of control were unable to self-manage health behaviors and health values.

Wallston and Wallston (1978) formulated a scale for the assessment of the "health" locus of control that is consistent with Rotter's theory. The scale assesses the extent of control that individuals perceive they have over their states of health. The statements are designed to elicit information about an individual's health beliefs. Subjects respond to each statement using a six-point Likert scale. The score for the instrument can range from 11 to 66 with a higher number correlating with an external locus of control

orientation and a lower score correlating with an internal locus of control orientation. Test-retest reliability for Wallston's Health Locus of Control (Wallston, Wallston, Kaplan, & Maides, 1976) over an eight-week period was .71 (n = 22). Cronbach's alpha internal consistency was .72 (n = 98).

Wallston, Wallston, and De Vellis (1978) developed the Multidimensional Health Locus of Control Scale as a means to evaluate beliefs held toward health outcomes. Reliability (.67) was established on a sample of 115 respondents with an average age of 16. Bandura (1986) proposed that the Health Locus of Control measure was useful in health research because an individual's sense of control often varies by domains of experience and action.

Stages of Change

The Transtheoretical Model is an innovative theory that offers an integrative view of intentional behavior change. It posits that behavior change is a multi-step process that involves progression through a series of stages from precontemplation (not considering behavior change) to termination (no longer susceptible to cues to revert to the original behavior). Each stage has a specific task that must be accomplished before progressing to the next stage, and certain tools play a primary role in accomplishing these stage-specific tasks by helping to develop skills and/or attitudes needed to progress along the continuum. Other important constructs in this model include decisional balance (which is the weighting that occurs between the pros and cons of changing the behavior) and self-efficacy. A review of the literature identifies a wealth of articles demonstrating the efficacy of this model and its ability to predict and/or explain volitional behavior. Stages

of Change is the core construct of the model, and the model is commonly referred to as Stages of Change (Prochaska & Velicer, 1997).

According to the model, individuals cycle through five common stages as they move toward the adoption of a regular exercise program:

1. Precontemplation: Precontempators are not seriously considering changing their activity pattern in the next 6 months. They are very resistant to change and are often unaware that being sedentary is a problem.

   "I currently do not exercise and do not intend to start in the next 6 months."

2. Contemplation: Contemplators are aware that physical inactivity is a problem. They are seriously thinking about becoming more active but have not yet made a commitment to take action.

   "I currently do not exercise but I am thinking about starting to exercise in the near future."

3. Preparation: In the preparation stage, some behavioral change catches up with intention. Individuals want to take action in the next month and have successfully taken action in the last year.

   "I currently exercise some, but not regularly."

4. Action: The greatest observable change occurs in the action stage. People reach a level of exercise deemed to reduce health risk, such as being active for a minimum of 20 minutes three times a week.

   "I currently exercise regularly, but have only begun doing so in the last 6 months."

5. Maintenance: In the maintenance stage, people have sustained their exercise behavior for at least 6 months.

   "I currently exercise regularly, and have been doing so for more than 6 months."

Research investigating perceptions of physical activity in the college student and adult populations suggests that levels of perceived barriers are higher for individuals in the precontemplation stage of behavior change than in the maintenance stage. Research also suggests that levels of self-efficacy, perceived benefits of change, susceptibility to regression, and cues to action are lower in the precontemplation stage than in the maintenance stage of behavior change.

Given the challenges of altering long-standing unhealthy behaviors, many health educators are calling for dynamic theoretical models to encourage programs to change behavior. The stages of change approach represents a comprehensive example of such a dynamic model. This approach has been used to understand the stages people progress through and the processes they use while changing unhealthy behaviors.

Prochaska and DiClemente (1983) suggested that individuals who adopt new behaviors move through the stages of pre-contemplation (not intending to make changes), contemplation (considering making changes), preparation (making small changes), action (engaging in the new behavior), and maintenance (sustaining the behavior change over time).

The primary objective in applying the stages of change approach to exercise behavior is to understand the process of behavior change so that more successful programs can be developed to help people begin and continue to be active. When applied to exercise, the stages of change approach would posit that exercise participation would

vary among individuals in various stages (e.g., precontemplation/contemplation v preparation v action/maintenance). The model would predict that greater participation in physical activities would be reported among individuals in action/maintenance than those in preparation and that more activity would be reported by individuals in preparation than by those in pre-contemplation/contemplation. The model would also predict that there would be no significant differences in time spent in physical activity between individuals in precontemplation and those in contemplation and, similarly, between those in action and maintenance (Marcus & Simkin, 1993). The model has been applied to examining physical activity in the worksite (Marcus & Owen, 1992) and in community samples (Marcus et. al., 1992). Interventions matched to an individual's stage of readiness that have been applied to worksite and community samples have been shown to be superior to standard interventions for exercise promotion (*Marcus*, Emmons, Sirekin, et al, 1993).

Marcus looked at the link between the Stages of Change and exercise self-efficacy. It was found that individuals at higher exercise behavior had higher levels of self-efficacy for exercise, further suggesting the benefit of using stage specific interventions (Marcus, Eaton, Rossi, & Harlow, 1994). The costs and benefits of exercise have also been shown to be related to exercise behavior, mediated by stage of readiness (Marcus et al., 1994). Decisional balance, as described by Janis and Mann (1968), involves the assessment of benefits (pros) and costs (cons) of behaviors to self and others. In the context of exercise behavior, Prochaska et al. (1994) found that relative values of pros and cons varied by stage. At precontemplation, the cons outweighed the pros and remained so until the preparation stage, when they were equal. In the action and maintenance stage, the pros outnumbered the cons. These results suggested that strategies

should be tailored to increase pros of exercise early, and to decrease cons once exercise behavior is realized.

The stages of change approach has been applied to weight control (Marcus, Rossi, Selby, Niaura, & Abrams, 1992) and to consumption of high-fat diets (Rossi, 1993) in samples of college students. The application of this approach to understanding and promoting exercise behavior in young adults has been scant, however. Despite the potential health benefits of physical activity for preventing coronary heart disease, cancer, and other chronic diseases (Paffenbarger, Hyde, Wing, & Hsieh, 1993) and the psychological benefits, such as mood improvement and management of anxiety and depression (LaFontaine, DiLorenzo, Frensch, Stucky-Ropp, Bargman, & McDonald, 1992), epidemiologic studies show that participation in physical activity declines with age, beginning in childhood, with the steepest decline in physical activity occurring in adolescence (approximately 15 to 18 years of age) and young adulthood (approximately 20 to 25 years of age). Given the difficulties encountered in getting adults to adopt and adhere to exercise programs, several national health objectives target adolescents and young adults in an effort to increase participation in exercise earlier in life (Healthy People, 1990).

The issue of stage-specific interventions was directly tested in another study (Marcus et al., 1992) in which over 1100 worksite participants were recruited to participate in a program whereby their stages of change were assessed, and then an intervention program based on the processes of change was administered appropriate to each level of exercise behavior. The study provided further evidence of the model's validity in the domain of exercise behavior, and examined the validity of the Process of

Change Questionnaire (PCQ). Results indicated that participants utilized all ten processes of change in their attempt to change their exercise behavior, and they did so in a pattern similar to that found by Prochaska and DiClemente (1983) in that various processes were more likely to be utilized at specific stages. The use of these processes of change were not, however, as widespread in a more recent study by Gorely and Gordon (1995). In this study, only 5 of the 10 processes did fluctuate across stages. This may indicate that processes of change are themselves age and/or culture specific. Nevertheless, the findings of Gorely and Gordon support most of the findings of Marcus et al. in that individuals were seen at all stages of the model, and specific processes of change could bring about changes in exercise behavior such that individuals could progress from an 'earlier' stage, e.g., contemplation, to a 'later' stage, e.g., action.

Criticisms do exist for the Stages of Change model. The TTM have been criticized as being arbitrarily defined descriptive categories at best (Bandura, 1997). In most stages of change instruments, respondents must indicate that they either intend or do not intend to change their behavior. Contemplators are those who intend to change their behavior, while precontemplators do not. It has been argued that intention is a factor that more accurately can be thought of as continuously varying along a continuum, rather than either/or states (Bandura, 1997). The six month cut point between the stages of action and maintenance is also a point of contention. Individuals who have maintained behavior change for less than six months are categorized in the action stage while those who have maintained the behavior change for six months or longer are considered in maintenance (Prochaska et al., 1992). Thus, an individual who has exercised for 23 weeks is placed into the same category as someone who has exercised for 1 week (action), while someone

who has exercised for 24 weeks would be placed in a separate stage (maintenance). This specific cut point is hard to justify. For example, the relapse curve in physical activity does not change noticeably at the six month point.

The concerns for the model were addressed by Prochaska and DiClemente (1992), and they reiterated that this model is like a spiral staircase and that a person can move up or down, depending on his or her attitude at that time. They conceded that there is no empirical data to show a person is moving successfully from one stage to the next but they have shown that a person cannot succeed if they move to action without adequately staying in the previous stages.

In another criticism, the model lacks validity established for the Stages of Change instrument. This issue was recently addressed by Cardinal (1995) in a study of female adults between the ages of 22 and 66 years. Cardinal developed and tested an instrument theoretically based on the transtheoretical model, which assumes that exercise behavior patterns should successfully differentiate participants into the five stages of exercise behavior. These stages were compared to scores on three separate valid and reliable physiological indicators (exercise energy expenditure, and maximum oxygen uptake). Results indicated that classification by stage of exercise was consistent with the physiological indicators, providing additional construct validity for the stage of exercise scale. The Stage of Exercise Scale created represents a legitimate step forward in instrumentation, and it will be utilized in this study with a similar (female, middle-aged) population.

Health Belief Model

The Health Belief Model (HBM) was first applied to the understanding of disease prevention and in identifying unhealthy behaviors, and it has broadened its scope to preventive-health behaviors, sick-role behaviors, clinical utilization, and as a predictor of compliance with a variety of medical regimes (Janz & Becker, 1984). The components of the HBM lie within various psychological and behavioral theories, such as the Social-Learning Theory and Social-Cognitive Theory. The HBM explains behavior change based on the value placed by an individual on a particular goal and on the individual's estimate of likelihood that a given action will achieve the goal (Janz & Becker, 1984). The dimensions of the HBM include perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. Along with these dimensions, "cues to action" and general health values also influence the likelihood that an individual will intend to act on a specific behavior.

For individuals to intend to change their behaviors, they must have the subjective perception of being at risk for the particular disease or condition, which is termed perceived susceptibility. Perceived severity pertains to the individual's belief that he or she will contract an illness based on the evaluation of both medical/clinical consequences and possible social consequences. Individuals must believe that their behaviors are risky enough to motivate a change. Finally, in order for a behavior to change, individuals must perceive a minute amount of negative feelings associated with the potential costs of performing a particular health action. Perceived barriers that can contribute to stagnation of behavior change include monetary reasons, pain, inconvenience, and lack of social support. The last two components of the HBM, cues to action and general health values,

pertain to how individuals become aware of changing their behavior and how serious they are about being healthy. Specifically, "cues to action" refers to the different type of stimuli necessary to provoke the decision-making process, which can result from either internal, such as symptoms, or external such as mass media communications.

The HBM has been applied to numerous health behaviors in the prevention of various diseases and in the fulfillment of changed behavior. One infectious disease to which it was applied was influenza and the inoculation against Swine Flu (Aho, 1979). The study distinguished between participants versus non-participants in an inoculation program. Individuals that were participants of the inoculation group significantly differed from non-participants by perceiving themselves as more susceptible to the flu, and perceiving more benefits and fewer barriers in receiving a vaccination to prevent the flu.

The utilization of the Health Belief Model assists in changing individuals' beliefs and attitudes with respect to general health and exercise. The difficulty of this lies in altering individuals' belief systems and attitudes. Most studies that have applied the HBM to exercise behavior have focused on the relationship between belief systems and exercise behaviors without providing an intervention that questioned individuals' belief systems.

For example, Slenker, Price, Roberts, and Jurs (1984) utilized the HBM to assess the knowledge, attitudes and beliefs about jogging (using joggers and non-exercisers). Applying the model to health-protective behaviors, the objectives of the study were to develop a questionnaire based on the HBM that is valid and reliable and to test the utility of the questionnaire in predicting jogging and non-exercising behaviors. After formulating a valid and reliable questionnaire, the HBM was successful in explaining

why some individuals jog and others do not. Results indicated that perceived barriers, perceived benefits of jogging, perceived severity of potential health problems, sex, age, complexity of jogging, and health motivation were significant predictors of exercise behavior. Perceived susceptibility, however, was found to be a weak predictor. Focusing on the finding that perceived barriers (e.g. lack of time, family or job responsibilities, unsuitable weather) are the best predictor of exercise behavior, health educators promoting exercise can help identify areas where individuals can incorporate exercise into their daily lives and decrease these barriers.

In another example, Sommers, Andres, and Price (1995) applied the Health Belief Model to study "mall walkers" and their motivation to exercise. Results showed that if the mall walkers were told specifically by their physicians to exercise, perception of susceptibility and severity of health problems were significant determinants of the exercise behavior. Fewer barriers and perception of more cues to walk in the mall were noted for those told by their physician to exercise. This suggests that physicians and knowledge of one's general health can impact attitudes toward exercising and increase the likelihood of exercising.

Even though the HBM has been found to be a valid model in addressing behavior change, the debate on expanding its use is ongoing. According to Rosenstock, Strecher, and Becker (1998), incorporating the component self-efficacy may account more fully for health-related behavior than the original formulation of the HBM. Self-efficacy, a component of Social-Cognitive Theory, refers to the belief in one's capability to organize and execute the courses of action required to produce attainments (Bandura 1997). Bandura explains that belief in oneself can influence the course of action people chose to

pursue, how much effort they put forth in a given endeavor, and how long they will persevere in the face of obstacles and failures. Self-efficacy can also affect their resilience to adversity, whether their thought patterns are self-hindering or self aiding, how much stress and depression they experience in coping with taxing environmental demands and the levels of accomplishments they realize.

Because one's lifestyle, habits, and environment largely determine physical health, self-efficacy may be incorporated into understanding health and exercise behavior. Past research shows that self-efficacy is a strong predictor of exercise behavior (Atkins, Kaplan, Timms, Reinsch, & Lofback, 1984; McAuley, 1992) and adherence to an exercise program (Desharnais, Boullion, & Godin, 1986; Rogers & Gauvin, 1998). For example, Calfas, Sallis, Oldenberg, and French (1997) applied self-efficacy in studying a physician-based assessment and counseling for exercise. Cognitive and specific behavior strategies were utilized through the various stages. The Cognitive intervention components included identifying benefits and considering becoming active, while the behavioral components included how to elicit social support, goal setting, and problem solving around barriers. The findings showed that the counseling increased physical activity in sedentary adults. Preliminary support was also found for increasing activity-specific social support and for self-efficacy influencing changes in physical activity.

Adherence to an exercise program was studied by McAuley (1992) through examining the role that perceptions play in personal efficacy. The study examined both general-exercise self-efficacy (perceptions of physical ability) and specific-exercise self-efficacy (perceptions of capability to overcome barriers to exercise) in predicting participants' levels of intensity and frequency of exercise participation. General self-

efficacy was found to be a significant predictor of intensity (measured by heart rate) in the early stages of the exercise program, and specific self-efficacy was a significant predictor of frequency (measured by attendance) of exercise participation. In terms of adoption and maintenance of an exercise program, McAuley (1992) found that self-efficacy was a significant predictor of adoption of an exercise program; however, for maintaining subsequent exercise behavior, exercise history was found to be the strongest predictor of participation. What this suggests is when faced with barriers in the early stages of adopting an exercise behavior, one's self-beliefs predict adherence to the behavior, while maintenance of the behavior is influenced by exercise becoming more of a habit and part of a routine. These findings were further supported by Oman and Duncan's (1995) research on exercise behavior, which found exercise history to be the most significant predictor of exercise behavior (Dishman, Sallis, & Orenstein, 1985).

Behavioral Practices in the United States

Behavioral Factors

Literature agrees that Americans do not participate in enough physical activity and some do not participate at all. These types of lifestyle choices begin to develop during childhood, and, according to the 1996 Surgeon General's Report, many children are not making the proper choices. Nearly 50% of children ages 12-21 are physically inactive (National Center for Chronic Disease Prevention and Health Promotion: Physical Activity and Health, 1999).

Sixty percent of U.S. adults are thought to be inactive or under active, while 25% do not participate in any physical activity, and the remaining 15% are the few Americans who exercise vigorously at least three times a week (Center for the Advancement of

Health, 1999). From the U.S. National Center for Chronic Disease Prevention and Health Promotion (2005), 51% of the males in the United States and 56% of females did not meet the recommended levels of physical activity. Recommended activity is physical activity at least 5 times/week and 30 minutes/time or vigorous physical activity for 20 minutes at a time at least 3 times/week.

To provide social support to bolster behavior change success, some interventions focus on interpersonal dynamics, working with pre-existing social units such as the family or peer groups, or creating new social units. A number of studies document the value of social support in implementing and maintaining behavior change (Janis, 1983). For example, a study of African American women regarding barriers to exercise participation found that a preference for social over individual regimens often kept subjects inactive (Kumanyika, Wilson, & Guilford-Davenport, 1993). Social behavior change strategies can provide models for healthy behaviors, feedback on progress, and encouragement in the face of challenge.

Participation in regular exercise among college students offers both physiological and psychological benefits. For example, adopting an exercise regimen has been associated with reductions in total cholesterol and low-density lipoprotein cholesterol among students with high cholesterol (Merrill & Friedrichs, 1990) and also leads to a decrease in anxiety and depression (Berger, Olson, & Boudreau, 1983), reduced test anxiety (Topp, 1989), and improved self-esteem (Trujillo, 1983). Surveys of college students' health habits, however, indicate that only about 35% of those reporting have a regular schedule of physical activity (Page, 1997), with a slightly higher proportion of men (40%) than of women (32%) reporting regular exercise.

Successful models in adult physical activity counseling have incorporated concepts from stages of change theory, social cognitive theory, and behavior modification techniques. These include identifying the patient's readiness to make a behavioral change, goal setting, creating contracts, addressing barriers, and enlisting social support. These concepts can easily be incorporated into brief clinical counseling interventions and can be adapted to a variety of health behaviors.

The key point is that a physical activity prescription is needed only for those patients who are ready to make a change. Youngsters who meet the recommended levels of activity should receive brief reinforcement about their healthy lifestyles and encouragement about continuing their activity. This approach is more satisfying for patients and physicians, is a much better use of valuable counseling minutes, and allows physicians to spend the most time with patients who are ready to make positive changes.

Physical activity obviously causes a positive effect on a person's health. Exercise helps to reduce the risks of each of the chronic diseases mentioned above by up to 40% (National Center for Chronic Disease Prevention and Health Promotion: Factors contributing to Obesity, 1999). Physical activity does not have to be strenuous in order to be effective (Anderssen et al.1996). Physical activity helps build and maintain strong bones, helps to control weight, builds muscle, reduces fat, and it may reduce pain from arthritis (*American Heart Association,* 2002). In addition, physical activity significantly delays the onset of functional impairment and loss of autonomy in the elderly population (Miller et al., 2002).

Regular physical activity is positively associated with psychological as well as physiological health benefits. The results of physical activity certainly increase a person's

overall well-being. Some of the psychological benefits that are attributed to activity are: enhanced mental performance and concentration, improved self-image, feelings of confidence, greater sleep quality, and a reduction in perceived feelings of anger, time urgency, and time pressure.

Physical Activity

Many people across the United States know the importance of physical activity in their daily routines, but less than half of Americans actually do anything about it. Physical inactivity is a growing problem in our country today. Low participation rates in physical activity are largely due to perceived lack of time and the belief that one must engage in vigorous, continuous exercise (Lee and Owen, 1985). Scientific evidence, however, demonstrates that regular, moderate-intensity physical exercise provides substantial health benefits, and also that intermittent activity confers substantial benefits (Paffenbarger & Hyde, 1988). It is critically important, therefore, that programs geared toward increasing physical fitness to improve health emphasize not only high-intensity aerobic exercise (3 x 20), but also how to accumulate 30 minutes of moderate-intensity activities on most days of the week (Bouchard, Shephard, & Stephens, 1994).

The primary objective in applying a stage of change approach to exercise behavior is to understand the process of behavior change so that more successful programs can be developed to help people begin and continue to be active. When applied to exercise, the stages of change approach would posit that exercise participation would vary among individuals in various stages (e.g., precontemplation/contemplation). The model would predict that greater participation in physical activity would be reported among individuals in action/maintenance than those in preparation and that more activity

would be reported by individuals in preparation than by those in precontemplation/contemplation. The model would also predict that there would be no significant differences in time spent in physical activity between individuals in precontemplation and those in contemplation and, similarly, between those in action and maintenance (Marcus & Simkin, 1993). The model has been applied to examining physical activity in the worksite (Marcus & Owen, 1992) and community samples (Marcus & Banspach, 1992). Interventions matched to an individual's stage of readiness that have been applied to worksite and community samples have been shown to be superior to standard interventions for exercise promotion (Marcus, Emmons, Sirekin, et al, 1993).

College Physical Activity

The health benefits of physical activity are widely promoted in the lay and scientific communities, as well as by the Surgeon General, yet there has been little published evidence in support of college age students being physically active. Recent population surveys indicate that half the population believes that physical activity can contribute to "feeling better mentally." These perceptions are even more accentuated for women, older persons, and successful exercise adherers. Studies of girls 12-17 years of age report that girls derive positive self-esteem from physical activity through approval of others and that girls who are physically active in sports are more confident, feel better about their appearance and weight, and have enhanced self-esteem.

A study was used to conduct a prospective 8-year follow-up study of depressive symptomoatology and physical activity. The results showed that in white women little or no recreational physical activity was an independent predictor of depressive symptoms.

Another study indicates that female former college athletes, in comparison with non-athletes, have a lower risk of physician-diagnosed depression in early middle age and into the older years. The athletes also report more favorable self-ratings of current symptoms of psychiatric distress. The results are in accord with the conclusion of the Surgeon General's report on Physical Activity and Heath that "physical activity appears to relieve symptoms of depression and anxiety and improve mood." The Surgeon General's report also concludes, "regular physical activity may reduce the risk of developing depression, although further research is needed on this topic". These findings show that there is a positive association between women's early physical activity and the risk of depression in later life, although the mechanism is not known (Wyshak, 2001).

Nutritional Behaviors

Eating disorders are a common problem among college students as well. Having a false sense of body image and having a preoccupation with weight management can lead to eating-related problems. Colleges and universities are incorporating eating disorder prevention programs to help educate the students on eating related issues, but the concern of reaching students with a wider variety of eating disorders is at hand. Schwitzer, Bergholz, Dore, and Salimi (1998) performed a study assessing the use of the Eating Disorder Not Otherwise Specified (NOS) tool, which is used to identify a wider variety of eating concerns on a college campus. Eating Disorders NOS provides criteria to health professionals for making mental health diagnoses (Schwitzer, Bergholz, Dore, & Salimi, 1998).

These criteria allowed the health professionals to categorize the patients who do not fit the strict definitions of having an eating disorder. Some patients may fit the

general guidelines for having a mental disorder, but they do not fit the guidelines for having specific physical symptoms of an eating disorder. There may be clear evidence that the patient needs help, and using the Eating Disorder NOS will help categorize the patients so that they receive the proper intervention. The researchers stated that there is a large variation of eating disorders on college campuses, and they may be overlooked because the eating disorders do not follow the general guidelines of diagnosis (Schwitzer et al., 1998). After the patient is diagnosed, the proper intervention plan is necessary.

Prevention strategies for eating disorders included educational information, attitude identification and promotion of healthier behaviors and lifestyle (Schwitzer et al., 1998; Springer, Winzelberg, Perkins, & Taylor, 1999). Springer et al. (1999) studied the influence of a body image course administered at the undergraduate level to see if the perceptions of body image where changed. Topics offered in the course ranged from the media's influence on body image to risk factors and consequences of eating disorders. Body image and eating attitudes were assessed in the current study. Baseline data of attitudes was acquired at the beginning of the course and once again at the end of the course.

The treatment sample attained from the course was compared to a control group, which was comprised of students participating in a different body image intervention at the same time as the course was being offered. The researchers found that there were significant improvements in the self-reported attitudes of body image and eating behaviors ($p < 0.04$), but there was no significant relationship between body mass index and changes in body image and eating behaviors. The researchers felt that the use of applying impersonal analysis of eating disorder issues to their personal lives in

homework assignments and the use of participation through group discussion and journaling may have played an important role in the significant change in body image and eating behavior. Overall, Springer et al. (1999) found that an educational format in an eating disorder prevention program may help reduce risk factors for the development of eating disorders in college students.

Alcohol Use and Abuse

Students are bound to experiment with their lifestyles while they are in college. One form of experimentation is drinking alcohol. Some students try it, do not like it, and then do not drink again. Some try it and like it, but only drink occasionally. Others try drinking alcohol and like it so much or like how it makes them feel or act and decide to binge drink on a regular basis. Binge drinking is defined for men as consuming five or more drinks in a row within a two-week period and for women as consuming four or more drinks in a row within a two-week period (Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994).

Ziemelis, Bucknam, and Elfessi (2002) performed a study addressing the prevention efforts aimed at binge drinking on college campuses. The researchers sampled from colleges and universities who received Funds for the Improvement of Post-Secondary Education (FIPSE) grants, which are used for drug-prevention programs, to see if the programs were indicating any changes in binge drinking among the students. Out of the 94 institutions sampled, 34 had an increase in binge drinking behaviors, while the other 60 had a decrease. Twenty-four prevention effort variables were identified to significantly decrease binge drinking among the students. Of these 24 variables, eight had the greatest decrease. These eight variables included: "(1) student participation and

involvement in prevention activities, (2) changing campus social/cultural environment using informational and educational processes, (3) student participation and involvement in program development and operation, (4) curriculum infusion, (5) student participation and involvement in volunteerism, (6) policy enforcement, (7) changing campus physical/regulatory environment, and (8) summative evaluation (Ziemelis, Bucknam, & Elfessi, 2002). These eight variables accounted for 78.77% of the variance explained in binge drinking among the students (Ziemelis et al., 2002).

Ziemelis et al. (2002) also used the previous eight variables to predict the change in binge drinking. They found that the entire regression model, using all eight variables, significantly predicted the change in binge drinking ($p = .038$). Overall, Ziemelis et al (2002) found that encouraging participation and involvement among the students in the prevention program and its development and operation, along with using informational and educational techniques to provide the prevention material, may significantly decrease binge drinking among college students

Another important factor in decreasing binge drinking among college students is changing the students' perception of the norm regarding drinking among college students. Haines and Spear (1996) performed a study looking at the effect of incorporating into the curriculum a strategy to teach the participants how to change their perception of the norm. The researchers compared a traditional binge drinking prevention program, using media campaigns, policies, and awareness events, to a program aimed at changing the perceptions of the norm among the participants. The study of the two types of programs was conducted over a five-year period. The first year was used to collect data related to the current perceptions of students drinking alcohol. The traditional program was

implemented the second year and the new changing perception program was implemented the third, fourth, and fifth years. The results of the study indicated that during the traditional program, 69.3% of the sample continued to believe that binge drinking was a norm of college students. After the implementation of the changing perception program, 57% of the sample believed that binge drinking was a norm of college students. This difference remained constant over the three years the new program was studied. The study also showed that significantly fewer students self-reported binge drinking during the years the perception change program was implemented than the students who were surveyed during the tradition program (1990: $p < 0.01$; 1991: $p < 0.01$; 1992: $p < 0.001$). Overall, Haines and Spears (1996) showed that students tend to overestimate the amount of students who binge drink. Including a perception of the norm strategy in a prevention program can have an influence on the perception of the norm of the students on the college campus and can influence the engagement of binge drinking among the college students.

Personal Costs

Even the financial well-being of individuals may be associated with their weight. Researchers analyzed data from the University of Michigan Health and Retirement Study on more than 7,000 men and women between the ages of 57 and 67 and found that heavier women had significantly smaller individual net worth, even after controlling for health, marital status and other demographic factors. The association between obesity and the net worth of the men was smaller and not statistically significant.

Environmental (Enabling, and Reinforcing) Factors

The increase in sedentary lifestyles is not only a matter of individual choice it is also largely a function of an environment that promotes physical inactivity. Many people make decisions about physical activity based on their environment. Daily enrollment in physical education classes among high school students has decreased significantly. It has declined from 42% in 1991 to a mere 29% in 1999 (American Heart Association, 2002). Another environmental factor is the presence of television; this factor greatly affects college-aged adults, males more so than females. The average male college-student watches television, plays video games, or plays on the computer for approximately 3-5 hours per day (Suminski, Petosa, Utter & Zhang, 2002). Students in this age group often spend much of their time sitting, whether it be in class or at home studying, and this is all time that cuts into time that physical activity could be taking place. The excuse used by 21% of the college students surveyed was that they didn't have enough time to participate in physical activities (Suminski et al., 2002).

Many people have careers that do not allow for physical activity during the day, which leads to an increased amount of sedentary behavior. One more factor is the community and how it affects activity levels. If the streets people live on are not safe or are not well kept, people are more likely to drive places than walk (National Center for Chronic Disease Prevention and Health Promotion: Factors Contributing to Obesity, 1999).

Since rates of physical activity among college students are relatively low, and levels of college activity have been linked to levels of adult physical activity, this population is an important population in which to conduct physical activity interventions.

Few studies have investigated correlates of physical activity in a college population. Of those that have, it seems that self-regulation, social support, exercise enjoyment, and self-efficacy are more consistently related to physical activity. Outcome expectations and expectancies, as well as attitude, benefits versus barriers, and motivation all are potentially promising variables to focus on in developing interventions for this population.

CHAPTER 3: RESEARCH QUESTIONS

This chapter is divided into four sections: research questions, methods, assessments, and instrument validity and reliability. The research questions introduce the problems to be addressed. The methods section explains who the subjects were and the type of study design used. Also in the methods section, the pre-test, intervention, and post-test methods are explained. Analysis of Variance (ANOVA) was used for the statistical analysis of the data. Effect size and means comparison was the last part of the methods section. The assessment section explains the types of variables used in the study. The research questions consisted of the following:

1. When introducing an intervention such as a health and wellness course (EX 145), what is the likelihood that a student would change his or her behavior to reflect a healthy lifestyle?
2. Which gender is more likely to change behavior to reflect a healthy lifestyle?
3. Of the three variables: physical activity, nutritional choices, or substance abuse; which will have the greatest behavioral change due to the class as an intervention?
4. Do ethnicity and a person's personal history influence the degree of behavior change?

Methods

Subjects

Subjects consisted of college age men and women of all races and ethnic background enrolled in Colorado State University's Health and Wellness course (EXCC145). See Appendix B-course syllabus. The syllabus describes the course outline and course objectives for the semester. Using students in this course provided the best cross-sectional sample of students from the University. In order to graduate, all Colorado State University students are required to take a certain number of credits from a core curriculum. Each baccalaureate Program of Study must incorporate foundations of knowledge and understanding intellectual perspectives from these core classes. Courses in this category of the Core are designed to bring the skills developed in Core Competencies to life and give them direction and purpose. One of those core objectives was from the Health and Wellness area. The objective of the Health and Wellness requirement is to identify those socioeconomic, environmental, physiological, and behavioral factors that affect the health and well-being of humans and to obtain critical information necessary to make informed choices about health and wellness issues (Colorado State University Catalog, 2004). One of those courses which students can take is EX 145.

Each class size consisted of approximately 150 students. Class content includes topics such as leading a physically active lifestyle, making proper nutritional choices, and safe lifestyle choices. Students of all ages were accepted into the study. The true sample size is unknown since this study consisted of a test and a retest using the Personal Wellness Profile for the class, and a number of students are expected to drop the class for

a variety of reasons. Also, the sample size continued to grow since the test was administered to several EX 145 classes both in the fall and spring semesters. Each student in the class was expected to complete the pre-test and the post-test survey. The data used in this study were from students who completely filled out the survey, at the beginning and the end of the semester. The testing was conducted over a three year period to gain a better sample size. Subjects self-reported all pertinent vital statistics pertaining to their family histories, personal histories, and medical histories. They answered questions about their heights and weights to calculate their BMIs. Physical activity levels were also assessed within the questionnaire and used in the statistics. Some of the potential biases that potentially arose were personal medical conditions such as CVD, CHD, diabetes, and cancer. Rare possibilities were breathing problems and reproductive complications. These confounders were controlled using various statistical analyses.

Study Design

On the first day of class, there was a short explanation of the study and why it was necessary to do this study. As a requirement of the class, each student filled out the Personal Wellness Profile (PWP). This needed to be done on the first day of each class at the beginning of each semester. In doing so, the potential subjects were not influenced by the intervention before the study started. Each PWP was encoded with a number, and no names were recorded to ensure confidentiality. The possible risks of the study were explained to the class prior to obtaining written consent.

Pretest

A pretest of the PWP was administered to the subjects who gave permission to participate in the study. A number was assigned to each PWP completed and handed in

the first day of class. This ensured confidentiality. Self-reported body height and weight was taken and later use to calculate BMI levels. Each subject's level of physical activity was also self-reported. This was entered into SPSS and analyzed to determine how much and the different levels of physical activity for each class and in each semester.

Intervention

The intervention consisted of the EX 145 course. In the course, the students were exposed to different topics of healthy lifestyle choices. At the end of the course, each student (and potential subject) should be able to explain the multiple dimensions of health and wellness. Also, they should be able to analyze current personal and societal attitudes/beliefs regarding important health issues. Once finished with the course, students will have the tools to be able to develop a sense of personal responsibility for their current health status and to understand that health is an expansive field with many domains.

Posttest

A second PWP was administered to the class at the end of the semester. A semester consisted of sixteen weeks (including finals week), with each class meeting two or three times per week. Again, self-reported data was taken to determine the three variables used in the study. This was summarized and compared to the pretest data. Self-reported physical activity levels was taken and compared to pretest data.

Measurement and Procedures

All procedures were performed on the campus of Colorado State University, Fort Collins, Colorado. The PWP was administered during the first and last day of course at

the beginning and end of each semester. All interventions were performed in the EX 145 course.

Analysis of Variance

The following are assumptions of ANOVA: level of measurement of the dependent variable must be interval or ratio, observations are independent, there is a normal distribution of scores for the dependent variable, homogeneity of variance, and homogeneity of covariance (Keppel, 1991; Pallant, 2001; Stevens, 1986). The levels of measurement of the dependent variables were continuous and were at least of interval level (theoretical variables in the process evaluation and physical activity in the impact evaluation). Random sampling was not used. This is a common occurrence in behavioral studies, as random assignment is not always possible (Stevens, 1986). Observations between groups were independent. Groups consisted of students in different courses. There were only a few students who provided more than one set of data. The first data set was used, and the second was thrown out. This occurred in two cases, and it occurred over two quarters. There were no students who took more than one of the involved courses in the same semester. Violation of the normal distribution assumption is typically not an issue with large enough sample sizes (Gravetter & Wallnau, 2000). An ANOVA is typically a relatively robust statistical test, and it should not be greatly affected by violation of this assumption (Gravetter & Wallnau, 2000; Pallant, 2001; Stevens, 1986).

Homogeneity of variance was assessed through the Levene test. If this test were significant at alpha = .05, then one might make alpha more conservative for interpreting the significance between groups. However, since alpha is already conservative (.05), and the sample size is small, this would greatly increase the risk of a type II error.

Another part of this study was to test whether or not there was a difference in theoretical variables between groups at the two time periods. The technique used to analyze the data was a mixed between-within subjects ANOVA. This is an extension of the repeated measures ANOVA. In a repeated-measure ANOVA, one group is tested multiple times. Thus, a mixed between (groups) - within (time) subjects ANOVA was the correct test to use. The independent variables for this analysis are time and group. The dependent variables are the variable scores. Only subjects providing complete data at both data collection points are included in Chapter 4.

Effect Size

Reporting effect sizes has three important benefits. First, reporting effects facilitates subsequent meta-analyses incorporating a given report. Second, effect size reporting creates a literature in which subsequent researchers can more easily formulate more specific study expectations by integrating the effects reported in related prior studies. Third, and perhaps most importantly, interpreting the effect sizes in a given study facilitates the evaluation of how a study's results fits into existing literature, the explicit assessment of how similar or dissimilar results are across related studies, and potentially informs judgment regarding what study features contributed to similarities or differences in effects (Tabachnick & Fidell, 1989).

The t-test

This is a statistical test to compare the sample population and determine if there is a significant difference between their means. The result of the t-test is a 't' value; this value is then used to determine the p-value.

The p-value is the probability that 't' falls into a certain range. In other words this is the value used to determine if the difference between the means in the sample population is significant. For the purpose of this study, a p-value ≤ 0.05 suggests a significant difference between the means of the sample population and the null hypothesis would be rejected. A p-value > 0.05 suggests no significant difference between the means of the sample population and the null hypothesis would not be rejected. However, effect size were run on all $t < .10$ (Coe, 2000).

Assessments

Physical Activity Assessment

Within the PWP, subjects were asked their levels of physical activity. *Aerobic exercise* was defined as aerobic exercise of at least 20-30 minutes duration such as cycling, swimming, aerobic dance, brisk walking, etc. It was rated from no regular exercise to five or more times per week. This had five levels of measurement. *Strength exercise* was defined as using weight training equipment and was rated from seldom to three or more times per week. Strength exercise had three levels of measurement. *Weight Satisfaction* was defined as about right, overweight-trim down, overweight-no change, underweight, and unknown. There were five levels of measurement. *Exercise level* was defined as the level of physical activity in the subject's exercise program. There were four levels of measurement: easy, moderate, vigorous, and not able (see appendix A).

Nutritional Assessment

When asked about their knowledge of nutritional choices, the measurement asked how often they ate breakfast. The answers consisted of: everyday, almost everyday, sometimes, rarely, unknown or never. The survey also measured the number of servings

of fruits and vegetables they ate each day. This consisted of answers from one, two, three, four, or none. Eating regularly will help the body's metabolic rate remain consistent and burn fuel (in the form of foods) to help maintain energy throughout the day. Eating several servings of fruits and vegetables can help stave off potential health problems. Also measured was the frequency in which they ate at fast food restaurants. The answers ranged from everyday, several/week, few times/month, seldom/never, unknown (see appendix A).

Drug and Alcohol Assessment

Drugs and alcohol use were analyzed the same way. Each participant was asked if he or she had ever used illicit drugs for recreational use. Answers consisted of frequently (every week), sometimes (monthly), rarely (few times per year), and never. The participants then answered how many alcoholic drinks they had in the past two weeks. The answers ranged from: did not drink in the past year, none in the past two weeks, one drink, two drinks, three to four drinks, to five or more drinks. Potential difficulties may exist with this variable. The participants may have under-reported or over-reported their drug and alcohol usage. This was controlled for by stressing to the participants that this survey was completely confidential and the answers they gave would not be reported to anyone (see appendix A).

Statistical Analysis

The three predictors that were used to specify whether the subjects made good choices or poor choices were: the amount of physical activity they incorporated into their daily routine, proper nutritional choices at each meal, and how frequently were drugs and alcohol used or abused.

Instrument Validity and Reliability

According to Gliner and Morgan (2000), establishment of construct validity is a complex task. The constructs measured in the survey were the predicted behaviors. Since few similar behavioral surveys of physical activity, nutritional choices, and drug and alcohol use existed in the literature review, convergent evidence with another scale was not possible.

Potential Difficulties and Limitations

As described in chapter one, one challenge in this study is the use of self-reported data. Inaccuracies may occur because subjects do not know their family histories or because they do not know their own medical histories due to infrequent visits to the doctor. Because of this recall bias may exist when answering certain medical questions on the PWP.

CHAPTER 4: RESULTS

Introduction

The purpose of the study was to measure the effectiveness of a health and wellness course designed for college students to increase their knowledge and use of self-regulation strategies. The study was designed using a pre-test, intervention, and a post-test for a required class in Health and Wellness.

This chapter is divided into four sections: an explanation of the sample population, frequencies, results of group comparisons, and pre-test/post-test main effects. In the sample section, the sample demographics are discussed. The frequencies section presents the means and standard deviations of the three variables presented in Chapter 3. In the results of group comparisons, analysis of variance and main effects are reported. When p was $<.05$, main effects were calculated. The pre-test/post-test main effects section reports the changes in means from the pre-test to the post-test.

Sample Population

The sample consisted of 466 students who took EX 145. The instrument was administered during the fall and spring semester of 2001-2002, 2002-2003, and 2003-2004. There were 164 males, 245 females, and 57 unknown or not reporting their gender.

Table 4.1

Gender

N[1]	*Male*	*Female*
409	164	245

[1] 57 Respondents did not state their gender

Four hundred and twenty nine students reported their age with 45 unknown or not reporting their age. The mean reported age was 19.30 years with a standard deviation of 2.7 years (Table 4.2). There were 397 Caucasians, 37 Hispanics, 9 African Americans, 6 Asians, 3 Native Americans, 6 others, and 8 unknowns (Table 4.3).

Table 4.2

Mean and Standard Deviation of Age

	N[1]	*Mean*	*SD*
Age	429	19.3	2.7

[1] 45 Respondents did not state their age

Table 4.3

Ethnicity

	N[1]	*%*
Caucasian	397	85.2
African American	9	1.9
Asian	6	1.3
Hispanic	37	7.9
Native American	3	0.6
Other	8	1.7
Unknown	6	1.3

[1] 8 Respondents did not state their ethnicity

There was a high attrition rate between the two data collection periods. At pretest, 466 students began the study. Of those 466, only 322 provided useable post-test data. The study participants who did not complete a significant part of the instrument were excluded from the study. At the end of the semester, 251 students completed both the pre- and post-test. Of those 251, only 233 students provided complete data. Seventy-one students did not complete the post-test, either because they dropped the course after taking the pre-test, or because they did not attend class on the day the post-test was given.

If students did not show-up on the assigned class day, they did not have an opportunity to take the post-test. In other words, if students missed class on the assigned day, there were no more class sessions to meet with them to complete the survey. Due to the lack of completed instruments and the attrition of students, only 72% of the initial population was retained in the study.

Body Measurements

Weight and Body Mass Index (BMI) data were also gathered in this study. Neither of these variables was meant to be a dependent variable in the study. In other words, it was not the purpose of the intervention to attempt to increase or decrease BMI in sixteen weeks. Table 4.4 displays the mean and standard deviations for weight. In Table 4.5, the mean and standard deviations of BMI is displayed. BMI is determined by your weight in kg divided by your (height in meters)^2 (Fleck and Kraemer, 1997). It is designed for men and women over the age of 18. A healthy BMI is between 20 and 25. A result below 20 indicates that a person may be underweight; a figure above 25 indicates that you may be overweight. Of the students reporting their weight, the mean weight was

148.88lbs with a standard deviation of 30.05. The mean BMI was 23.13 with a standard deviation of 3.88.

Table 4.4

Mean and Standard Deviation of Weight

	N[1]	*Mean*[2]	*SD*
Weight	426	148.88	30.05

[1] 48 Respondents did not state their weight
[2] Measured in pounds

Table 4.5

Mean and Standard Deviation of BMI

	N[1]	*Mean*	*SD*
BMI	426	23.13	3.88

[1] 48 Respondents did not report their weight in order to calculate their BMI

The sample sizes are different from the overall follow-up sample size because some students did not wish to list their weight. BMI could not be calculated for these subjects. According to the American College of Sports Medicine, the majority of the students who did report weight would be classified as normal weight, although on the higher end of the normal range (ACSM, 2000).

Frequency of Healthy Behaviors

Physical Activity by Group

Although means and standard deviations for physical activity are presented in the next section, it is important to understand how many subjects were considered to be meeting current physical activity guidelines. As mentioned in chapter two, the current

vigorous physical activity guideline is three days per week. For moderate activity, the recommendation is at least five days of activity per week.

Aerobic Activity

At pre-test, 18% reported no regular aerobic activity during the week, while the largest percentage of students (37%) reported doing at least three to fours days of some form of aerobic activity during the week (Table 4.6). In post-test measurements, the percentage of students doing no aerobic activity declined (10.8%) and the percentage of students doing three to four days actually declined also to 33% but stilled remained the largest group of those doing some form of aerobic activity (Table 4.7).

Table 4.6

Aerobic Activity (pre-test)

	Frequency[1]	*Percent*[2]
No regular exercise	84	18.0
1x/week	35	7.5
2x/week	69	14.8
3-4x/week	172	36.9
5+x/week	106	22.7

[1] 8 Respondents did not state their aerobic activity
[2] Respondents not answering all the questions will not necessarily add up to 100%

Table 4.7

Aerobic Activity (post-test)

	Frequency[1]	*Percent*[2]
No regular exercise	41	10.8
1x/week	58	15.3
2x/week	92	24.3
3-4x/week	127	33.5
5+x/week	61	16.1

[1] 95 Respondents did not state their aerobic activity
[2] Respondents not answering all the questions will not necessarily add up to 100%

In Table 4.8 and Table 4.9, aerobic activity was measured for both pre-test and post-test activity in gender participation. Of the 195 males responding to the pre-test, 42.2% reported they participated in at least one day of aerobic activity per week. Sixty-one percent of females in the pre-test reported participating in at least one day of aerobic activity per week.

Table 4.8

Aerobic Activity of Gender (pre-test)

	N	% Participating in Aerobic Activity	% Not Participating in Aerobic Activity
Males	195	42.2	57.8
Females	271	61.9	38.1

Of the 156 males responding to the post-test, 43.5% indicated they were participating in at least one day of aerobic activity per week. Of the 223 females responding to the post-test, 62.1% indicated they were participating in at least one day of aerobic activity per

week. There was a slight increase in the percentage of participation by both genders from pre-test to post-test.

Table 4.9

Aerobic Activity of Gender (post-test)

	N	% Participating in Aerobic Activity	% Not Participating in Aerobic Activity
Males	156	43.5	56.5
Females	223	62.1	37.9

Pre-test and post-test data in Table 4.10 and Table 4.11 measured the percentage of participation in aerobic activity for ethnic groups. Of the 397 Caucasians responding to the pre-test, 61.9% indicated they were involved in aerobic activity at least one time per week. A little over 40% of the African Americans were participating in aerobic activity once a week according to the pre-test and 51.2% of the Asian students were engaged in aerobic activity weekly. Other ethic groups' participation in aerobic activity is described below.

Table 4.10

Aerobic Activity of Ethnic Groups (pre-test)

	N	% Participating in Aerobic Activity	% Not Participating in Aerobic Activity
Caucasian	397	61.9	38.1
African-American	9	40.3	59.7
Asian	6	51.2	48.8
Hispanic	37	30.1	69.9
Native American	3	33.0	67.0
Other	8	50.0	50.0

The post-test data showed 59.3 of the 397 Caucasian participants were participating in aerobic activity at least once a week. Of the nine African American students, 40.1% were participating in aerobic activity at least once a week according to the post-test. Other ethnic groups' participation in aerobic activity at post-test time is seen below. The percentage of participants involved in aerobic activity at least once a week decreased in all groups.

Table 4.11

Aerobic Activity of Ethnic Groups (post-test)

	N	% Participating in Aerobic Activity	% Not Participating in Aerobic Activity
Caucasian	397	59.3	40.7
African-American	9	40.1	59.9
Asian	6	49.2	50.8
Hispanic	37	29.8	70.2
Native American	3	32.4	67.6
Other	8	45.2	54.8

Strength Training

Strength training was also measured at the beginning of the semester and at the end. Of the students reporting during the pre-test, 28 % reported seldom doing workouts, another 28% reported doing one to two days of strength training, and 44 % of the students were doing three or more days of strength training workouts (Table 4.12). In the post-test data, of the students reporting, there were no significant percentage changes in all three measurements to report (Table 4.13). According to the Centers for Disease and Control, people who participate in some form of strength training activity at least 3x per

week are less likely to develop certain bone degenerative conditions (Centers for Disease and Control, 2003).

Table 4.12

Strength Training (pre-test)

	Frequency[1]	*Percent*[2]
Seldom	129	27.7
1-2x/week	131	28.1
3+/week	206	44.2

[1] 8 Respondents did not state their strength training activity
[2] Respondents not answering all the questions will not necessarily add up to 100%

Table 4.13

Strength Training (post-test)

	Frequency[1]	*Percent*[2]
Seldom	72	26.9
1-2x/week	86	32.1
3+/week	110	41.0

[1] 206 Respondents did not state their strength training activity
[2] Respondents not answering all the questions will not necessarily add up to 100%

Table 4.14 and Table 4.15 show pre-test and post-test participation by gender in strength training activity. Of the 195 males responding to the pre-test, 70.2% indicated they were involved in strength training at least twice a week. Of the 271 females responding, 61.4 indicated they were involved in strength training at least twice a week.

Table 4.14

Strength Training of Gender (pre-test)

	N	% Participating in Strength Training	% Not Participating in Strength Training
Males	195	70.2	29.8
Females	271	61.4	38.6

The post test indicated that of the 156 males responding, 69.2% were participating in strength training at least twice a week. Of the 223 females responding to the post-test, 46.5 indicated they were participating in strength training twice weekly. There was a decrease in the percent participating in strength training from the pre-test to the post-test by both genders.

Table 4.15

Strength Training of Gender (post-test)

	N	% Participating in Strength Training	% Not Participating in Strength Training
Males	156	69.2	30.8
Females	223	46.5	53.5

Participants, sorted by ethnic groups, self-reported in both pre-test and post-test their participation in strength training activity. Tables 4.16 and 4.17 show the results. Of the 397 Caucasian students taking the pre-test, 62.3% indicated they were involved in strength training at least twice a week. The other ethnic groups are represented in Table 4.16.

Table 4.16

Strength Training of Ethnic Groups (pre-test)

	N	% Participating in Strength Training	% Not Participating in Strength Training
Caucasian	397	62.3	37.7
African-American	9	45.2	54.8
Asian	6	45.2	45.2
Hispanic	37	45.0	55.0
Native American	3	33.0	67.0
Other	8	80.0	20.0

In the post-test, 59.1% of the Caucasians were participating in strength training at least twice a week. Of the African Americans, 80.1% were participating in strength training at least twice a week. The other ethnic groups' responses to the post-test are represented in Table 4.17. African American and Asian students showed an increase in the percent participating in strength training at least twice a week.

Table 4.17

Strength Training of Ethnic Groups (post-test)

	N	% Participating in Strength Training	% Not Participating in Strength Training
Caucasian	397	59.1	40.9
African-American	9	80.1	19.9
Asian	6	50.0	50.0
Hispanic	37	25.5	74.5
Native American	3	00.0	100.0
Other	8	60.0	40.0

Exercise Levels

Participants were asked to rate their exercise levels. At pre-test, 16% of those reporting said their exercise levels were easy. Also at pre-test, participants indicating they had moderate and vigorous activity levels were the two largest reporting groups with a combined 82.8% (Table 4.18). Exercise levels for post-test respondents for each of the categories remained unchanged (Table 4.19).

Table 4.18

Exercise Levels (pre-test)

	Frequency[1]	*Percent*[2]
Easy	76	16.3
Moderate	195	41.8
Vigorous	191	41.0
Not Able	4	.9

[1] 8 Respondents did not state their exercise levels
[2] Respondents not answering all the questions will not necessarily add up to 100%

Table 4.19

Exercise Levels (post-test)

	Frequency[1]	*Percent*[2]
Easy	40	14.9
Moderate	115	42.9
Vigorous	111	41.4
Not Able	2	.7

[1] 206 Respondents did not state their exercise levels
[2] Respondents not answering all the questions will not necessarily add up to 100%

Exercise Levels were measured for both genders. The results are in Table 4.20 and 4.21.

Table 4.20

Exercise Levels for Gender (pre-test)

	Males %	Females %
Easy	30	35
Moderate	43	40
Vigorous	20	20
Not Able	7	5

Though a slight decrease in exercise levels (Table 4.21) was reported, moderate exercise was still the level most participants ranked as their level of exercise. The decrease in exercise levels was not significant.

Table 4.21

Exercise Levels for Gender (post-test)

	Males %	Females %
Easy	35	35
Moderate	40	39
Vigorous	20	16
Not Able	5	10

Exercise levels by ethnic groups were assessed for both pre-test and post-test measurements. Results are shown in Table 4.22 and 4.23. Thirty percent of Caucasians responding to the pre-test reported they exercised at an easy level. Forty-five percent responded they exercised at a moderate level, with 25% exercising at a vigorous level. Three percent of Caucasians responded that they were not able to exercise at all. Other ethnic groups' responses on the pre-test to their level of exercise are tabulated in Table 4.22.

Table 4.22

Exercise Levels for Ethnic Groups (pre-test)

	Caucasians %	African American %	Asian %	Hispanic %	Native American %	Other %
Easy	30	45	100	30	100	50
Moderate	45	50	0	65	0	50
Vigorous	22	0	0	0	0	0
Not Able	3	5	0	5	0	0

In the post-test, 31% of Caucasians responded on the pre-test that they exercised at an easy level. Forty-four percent responded that they exercised at a moderate level, with 25% exercising at a vigorous level. Three percent of Caucasians responded that they were not able to exercise at all. Other ethnic groups' responses on the post-test to their level of exercise are described in Table 4.23.

Table 4.23

Exercise Levels for Ethnic Groups (post-test)

	Caucasians %	African American %	Asian %	Hispanic %	Native American %	Other %
Easy	31	45	100	30	100	50
Moderate	44	45	0	65	0	50
Vigorous	22	0	0	0	0	0
Not Able	3	10	0	5	0	0

Fruit and Vegetable Intake by Group

Fruits and vegetables are packed with essential vitamins, minerals, fiber, and disease-fighting phytochemicals. Because of this, eating plenty of fruits and vegetables everyday can help reduce the risk of heart disease, high blood pressure, type II diabetes, and certain cancers. Eating five or more servings of fruits and vegetables a day is recommended for healthier living.

Of the students who reported eating fruits and vegetables daily, 17% of the pre-test students reported eating more than 4 servings of fruits and vegetables (Table 4.24). There was little change in the post-test data (16.8%). In the pre-test, 33.5 % of the students reported eating a fast food meal 4+ days per week. Post-test data showed a decrease in the percentage of students eating a fast food meal (Table 4.25).

Table 4.24

Fruits and Vegetables Consumed Daily (pre-test)

	Frequency[1]	*Percent*[2]
5+/day	30	6.5
4/day	50	10.8
3/day	118	25.5
2/day	151	32.7
1 or less/day	113	24.5

[1] 4 Respondents did not state their fruits and vegetable intake
[2] Respondents not answering all the questions will not necessarily add up to 100%

Table 4.25

Fruits and Vegetables Consumed Daily (post-test)

	Frequency	*Percent*[2]
5+/day	16	6.0
4/day	29	10.8
3/day	64	23.9
2/day	92	34.3
1 or less/day	67	25.0

[1] 206 Respondents did not state their fruits and vegetable intake
[2] Respondents not answering all the questions will not necessarily add up to 100%

Tables 4.26 and 4.27 show the fruits and vegetables consumed daily for both genders. Of the 195 males responding to the pre-test, 20% responded that they consumed at least five servings of fruits and vegetables per day. Of the 271 females responding to the pre-test, 30% indicated that they ate at least five servings of fruits and vegetables per day.

Table 4.26

Fruits and Vegetables Consumed Daily by Gender (pre-test)

	N	% 5/day	% Not Consuming 5/day
Males	195	20.0	80.0
Females	271	30.0	70.0

In the post-test, 22% of the 156 males responding indicated that they ate at least five servings of fruit and vegetables per day while 31% of females responding indicated that they consumed at least five servings of fruits and vegetables per day. This was a slight increase in the percentage consuming five fruits and vegetables per day for both genders.

Table 4.27

Fruits and Vegetables Consumed Daily by Gender (post-test)

	N	% 5/day	% Not Consuming 5/day
Males	156	22.0	78.0
Females	223	31.0	69.0

Tables 4.28 and 4.29 shows the fruit and vegetable consumption by ethnic groups who reported their daily intakes. Of the 397 Caucasians responding to the pre-test, 23% indicated that they ate at least five servings of fruits and vegetables per day. A little over 21% of the African Americans consumed at least five servings of fruits and vegetables a

day and 60% of the Asian students ate at least five servings of fruits and vegetables per day. Other ethnic groups' daily consumption of fruits and vegetables is described below.

Table 4.28

Fruits and Vegetables Consumed Daily by Ethnic Groups (pre-test)

	N	% 5/day	% Not Consuming 5/day
Caucasian	397	23.0	77
African-American	9	21.0	79
Asian	6	60.0	40.0
Hispanic	37	20.0	80.0
Native American	3	66.0	34.0
Other	8	50.0	50.0

Of the 397 Caucasians responding to the post-test, 22% indicated that they consumed at least five servings of fruits and vegetables per day. Twenty percent of African American's consumed at least five servings, and 60% of Asians ate at least five servings of fruits and vegetables per day. This showed a small decrease from pre-test to post-test in the percentage of Caucasians and African Americans eating at least five servings of fruits and vegetables per day.

Table 4.29

Fruits and Vegetables Consumed Daily by Ethnic Groups (post-test)

	N	% 5/day	% Not Consuming 5/day
Caucasian	397	43.3	56.7
African-American	9	20.0	80.0
Asian	6	60.0	40.0
Hispanic	37	40.0	60.0
Native American	3	66.0	34.0
Other	8	50.0	50.0

Eating Breakfast

Breakfast is the most important meal of the day for everyone (American Dietetic Association, 2001). Of the participants responding to the question about how many times they eat breakfast during the week, the pre-test data showed an even distribution in all four categories. Twenty-seven percent reported eating breakfast everyday, 25% eat breakfast almost everyday, 23% sometimes eat breakfast during the week, and 25% of the respondents rarely eat breakfast (Table 4.30). The post-test data shows an increased number of participants (28%) eating breakfast everyday and a decrease (24%) in the participants rarely eating breakfast (Table 4.31).

Table 4.30

Eating Breakfast (pre-test)

	Frequency[1]	*Percent*[2]
Everyday	125	26.9
Almost Everyday	115	24.7
Sometimes	105	22.6
Rarely/Never	120	25.8

[1] participant did not state their breakfast consumption
[2] Respondents not answering all the questions will not necessarily add up to 100%

Breakfast consumption was measured for both males and females. Table 4.32 and Table4.33 show the results. Of the 195 males responding to the pre-test, 70.2% indicated that they ate breakfast daily. Of the 271 females responding, 62% indicated that they ate breakfast daily.

Table 4.31

Eating Breakfast (post-test)

	Frequency[1]	*Percent*[2]
Everyday	75	28.0
Almost Everyday	65	24.3
Sometimes	61	22.8
Rarely/Never	66	24.6

[1] 207 participants did not state their breakfast consumption
[2] Respondents not answering all the questions will not necessarily add up to 100%

Table 4.32

Breakfast Consumption by Gender (pre-test)

	N	% Eating Breakfast	% Not Eating Breakfast
Males	195	57.0	43.0
Females	271	62.0	38.0

Of the 156 males responding to the post-test, 57% indicated that they ate breakfast daily. Of the 223 females responding, 62% indicated that they ate breakfast daily.

Table 4.33

Breakfast Consumption by Gender (post-test)

	N	% Eating Breakfast	% Not Eating Breakfast
Males	156	57.0	43.0
Females	223	62.0	38.0

Ethnic groups who reported their breakfast consumption are shown in both Table 4.34 and Table 4.35. According to the pre-test, 60% of Caucasians reported they ate breakfast daily at least some of the time. Seventy percent of African Americans reported

eating breakfast at least some of the time, while 100% of the Asian respondents indicated that they ate breakfast daily. Additional results are reported in Table 4.34.

Table 4.34

Breakfast Consumption of Ethnic Groups (pre-test)

	N	% Eating Breakfast	% Not Eating Breakfast
Caucasian	397	60.0	40.0
African-American	9	70.0	30.0
Asian	6	100.0	00.0
Hispanic	37	70.0	30.0
Native American	3	100.0	00.0
Other	8	100.0	00.0

According to the post-test, 61% of Caucasians reported that they ate breakfast daily at least some of the time. Sixty-nine percent of African Americans reported eating breakfast at least some of the time, while 100% of the Asian respondents indicated that they ate breakfast daily. Further results can be found in Table 4.35.

Table 4.35

Breakfast Consumption of Ethnic Groups (post-test)

	N	% Eating Breakfast	% Not Eating Breakfast
Caucasian	397	61.0	39.0
African-American	9	69.0	31.0
Asian	6	100.0	00.0
Hispanic	37	70.0	30.0
Native American	3	100.0	00.0
Other	8	100.0	00.0

Fast Food Consumption

People who eat fast food have a greater caloric intake than those who do not, and therefore they have a greater risk of overweight or obesity. Increased work-week hours

and a doubling of the number of US fast food restaurants in the past 25 years have influenced the amount of time people spend on food shopping and meal preparation. Researchers said that planning weekly meals and related grocery shopping could help adults resist the fast meal decisions that lead to grabbing a quick bite (Bowman, 2004).

In the pre-test the largest group of participants, 46% reported eating at a fast food restaurant only a few times a month. Thirty percent of the participants reported eating at a fast food restaurant several times a week, while 20% reported seldom or never eating at a fast food restaurant. A small percentage (3.9%) reported having their meals everyday at a fast food restaurant (Table 4.36).

The post-test data show disappointing results. Respondents who reported having eaten at a fast food restaurant everyday increased to 4.5%, while those who reported seldom or never eating at a fast food restaurant decreased to 21.6% (Table 4.37). These changes in percentages might be attributed to the busy schedules and the increased responsibilities at the end of the semester.

Table 4.36

Fast Food Consumption (pre-test)

	Frequency[1]	*Percent*[2]
Everyday	18	3.9
Several Times/week	138	29.7
Few Times/month	218	46.9
Seldom/Never	91	19.6

[1] 9 Respondents did not state whether they eat breakfast
[2] Respondents not answering all the questions will not necessarily add up to 100%

Table 4.37

Fast Food Consumption (post-test)

	Frequency[1]	*Percent*[2]
Everyday	75	4.5
Several Times/week	65	28.0
Few Times/month	61	45.9
Seldom/Never	66	21.6

[1] 206 Respondents did not state whether they eat breakfast
[2] Respondents not answering all the questions will not necessarily add up to 100%

Gender differences consumption were evaluated. Results are shown in Table 4.38 and 4.39. Of the 195 males responding to the pre-test, 75% indicated that they ate fast foods at least twice a month with 55% of the females indicating that they ate fast foods at least twice a month.

Table 4.38

Fast Food Consumption by Gender (pre-test)

	N	% Eating Fast Foods at Least 2x per Month	% Not Eating Fast Foods in One Month
Males	195	75.0	25.0
Females	271	55.0	45.0

Of the 156 males responding to the post-test, 76.2 indicated that they consumed fast foods at least twice a month, while 54.2% of females reported that they did the same. This reflected a slight increase in the percentage of males reporting that they consumed fast foods at least twice a month.

Table 4.39

Fast Food Consumption by Gender (post-test)

	N	% Eating Fast Foods at Least 2x per Month	% Not Eating Fast Foods in One Month
Males	156	76.2	23.8
Females	223	54.2	45.8

Levels of fast food consumption of different ethnic groups were also evaluated (Table 4.40 and Table 4.41). According to the pre-test, 62% of Caucasians reported that they ate fast foods at least twice a month. Sixty-nine percent of African Americans reported eating fast foods at least twice a month, while 50% of the Asian respondents indicated that they ate fast foods at least twice a month. Additional results are reported in Table 4.40.

Table 4.40

Fast Food Consumption by Ethnic Groups (pre-test)

	N	% Eating Fast Foods at Least 2x per Month	% Not Eating Fast Foods in One Month
Caucasian	397	62.0	38.0
African-American	9	69.0	31.0
Asian	6	50.0	50.0
Hispanic	37	45.9	54.1
Native American	3	33.0	67.0
Other	8	40.0	60.0

According to the post-test, 61% of Caucasians reported that they ate fast foods at least twice a month. Seventy percent of African Americans reported eating fast foods at least twice a month, while 50% of the Asian respondents reported they ate fast foods at least twice a month. Further results can be found in Table 4.41.

Table 4.41

Fast Food Consumption by Ethnic Groups (post-test)

	N	% Eating Fast Foods at Least 2x per Month	% Not Eating Fast Foods in One Month
Caucasian	397	61.0	39.0
African-American	9	70.0	30.0
Asian	6	50.0	50.0
Hispanic	37	46.0	54.0
Native American	3	33.0	67.0
Other	8	50.0	50.0

Alcohol Intake by Group

On university campuses, many consider alcohol use to be synonymous with student life. Under-age as well as high-risk drinking (drinking to get drunk, usually more than 4 drinks per sitting) is a common problem. If you are of age, however, and choose to drink moderate amounts of alcohol responsibly, it can contribute to your social experience (The Health Survey, 2004).

At Rice, 92% of students consider alcohol to be a problem within their University. Indeed, in the 2004 Health Survey, 67.7% of the surveyed population had at least one alcohol drink in the past two weeks; however, 64% of the surveyed population were under 21, the Texas legal drinking age. In addition, 35.5% had five or more drinks in one sitting in the past two weeks and 10.2% had 10 or more alcoholic drinks in one sitting (The Health Survey, 2004).

In the pre-test data, the largest group of students (39%) reported drinking 1-3 days per week. Twenty-six percent of participants reported having 5+ drinks in one setting (Table 4.40). Post-test results again remained unchanged (Table 4.42).

Table 4.42

Number of Days in a Week Consuming Alcohol (pre-test)

	Frequency[1]	*Percent*[2]
Not in a year	57	12.2
None in Two Weeks	85	18.2
1-3 Days	176	37.8
4-6 Days	90	19.3
5-7 Days	38	8.2
11-14 Days	16	3.4

[1] 8 respondents did not state their alcohol consumption
[2] Respondents not answering all the questions will not necessarily add up to 100%

Table 4.43

Number of Days in a Week Consuming Alcohol (post-test)

	Frequency[1]	*Percent*[2]
Not in a year	35	13.1
None in Two Weeks	40	14.9
1-3 Days	107	39.9
4-6 Days	51	19.0
5-7 Days	27	10.1
11-14 Days	8	3.0

[1] 206 Respondents did not state their alcohol consumption
[2] Respondents not answering all the questions will not necessarily add up to 100%

Gender differences were assessed for the percentage of respondents consuming alcohol at least once during a two-week period (Table4.44 and Table4.45). Of the 195 males responding to the pre-test, 76.3% indicated that they had consumed alcohol at least once in a two-week period. Fifty-three percent of the 271 females responding to the pre-test indicated that they had consumed alcohol at least once in a two-week period.

Table 4.44

Consuming Alcohol in a Two Week Period by Gender (pre-test)

	N	% Consuming Alcohol	% Not Consuming Alcohol
Males	195	76.3	23.7
Females	271	53.0	47.0

Of the 156 males responding to the post-test, 77.2% indicated that they had consumed alcohol at least once in a two-week period. Fifty-two percent of the 223 females responding to the post-test indicated that they had consumed alcohol at least once in a two-week period. The results indicate that a slightly higher percentage of males consumed alcohol in the post-test than in the pre-test.

Table 4.45

Consuming Alcohol in a Two Week Period by Gender (post-test)

	N	% Consuming Alcohol	% Not Consuming Alcohol
Males	156	77.2	22.8
Females	223	52.2	47.8

Each ethnic group was also assessed for alcohol consumption in a two week period. Results are shown in Table 4.46 and Table 4.47. According to the pre-test, 65.1% of Caucasians reported that they consumed alcohol at least once in a two-week period. Seventy percent of African Americans reported consuming alcohol in a two-week period, while 50% of the Asian respondents indicated that they had consumed alcohol. Additional results are reported in Table 4.46.

Table 4.46

Number Consuming Alcohol in a Two-week Period by Ethnic Group (pre-test)

	N	% Consuming Alcohol	% Not Consuming Alcohol
Caucasian	397	65.1	34.9
African-American	9	70.0	30.0
Asian	6	50.0	50.0
Hispanic	37	52.0	48.0
Native American	3	100.0	00.0
Other	8	50.0	50.0

According to the post-test, 66.1% of Caucasians reported consuming alcohol at least once during a two-week period. Seventy percent of African Americans reported consuming alcohol during a two-week period, while 50% of the Asian respondents indicated that they had consumed alcohol. In comparing the pre and posttest, there were few changes in alcohol consumption according to ethnic groups. Further results can be found in Table 4.47.

Table 4.47

Number Consuming Alcohol in a Two-week Period by Ethnic Group (post-test)

	N	% Consuming Alcohol	% Not Consuming Alcohol
Caucasian	397	66.1	33.9
African-American	9	70.0	30.0
Asian	6	50.0	50.0
Hispanic	37	55.0	45.0
Native American	3	100.0	00.0
Other	8	50.0	50.0

For the number of drinks in one setting, pre-test data shows that the largest group of participants has 5+ drinks (Table 4.48). Post-test results show no improvement in any categories, with those having 5+ drinks in one setting still the majority of all the categories (Table 4.49).

Table 4.48

Number of Drinks in One Setting (pre-test)

	Frequency[1]	*Percent*[2]
Not in a Year	55	11.8
None in two weeks	81	17.4
1 Drink	31	6.7
2 Drinks	61	13.1
3-4 Drinks	113	24.2
5+ Drinks	122	26.2

[1] 8 Respondents did not state their alcohol consumption
[2] Respondents not answering all the questions will not necessarily add up to 100%

Table 4.49

Number of drinks in one setting (post-test)

	Frequency[1]	*Percent*[2]
Not in a Year	55	13.4
None in two weeks	81	14.2
1 Drink	31	7.5
2 Drinks	61	12.3
3-4 Drinks	113	24.6
5+ Drinks	122	28.0

[1] 8 Respondents did not state their alcohol consumption.
[2] Respondents not answering all the questions will not necessarily add up to 100%.

Gender difference in the number of drinks consumed in one setting was evaluated (tables 4.50 and 4.51). Of the 195 males responding to the pre-test, 76.3% indicated that they had consumed at least two drinks per setting. Fifty three percent of the 271 females responding to the pre-test indicated that they had consumed at least two drinks per setting.

Table 4.50

Number of Drinks in One Setting by Gender (pre-test)

	N	% Consuming at Least Two Drinks per Setting	% Not Consuming Any Alcoholic Drinks
Males	195	82.4	17.6
Females	271	63.9	36.1

Of the 156 males responding to the post-test, 83.4% indicated that they had consumed at least two drinks per setting. Of the 223 females responding to the post-test 66.7% indicated that they had consumed at least two drinks per setting. The results indicate a slightly higher percentage of both genders in the post-test indicating that they had consumed at least two drinks per setting. The results can be found in Table4.51.

Table 4.51

Number of Drinks in One Setting by Gender (post-test)

	N	% Consuming at Least Two Drinks per Setting	% Not Consuming Any Alcoholic Drinks
Males	156	83.4	16.6
Females	223	66.7	33.3

Each ethnic group was asked about their alcohol consumption in one setting. Table 4.52 and Table4.53 show the results. According to the pre-test, 92.3% of

Caucasians reported that they had consumed at least two drinks in a setting. Seventy-six percent of African Americans reported consuming at least two drinks per setting, while 95% of the Asian respondents indicated that they had consumed at least two drinks per setting. Additional pre-test results are reported in Table 4.52.

Table 4.52

Number of Drinks in One Setting for Ethnic Groups (pre-test)

	N	% Consuming at Least Two Drinks per Setting	% Not Consuming Any Alcoholic Drinks
Caucasian	397	92.3	7.7
African-American	9	76.7	23.3
Asian	6	95.0	5.0
Hispanic	37	88.3	11.7
Native American	3	100.0	00.0
Other	8	80.0	20.0

According to the post-test, 97.2% of Caucasians reported consuming at least two drinks per setting. One hundred percent of African Americans reported consuming at least two drinks at a time, and a 100% of the Asian respondents indicated that they had consumed at least two drinks per setting. In comparing the pre and post test, there were increased percentages in most ethnic groups reporting consumption of at least two drinks per setting. Further post-test results can be found in Table 4.53.

Drug Use by Group

For the purpose of this study, all illicit drugs have been combined into one variable. In the pre-test results, the majority of participants (57%), had never used any illicit drugs. 21% rarely used any illicit drugs, 13% used drugs every week, and 9% sometimes used illicit drugs (Table 4.54). For the post-test data, the number of

Table 4.53

Number of Drinks in One Setting for Ethnic Groups (post-test)

	N	% Consuming at Least Two Drinks per Setting	% Not Consuming Any Alcoholic Drinks
Caucasian	397	97.2	2.8
African-American	9	100.0	00.0
Asian	6	100.0	00.0
Hispanic	37	93.2	6.8
Native American	3	100.0	00.0
Other	8	100.0	00.0

participants who never used drugs went up to 60%, while those who rarely used drugs went down to 17%. Participants who used drugs every week and sometimes remained the same (Table 4.55).

Table 4.54

Drug Use (pre-test)

	Frequency[1]	*Percent*[2]
Every week	59	12.7
Sometimes, monthly	44	9.4
Rarely	97	20.8
Never	264	56.7

[1] Respondents did not state their drug use.
[2] Respondents not answering all the questions will not necessarily add up to 100%.

Drug use was assessed for both males and females (tables 4.56 and 4.57). Of the 195 males responding to the pre-test, 60.2% indicated that they had used drugs at least once a year. Of the 271 females responding, 40.3 indicated that they had used drugs.

Table 4.55

Drug Use (post-test)

	Frequency[1]	*Percent*[2]
Every week	35	13.1
Sometimes, monthly	24	9.0
Rarely	46	17.2
Never	163	60.8

[1] 206 Respondents did not state their drug use.
[2] Respondents not answering all the questions will not necessarily add up to 100%.

Table 4.56

Drug Use by Gender (pre-test)

	N	% Using Drugs at Least Once a Year	% Not Using Drugs in a Year
Males	195	60.2	39.8
Females	271	40.3	59.7

Of the 156 males responding to the post-test, 61.4% indicated that they had used drugs at least once a year, while 42.2% of the 223 females reported drug use. The post-test results show an increase in the percentage of respondents using drugs at least once a year.

Table 4.57

Drug Use by Gender (post-test)

	N	% Using Drugs at Least Once a Year	% Not Using Drugs in a Year
Males	156	61.4	38.6
Females	223	42.2	57.8

Table 4.58 and Table 4.59 show the results of drug use for each ethnic group. According to the pre-test, 55.2% of Caucasians reported that they used drugs at least once a year. A little over 43% of African Americans reported using drugs at least once a year, while 50% of the Asian respondents indicated that they used drugs at least once a year. Additional pre-test results are reported in Table 4.58.

Table 4.58

Drug Use by Ethnic Groups (pre-test)

	N	% Using Drugs at Least Once a Year	% Not Using Drugs in a Year
Caucasian	397	55.2	44.8
African-American	9	43.2	56.8
Asian	6	50.0	50.0
Hispanic	37	52.0	48.0
Native American	3	100.0	00.0
Other	8	20.0	80.0

According to the post-test, 56.2% of Caucasians reported using drugs at least once a year. Of the nine African American respondents, 42.3% said they used drugs at least once a year, and 50% of the six Asian respondents indicated that they used drugs at least once a year. Further post-test results can be found in Table 4.59.

Table 4.59

Drug Use by Ethnic Groups (post-test)

	N	% Using Drugs at Least Once a Year	% Not Using Drugs in a Year
Caucasian	397	56.2	43.8
African-American	9	42.3	57.7
Asian	6	50.0	50.0
Hispanic	37	55.0	45.0
Native American	3	100.0	00.0
Other	8	50.0	50.0

Results of Group Comparisons

In the following section, means and standard deviations for each of the study variables are presented. The sample included in this analysis only includes students who provided complete data for both pre-test and post-test. The reason for this is to provide consistency between descriptive statistics and hypothesis testing.

Assumptions

Analysis of Variance

Sphericity, or the assumption that the variance of population difference scores for any two conditions are the same as any other two conditions (Pallant, 2001), is also a concern when running a mixed between-within analysis of variance. To test this assumption, Machley's test of sphericity is used. If this test is significant, then one can refer to the multivariate statistics rather than the univariate statistics.

Missing Data

The issue of missing data was addressed through mean replacement. If 80% of the items on an instrument or subscale were complete, then mean replacements were entered

for missing data values. If more than 20% of the data values were missing, then subjects were excluded from the final analysis. In the majority of cases, missing data occurred because students missed an entire page or a subscale of an instrument. These subjects were removed from the study. Of the original sample (466 students), 209 students were excluded from the study due to providing incomplete data sets. These students missed an entire page of the survey, or missed the majority of an instrument. The remainder of students provided at least 80% of instrument. For both the pretest and posttest, only 25 data sets required mean replacement for one to three items. Missing data points were replaced by inputting the calculated mean of the subscale or instrument. Mean replacement decreases variability, thus increasing the chance of finding a significant result.

For the analysis of variance, an alpha level of .05 was used for all statistical tests and effects size was calculated if $p < .10$. Effect size (ES) is a simple way of quantifying the difference between two groups that has many advantages over the use of tests of statistical significance alone (Coe, 2002). ES emphasizes the size of the difference rather than confounding this with sample size. ES is defined as the strength of the relationship between the independent variable and the dependent variable (Vaske, Gliner & Morgan, in press). ES is measured by small (.1), medium (.3), and large (.5) for the interpretation of eta. An ES of small has minimal statistical relationship, an ES of medium is usually a typical relationship, and an ES that is large indicates a substantial relationship between the variables.

Physical Activity

For aerobic activity the variables were transformed into xaerobic-xaerobic2 by gender for pre-test and post-test ANOVA testing (Table 4.60). A one-way analysis of variance (ANOVA) was calculated on the participants' levels of aerobic activity. The analysis was not significant, $F(1,1)=1.08$, $p=.300$. Both men and women were both physically active.

Table 4.60

Analysis of Variance of Amount of Time Participating in Aerobic Activity by Gender

Source	*Df*	*SS*	*MS*	*F*	*p*
Between groups	1	.460	.512	1.08	.300
Within groups	1	.512	.512		
Total	2	.972			

Strength training variables was transformed into xstrength-xstrength2 by gender for pre-test and post-test ANOVA measurements (Table 4.61). A one-way ANOVA was calculated on the participants' levels of strength training. The analysis was not significant, $F(1,1)=1.61$, $p=.206$. Both men and women reported doing about the same levels of strength training.

Table 4.61

Analysis of Variance of Amount of Time Participating in Strength Training by Gender

Source	*Df*	*SS*	*MS*	*F*	*p*
Between groups	1	.821	.821	1.61	.206
Within groups	1	.148	.148		
Total	2	.969			

Exercise level variables were transformed into xexercise level-xexercise level2 by gender for pre-test and post-test ANOVA measurements (Table 4.62). The one-way ANOVA of exercise levels of participants was also calculated. It shows that there was no significance, $F(1,1)=.43$, $p=.511$. Both men and women reported having about the same exercise levels. When the means were compared, both genders had about moderate exercise levels.

Table 4.62

Analysis of Variance of Exercise Levels by Gender

Source	*Df*	*SS*	*MS*	*F*	*p*
Between groups	1	.037	.037	.43	.511
Within groups	1	.014	.014		
Total	2	.051			

The student's satisfaction regarding their weight levels was assessed. The variables were transformed into xweight-xweight2 by gender for pre-test and post-test ANOVA measurements (Table 4.63). A one-way ANOVA was taken to measure the participant's weight satisfaction. Results show that this was significant $F(1,1)=6.32$, $p=.013$. When comparing means, 60% of the men surveyed were more satisfied with their weight levels versus 40% of the women surveyed who said they were satisfied with their weight levels. When effect size was calculated, the eta squared was found to be medium (.134). This means that about 13% of the variance within the findings can be explained by this factor (gender). According to Coe (2002), the square root of eta can be used as an associational measure of the effect size. Simply put, it is a way to measure differences

between two groups, in this case, males and females. That effect is eta=.366, which is a medium or typical effect size.

Table 4.63

Analysis of Variance of Weight Satisfaction by Gender

Source	*Df*	*SS*	*MS*	*F*	*p*	eta^2
Between groups	1	.436	.436	6.32	.013	.134
Within groups	1	.059	.059			
Total	2	.495				

Nutritional Intake

Because of the different subjects in the nutrition instrument, these variables could not be transformed. ANOVA measurements were taken for pre-test and post-test. Students' answers were tabulated regarding how often they ate breakfast during the week. The results are in Table 4.64. A one-way ANOVA measured students' breakfast consumption. Results show no significance $F(1,1)= .06$, $p=.059$, between the means for males and females. Both genders reported eating breakfast at least five days a week. Since the *p* value was less than .10, the effect size was calculated. Eta was .66, which is a very large effect size. Thus even though the p value was greater than .05, there is a strong relationship between gender and the variable of eating breakfast. This supports the assumption made by Grunwald, Sullivan, and Hise et al. (2003) that both males and females typically eat breakfast, but females reported eating breakfast more frequently than males.

Table 4.64

Analysis of Variance of Breakfast Consumption by Gender

Source	*Df*	*SS*	*MS*	*F*	*p*	etd^2
Between groups	1	.607	.607	3.60	.059	.444
Within groups	1	.607	.607	.25		
Total	2	1.21				

Measurements were taken to assess the amount of fruits and vegetables students consume during the day (Table 4.65). A one-way ANOVA measured the amount of fruits and vegetables students eat during the day. Results show no significance $F(1,1) = .64$, $p = .424$. When the means were compared, both genders reported not eating at least five servings of fruits and vegetables per day.

Table 4.65

Analysis of Variance of Fruits and Vegetable Intake by Gender

Source	*Df*	*SS*	*MS*	*F*	*p*
Between groups	1	.08	.08	.64	.424
Within groups	1	.09	.09	.14	
Total	2	.17			

Students were asked about their fast food habits and how often they eat at fast food restaurants (Table 4.66). A one-way ANOVA was taken to measure fast food consumption of the students during the week. Results show that it was not significant $F(1,1)=.63$, $p=.427$. When the means were compared, both genders reported eating at fast food restaurants at least two days a week. There was no statistical significance, therefore, between males or females from pre-test to post-test.

Table 4.66

Analysis of Variance of Fast Food Intake by Gender

Source	*Df*	*SS*	*MS*	*F*	*p*
Between groups	1	.05	.05	.63	.427
Within groups	1	.01	.01	.08	
Total	2	.07			

Alcohol Use

The results of analysis of variance for drinking alcohol are in Table4.67. One-way ANOVA results show significance $F(1,1)=4.15$, $p=.003$. Since p was less than .10, effect size was calculated. Results show that there is a large effect size (eta=.566); this means that males are far more likely to drink more days per week than females.

Table 4.67

Analysis of Variance of the Number of Days Drinking Per Week by Gender

Source	*Df*	*SS*	*MS*	*F*	*p*	eta^2
Between groups	1	.851	.851	4.15	.003	.321
Within groups	1	.040	.040	14.69		
Total	2	.891				

Students were asked how many drinks they consumed in a single setting (Table 4.68). Further one-way ANOVA measured the number of drinks in one setting a student had. Results show no significance $F(1,1)=.928$, $p=.336$. In both pre-test and post-test measurements, males drank more than women by at least three drinks. However,

according to Patton, Mackay, and Broszeit (2005) there is support that males consumed more alcohol with greater frequency than females.

Table 4.68

Analysis of Variance of the Number of Drinks by Gender

Source	*Df*	*SS*	*MS*	*F*	*p*
Between groups	1	.40	.40	.93	.336
Within groups	1	.40	.40		
Total	2	.80			

Students were asked about their drug use and how often they had used drugs (Table 4.69). Drugs were defined as anything illegal or prescription drugs used by someone other than for whom they were prescribed. The analysis shows that there was no significance between both genders, $F(1,1)=.928$, $p=.353$. At least 90% of both genders had tried drugs at least once in a one-year period.

Table 4.69

Analysis of Variance of Drug Use by Gender

Source	*Df*	*SS*	*MS*	*F*	*p*
Between groups	1	.171	.171	.87	.353
Within groups	1	.171	.171		
Total	2	.342			

Pre-test/Post-test Main Effects

The *t-test* is employed when one wishes to determine if two samples have statistically different means. If t is greater than the critical value, then the two samples have statistically different means. The critical value can be determined given the sample sizes, the level of significance chosen (typically $a = 0.05$), and a critical value table.

The *t-test* helps calculate whether, given the variance in a set of data, two mean values are significantly different. SPSS calculates a *t*-test value and a *df*, but the researcher will need one other number to carry out the test, an alpha (a) value. The statistical convention that is followed the most often is the 5% rule which states that if the probability that a result occurs *by chance* is less than 5%, we say that the result is statistically significant.

The key questions in this research revolved around effects that the course might have had on student behavior. The following section shows the pre-test and post-test measurements.

Physical Activity

The relationship between pre-test and post-test was assessed by using means comparison. The mean score for pre-test aerobic activity was 3.03 (SD=2.09) n=268 and the mean score for post-test aerobic activity was 3.09 (SD=2.0). The results were not significant, $t(267)=-.06$, $p=.330$.

The mean score for strength training (pre-test) was 2.60 (SD=2.20) n=268 and the mean score strength training (post-test) was 2.53 (SD=2.14). The results were not significant, $t(267)=.06$, $p=.632$.

Students self-reported their exercise levels on the PWP. The mean score in the pre-test was 2.30 (SD=.74) n=268. The mean score for the post-test was 2.30 (SD=.73). The results were not significant, $t(267)=.02$, p=.467.

Students also reported their satisfaction with their current weight levels. The mean score in the pre-test was 2.55 (SD=1.52) n=268. The mean score for the post-test was 2.37 (SD=1.33). The results were not significant, $t(267)=.19$, $p=.333$.

Nutritional Intake

Because of the types of questions for the nutritional section, the variables were not combined, but the scores were recoded. Students were asked about their breakfast consumption. The mean score for the pre-test was 2.50 (SD=1.15) n=268. For the post-test score, the mean was 2.44 (SD=1.14). The results were not significant, $t(267)=.04$, $p=.192$.

The amount of fruits and vegetables students ate during the day was assessed. The pre-test mean score was 3.63 (SD=1.20) n=268. The mean score in the post-test results was 3.61 (SD-1.15). The results were not significant, $t(267)=.03$, $p=.432$.

Fast food consumption was also assessed. Students were asked the amount of fast food meals they had during the week. The pre-test mean result was 2.82 (SD=.80) n=268. Post-test results showed the mean score was 2.85 (SD=.81). The results were not significant, $t(267)=.03$, $p=.729$.

Alcohol and Drug Use

As with the nutritional intake section, alcohol and drug variables could not be combined. The scores were recoded to give greater weight to each answer. This also reduces the number of categories to analyze during data analysis. Pre-test results

provided a mean score for days spent drinking during the week was 3.00 (SD=1.23) n=268. Post-test assessment showed the mean score was 3.07 (SD=1.24). The results were not significant, $t(267)=.03$, $p=.729$.

Students were asked about the number of drinks they had in one setting. The mean was 4.00(SD=1.81) n=268. Post-test data showed the mean score to be 4.04 (SD=1.80). The results were not significant, $t(267)=.06$, $p=.215$.

The standard for drug use was any illegal drugs or prescription drugs taken by someone other than the prescribed person. The mean score for the pre-test was 3.21 (SD=1.10) n=268. In post-test results, the mean score was 3.26 (SD=1.08). The results were not significant, $t(267)=.04$, $p=.258$.

The results show that both ANOVA tests and paired *t*-tests confirm that the class did not show a difference between the pre-test and the post-test results. Further explanation will be discussed in chapter 5.

Chapter 5: CONCLUSIONS AND DISCUSSION

This chapter includes three sections: conclusions, limitations of the study, and recommendations for practice and future research. Conclusions are summarized and discussed according to each research question. Study limitations include sections on sample size, course structure, length, intervention, subject attrition, power, effect size, and practical significance. Recommendations include implications for practice, significance, and for future course design. The chapter concludes with recommendations for future research.

Conclusions

The main purpose of this study was to determine if students exhibited changes in their lifestyles while enrolled in a health and wellness course. Of the original sample (n=466), only 39% were retained for all data collection periods. Students were given information regarding behavioral skills in the course and how to integrate these skills into their lifestyle. These behavioral practices are linked to healthy choices.

Research Question 1

When introducing an intervention such as a health and wellness course (EX 145), what is the likelihood that a student would change his or her behavior to reflect a healthy lifestyle?

Summary of Research Question 1 Findings

For the purposes of this study, a healthy lifestyle was characterized by physical activity, nutritional intake, and alcohol and drug use. Physical activity was further defined by questions related to aerobic activity, strength training, exercise level, and weight satisfaction. Nutritional intake was further defined by questions about breakfast consumption, fruit and vegetable consumption and fast food intake. To further define the concept of a healthy lifestyle, questions about alcohol and drug use were also included in the pre and post surveys.

According to the statistical analysis described in Chapter 4, no statistical difference was found between the pre and post surveys in any of the three categories making up a healthy lifestyle. While the majority of students participated in some form of physical activity on a weekly basis, results indicated the participation level was not influenced by the intervention (EX 145). Women participated in aerobic activities more often than men, while men on the other hand participated in strength training more often than women. This coincides with other studies that claim gender plays an important role in the types of activities a person selects as his or her form of exercise (Calfas, Sallis, and Nichols, 2000).

Ethnicity was assessed to distinguish if there was a change among the different ethnic groups in the course. Caucasians were the majority of all the ethnic groups (85%), while Hispanics were the second largest group (37%), and African-Americans were the third largest ethnic group (9%). Other ethnic groups made up the rest of the demographics in the class. Reinforcing Chepyator-Thompson's (1994) reports that Caucasians were frequently more active than other ethnic groups such as Asians-

Americans and African-Americans, Caucasians were the most active of all the ethnic groups in this study. Native Americans (0.6%) were the least active in the pre-test and post-test assessments. Ethnic differences may indicate the need for different approaches in the curriculum. Chepyator-Thompson (1994) also reported the physical education curriculum should provide culturally responsive pedagogy and should promote multicultural understanding. This may advance the development and understanding of cultural differences, especially with regard to physical activity (Bennett, 1990).

Females, in both the pre-test and post-test measurements, made better nutritional choices than males. Females ate more fruits and vegetables daily than males. Females also ate breakfast more often than males and ate less at fast food restaurants on a weekly basis. Most students in the study did not meet the recommended intake of at least 5 servings of fruits and vegetables per day or the minimum of 20g of dietary fiber per day, which suggests an unhealthy diet trend that may play a significant role in future risk of disease. It appears that the students' reported diets were slightly higher in fruits and vegetables and fiber intake than national averages, but they still did not meet dietary recommendations. Nationally, 78.4% of 18- to 24-year-olds report consuming less than 5 servings of fruits and vegetables per day (Bialostosky, Wright, Kennedy-Stephenson, McDowell, Johnson, 2002), and the average daily fiber intake in this age group is 16g. (Bialostosky, et al., 2002). In their findings, men reported consuming more fiber than the women, which was consistent with national data.

When nutritional intake was broken down by ethnic groups, the majority of the ethnic minority groups ate better than Caucasians. Asians ate breakfast more often and often indicated better food choices when it came to eating fruits and vegetables. Ethnic

minorities' food choices may be explained by the culture in which they were raised (Chepyator-Thompson, 1996). Culture highly influences the healthy lifestyle of individuals and the types of choices they make when it comes to eating. In cultures outside of the United States, a meal is a time for gathering and socializing, whereas for some families in the US, eating on the run, eating in shifts and barely seeing another family member at meal time is more often the norm rather than the exception. That does not mean that people from other cultures who come to the United States are not influenced by the culture around them, but some habits may be harder to change than others.

Assessment of drugs and alcohol use comes with certain caveats. The main one is truthfulness. Students may either under-report or over-report their level of involvement in these activities. In other studies, it has been found that drug and alcohol reporting may be flawed because the participants were afraid that if they reported illegal activity, they might get in trouble. Others would like to pump up their number in an attempt at bravado (US Department of Justice, 2004).

According to the results of this study, males drank more than women on a weekly basis (up to 5), had more drinks in a single setting (as many as 5), and possibly used drugs more often (10 to 1). There was no significant change from the pre-test to the post-test assessment. This outcome was the same as Bennett, Miller, and Woodall (1999) in other studies that studied drinking patterns among college students.

Among ethnic groups, Native Americans exhibited the highest statistical outcomes of all the groups. In all three variables, participation was 100% in both pre-test and post-test measures. Because of the small sample size (n=3), however, this may not be

a true measure of the culture itself. In a study by the Center for the Advancement of Health (2004), researchers measured alcoholism among people living on reservations in the southwest. The percentage of alcohol dependent tribe members varied significantly among tribes, from only one to two percent in one tribe to 56% of the men in another. Across all the tribes, 30% of the men and 18% of the women were diagnosed with some form of alcohol dependence. More than half said they had at least one parent with alcohol problems. Nineteen percent of Native Americans reported taking their first drink when they were 12 years old versus other ethnic groups (16years old). Also, incidence rates for fetal alcohol syndrome and fetal alcohol spectrum disorders are greater in Native-Americans than in Caucasians.

The outcomes from all of the results for Research Question 1 would indicate that students did not change their behavior after the intervention of a health and wellness course (EX145).

Discussion of Research Question 1

Although the results of this study indicate the students did not change their behaviors, there is the possibility they may already have viewed themselves as having a healthy lifestyle and therefore not needing change. At pre-test, only 18% reported no regular aerobic activity during the week, while the largest percentage of students (37%) reported doing at least three to fours days of some form of aerobic activity during the week (Table 4.6). This decrease may be attributed to a number of factors. One factor was when the post-test was administered. Finals week was coming up and many students may have chosen to not participate in any aerobic activity because studying for finals was a higher priority.

Seventy-two percent of study participants engaged in some form of strength training during the week and over 80% of students viewed their exercise level as moderate to vigorous. According to Marcus & Lewis (2003), only 25% of Americans participate in recommended levels of physical activity. The participants in this study far exceeded that average before the intervention even began (Table 4.18). In the pre intervention survey, self reports also indicated that over 32% of the participants ate at least two servings of fruits and vegetables per day (Table 4.24), and almost 27% ate breakfast everyday or almost everyday (Table 4.30).

The results of this study indicate a need for physical activity promotion at the college level. Approximately 47% of the total sample did not engage in vigorous physical activity, and 17% were inactive during the month preceding the study. Female college students, particularly those from minority groups, displayed high rates of physical inactivity. For example, 28.1% of Asian women reported that they had not participated in any type of physical activity during the month preceding the study. The current rates of inactivity we observed are consistent with earlier investigations. Clearly, rates of inactivity are related to ethnicity, which suggests that members of the health promotion staff should consider ethnic differences when they design programs.

Many explanations have been proposed to account for low levels of physical activity. Desmond, Price, and Lock (1990) suggested that women, especially minority women, might be less informed about the importance of physical activity and suggested that this may stem from insufficient education or role modeling during women's childhood and adolescence. Women may lack support to be physically active from others; as a consequence, they may not develop positive beliefs concerning exercise or the

confidence to engage in physical activity (e.g., self-efficacy). Although physical activity rates among women need to be improved, particular attention should be focused on women of Asian and African descent.

Because the physical activity determinants are expected to be multiplied over the entire population, the overall impact on physical activity levels could be substantial (King, Jeffery, Fridinger, et al., 1995). Demonstration programs in schools have been moderately successful in promoting physical activity in children (Luepker, Perry, & McKinlay, 1996). Such programs stress the importance of lifelong physical activity as they attempt to make activity enjoyable for the child. This model could be extended to the college environment, thus providing a stable curriculum framework from an individual's early childhood through young adulthood. Repeated exposure (10 to 12 years) to positive experiences with physical activity may be an effective strategy for decreasing sedentary lifestyles. Conversely, it would be important to target college students who had little youthful sport experience. These students are likely to need different recruitment strategies and physical activity programming. It will be important to acquire data from college alumni to learn how students' earlier school experiences (at all levels) affect their current physical activity status.

The results of this study indicate that both genders were active and participated in some form of physical activity. Although patterns of physical activity have not previously been assessed in college students, researchers have determined that adult participation in physical activity fluctuates. Furthermore, previous studies have reported that male students are more active than female students (Centers for Disease Control and Prevention, 1995; Dinger, 1999). These studies relied on indirect, self-reported measures

of physical activity, however, that required the students to accurately recall their participation in vigorous and moderate physical activity. Our findings suggest that male and female students do not differ in their daily total ambulatory physical activity.

Research Question 2

Research question 2 explored: Which gender is more likely to change behavior to reflect a healthy lifestyle?

Summary of Research Question 2 Findings

As described in the summary for Question 1, a healthy lifestyle was defined by three main categories: physical activity, nutritional intake, and alcohol and drug use.

The research findings indicated there was no significant interaction between gender and the categories comprising the definition of a healthy lifestyle. In the category of physical activity, there was no statistical significance between gender groups in regard to changes in aerobic activity. There was also no difference between gender groups in relation to strength training, exercise levels or weight satisfaction.

In the category of nutritional intake, there was no difference between gender groups in relation to breakfast consumption, fruit and vegetable intake or fast food intake. Students may be more likely to forgo a regular home cooked meal and opt for the convenience of a quick meal. Stresses due to the end of the semester deadlines, finals week, etc., may have contributed to these choices.

In the category of alcohol and drug use, the only significant difference between gender groups was found in the amount of alcohol consumed by men vs. women. Men were found to consume three times more drinks in one setting than women.

Discussion of Research Question 2

Past research has proposed gender to be one of the most important determinants of health behavior. One showed that in a survey of males and females, males drank more than females by 4 to 1. Also, males drank beverages other than beer, such as hard liquor. This is a dangerous combination (Courtenay, 1998). This study supported past research that has consistently shown that men engage in far fewer health-promoting behaviors and have less healthy lifestyle patterns than women (Kandrack, Grant, & Segall, 1991).

Overall, past research has also shown that women tended to participate in healthier behaviors than men in areas such as eating habits, tobacco and alcohol non-use, dental care, sun protection, and driving behavior. According to the National College Risk Behavior Survey (1995), female students (62.6%) were significantly more likely than male students (42.3%) to have exercised either to lose weight or to keep from gaining weight. In contrast, this study showed slightly more men (61.9%) reported in the pre-survey being actively involved in aerobic exercise than women and more men also reported participating in strength training (57.4%) than the women in the study. Men continued to report higher levels of aerobic activity and strength training in the post survey than women.

These findings did, however, support other findings that problem drinking is greater among college men than women (Courtenay, 1998). According to the National College Health Risk Behavior Survey (1995), male students (6.6%) were significantly more likely than female students (2.2%) to report current frequent alcohol use. The most recent data from the Core Alcohol and Drug Survey reveal that, on average, college men consume nearly seven drinks per week, two times the amount that women consume.

College men are also two times more likely to consume 10 or more drinks per week and six times more likely to consume 21 drinks. Nearly one half of college men, compared to less than one third of college women, binge drink over a two-week period. Although this study found that men consumed more than women, both genders exhibited unhealthy behaviors. In comparison to women, males that tend to drink more often and become more intoxicated. This outcome leads to the conclusion that efforts to curtail this type of behavior need to be focused on males (Table 4.45). The increase in drinking behaviors after the intervention could also be documented in the literature. In a study by Siemelis, Bucknam, and Elfessi (2002) of 94 institutions implementing drug-prevention programs in an effort to curtail binge drinking, 34 actually had an increase in binge drinking behavior, while the other 60 had a decrease.

Respondents' consumption in one setting was also measured. The largest category was having 5+ drinks in one setting (Table 4.20). A drinking binge is commonly defined as having five or more "standard" drinks in a row for men, and four or more in a row for women. In 1994, by this definition, 40% of college students reported binge drinking at least once within two weeks of being surveyed (O'Malley, Johnston & Bachman, 1998). Thirty-one percent of college women binge drank compared with 52% of college men. A strong argument has been made, however, that a more equivalent drinking binge criterion for women is four drinks per occasion (Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994) and that the five-drink per occasion level may over estimate binge drinking among women. Developmentally, ages 18 through 21 is the period of heaviest alcohol consumption for most drinkers in the United States (Chen & Kandel, 1995).

Within this heavy-drinking age group, however, binge drinking is more prevalent among college students than non-students (O'Malley, Johnston & Bachman, 1998).

Intakes of alcohol in males increased at the end of the semester, but none of these increases were significant. Intakes of alcohol for females decreased slightly at the end of the semester, but none of these decreases were significant. Compared to non-problem drinkers, problem drinkers are impulsive, prone to deviant behavior, less oriented toward academic success, more independence-seeking, and more likely to drink for escapist reasons (Berkowitz & Perkins, 1986). With regard to gender differences, information on the increase or decrease in use among college women is conflicting. The prevalence of heavy drinking remains, however, much greater for males than females (Johnston et al., 1986). Women also show a greater resistance to drinking than do men, except in dormitory living situations (Shore and Rivers, 1985).

In *Healthy Campus 2010* (ACHA, 2005), the survey asked males and females across the country on college campuses "*Over the last two weeks, how many times, if any, have you had five or more alcoholic drinks at a sitting?*" Twenty-six percent of males reported having three or more days of consuming alcohol in a two-week period, and only 10% of females reported consuming alcohol three or more days in a two-week period. In comparison, 77% of males at Colorado State consumed alcohol three or more days in a two-week period, while 52% of females consumed alcohol three or more days, in a two week period (Table 4.45). These outcomes show that current efforts to curtail drinking are not working. Health educators at CSU should be alarmed at these outcomes. Education efforts should be focused on getting these numbers down to below the national norms.

The majority of students used alcohol. Drinking on college campuses represents one of the most serious health and public safety risks to both the students and the surrounding community. Research has shown that up to 95% of college students reported having used alcohol (Center on Addiction and Substance Abuse: New York, 1994). Aggravating the seriousness of alcohol use among college students is their frequent involvement in binge drinking (i.e., consuming large quantities of alcohol in any one sitting); at least one-third of college students may be defined as binge drinkers. This high prevalence of alcohol use, combined with heavy involvement in binge drinking, leads to serious consequences for college drinkers (Wechsler, Austin & DeJong, 1996) and their fellow students. Consistent with previous research, the data showed that 86% of students drank alcohol in the past year, and 72% drank in the past month. About 54% of the sample engaged in binge drinking at least once in the past month (five or more drinks per sitting).

Research Question 3

Research question 3 explored: Of the three categories: physical activity, nutritional choices, or substance abuse, which will have the greatest behavioral change due to the class as an intervention?

Summary of Research Question 3 Findings

There was no statistically significant difference between the pre and post survey with any of the three categories. Substance abuse was the one category that did show some differences in regards to the number of drinks consumed by men in the study, but it was not statistically significant, and it reflected an increase in drinking behavior after the intervention occurred.

Discussion of Research Question 3

If, as described in question 1, participants already viewed themselves as having a healthy lifestyle, then change might not have been be a desired outcome. The Stages of Change Model (Prochaska, et al., 1992) suggests that different interventions should be applied depending upon the individual's current stage of readiness for change. If participants in the study were in fact in the precontemplation stage and not yet consciously considering the possibility of change, their level of readiness for actually making a change could be low or non-existent.

That being said, according to the National College Youth Risk Behavior Survey conducted by the Centers for Disease Control and Prevention, almost one-fourth of college students are overweight and 40% are attempting to lose weight. As discovered in this study, students were generally active and this was reflected in the outcomes. There was no statistical change in behavior across the three variables being assessed. BMI percentiles are usually used to categorize overweight and obesity in children and adolescents. The mean BMI was 23.13 (Table 4.5). This indicated a generally healthy weight for the students in the class. Whereas BMI is used directly to categorize adults, but the definition of adulthood has not been consistent, with some researchers using 18 years of age as the cutoff and others using 20 years old.

The national survey, *Healthy Campus 2010* (ACHA, 2005), reported that as of the fall of 2001, 57% of males said they were satisfied with their weight, while 52% of females said they were happy with their weight. In contrast, in this study, 60% of the men surveyed were more satisfied with their weight levels versus 40% of the women surveyed who said they were satisfied with their weight levels (Table 4.63). This is higher than the

national average. This suggests that males at Colorado State were more satisfied with their weight levels than males across the country. Females at CSU were less satisfied with their weight levels than females across the country. For health educators on campus, the focus on weight management issues should specifically target female students.

A positive relationship has been reported between eating breakfast before school and school performance (Pollitt, 1995). Results showed that breakfast consumption does influence tasks requiring certain aspects of a person's memory. As was shown earlier, students ate breakfast. It is not known what they ate for breakfast but for most health advocates, eating something before school is better than not eating (Rampersaud, et al., 2005). In a study done by Worobey and Worobey (1999), a memory test was also given to participants, and results showed that those who ate breakfast performed better on the tests than those who did not eat breakfast. A study reviewed by Pollitt (1995) indicated that students given tests in spatial memory and immediate recall displayed higher performance when they ate breakfast than when they did not eat breakfast.

The rise of fast food consumption and lifestyles of convenience have managed to take over the nation's weight problem. Although many people are becoming more health conscious, some have not reached the necessary level of awareness. There are so many food choices that can be made throughout each day. Lack of time due to homework, sports participation, and social lives can hurt healthful eating. College students especially understand the lure of fast food. Many on-campus dining options are fast food restaurants appreciated for convenience and familiarity.

In pre-test results, 13% of the students in this study reported using illicit drugs frequently (Table 4.54). This fell within the norms of other studies. According to a report

from Harvard School of Public Health researchers, the prevalence of recent marijuana use among U.S. college students rose from 12.9% to 15.7% between 1993 and 1999, an increase of 22%. Most of the increase occurred between 1993 and 1997. While rates did not increase further in 1999, they did remain at the higher 1997 rate. Use of other illicit drugs followed the same trend, rising significantly between 1993 and 1997 and then changing little between 1997 and 1999 (Gledhill-Hoyt, Lee, Strote, &Wechsler, 2000).

According to Gledhill-Hoyt, Lee, Strote, and Wechsler (2000), of the 7.0 million current users of illicit drugs other than marijuana, 4.8 million were current users of psychotherapeutic drugs. This represents 2.1% of the population aged 12 or older, which was higher than the rate observed in 2000 (1.7%). Of those who reported current use of any psychotherapeutics, 3.5 million used pain relievers, 1.4 million used tranquilizers, 1.0 million used stimulants, and 0.3 million used sedatives. In 2001, an estimated 1.7 million (0.7 percent) of Americans aged 12 or older were current cocaine users and 406,000 (0.2 percent) were current crack users.

Research Question 4

Do ethnicity and a person's personal history influence the level of behavior changes?

Summary of Research Question 4 Findings

No one group, categorized by ethnicity or background, showed any statistical significant difference after the intervention either between groups or within groups.

Discussion of Research Question 4

Research has reported differences in health behaviors in regards to ethnicity and background. According to the National College Health Risk Behavior Survey (1995),

White students (4.7%) were significantly more likely than black (1.6%) and Hispanic (2.0%) students to report current frequent alcohol abuse behaviors. Black students (33.5%) were significantly more likely than Caucasians (19.5%) and Hispanics (20.8%) students to be overweight. Harrell and Gore (1998) also reported that black women are less likely to practice health promoting behaviors, and they are less likely to perceive themselves as being overweight, to be on weight reduction programs, to participate in physical activity, or to evaluate the sedentary life-style as harmful behavior.

There was little diversity in the population for this study which may have affected the variation in responses according to ethnicity. Eight percent of the respondents were Hispanic, while only 1.9% of students in the pre-intervention survey indicated they were African American. The largest percentage, 85%, reported their ethnicity as Caucasian. Almost 46% of the African American's participating in the pre-survey indicated they were involved weekly in aerobic activity, and 59% of Hispanic students were participating in weekly aerobic activity before the intervention began.

Ethnicity, a socio-cultural factor influencing nutritional and health status, plays a significant role in determining culinary practices (Lantz, House, Lepkowski, Williams, Mero, & Chen J., 1998). Black, Hispanic, and Asian-Pacific immigrants have lower mortality rates and lower rates of chronic disease than their US-born counterparts, which most likely is due to better health habits. Singh and Siahpush (2001) note this may in part be attributed to "positive immigrant selectivity" with some immigrants groups being well-educated professionals; however, over time, health behaviors become increasingly similar to those of US-born minorities, with a concomitant rise in chronic disease. Obesity and hypertension increase with length of residence in the United States. This

suggests that culturally bound lifestyle practices, including healthy dietary habits, restricted alcohol use, abstinence from smoking, and greater physical activity, initially are protective factors for immigrants. Though the PWP did not assess the origin of birth, eating habits may have been formed during childhood and subsequently those same habits were brought with the students when they left home and came to school at Colorado State University.

Limitations of the Study

Sample Size

One of the important limitations of the study was the attrition rate of sample size. Although data was collected over four semesters there was little attempt to retain subjects, and, therefore, attrition was still a problem. Only 32% of the original sample was retained for follow-up. Sample selection was also a concern in this study. Students selected their level of the treatment by registering for the different courses. It may have been that students who were already active or interested in becoming active would register for activity courses.

Course Structure

Another limitation was the structure of the course taught by different instructors. Though implementation was controlled to a degree, it was not controlled for perhaps the most important parts of the intervention: reading the assigned topics and completing assignments. The current course includes multiple sections, all of which include the same material. Instructors were assigned to the lecture courses before the study began, and the researcher was unable to teach the content in the lecture sections.

Length of Intervention

Time available for the intervention was a limitation. The semester system at Colorado State University allows for sixteen weeks of instruction. Two of the 15 weeks were taken-up by exams. This means that the remaining 13 weeks were available for lesson content. With four constructs as the focus of the intervention, it was difficult to decide which constructs would hold more weight in the lessons. Data collection occurred during class time in the first and last weeks of the semester. Some of the courses met twice per week, and others met three times per week. If students were absent on these days, they did not complete a post-test survey. It is recommended that future similar studies have at least two days of data collection scheduled with instructors to allow for maximum subject retention.

Subject Attrition and Outcomes of the Study

Many subjects dropped out of the study during the semester, which fell between the pre-test and post-test. Had they been retained, the mean score used for analysis could have been higher. This might have led to less of a difference between groups at post-test.

Power, Effect Size, and Practical Significance

Power is an important idea to discuss when interpreting the statistical findings of this study. Since sample size was not a concern (n=409), it is necessary to discuss the power of the statistical tests in detecting a difference between means. Statistical power is dependent on several items: sample size, alpha level, and effect size, as well as other things, such as the sensitivity of the measures (Murphy & Myors, 1998). If there are a large number of subjects, one is likely to find many statistically significant differences, regardless of magnitude. On the other hand, it is also possible that large differences will

not be statistically significant if there are a small number of subjects. The attrition rate of the students was more of a concern than sample size. Alpha level also affects power.

In this study, alpha was set at .05. If alpha were set to a more strict level, such as .01 or .001 instead of .05 then power is typically lower, and the chance of making a Type II error increases, but the chance of making a type I error is decreased. This study used the social science standard of .05 for alpha, but effect size calculations were run for any *p* value less than .10.

Recommendations

Implications for Practice

Each of the limitations described above have implications for practice. One of the most important implications is in regards to maintaining the size of the study population throughout the intervention and maintaining the integrity of the post-survey data.

The results of this study are important for health promotion practitioners for several reasons. First, the findings indicate that the students are already physically active and eat well. It may be more advantageous to target those students who are not physically active and to plan physical activities so that these participants' adherence rates are enhanced, so that the programs are more successful, and student health can be improved. Some ideas for physical activity interventions include campus walking tours, greater intramural sports participation, or educational interventions that focus on awareness of the benefits of regular physical activity. Although physical activity is higher on the weekdays, the weekends should not be overlooked. Participation in outdoor recreation, sports tournaments, and various fundraisers such as car washes and fun-run/walks are excellent ways to encourage students to increase their physical activity on the weekends.

Second, because physical activity differs from weekday to weekend (Behrens & Dinger, 2003), it is important for practitioners to collect data that assesses an entire week (Monday to Sunday). The PWP just asks about physical activity throughout the week. As Behrens and Dinger indicate (2003), physical activity decreases during the weekends. Recall during the assessment may not include activities such as hiking in the mountains or bike riding through town as physical activities. Collecting data in this manner is critical when examining physical activity as part of a needs assessment, conducting an impact evaluation of a physical activity program, or attempting to explain patterns of physical activity in the college student population.

Third, if male and female college students do not differ in moderate physical activity, then it may not be necessary to offer gender specific physical activity interventions. Unisex programming that integrates males and females possibly would reduce physical activity gender disparities that may exist based on the students perceptions of gender roles. This may reduce cost for those colleges that have unisex programs by integrating activities that target the entire student population.

Eating breakfast has been proven to improve concentration, problem solving abilities, mental performance, memory and mood (Brevard & Ricketts, 1996). Attributes of the breakfast meal, such as its composition, size, and time of consumption, can induce several metabolic alterations, including changes in blood glucose, insulin, and neurotransmitter concentrations, and therefore it is plausible that characteristics of the meal itself may influence cognitive function (Pollitt & Mathews, 1998). Although course performance was not assessed, future research may include course performance and breakfast consumption of students in the course.

Prevention efforts related to college drinking may need to start in high school. Students who used alcohol in their senior year of high school ran significantly higher risks of consuming large amounts of alcohol and demonstrating alcohol problems in college than those who did not use alcohol in their senior year of high school (Baer, Kivlahan, Marlatt, 1995). If alcohol use behaviors can be effectively reduced while youths are still in high school, or if the onset of these behaviors can be significantly delayed, students' chances of becoming involved in heavy drinking and developing severe alcohol problems may decrease. The high prevalence of students who may be showing signs of alcohol problems should draw attention from college administrators and alcohol/ substance abuse treatment providers. Additional assessment services and more readily available treatment services may be required to address college students' treatment needs.

The curriculum may also be impacted by applying principles of patient treatment matching. "Patient-treatment matching" refers to matching intervention strategies with characteristics of an individual or group. Targeted information may not be equally appropriate for every individual or an identified group and may not address the unique needs, interests, and concerns of each individual (Kreuter, Bull, Clark, & Oswald, 1999). The rationale for patient-treatment matching is that individuals are at different stages of readiness to change their behavior, and, therefore, interventions should differ depending on the individual's stage of readiness.

Differentiation Provided through the Transtheoretical Model

Health-related habits develop early in life. The period during junior high school is especially important for developing these habits and also presents a window of

vulnerability for initiating behaviors related to smoking, drug use, and sexual risk taking (Cohen, Brownell, & Felix, 1990; Taylor, 1999). Because adolescent behaviors may be better predictors of disease after age 45 than adult health behaviors, interventions with children and adolescents are important (Taylor, 1999). Few of us emerge from adolescence with ideal health habits. Thus, mastering behavior change after adolescence is critical to our quality of life as adults.

Countless individuals have initiated behavior changes only to relapse after a few weeks, months, or years. To be successful, behavior change must be maintained, and this requires considerable time, effort, and energy. Behavior change is often measured primarily in terms of getting started. The struggle to overcome inertia often seems so great that people assume it must get easier from that point on. This is seldom true. To accomplish permanent changes in habits, many tools are needed.

Prochaska and colleagues studied the business of behavior change for over two decades and developed the Transtheoretical Model (Prochaska, DiClemente, & Norcross, 1992; Prochaska, Norcross, & DiClemente, 1994; Prochaska, Redding, & Evers, 1997). Their work revealed that behavior change evolves through different stages:

Stage 1—Precontemplation: Individuals in this stage do not believe they have a problem and have often constructed defenses that aid in denial of the problem.

Stage 2—Contemplation: Individuals acknowledge having a problem and begin to deliberately increase awareness and knowledge related to the problem.

Stage 3—Preparation: Before initiating behavior change, individuals should reevaluate themselves with respect to the problem, develop commitment to change, and construct a

detailed plan for change. By the time they reach this stage, individuals begin to perceive greater benefits than barriers to change.

Stage 4—Action: Behavior change is initiated. Others are likely to recognize a person's progress toward change. After at least 6 months in the action stage, the person may move into the fifth stage.

Stage 5—Maintenance: Though change is maintained more easily now, some vigilance is still required to avoid slips or setbacks. If and when the change becomes so automatic that there is no possibility of reverting to a former behavior, the goal--"Termination"--is reached.

Regression occurs when individuals revert to an earlier stage of change. Relapse is one form of regression, involving regression from Action or Maintenance to an earlier stage. People can regress from any stage to an earlier stage, however. The bad news is that relapse tends to be the rule when action is taken for most health behavior problems. The good news is that for smoking and exercise only about 15% of people regress all the way back to the Precontemplation stage. The vast majority regresses to Contemplating or Preparation.

Some researchers have used concepts of relapse prevention to help new exercisers anticipate problems with adherence. Factors that contribute to relapse include negative emotional or physiologic states, limited coping skills, social pressure, interpersonal conflict, limited social support, low motivation, high-risk situations, and stress. Principles of relapse prevention include identifying high-risk situations for relapse (e.g., change in season) and developing appropriate solutions (e.g., finding a place to walk inside during the winter). Helping people distinguish between a lapse (e.g., a few days of not

participating in their planned activity) and a relapse (e.g., an extended period of not participating) is thought to improve adherence.

Processes of Change are the covert and overt activities that people use to progress through the stages. Processes of Change provide important guides for intervention programs, since the processes are the independent variables that people need to apply, or be engaged in, to move from stage to stage.

The Transtheoretical Model is an appropriate model for the *recruitment* of an entire population. Traditional interventions often assume that individuals are ready for an immediate and permanent behavior change. The recruitment strategies reflect that assumption, and, as a result, only a very small proportion of the population participates. In contrast, the Transtheoretical Model makes no assumption about how ready individuals are to change. It recognizes that different individuals will be in different stages and that appropriate interventions must be developed for everyone. As a result of the differentiation provided through the Transtheoretical Model, very high participation rates have been achieved.

Significance

Statistical significance means that the observed mean differences are not likely due to sampling error. Is there a statistical significance, even with very small population differences or if the sample size is large enough? It is a substantive issue with no practical way to judge the outcome. Practical significance looks at whether the difference is large enough to be of value in a practical, realistic sense. Significance for this study may not have been achieved in the statistical sense, but a fair amount of practical significance may be more measurable. Practical significance cannot be measured in statistical outcomes but

is measured one person at a time. Even though significance was low in this study, in reality, if one person changes from an unhealthy behavior to a healthy behavior, then the intervention (course) was successful. Changing a behavior for the better alleviates the need for possible health interventions as the person becomes older.

Future Research

Students who participated in this study were assessed from their answers on the PWP. They were not evaluated for placement in a particular stage of change. Because of the times of year the PWP was administered, for example at end of the calendar year, students may have been in a stage ready to change a behavior, and the researcher was not aware of it. Future research should still be based on the Personal Wellness Profile, but the focus on students should be staged base. This ensures identification of which student is in what particular stage and then measures the significance of his or her behavior from that point of reference.

In order to stage-base a person, a questionnaire should be included with the PWP. This questionnaire should include questions such as "are you physically active?", "if not, are you considering becoming active within the next month, six months, or year?" Based on these answers, the researcher can place the respondent in the stage that suits him or her. Efforts to move people through the different stages can be focused on each specific stage with different tools, such as newsletters, to suggest different ways to become more physically active.

Since the mean age of the students was 19.3 years, most students were freshmen. This means that most students have just recently moved out of their parents' homes and moved into residence halls on campus. At this age and time of the semester, most

students have not formed any ideas about what a healthy lifestyle is. Application of the PWP should not take place in the fall semester. Administering the PWP in the spring semester would insure better participation rates and insure higher inter-reliability of answers on the PWP.

Practical implications of the study are twofold. First, more research is urgently needed to assess the nature of diet, physical activity, and clinical risks for obesity and the metabolic syndrome (a cluster of metabolic dysfunctions that predispose one to risks for cardiovascular disease and type 2 diabetes) in college students. Additional clinical and epidemiologic studies, using both quantitative and qualitative approaches, can also help researchers and clinicians better understand methods to modify those risk factors. Second, both population-based and well-controlled clinical intervention studies are needed in this age group. Campus student health centers provide an excellent opportunity to provide a central testing location with an experienced staff to be a liaison between researchers and students, to act as leaders in distributing health education information, and to offer medical expertise in clinical intervention studies.

None of the work here indicates that the course has a negative impact on students. Even though no changes in behavior were evident by the data in this study, the results provide the groundwork for future development of curricula to promote healthy behaviors in college students. Future studies or a future curriculum examining physical activity patterns of college students should utilize larger samples to examine daily activity over longer periods of time to assess the efficacy of these findings. A longitudinal follow-up is also needed to assess the long term effectiveness of the course.

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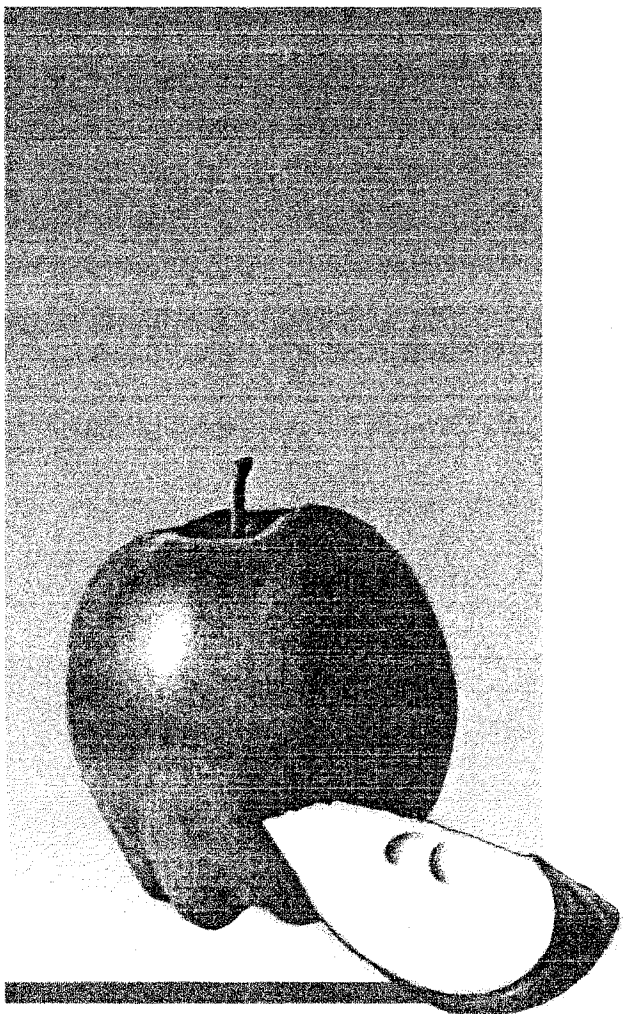
APPENDIX A

Personal Wellness Profile

Personal Wellness profile



questionnaire

Personal Wellness Profile

Section A: Biographical Information

Instructions: Read each question carefully. Then, using a pencil, indicate your answer by filling in the circle that best describes your present health status. To process your report accurately, please include your age, height (with shoes off), weight (in light clothing and no shoes), gender and body build. Then go on to sections B, C, and D. We want you to know that the personal information you share will remain just that, personal. Your confidentiality will be respected. Remember to use a soft lead pencil.

Example:
How often do you exercise?

- ○ Never
- ○ 1-2 times/week
- ● 3-4 times/week
- ○ 5+ times/week

USE BLACK INK OR #2 PENCIL ONLY

- Use a No. 2 pencil only
- Erase changes cleanly
- Marks should fill the circle completely

Proper Mark ● **Improper Marks** ⊗ ✓ ○ —

FILL IN ADDRESS BELOW — PRINT CLEARLY

Name _____

Address _____

City/State/Zip _____

Phone (H) _____ (W) _____

Company Name _____

LAST NAME-SPACE-FIRST NAME

DATE TODAY — Mo | Day | Year

Personal ID number or SOCIAL SECURITY #

GENDER

① Male

② Female

If pregnant or nursing, put pre-pregnant weight.

AGE (yrs)

HEIGHT — ft | inch

BODY BUILD

① *Small* - thin narrow build

② *Medium* - most people

③ *Large* - stocky, muscular build

WEIGHT lbs.

GROUP I.D. NO.

Please do not mark in this box

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Section B

Personal History

Indicate your answer by filling in the circle with a pencil.

1. **Ethnic background.** (Optional)
   - ① Caucasian (white)
   - ② African American (Black)
   - ③ Asian
   - ④ Hispanic
   - ⑤ Native American
   - ⑥ Other

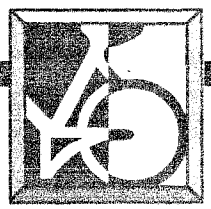
2. **Family income** level per year. (Optional)
   - ① Less than $10,000
   - ② $10,000-$14,999
   - ③ $15,000-$19,999
   - ④ $20,000-$29,999
   - ⑤ $30,000-$44,999
   - ⑥ $45,000 or more

3. **Family Health History.** Have any of your family members (parent, brother, sister) ever had any of the following health problems? If yes, fill in circle for each problem. If not, leave blank.
   - ○ High blood pressure
   - ○ Bowel cancer
   - ○ Breast cancer
   - ○ Diabetes
   - ○ Heart attack or die suddenly before age 55

4. **Personal Health History.** Has a physician informed you that you currently have one of the health problems listed below? If yes, fill in circle for each problem. If not, leave blank.
   - ○ Cancer within the last 7 years
   - ○ Coronary heart disease/surgery or heart attack
   - ○ Diabetes, high blood sugar
   - ○ High blood pressure
   - ○ High blood cholesterol
   - ○ Stroke or partially blocked blood flow to head or legs

5. **Current Symptoms.** Indicate any symptoms you may have experienced recently. Fill in circle for each current symptom. If not, leave blank.
   - ○ Chest pain/discomfort
   - ○ Unusual shortness of breath
   - ○ Unexplained dizziness
   - ○ Persistent hoarseness or cough
   - ○ Significant unexplained weight loss
   - ○ Passing blood in stool
   - ○ Obvious change in a mole
   - ○ Unexplained change in bowel or bladder habits
   - ○ A sore that does not heal
   - ○ Unusual bleeding or discharge
   - ○ Thickening or lump in breast
   - ○ Unusual indigestion or difficulty in swallowing
   - ○ Frequent back pain

   If you have any of the above symptoms, please discuss them with a physician.



Exercise Level

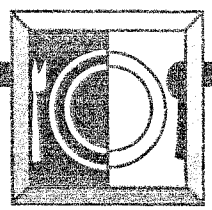
6. **Aerobic exercises.** How many times per week do you engage in aerobic exercise of at least 20-30 minutes duration (activities such as cycling, swimming, aerobic dance, jogging, active sports, brisk walking, and sustained vigorous work)?
   - ① Don't have a regular exercise program
   - ② Once per week
   - ③ Twice per week
   - ④ Three or four times per week
   - ⑤ Five or more times per week

7. **Strength exercises.** How often do you do strength building exercises such as sit-ups, push-ups, or use weight training equipment?
   - ① Seldom
   - ② Once or twice per week
   - ③ Three or more times per week

Please do not mark in this box

8. **Stretching exercises.** How often do you do stretching exercises for the back, neck, shoulders or calves?
   ① Seldom
   ② Once or twice per week
   ③ Three or more times per week

9. **Exercise level.** Indicate the level of physical activity you would like to follow in your exercise program.
   ① *Easy level* -You're in good health and wish to start or simply maintain an easy program.
   ② *Moderate level* -You're in good health and used to regular exercise, but not ready for or interested in vigorous activity.
   ③ *Vigorous level* -You're in excellent health, getting regular exercise, and want to participate in vigorous activities and maintain high fitness levels.
   ④ *Not able* -You're not able to exercise due to current health problem or disability.



Eating Habits

10. **Weight.** How do you feel about your present weight?
   ① Weight is about right, no desire to change
   ② Overweight, would like to trim down
   ③ Overweight, but not interested in changing
   ④ Underweight

11. **Meat/Protein foods.** Indicate the kinds of meat/protein foods you usually eat.
   ① Eat regular cuts of red meat, hamburgers, weiners, and luncheon meats
   ② Eat a mixture of regular meats and some poultry or fish
   ③ Eat only lean meats, skinless poultry, or fish
   ④ Eat very little red meat, mostly white meat of poultry or fish
   ⑤ Seldom or never eat meat; eat vegetable proteins

12. **Dairy products/Eggs.** Indicate the kinds of dairy products you usually eat.

   High fat dairy products include: ice cream, sour cream, yellow cheese, whole milk, eggs, and butter.

   Low fat dairy products include: skim milk, low fat yogurt or cottage cheese, egg whites or egg substitutes.

   ① Nearly always eat the high fat products
   ② Eat mostly the high fat products, some low
   ③ Eat both about the same
   ④ Eat primarily low fat products, some high fat
   ⑤ Eat only low fat products or none at all

13. **Desserts.** Indicate the kinds of desserts you usually eat. (If you rarely eat desserts, mark number 5 below).

   High fat desserts include: cake, donuts and pastry, pies, ice cream, custards, chocolate.

   Low fat desserts include: fruit salads, gelatins, melons, grapes, dried fruit, home baked goods using vegetable oil moderately

   ① Nearly always eat the high fat products
   ② Eat mostly the high fat products, some low
   ③ Eat both about the same
   ④ Eat primarily low fat products, some high fat
   ⑤ Eat only low fat products or none at all

14. **Cooking fats/Food preparation.** Indicate the way you usually prepare food, or the kind of food you like to eat.

High fat methods: Frying, deep fat frying, primarily use shortening, frequently add butter or other fats to foods for flavoring, use regular amount of fat called for in recipes, and creamy dressings.

Low fat methods: Broil, bake, or boil. Primarily use vegetable oil (sparingly), flavor food with seasonings, keep added fat very low in cooking, and use low fat dressings.

① Food nearly always cooked the high fat way
② Food mostly cooked the high fat way
③ Food cooked both ways about the same
④ Food cooked primarily the low fat way
⑤ Food prepared only the low fat way

15. **Breads and grains.** Indicate the kind of breads you usually eat.

Refined grain products - White bread, rolls, biscuits, crackers, regular pancakes and waffles, white rice, typical breakfast cereals, typical baked goods.

Whole grain products - Whole grain breads, rolls, whole grain pancakes and waffles, whole grains used in baked goods, brown rice, oatmeal and other whole grain cereals such as Shredded Wheat.

① Nearly always eat refined grain products
② Eat mostly refined grain products
③ Eat both about the same
④ Eat primarily whole grain products
⑤ Eat only whole grain products

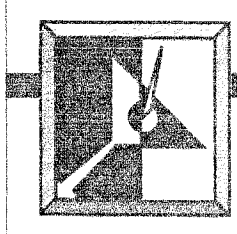
16. **Fruits and vegetables.** How often do you eat fruits and vegetables?
① Five or more servings per day
② Four servings per day
③ Three servings per day
④ Two servings per day
⑤ One serving or less per day

17. **Fast foods.** How often do you eat fast food meals such as hamburgers, tacos, fried chicken, hot dogs, french fries, milk shakes, etc.?
① Nearly every day
② Several times per week
③ Few times per month
④ Seldom or never

18. **Salt.** How often do you eat salt/salty foods (chips, pickles, soy sauce, added salt at table)?
① Seldom or never
② Occasionally
③ Regularly
④ Frequently, like salty foods

19. **Breakfast.** How often do you eat breakfast (more than a roll and coffee)?
① Eat breakfast every day
② Almost every day
③ Sometimes
④ Rarely or never

20. **Snacks.** How often do you eat typical snack foods (chips, pastry, soft drinks, sweets) between meals (don't forget evening snacks)?
① Three or more times per day
② Once or twice per day
③ Few times per week
④ Rarely or never



Alcohol/Drugs

21. **Drinking.** In the **past two weeks** on how many days did you drink any alcoholic beverages such as beer, wine, or liquor?
① Did not drink in past year
② None in past two weeks
③ One to three days
④ Four to six days
⑤ Seven to ten days
⑥ Eleven to fourteen days

22. **Number of drinks.** In the **past two weeks** on the days that you drank an alcoholic beverage, how many drinks did you have per day on the average?
① Did not drink in the past year
② None in the past 2 weeks
③ One drink
④ Two drinks
⑤ Three to four drinks
⑥ Five or more drinks

23. **Drugs.** How often do you use drugs or medications that affect your mood, help you relax, or sleep?
① Frequently, every week
② Sometimes, monthly
③ Rarely, few times per year
④ Never

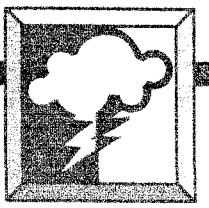
24. **Drug interactions.** When taking medications, are you careful to tell your physician about other drugs you are taking, and to abstain from alcohol in order to avoid harmful drug interactions?
① Yes, very careful about this
② No, not too careful about this
③ Didn't know about drug interactions

25. **Caffeine.** How many caffeine containing drinks do you usually drink per day? (coffee, tea, colas)
① None
② One per day
③ Two to three per day
④ Four to five per day
⑤ Six or more per day

26. **Smoking status.** Mark the appropriate response.
① Have never smoked
② Quit smoking, 10 years or more ago
③ Quit smoking, less than 10 years ago
④ Smoke pipe or cigar only
⑤ Smoke less than 10 cigarettes per day
⑥ Smoke 10 or more cigarettes per day

27. **Smokeless tobacco.** Do you use smokeless tobacco?
① Yes
② No

Stress/Coping



28. **Stress/Coping status.** Mark the response that describes how you feel you are currently coping with life.
① Seldom stressed, coping very well
② Sometimes stressed, coping fairly well
③ Often stressed, trouble coping at times
④ Heavily stressed, often have trouble coping
⑤ Excessively stressed, unable to cope

29. **Stress signs.** Mark any stress signal listed below that you currently feel applies to you. If any stress signal is present, fill in circle. If not, leave blank.
○ Minor problems throw me for a loop
○ I find it difficult to get along with people
○ Nothing seems to give me pleasure
○ I am unable to stop thinking about my problems
○ I feel suspicious and mistrustful much of the time
○ I feel trapped and/or inadequate most of the time

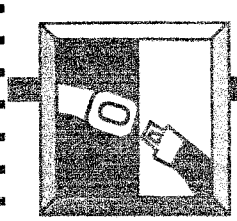
30. **Energy level.** Have you felt tired, worn out, used-up, or exhausted during the past month?
① The majority of the time
② Less than half of the time
③ Only occasionally
④ Seldom or never

31. **Sleep.** On the average, how often do you get at least 7-8 hours of sleep each day?
① Nearly all the time
② Majority of the time
③ Less than half the time
④ Only occasionally

32. **Happiness.** All in all, how happy are you these days?
① Very happy
② Pretty happy
③ Not too happy
④ Very unhappy

GO to question 33.

33. **Social support system.** In general, how strong are your social ties with family and friends? (Someone with whom to share problems/joys or get help if needed.)
① Have strong family/friend social support
② Have some family/friend social support
③ Have little family/friend social support
④ Have no close family/friend available



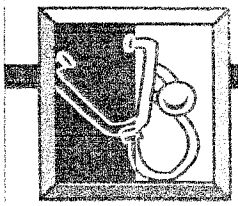
Safety

34. **Seat belts.** When driving or riding in a car, how often do you wear a seat belt?
① Always
② Majority of the time
③ Less than half the time
④ Only occasionally

35. **Smoke detector.** Does your home have a working smoke detector near your sleeping area?
① Yes
② No

36. **Lifting.** When lifting heavy objects, how often do you make sure to use correct lifting techniques? (Keep object close to body, bend at hips and knees, keep back in normal arched position with head and shoulders up, lift with legs.)
① Always
② Majority of the time
③ Less than half the time
④ Only occasionally
⑤ Seldom or never
⑥ Don't know correct lifting technique

37. **Drinking and driving.** During the past year, how many times did you drive when you perhaps had too much to drink?
① Never drink, or never drive after drinking
② Once
③ Twice
④ More than twice



Medical Care

38. **Office visits.** How many visits have you made during the past 12 months to a physician's office, emergency room, psychiatrist, psychologist, chiropractor or other health care professional?
① None
② One
③ Two
④ Three to five
⑤ Six to nine
⑥ Ten or more

39. **Sick days.** How many days did you miss from work due to sickness or injury during the past 12 months?
① None
② One to three days
③ Four to six days
④ Seven to nine days
⑤ Ten to thirteen days
⑥ Fourteen or more days

40. **Hospital days.** How many days did you spend in the hospital due to sickness or injury during the last 12 months?
① None
② One day
③ Two days
④ Three days
⑤ Four to six days
⑥ Seven or more days

41. **Blood pressure.** Indicate your usual blood pressure.
① Low normal, 120/80 or below
② Fair/Average, (121-139)/(81-89)
③ Moderately high, (140-159)/(90-94)
④ High 160/95 or higher
⑤ Don't know

42. **Cholesterol.** Indicate your usual blood cholesterol level.
① Low normal, 180 or below (Less than 4.7 mmol/L)
② Fair/Average, 181-199 (4.7-5.17 mmol/L)
③ Moderately high, 200-239 (5.2-6.2 mmol/L)
④ High, 240 or higher (Greater than 6.2 mmol/L)
⑤ Don't know

43. ○ Mark here if you don't have a personal physician.

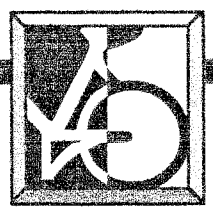
① Yes
② No (if no, skip to section C)

45. If yes, indicate how many times.
① One
② Two
③ Three
④ Four
⑤ Five or more

46. Mark any changes or improvements you've made since the last time you completed this questionnaire.
○ Get more exercise
○ Eat less fat and fatty foods
○ Eat more fiber-rich foods; fruits, vegetables, legumes, whole grains
○ Lost weight (5 or more pounds)
○ Started wearing seatbelts regularly
○ Have fewer alcoholic beverages
○ Lowered my blood cholesterol level (5 or more points)
○ Lowered my blood pressure (5 or more points)
○ Stopped smoking
○ Cope better with stress
○ Have had fewer sick days

Section C:

- Exercise Preference



Mark those activities you would most enjoy. (Mark up to 5)

1 ○ Aerobics to music
2 ○ Active sports
3 ○ Backpacking/hiking
4 ○ Bicycling, easy pace
5 ○ Bicycling, fast pace
6 ○ Canoeing/rowing
7 ○ Calisthenics
8 ○ Handball, squash
9 ○ Ice skating
10 ○ Jogging, easy pace
11 ○ Racquetball
12 ○ Rope skipping
13 ○ Running (faster than jogging)
14 ○ Skiing, cross country
15 ○ Skiing, downhill
16 ○ Stationary cycling
17 ○ Swimming
18 ○ Tennis
19 ○ Walking briskly
20 ○ Weight lifting/circuit training
21 ○ Wood chopping
22 ○ Work, hard sustained (lifting, carrying, shoveling)

Section D:

Health Interest Survey

Mark those activities you would like to be personally notified about if they were available.

1 ○ Stop smoking program
2 ○ Weight control
3 ○ Aerobic exercise to music
4 ○ Join a walking group
5 ○ Join a jogging group
6 ○ Take a fitness evaluation
7 ○ Nutrition education class
8 ○ Cholesterol reduction program
9 ○ Blood pressure control
10 ○ Coronary risk screening/education
11 ○ Cancer risk reduction
12 ○ Alcohol/drug education
13 ○ Healthy back program
14 ○ Medical self care
15 ○ Stress management
16 ○ CPR training
17 ○ First Aid
18 ○ Comprehensive health/fitness evaluation
19 ○ Attend brown bag (lunch time) health seminars
20 ○ Women's health program
21 ○ Relationship enrichment
22 ○ Communication skills

23 Please indicate if you consent to being personally notified of intervention programs related to your health risks (all health information is kept confidential).
① Yes
② No

Please take a moment to make sure all questions are answered and marked correctly.

Thank you.

Please do not mark in this box

APPENDIX B

Course Syllabus

The Department of Health and Exercise Science
EXCC 145 Health and Wellness

Instructor:

Number of Credits: 3 (3-0-0)

Prerequisites: Credit not allowed for EX 143 and EX 145

Enrollment Priority: 1) Health and Exercise Science
2) Human Development and Family Studies

Course Description:

The purpose of this course is to provide a continuum of learning which enables people, as individuals and as members of social structures, to voluntarily make personal decisions, modify lifestyle practices, and change social conditions in ways which are health enhancing ***(objective 5).*** Individuals can be taught to assume responsibility for their own health and wellness and, to some extent for the health of others, and this assumption of responsibility in turn brings about changes in their behaviors and lifestyles. The holistic approach to health and wellness is integrated within course content and represents a synthesis of facts, principles, and concepts drawn from biological, behavioral, sociological, and health sciences, and interpreted in terms of human needs, human values, and human potential ***(objectives 1, 2 & 3)***.

The subject matter is presented in a conceptual approach to the core competencies in the study of health and wellness. Course content is predicated on three key concepts: growing and developing, decision making, and interaction ***(objective 4 & 6)***.

** (Objectives) Academic Core Curriculum Health and Wellness Objectives 1-6*

Assumptions

1) Growth and development influences and is influenced by the structure and functioning of the individual.
2) Growing and developing follows a predictable sequence, yet is unique for each individual.
3) Protection and promotion of health and wellness is an individual, community, and international responsibility.
4) The potential for hazards and accidents exists, whatever the environment.
5) There are reciprocal relationships involving men/women, disease, and environment.
6) The family serves to perpetuate man and to fulfill certain needs.
7) Personal health and wellness practices are affected by a complexity of forces, often conflicting.
8) Utilization of health and wellness information, products, and services is guided by values, perceptions, and the ability to use quantitative and qualitative data to analyze such resources.
9) Use of substances that modify mood and behavior arises from a variety of motivations.

10) Food selection and eating patterns are determined by physical, social, mental, economic, and cultural forces.

Course Objectives: This course allows students the opportunity to explore wellness at personal, cultural and societal levels, and to gain new or enhanced insights into health and wellness. Upon completion of this course students should be able to:

1. Define the multiple dimensions of wellness.
2. Describe the multiple factors that influence health and well being.
3. Identify individual choices in response to wellness in order to set personal goals.
4. Analyze current personal and societal health attitudes and beliefs.
5. List personal and cultural risk factors that can potentially impact one's individual health and wellness.
6. Critique written health publications and websites for accurate and credible consumer health information.
7. Continue study in the health and exercise science profession as a career choice.

Required Text:

Insel, P.M. & Roth, W.T. (2004). Core Concepts in Health (9^{th} ed.). San Francisco, CA: McGraw Hill Publishers.

Course Evaluation:

4 Exams @ 100 points each = 400 points

A= 90- 100% (360 - 400 pts.)
B = 80- 89% (320 - 359 pts.)
C = 70 -79% (280 – 319 pts.)
D = 60 - 69% (240 – 279 pts.)
F = 59% or below (< 240 pts.)

Exams:

All exams will be worth 100 points for a total of 400 points for the semester. Exams 1-3 will be given during the regular semester. Test questions will be constructed from: a) lecture information, b) assigned readings, c) possible guest lecturers, and d) audiovisual presentations. The only exam date that is NOT flexible is the final (Exam 4). All others are subject to rescheduling depending on the progression of the lectures.

Lecture Schedule

Week	Topic
1	Introduction Taking Charge of Your Health Stress: The Constant Challenge
2	Stress: The Constant Challenge Psychological Health
3	Health Care Self-Care
4	Intimate Relationships **Exam 1**
5	Sex and Your Body Contraception
6	Abortion Use and Abuse of Psychoactive Drugs
7	Nutrition Basics **Exam 2**
8	Nutrition Basics Exercise for Health and Fitness
9	Weight Management Cardiovascular Health
10	Cardiovascular Health Cancer
11	Cancer Immunity and Infection
12	Sexually Transmitted Infections **Exam 3**
13	Responsible Use of Alcohol-Pam McCracken Personal Safety
14	Aging: A Vital Process Death and Dying

15	Toward a Tobacco Free Society-Gwen Sieving Environmental Health
16	**FINAL EXAM**

APPENDIX C

Human Subjects Approval Letter

Colorado State University

Office of Regulatory Compliance
Office of Vice President for Research
and Information Technology
Fort Collins, CO 80523-2011
(970) 491-1563
FAX: (970) 491-2293

MEMORANDUM

TO: Cathy Kennedy, Health & Exercise Science, 1582

FROM: Janell Meldrem, Administrator for the
Human Research Committee

SUBJECT: PROJECT APPROVAL
Title: Administration of the National College Health Association's College Health Assessment
Protocol No.: 03-218H
Funding Agency: N/A

DATE: September 25, 2003

I am pleased to inform you that the above-referenced project was approved by the Human Research Committee on August 25, 2003 for the period August 25, 2003 to July 23, 2004. Because of the nature of this research, it will not be necessary to obtain a signed consent form. The requirement of documentation of a consent form is waived via § 46.117 (c)(2) and parental consent is waived under § 46.116 (d). However, all subjects must receive a copy of the approved cover letter printed on department letterhead.

A status report of this project will be required within a 12-month period from the date of approval. You will be sent a reminder approximately two months before the protocol expires. The Principal Investigator will report on the numbers of subjects who have participated this year and project-to-date, about problems encountered, and provide a verifying copy of the consent form or cover letter used. The necessary form (H-101) is available from the Regulatory Compliance web page (see below). Should the protocol not be renewed before expiration, all activities must cease until the protocol has been re-reviewed.

It is the responsibility of the investigator to immediately inform the Committee of any serious complications, unexpected risks, or injuries resulting from this research. It is also the investigator's responsibility to notify the Committee of any changes in experimental design, participant population, or consent procedures or documents. This can be done with a memo which completely describes the changes and their consequences (new consent form or cover letter, or altered survey instrument, for example). Students serving as Co-Principal Investigators may not alter projects without first obtaining PI approval. The PI is ultimately responsible for the conduct of the project.

This approval is issued under Colorado State University's OHRP Federal Wide Assurance 00000647 issued July 1, 2001. If approval did not accompany a proposal when it was submitted to a sponsor, it is the researcher's responsibility to provide the sponsor with the approval notice.

Please direct any questions about the Committee's action on this project to me for routing to the Committee. Additional information is available from the Regulatory Compliance web site at www.research.colostate.edu/rcoweb