

HEALTH BEHAVIORS AND LIFE SATISFACTION IN COLLEGE STUDENTS

by

ROBERT FRANCIS PETTAY

B.S., Emporia State University, 1985

M.S., Kansas State University, 1993

M.S., Kansas State University, 1994

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Special Education, Counseling, and Student Affairs
College of Education

KANSAS STATE UNIVERSITY

Manhattan, Kansas

2008

ABSTRACT

This study explored the relationship between a variety of health behaviors and life satisfaction in college students. University students ($N=794$) enrolled in a midwestern university during the Fall, 2006 and Spring, 2007 semester, completed an online Health Behavior Assessment designed to measure body mass index (BMI), frequency of physical activity behavior, fruit and vegetable consumption, sleep behavior, alcohol use, frequency of use of stress-management skills, stage of change for physical activity, stage of change for fruit and vegetable consumption, stage of change for frequency of stress-management skills, and life satisfaction. As predicted, significant correlations were found between life satisfaction and BMI, frequency of physical activity, fruit and vegetable consumption, and frequency of use of stress-management skills. Students who regularly received 6-8 hours of sleep showed higher levels of life satisfaction. Students in the maintenance stage of change for physical activity behavior and stress-management skill use were found to have higher levels of life satisfaction compared to individuals in earlier stages of change. Results indicated that increased life satisfaction is related to a variety of health behaviors in college students.

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CHAPTER ONE

INTRODUCTION

College is a crucial time of transition when students develop and integrate health-related behaviors into their lives (Paffenbarger, Hyde, Wing, & Hsieh, 1986). College life can be demanding and stressful for a new student (Noel, Levitz, & Saluri, 1985). Makrides, Veinot, Richard, McKee, and Gallivan (1998) reported 60% of college students rated stress levels as high or very high, and Abousiere (1994) found 80% of college students reported feelings of moderate stress. College is also a time that requires more independence, initiative, and self-regulation of behaviors (Bryde & Milburn, 1990). The college student not only faces academic challenges, but also challenges to maintaining healthy behaviors in this new environment. Although a number of authors (Noel et al., 1985; Miley & Frank, 2006; Trockel, Barnes, & Egget, 2000) have examined the challenges a new student faces when beginning college life (e.g., alcohol use, sleep, weight gain, stress), there is limited research on the relationship between health behaviors such as physical activity, diet, stress, sleep, alcohol use, and ratings of life satisfaction in this population.

Life satisfaction has been defined as “a global assessment of a person’s quality of life dependent on the values and criteria deemed important by the individual” (Shin & Johnson, 1978, p. 478). Life satisfaction along with positive and negative affect are the components of Subjective Well-Being (SWB, Andrews & Withey, 1976). Subjective well-being is a way of defining a good life, and is often referred to as happiness. People who experience abundant SWB have many pleasures and few pains, and they feel satisfied with their lives (Diener, 2000). Previous research (Diener, Suh, Lucas, & Smith, 1999) has found college students consider happiness and life satisfaction to be extremely important, and there is evidence that increased life

satisfaction impacts academic performance in college students (Rode et al., 2005). Research has shown increased life satisfaction and happiness may be related to goal progression (Emmons, 1986), close social relationships (Myers, 2000), and being involved in flow activities (Csikszentmihalyi, 1997).

Life satisfaction has a variety of influences. Personality (Costa, 1994), culture (Shimmack, Diener, & Oishi, 2002), weight (Ball, Crawford, & Kenardy, 2004), alcohol use (Murphy, McDevitt-Murphy, & Barnett, 2005), stress (Schnohr, Kristensen, Prescott, & Scharling, 2005), and physical activity (Valois, Zullig, Huebner, & Drane, 2004b) have been shown to be related to life satisfaction in different populations. With an increased emphasis on “positive psychology” (Luthans, 2002), there has been a growing interest in examining how different behaviors and situations influence life satisfaction, and how life satisfaction may be related to outcomes such as academic performance, retention, and positive student experiences.

Significance of the Study

College is a major transition period in life, and health-related behaviors developed during the college experience have a long-range impact on lifetime health and fitness (Paffenbarger et al., 1986). Students beginning college face an array of challenges that affect health, including diet behaviors, alcohol-use, stress, sleep issues, weight gain, and changes in exercise behavior. Research has demonstrated that college freshmen misuse alcohol (Miley & Frank, 2006), gain weight (Hodge, Jackson, & Sullivan, 1993), have altered sleep behaviors (Trockel et al., 2000), reduce physical activity (Bray & Born, 2004), have a pervasive feeling of being “stressed” (Rawson, Bloomer, & Kendall, 2001) and have poor dietary behaviors (Butler, Black, Blue, & Gretebeck, 2004). Behaviors such as engaging in regular physical activity, eating a healthy diet,

and getting enough sleep are known to enhance health and longevity (Weidner, Kohlmann, Dotzaurer, & Burns, 1996). With evidence that life satisfaction influences academic performance (Rode et al., 2005), there is a need to examine how different health behaviors relate to life satisfaction in college-age adults.

If health behaviors are found to be related to levels of life satisfaction, professionals who work in college student services may see the benefit of promoting healthy behaviors as an important component to a successful college experience. Research interventions designed to enhance healthy behaviors in college students may also begin to focus on both the psychological and physical health of the student. Students entering college are less physically active (Douglas et al., 1997) and more obese (Mokad et al., 1999) than ever before. Poor health behaviors, high stress levels, (Makrides et al., 1998) and an increase in complex problems such as anxiety and depression (Benton, Robertson, Tseng, Newton, & Benton, 2003) demonstrates the need for effective interventions to improve the overall college experience.

Statement of the Problem

Many college students do not practice beneficial health behaviors. Previous research has documented the benefits of healthy behaviors for reducing depression (Craft, Freund, Culpepper, & Perna, 2007), anxiety (Ekkekakis, Hall, & Petruzzello, 1999), and stress (Nguyen-Michel, Unger, Hamilton, & Spruijt-Metz, 2006), and improving academic performance (Sibley & Etnier, 2003). Research has also shown that life satisfaction is related to healthy behaviors in a number of different populations (Kelly, 2004; Rudolf & Watts, 2002; Valois, Zullig, Huebner, & Drane, 2004b), but less is known about the relationship between healthy behaviors and life satisfaction in the college student.

Purpose and Research Questions

The purpose of this study is to explore how college-student health behaviors are related to life satisfaction by examining survey responses to questions related to sleep behavior, diet, physical activity, alcohol use, weight, stress-management skills, and life satisfaction. College students face high levels of stress, and numerous issues related to alcohol use, sleep, weight, and physical activity. An understanding of how positive health behaviors affect students' mental health may provide a framework for developing more effective interventions to improve health, academic performance, and retention.

The following research questions guided the development of this study :

1. What is the level of students life satisfaction?
2. What is the relationship between various health behaviors and life satisfaction in college students?

To examine the research questions, life satisfaction and current health behaviors in a sample of 796 college students were collected using the Health Behavior Assessment (HBA; Newton, Kim, & Newton, 2006) during the Fall, 2006 and Spring, 2007 semesters. Students completed an online survey designed to measure current health behaviors and to provide students feedback to encourage future behavior change. Responses on current physical activity behavior, diet, sleep behavior, alcohol use, frequency of use of stress-management skills, body mass, and life satisfaction were examined to understand the relationship between health behaviors and life satisfaction in college students.

Hypotheses

- 1) College students' Body Mass Index will be negatively correlated with life satisfaction.
- 2) College students' frequency of use of stress-management skills will be positively correlated with life satisfaction.
- 3) College students' frequency of physical activity behavior will be positively correlated with life satisfaction.
- 4) College students' consumption of fruits and vegetables will be positively correlated with life satisfaction.
- 5) College students who have high levels of weekly alcohol use will have lower levels of life satisfaction than individuals who have no or low levels of weekly alcohol use.
- 6) College students who regularly receive 6-8 hours of sleep per night will have higher levels of life satisfaction compared to individuals who do not regularly receive 6-8 hours of sleep per night.
- 7) College students in later stages of change for physical activity, based on the Transtheoretical Model (TTM; Prochaska & DiClemente, 1982), will have higher levels of life satisfaction compared to individuals in earlier stages of change based on the TTM.
- 8) College students in later stages of change for fruit and vegetable consumption, based on the Transtheoretical Model (TTM), will have higher levels of life satisfaction compared to individuals in earlier stages of change based on the TTM.
- 9) College students in later stages of change for use of stress-management skills, based on the Transtheoretical Model (TTM), will have higher levels of life satisfaction compared to individuals in earlier stages of change based on the TTM.

Definitions

Body Mass Index: a calculation based on the height and weight of the individual used to classify weight status.

Life Satisfaction: a global assessment of a person's quality of life, dependent on the values and criteria deemed important by the individual (Shin & Johnson, 1978).

Overweight/Obese: individuals with a body mass index (BMI) over 25 are considered to be overweight, a BMI of over 30 is considered to be obese.

Physical activity: Any bodily movement produced by contraction of skeletal muscle that substantially increases energy expenditure (Howley, 2001).

Regular exercise: Exercise sessions of 3 times or more per week for 20 minutes or longer each time (Reed, Velicer, Prochaska, Rossi, & Marcus, 1997).

Stress: a substantial imbalance between demand and response capability, under conditions where failure to meet that demand has important consequences (McGrath, 1970).

Subjective Well-Being: a person's evaluative reactions to his or her life, either in terms of life satisfaction or affect (Diener & Diener, 1995).

Transtheoretical Model: a format for demonstrating individual progression, and sometimes regression, on a continuum of behavioral change along five stages (precontemplation, contemplation, preparation, action, and maintenance; Prochaska & DiClemente, 1982).

CHAPTER TWO

REVIEW OF LITERATURE

The purpose of this chapter is to review literature pertinent to the proposed study. The literature review reports on the following topics: (a) current health behaviors in college students, (b) subjective well-being, (c) life satisfaction, (d) the Satisfaction With Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985), and (E) influences on life satisfaction.

Current Health Behaviors in College Students

The first semester of the freshman year of a college student's life is an important time for making personal choices and initiating healthy behaviors. Traditional-age college students are at a developmental level where they have increased autonomy, new relationships, and the beginning of an independent identity (Newton, Kim, & Newton, 2006). This first year of college holds numerous potential pitfalls, including excessive alcohol consumption (Wechsler, Lee, Kuo, & Lee, 2000), increased stress (ACHA, 2003), sleep-behavior problems (Trockel, Barnes, & Egget, 2000), weight gain (Anderson, Shapiro, & Lundgren, 2003), and change in exercise behavior (Bray & Born, 2004). The challenges of adapting to the university setting and the alteration in health behaviors of college students can negatively impact life satisfaction and the subjective well-being of the college undergraduate (Cooke, Bewick, Barkham, Bradley, & Audin, 2006; Pagoto, Spring, Cook, McChargue, & Schneider, 2006; Vickers et al., 2004).

The term *emerging adulthood* has been proposed by Arnett (2000) to describe the culturally constructed period of extended adolescence that occurs in industrialized countries when higher education is undertaken (Dyson & Renk, 2006). Individuals in the 18 to 25 year-old range are in the age of identity exploration and do not consider themselves either adolescents or

adults. Unfamiliarity with university life and the university experience makes this transition to adulthood a challenge to the individual's personal security, need for acceptance, need for comfort (Blimling & Miltenberg, 1981), and social support network (Beck, Taylor, & Robbins, 2003). Research has shown that some college freshmen misuse alcohol (Miley & Frank, 2006), gain weight (Hodge, Jackson, & Sullivan, 1993), have altered sleep behaviors (Trochel, Barnes, & Egget, 2000), reduce their physical activity (Bray & Born, 2004), have a pervasive feeling of being "stressed" (Rawson, Bloomer, & Kendall, 2001), and have poor dietary habits (Butler, Black, Blue, & Gretebeck, 2004). These unhealthy behaviors formed during young adulthood may have a sustaining impact on health and psychological well-being across later life.

Alcohol use. Heavy drinking, defined as five or more drinks in a single setting for men, and four or more drinks in a setting for women (Wechsler, Dowdall, Maenner, Gledhill-Hoyt, & Lee, 1998), is a substantial public health problem among college students (Hingson, Heeren, Zakocs, Kopstein, & Weschsler, 2002). Although 20% of college students abstain from alcohol use, 20% drink frequently (i.e., 10 or more of the past 30 days), and 28% report being drunk three or more times in the past month (Weschler et al., 1998). To detail the impact of college-age drinking, Hingson et al. (2002) examined traffic and unintentional injury deaths from the 1998 National Highway Traffic Safety Administration and national coroner studies, college enrollment data from the Department of Education, the National Household survey on Drug Abuse, the CDC National College Health Risk Behavior Survey, and the Harvard School of Public Health College Alcohol Survey. In summarizing these data for 18 to 24 year olds enrolled in college, Hingson et al. estimated that during a one-year time period college-student alcohol use was associated with 500,000 injuries, 399,725 unprotected sexual encounters, 632,889 physical assaults, 71,379

sexual assaults or date rapes, and 1,445 unintentional alcohol-related fatalities. Although Hingson et al. demonstrated the negative impact that heavy drinking has on college students, the value an individual places on alcohol use is a function of the overall negative outcomes from drinking (e.g., alcohol- related problems, impact on academics, health, relationships) compared to the positive outcomes from drinking (social enhancement, alleviation of boredom, enjoyment; Murphy et al., 2006). Most students do not experience negative outcomes directly related to drinking patterns, and male students often experience social benefits associated with drinking (Burda & Vaux, 1988). Park (2004) found college students in the United States reported positive outcomes like having fun and meeting people were more common than negative outcomes when drinking alcohol.

Studies have shown that students with high levels of alcohol-related problems have increased stress and depression, social anxiety, and low self-esteem (Camatta & Nagoshi, 1995). Camatta and Nagoshi surveyed 135 self-reported alcohol-using college students on levels of alcohol use, moderate to severe problems with alcohol use, and a number of psychological inventories. Impulsivity and venturesomeness were positively correlated with quantity and frequency of alcohol use. Depression, stress, and irrational beliefs were positively related with alcohol problems, but not with alcohol use.

Murphy et al. (2006) examined the relationship between alcohol use, alcohol problems, and quality of life among college students. A random sample of 196 undergraduates (75% women) was measured on total alcohol consumption, alcohol-related problems, and quality of life. Findings indicated that alcohol-related problems were associated with diminished general satisfaction among both men and women, and students who experienced a number of negative

consequences associated with drinking also reported more negative evaluations in various life domains.

Heavy drinking and alcohol-related problems have also been examined extensively in college students. Sheffield, Darkes, Del Boca, and Goldman (2005) surveyed 789 college students about alcohol use and related problems. Based on gender-specific criteria (5 or more drinks per occasion for men, 4 or more for women, at least 2 or 3 times per month), 25% of the sample engaged in binge drinking. Bingers had higher rates of drinking-related problems, including difficulties in school, relationships, jobs, and legal consequences.

Obesity. Obesity is an ongoing issue in the United States, especially in the college-age population where the greatest increase in obesity from 1991-1997 was found among 18 to 29 year-olds and among those with some college education (Mokad, Serdula, Dietz, Bowman, Marks, & Koplan, 1999). Research suggests that the first year of college does not uniformly lead to weight gain in all students (Graham & Jones, 2002). Other research has shown that college freshman gain weight their first year (Hovell, Mewborn, Randle, & Fowler-Johnson, 1985), with freshman women gaining different magnitudes from less than 1 lb. after 6 months of college to 8.52 lbs. during the entire first year. Hovell et al. (1985) found that college freshmen women were 2.6 to 5.2 times as likely as women who did not leave home to attend college to gain 15% or more above their ideal weight. Data from the National College Health Risk Behavior survey suggest that up to 35% of college students may be overweight or obese (Lowry et al., 2000).

Pagota, Spring, Cook, McChargue, and Schneider (2006) examined the relationship between high body mass index (BMI) and enjoyment of pleasant events. In a sample of 290 women, the authors found that individuals with higher BMI's reported less frequent engagement

in behavior that is ordinarily viewed as rewarding, and their disengagement was related to a diminished subjective enjoyment of those behaviors, not depressive symptomatology. They concluded that obesity among women may be associated with reward deficiency, whereby ordinary reinforcers lack the potency to induce pleasure. This reward deficiency may lead obese women to neglect healthy forms of reinforcement, such as physical activity, and to disproportionately resort to eating as a way to attain pleasure, contributing to continuous weight issues.

Sleep behavior. Adequate daily sleep is an important part of a healthy lifestyle, yet American adults on average sleep only 6.85 hours per night, and only 37% report obtaining 8 or more hours of sleep each night (Alvarez & Ayas, 2004). Sleep deprivation has been shown to have a negative effect on college students' cognitive performance (Pilcher & Walters, 1997). Trockel, Barnes, and Egget (2000) examined health-related variables and academic performance in 200 university students. Students responded to questionnaires measuring exercise behavior, eating and sleep habits, mood states, perceived stress, time management, social support, spiritual and religious habits, and number of hours worked per week. The positive relationship between recommended sleep habits and higher grade point average was the most significant finding of this study. Weekday and weekend wake-up times had the largest relative effect on semester GPA. For each hour of delay in reported average week-day wake-up time, the predicted GPA decreased by .132 on a standard 0.00 to 4.00 scale.

Pilcher and Walters (1997) examined the impact of sleep deprivation on psychological variables and cognitive performance in college students. The 44 participants completed the Watson-Glaser Critical Thinking Appraisal (WG; The Psychological Corporation, San Antonio,

TX) after either 24 hours of sleep deprivation or approximately 8 hours of sleep. Sleep-deprived participants not only performed significantly worse in a cognitive task, but also rated their estimated performance significantly higher than the non-deprived participants. These findings indicated that college students are not aware of the extent to which sleep deprivation negatively affects their ability to complete cognitive tasks (Pilcher & Walters, 1997).

Physical activity. Investigating the effects of the transition to college on physical activity patterns is important for several reasons. Regular, vigorous physical activity is positively associated with beneficial health factors such as weight control, decreased risk of heart disease (Powell, 1988), and lower incidence of illness (Bray & Born, 2004). Regular, vigorous physical activity is related to psychological well-being, established through lower levels of anxiety (Petruzello, Landers, Hatfield, Kubitz, & Salazar, 1991), depression (Crews & Landers, 1987), and stress (Nguyen-Michel et al., 2006) in the physically active. Finally, the decline in physical activity experienced during the first few months of college life can lead to a pattern of inactivity that persists throughout one's university years and beyond (Paffenbarger et al., 1986).

Data from the 1995 Youth Risk Behavior Survey showed that 54.9% of high school seniors participated in adequate amounts of vigorous physical activity (Kann et al., 1996), but only 35.5% of students at a 2-year institution and 39.6% of students at 4-year institutions engaged in adequate amounts of physical activity (Douglas et al., 1997). Baranowski et al. (1997) also documented decreases in frequency and intensity of physical activity following high school. These findings suggest a stark decline in vigorous physical activity participation occurs from high school to university as changes occur in social roles, residence, peers, and employment. This decline may have numerous short- and long-term physical and psychological

implications. Given the positive physical and mental health benefits of regular, vigorous physical activity and the competitive, stressful environment of college, first-year students may have a great deal to gain in terms of health and well-being by staying active.

Stress. College students face a variety of challenges as they transition from high school to higher education (Schwitzer, Griffin, Oris, Ancis, & Thomas, 1999), resulting in a higher incidence of psychological distress (Ferry, Tobin, & Beesley, 2004). Feeling stressed is pervasive among college-age students (Rawson, Bloomer, & Kendall, 2001), permeating college life with nearly 60% of students reporting stress levels as high or very high (Makrides et al., 1998), and 80% of students reporting being moderately stressed (Abousiere, 1994) or “burned out” (Anderson & Cole, 2001). Benton and colleagues (Benton et al., 2003) found significant increases across a 13-year period in the percentage of college student clients seen in counseling services for stress and anxiety related problems. The responsibility for one’s own lifestyle, work ethic, resource use, and choice of social partners, plus academic demands, can be overwhelming for many new students and failure to deal with these stressors can lead to low grades, financial debt, social problems, and even dropping out of school (Arnett, 2004). Research suggests that individuals who report more chronic stressors are more likely to be ill (Lepore, Miles, & Levy, 1997), anxious, and depressed (Towbes & Cohen, 1996).

Dietary behaviors. Eating 5 to 9 daily servings of fruits and vegetables daily significantly reduces the risk of diet-related chronic diseases, such as heart disease, cancer, and stroke, and it also reduces the risk of some lung cancers, gastrointestinal problems, obesity, and diabetes (Van Duyn & Pivonka, 2000). One *Healthy Campus 2010* goal (American College Health Association, 2002) is to increase the proportion of college students who consume the minimum

daily servings of fruit from 7.4% to 25.5%. College students' diets are typically low in fruits and vegetables, and high in fat, sodium, and added sugars (Shive & Morris, 2006). Schuette, Song, and Hoerr (1996) had 2,498 college students keep a detailed food record for one typical weekday. The daily mean intakes from grain, vegetable, fruit, dairy, and meat groups were all at or above the recommended minimum number of servings. A high percentage of students consumed inadequate servings of fruit and vegetables and excessive amounts of fats and sugars. The authors concluded that an emphasis on healthier and more balanced diets is necessary in the college-student population. Reliance on fast food, calorie-dense but nutrient poor snacks, and limited income may place this population at risk for chronic health problems related to poor nutrition.

Summary. Fortunately, college students are at a time and place in their lives where their behaviors are very conducive to change; the student's role as learner is largely defined by a readiness to change (Shive & Morris, 2006). Healthy management of eating, exercise, and stress during the college years is crucial to combating the growing rates of obesity in the college population, and to helping students develop and maintain healthy behaviors throughout their lifetime. Past physical activity interventions have not focused on college students, and more college students than ever have adopted sedentary lifestyles (Keating, Guan, Pinero, & Bridges, 2005). Huang et al. (2003) examined obesity, diet, and physical activity in college students. Using a sample of 738 students, they found overweight rates at 21.6%, using body mass index standards, and obesity rates of 4.9%. Over 69% of the participants reported eating fewer than 5 servings of fruits and vegetables a day, and 67% reported getting less than 20 grams of fiber each day. The authors concluded that most college students are not meeting dietary and physical

activity standards, and there is a critical need for intervention studies within this population.

Health behaviors formed during young adulthood may have a sustaining impact on health across later life. Paffenbarger et al.'s (1986) landmark study of 16,936 college alumni showed decreased rates of mortality of up to 49% in participants who maintained regular physical activity from their college years to age 70 to 84 years. Due to the fact that more American students age 18 to 24 years display the highest rates of decline in physical activity and the highest increases in obesity, targeting primary care interventions to promote physical activity and to reduce obesity in this population would be beneficial.

Transtheoretical Model and Stages of Change

The Transtheoretical Model (TTM) introduced by Prochaska and DiClemente (1982) provided a format for demonstrating individual progression, and sometimes regression, on a continuum of behavioral change along five stages. The TTM conceptualizes when and how behavior change occurs (Prochaska & Velicer, 1997). The model proposes that behavior change is a dynamic process with five distinct stages of temporal continuum including;

1. *Precontemplation*. The person is unaware a problem exists and/or is not considering changing the behavior.
2. *Contemplation*. The person is thinking about changing.
3. *Preparation*. The person is planning to change in the immediate future and may have made small attempts.
4. *Action*. The person has changed the problem behavior in the short term (within the last 6 months).
5. *Maintenance*. The person has changed the problem behavior for at least 6

months.

This model has been effective as a basis for developing interventions for changing addictive behaviors, especially cigarette smoking (Prochaska, Velicer, & DiClemente, 1988; Prochaska, DiClemente, & Norcross, 1992; DiClemente et al., 1991). The model has also been used for dietary-fat reductions (Finckenor & Byrd-Bredbenner, 2000), dietary fiber consumption, fruit and vegetable intake (Cullen, Bartholomew, Parcel, & Koehly, 1998), and physical activity behavior (Marcus et al., 1998; Dunn et al., 1999; Steptoe et al., 1999; Woods, Mutrie, & Scott, 2002).

Finckenor and Byrd-Bredbenner (2000) examined the impact of a dietary-fat intake intervention on changes in dietary-fat reduction and stage of change progression in a group of college undergraduates ($N=110$). An experimental group that participated in a group-based dietary-fat intake intervention that included a series of 11 lessons taught over a 14-week period in introductory nutrition science courses was compared to a control group that received no intervention. Results showed a significant change in dietary-fat intake and stage of change progression in the experimental group, but no change was found in the control group. The intervention program produced an enduring, significant reduction in mean dietary fat consumption and a significant progression in mean stage, which suggests the benefit of targeting interventions towards individuals in the pre-action stages of the TTM.

Woods, Mutrie, and Scott (2002) examined the impact of a physical activity intervention in helping sedentary young adults become active. A baseline *Stages of Change* questionnaire was completed by 2,943 undergraduate students. A mail-based intervention based on the TTM was designed to encourage, support, and motivate sedentary young people to become more physically

active. No specific exercise program was provided, but students were encouraged to use the University Sport and Recreation Service facilities. At post-intervention, significantly more students in the experimental group, relative to a control group who did not receive the mail-based intervention, improved on exercise stage of change from baseline assessment. The TTM has been used to examine the relationship between stage of exercise adoption and participation in a number of health-related behaviors (Costakis, Dunnagan, & Haynes, 1999), but there is limited research examining how an individual's stage of change relates to measures of life satisfaction.

Subjective Well-Being

The subjective definition of quality of life is democratic in that it grants to each person the right to decide the worth of his or her life. This approach to defining the good life has come to be called "subjective well-being" and is sometimes called happiness (Diener, 2000).

Subjective well-being is a person's evaluative reactions to his or her life, either in terms of life satisfaction or affect (Diener & Diener, 1995). In the literature, three separate components of Subjective Well-Being (SWB) have been identified: positive affect, negative affect, and life satisfaction (Andrews & Withey, 1976). SWB refers to people's evaluations of their lives. People experience abundant SWB when they feel many pleasant and few unpleasant emotions, when they are engaged in interesting activities, when they experience many pleasures and few pains, and when they are satisfied with their lives (Diener, 2000). Although SWB alone is not sufficient, research indicates that SWB is one component of the good life (Diener, Sapyta, & Suh, 1998).

Growth in the field of SWB reflects larger societal trends concerning the value of the individual, the importance of subjective views in evaluating life, and the recognition that well-

being necessarily includes positive elements that transcend economic prosperity (Diener, Suh, Lucas, & Smith, 1999). The vast majority of college students around the world consider happiness and life satisfaction to be extremely important, and almost all respondents in a study by Diener and Oishi (2000) believed that happiness was more important than money. Diener, Sandvik, Seidlitz, and Diener (1993) found a curvilinear relationship in the United States, indicating some wealth is necessary for SWB but too much can detract from SWB.

Psychologists have taken increased interest in the concept of “positive psychology,” examining issues such as happiness and positive emotions (Luthans, 2002). Rather than continue the traditional focus on negative or dysfunctional forces in daily life, researchers in this area argue that the focus should be on how to make life better. Luthans (2002) suggested that researchers should investigate how well-being, job satisfaction, work, and non-work conditions are interrelated. Inglehart (1990) proposed that as basic material needs are met, individuals move to a post-materialistic phase in which they are concerned with life-fulfillment, and variables such as health and self-actualization play a key role in overall quality of life.

Much of what is known about SWB is based on self-reports of happiness and life satisfaction (Diener & Lucas, 1999). The assessment of SWB offers a challenge because there are few if any external measures of SWB in existence. Researchers must make a critical assumption about the self-report nature of happiness. When an individual indicates he or she has high SWB, the report reflects a state with some temporal stability and is not solely based on momentary factors. For SWB to be meaningful as a construct, this judgment should correspond to a subjective state that is at least somewhat stable and that is influenced by factors such as the person’s long-term health, conditions of his or her life, and the personality traits used to interact

with the world (Diener & Lucas, 1999). Momentary factors can influence judgments, but SWB has been shown to be moderately stable across situations (Diener & Larsen, 1984) and across the lifespan (Costa & McCrae, 1980).

Arthaud-Day, Rode, Mooney, and Near (2005) examined the convergent, discriminant, and factorial validity of the SWB construct. They found that the three-factor structure provided the best fit to the data across two student samples ($n = 880$ and $n = 731$), and in a nationally representative U.S. sample ($n = 1799$). The three-factor model showed better fit than a one-or-two factor model, supporting the argument of Diener et al. (1999) that SWB is three separate components. As a component of SWB, Arthaud-Day et al. (2005) found life satisfaction to be consistently independent from negative and positive affect factors in the SWB model.

Life Satisfaction

Life Satisfaction is one component of SWB, a component that is consistently independent of the affect measures. Shin and Johnson (1978) defined life satisfaction as “a global assessment of a person’s quality of life according to his chosen criteria” (p. 478). Life satisfaction can be defined as “an attitude or a summary evaluation of objects along a dimension ranging from positive to negative “ (Petty, Wegener, & Fabrigar, 1997, p. 611). Judgments of satisfaction are dependent upon a comparison of one’s circumstances with what is thought to be an appropriate standard. The judgment of how satisfied people are with their present state of affairs is based on a comparison with a standard that each individual has set for him or herself; it is not externally imposed.

Although there may be some agreement about the important qualities of the “good life,” with considerations like health and successful relationships, each individual assigns different

values to these factors (Diener, Emmons, Larsen, & Griffin, 1985). Each person has his or her own values, criteria, and basis for evaluation. One weakness of measuring specific domains is that these values can distort the assessment of life satisfaction, because the individual bases his or her global life satisfaction on only one aspect of life in which he or she is not satisfied. Thus, it is necessary to assess the individual's global judgment of his or her life.

Overall life satisfaction judgments are composed of a long-term component, including personality and stable life circumstances, a moderate-term component reflecting current life events and cognitive schemata, and a short-term state component due to current mood and immediately salient life events (Pavot & Diener, 1993). Social cognitive research indicates that life-satisfaction judgments are based on a selected set of relevant information that is accessible at the time of the life-satisfaction judgment (Schimmack, Diener, & Oishi, 2002). Schwarz and Strack (1999) developed a model of life-satisfaction judgments that assumes life satisfaction judgments are based on a few, easily accessible, and relevant sources. Based on this model, Schwarz and Strack (1999) argued that there is little to be learned from self-report measures of global well-being because these reports are entirely dependent on the current context of the individual's life and give little information about global satisfaction views.

In contrast to this argument, Diener and Lucas (1999) held that because the personality traits of extraversion and neuroticism have a strong influence on life satisfaction, life satisfaction can be assessed with global measures. Diener and Lucas examined the research related to personality and subjective well-being and found that similar to personality traits (Costa, 1994), SWB is consistent across situations and stable across the life span, even after the occurrence of intervening life events. Costa and McCrae (1980) sampled 1,100 males between the ages of 35

and 85 and found that higher levels of neuroticism were related to negative affect or dissatisfaction, and higher levels of extraversion were related to positive affect and satisfaction. They concluded that personality differences predict differences in happiness over a period of 10 years, ruling out temporary mood or states as the explanation for the observed relations.

Schimmack et al. (2002) examined the interaction between culture, personality, and SWB. For this research, 651 participants from 2 individualistic cultures and 3 collectivistic cultures completed measures of personality, extraversion and neuroticism, and life satisfaction scales. Results suggested that the influence of personality on the emotional component of SWB is pan-cultural, but the influence of personality on the cognitive component of SWB is moderated by culture and the expectations within that culture. Schimmack et al. (2002) concluded that people rely on a variety of sources, both temporal and stable, in forming life-satisfaction judgments. Some sources like the weather provide temporal changes in life-satisfaction, whereas sources like academic success provide more stable information. Personality traits are responsible for the stability in chronically accessible sources, but people form life-satisfaction judgments partially in a consciously deliberate manner.

Research in this tradition has shown life-satisfaction to be stable for extended periods of time. Support for the temporal stability of SWB can be found in a study by Vitterso (2001) on 264 Norwegian high school students, where a test-retest stability on the SWB scale of .64 was found. Magnus, Diener, Fujita, and Pavot (1993) found a test-retest correlation of .54 over a four-year period of time on life satisfaction in a sample of 97 college students. The results were viewed as evidence that “situational factors usually pale in comparison with long-term influences on well-being measures” (Diener, 2000, p. 35).

Schimmack, Diener, and Oishi (2002) proposed that participants draw on three types of sources to form life-satisfaction judgments, which cause different implications for the stability and variability of these judgments. First, participants seem to use temporarily accessible sources that are salient in one assessment situation but not others, such as having a handicapped confederate present during the assessment. Strack and colleagues (1990) observed that the mere presence of a handicapped confederate was sufficient to increase reported SWB under self-administered questionnaire conditions, presumably because the confederate served as a salient standard of comparison. The use of these sources can influence the response of participants on current life satisfaction. Second, participants can use chronically accessible sources like mood as a salient and relevant source (Schwarz & Clore, 1983). Schwarz and Clore called respondents on sunny or rainy days and assessed reports of SWB in telephone interviews. As expected, respondents reported being in a better mood, being happier, and being more satisfied with their life as a whole, on sunny versus rainy days. Finally, participants may use chronically accessible and stable sources that provide stable information, sources like satisfaction with income. The use of these chronically accessible and stable sources, or evidence that is easily available and unchanging, could explain the stability of life satisfaction judgments that has been demonstrated in the personality tradition (Pavot & Diener, 1993).

Chronically accessible and stable sources reflect important aspects of people's lives (Schimmack, Diener, & Oishi, 2002), and the extent to which these sources are important to members of a particular group (e.g., weight as a source for college students) influences their use by most members of that group. This hypothesis that people use chronically accessible and stable sources integrates top-down and bottom-up theories of life satisfaction (Diener, 1984).

Bottom-up theories assume that life satisfaction is a summary evaluation of aspects of one's life. For example, one is satisfied with life because one has good social relationships, enough money, weight under control, and an interesting job. Top-down theories assume that life satisfaction is due to personality influences. For example, a neurotic individual is more dissatisfied in general with his or her job, social relationships, weight, and income in particular.

Heller, Watson, and Illies (2004) conducted a series of meta-analyses to examine explanations for individual differences in life satisfaction. A total of 317 correlations from 116 independent samples were used to calculate the meta-analytic estimates. Consistent with the top-down approach, meta-analytic findings indicated that neuroticism was negatively related, and extraversion, agreeableness, and conscientiousness were positively related to both domain (i.e., job, marital relationship, health) and global life satisfaction. Consistent with a bottom-up approach, domain satisfactions were strongly linked to life satisfaction but weakly linked to each other. Heller et al. (2004) concluded that the findings supported both a temperament-based top-down model and an integrative model that incorporates the direct influence of domain satisfactions on life satisfaction.

Satisfaction With Life Scale (SWLS)

In research on SWB, three separate components have been identified: positive affect, negative affect, and life satisfaction (Andrews & Withey, 1976). Positive affect and negative affect are related to the affective, emotional aspects of the construct of SWB, whereas life satisfaction relates to the cognitive-judgmental aspects. Diener, Emmons, Larsen, and Griffin (1985) developed the Satisfaction With Life Scale (SWLS) to measure the life satisfaction component of SWB. The SWLS is a five-item inventory with a 7-point scale. The five items used

to measure satisfaction with life are : (a) In most ways my life is close to ideal; (b) The conditions of my life are excellent; (c) I am satisfied with my life; (d) So far I have gotten the important things I want in life; and (e) If I could live my life over, I would change almost nothing. Participants respond to each item on a 7-point scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Alfonso, Allison, Rader, and Gorman (1996) found an extended version of the SWLS to be at the reading level of 7th to 10th grade and thus usable with most adults. Authors of the original scale (Diener et al., 1985) created 48 items to reflect life satisfaction and well-being. All these items were generated on the basis of the guiding theoretical principle that life satisfaction represents a judgment by the respondent of his or her life in comparison to his or her own standards. The initial factor analysis indicated that three factors were present : life satisfaction, positive affect, and negative affect. Ten items had loadings on the life satisfaction factor of .60 or above; these ten items were reduced to five to remove redundancies of wording while still retaining alpha reliability (Pavot & Diener, 1993). In scale validation studies, Lucas, Diener, and Suh (1996) confirmed the convergent validity of the *Satisfaction with Life Scale* (SWLS) with other satisfaction/happiness measures as well as its discriminant validity from positive and negative affect.

Lucas et al. (1996) examined the discriminant validity of well-being measures by having 212 college-age participants in an introductory psychology course complete the SWLS (Diener, et al., 1985) and the *Positive Affect Negative Affect Schedule* (PANAS; Watson, Clark, & Tellegen, 1998). Participants also completed the *Life Orientation Test* (LOT; Scheier & Carver, 1985), and the 9-item Rosenberg *Self-Esteem Scale* (Rosenberg, 1965). Four weeks later, the

same participants completed the same scales. The research examined the convergent and discriminant validity of life satisfaction, positive affect, negative affect, self-esteem, and optimism. Using the criteria for convergent and discriminant validity established by Campbell and Fiske (1959), the results indicated moderate to very good convergent validity on the measures of well-being, and moderate to very good evidence for the discriminant validity of life satisfaction from positive and negative affect, supporting the three factor model of subjective well-being.

Normative data for the SWLS are available for older adults, prisoners, individuals under inpatient care for alcohol abuse, abused women, psychotherapy clients, persons with physical disabilities, and college student samples. Scores on the SWLS can be interpreted in terms of absolute as well as relative life satisfaction. A score of 20 represents the neutral point on the scale, the point at which the respondent is about equally satisfied and dissatisfied (Pavot & Diener, 1993).

The stability of measurement versus sensitivity to change is a critical issue for any assessment instrument. The instrument has to demonstrate temporal stability yet maintain sensitivity to change as well. Measures of life satisfaction must demonstrate that they are reflective of more than momentary mood states in order for researchers to make inferences about life satisfaction as a relatively stable component of subjective experience over time. For use in applied settings, it is essential that the instrument be sensitive enough to detect any change in life satisfaction from ongoing events.

The SWLS has been examined for reliability, sensitivity, and validity and has been shown to have strong internal reliability and moderate temporal stability. Diener et al. (1985) had 176

undergraduate students complete the SWLS in a group setting and 76 complete the scale a second time two months later. Diener et al. reported a coefficient alpha of .87 for the scale and a 2 month test-retest reliability coefficient of .82.

Magnus, Diener, Fujita, and Pavot (1993) measured life satisfaction using the SWLS over a four-year period on 136 University of Illinois students (85 women and 51 men). Over a four-year period, a test-retest reliability of .54 was found, suggesting that considerable change in the individual's life may occur. Vitaliano et al. (1991) reported evidence that changing life conditions can lead to changes on the SWLS. The researchers studied 191 elderly caregivers who had a spouse diagnosed with primary degenerative dementia. The care recipients showed objective declines in functioning during the 15 to 18 month study. During this period, the caregivers also showed a significant decline in life satisfaction ($p < .05$). Only satisfaction with life changed during this time period, as scores for depression, anxiety, and suppressed anger stayed fairly constant.

The moderate stability of the SWLS supports the idea that there is some long-term consistency of life satisfaction over time. Immediate factors, such as current mood and situational context, are also likely to some degree to affect an individual's response to questions about life satisfaction and well being (Yardley & Rice, 1991). Life satisfaction has long-term, moderate-term, and short-term components. Personality and stable events have an impact on life satisfaction, but current events also impact the response of the individual. Events and conditions such as psychotherapy or the debilitation of a spouse that make the individual's circumstances better or worse influence life satisfaction (Pavot & Diener, 1993).

The SWLS has been compared with outcomes on a variety of both self-report and

external measures to establish its validity as a measure of life satisfaction. Diener et al. (1985) compared the SWLS on a sample of 176 college students with a number of scales, including Cantril's (1965) *Self-Anchoring Ladder* ($r = .62$); Gurin et al.'s (1960) single-item measure of mental health ($r = .59$); Andrew and Withey's (1976) *D-T* scale ($r = .68$); Fordyce's (1978) single-item measure of happiness ($r = .58$); Fordyce's (1978) percent of time happy question ($r = .58$); Campbell, Converse, and Rodgers' (1976) semantic differential-like scale ($r = .75$); Bradburn's (1969) *Affect Balance Scale* ($r = .50$); Tellegen's (1979) well-being sub-scale of his *Differential Personality Questionnaire* ($r = .68$); and Larsen's (1983) *Affect Intensity Measure* ($r = .09$).

A second sample of 163 undergraduate students was also given Buss and Plomin's (1975) survey of the temperaments (EASI-III), the Rosenberg (1965) *Self-Esteem Scale* ($r = .54$), the *Neuroticism* scale of the Eysenck Personality Inventory ($r = -.48$, Eysenck & Eysenck, 1964), a symptom checklist similar to the Hopkins inventory (Derogatis, Lipman, Rickels, & Covi, 1974), rating of life satisfaction in 10 key life domains, and the Marlowe-Crowne (Crowne & Marlowe, 1964) *Scale of Social Desirability*.

Scores on the SWLS correlated .02 with the Marlowe-Crowne measure, indicating that the SWLS was not evoking a social desirability response set. Correlations with the other life satisfaction measures provided considerable evidence for the convergence of the SWLS with numerous measures of subjective well-being and life satisfaction (Diener et al., 1985). The SWLS has been shown to demonstrate adequate convergence with related measures, including measures using a different methodological approach, such as interviews and informant ratings (Pavot & Diener, 1993). The SWLS has also been shown to be negatively correlated with

clinical measures of distress. Blais, Matthews, Schouten, O'Keefe, and Summergrad (1998) reported a strong negative correlation ($r = -.72, p = .001$) between the SWLS and the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961), and Larsen, Diener, and Emmons (1985) found a correlation of $-.31$ between the SWLS and a measure of negative affect.

In terms of individual difference dimensions, the SWLS is positively correlated with extraversion and inversely correlated with neuroticism (Diener et al., 1985; Pavot & Diener, 1993), providing additional construct validity for the scale. Extroversion has been repeatedly found to correlate with well-being (Diener, Sandvik, Pavot, & Fujita, 1992), with a possible explanation linking extroversion to a more sensitive reward system.

In making a life satisfaction judgment on the SWLS, the respondent applies his or her own standards of evaluation. Furthermore, the respondent draws on the domains she or he finds relevant in formulating his or her judgment of global life satisfaction. Because life satisfaction judgments are at least partially independent of affective measures, the SWLS is a promising instrument in terms of measuring change in subjective well-being and intervention outcomes (Pavot & Diener, 1993).

Health Behaviors and Life Satisfaction

Life satisfaction has been found to be related to an individual's health and overall well-being. Several studies have examined the relationship between life satisfaction and health factors such as obesity, alcohol use, suicidal thoughts, physical activity, stress, and academic performance in different populations. Diener and Diener (1995) found life satisfaction was positively correlated with feelings about oneself. People who score high on Life Satisfaction

measures are less likely to attempt suicide (Moum, 1996) and are less likely to become depressed in the future (Lewinsohn, Redner, & Seeley, 1991). The lack of significant decreases in life satisfaction across the life span suggests an impressive ability of people to adapt to their conditions (Shmotkin, 1992).

Ball, Crawford, and Kenardy (2004) examined longitudinal relationships between weight, life satisfaction, and aspirations in young women ages 18 to 23. A total of 7865 young women completed two surveys 4 years apart. Information about future life aspirations, work/career, marital status, life satisfaction, height, and weight was collected. Ball et al. found that obese women were less likely to aspire to further their education, and they were more dissatisfied with work, family, partners, and social activities than normal weight respondents. The researchers concluded based on the results, that being overweight/obese may have a long-term consequences on a young women's life satisfaction and future life aspirations.

Kelly (2004) examined the relationship between sleep-length and life satisfaction in a sample of 212 college students. Sleep length was measured by self-report on amount of time habitually slept during a 24-hour period, and life satisfaction was measured by the SWLS (Diener et al., 1985). Results of a linear regression indicated that individuals who reported habitually attaining less sleep also reported lower life satisfaction, indicating that sleep is positively related to less psychological health.

Murphy, McDevitt-Murphy, and Barnett (2005) examined the relationship between life satisfaction and alcohol use. Several studies indicated that adults with severe alcohol dependence had low life satisfaction in multiple life domains (Rudolf & Watts, 2002). However, moderate use of alcohol may be associated with positive life satisfaction (Peele & Brodsky,

2000). In a survey on 353 undergraduate students, Murphy et al. examined alcohol use, alcohol-related problems, and life satisfaction. Alcohol use was associated with lower satisfaction in women, and female abstainers reported higher life satisfaction than heavy drinking women. Men showed a positive, curvilinear relation to social satisfaction, with low and heavy drinkers having less social satisfaction than moderate drinkers. Murphy et al. (2005) concluded that alcohol use by young adults can be associated with both positive and negative outcomes that may be gender specific.

Valois, Zullig, Huebner, and Drane (2004a) examined life satisfaction and suicidal thoughts among high-school adolescents. A secondary data analysis of 4758 respondents to the 1997 South Carolina Youth Risk Behavior Survey (SCYRBS) was conducted. A logistic regression revealed that poor mental health, poor mental/physical health, serious suicide consideration, planning for suicide, attempting suicide, and attempting suicide that requires medical care were significantly related to life satisfaction. Because many adolescents are not “life skilled” in communication, stress-management, decision-making, problem-solving, and goal-setting (Valois et al., 1993), they might be more likely to engage in suicide ideation or suicide behavior.

Schnohr, Kristensen, Prescott, and Scharling (2005) examined associations between physical activity, life satisfaction, and stress. A group of 12,028 men and women aged 20 to 79 completed a self-administered questionnaire about socioeconomic status, physical activity, and risk behaviors such as smoking and alcohol use. Increased physical activity was positively correlated with lower levels of stress and lower life dissatisfaction for joggers (Schnohr et al., 2005). Although there was a dose-response effect between physical activity and psycho-social

well-being, the most pronounced difference in life satisfaction scores was seen between the group with low physical activity having less life satisfaction, and the group with moderate physical activity having more life satisfaction.

Valois et al. (2004b) explored the relationship between life satisfaction and physical activity behaviors in a sample of adolescents ($N=4758$) using the CDC Youth Risk Behavior Surveillance System (YRBSS) and the Brief Multidimensional Student Life Satisfaction Scale (BMSLSS). Adjusted logistic regressions revealed that not exercising, not doing strength and toning work, not participating in Physical Education classes, and not playing sports were each significantly associated with reduced life satisfaction.

McKnight, Huebner, and Suldo (2002) examined the relationship between stressful life events and life satisfaction in a sample of 1,201 adolescents between 6th and 12th grade. Life satisfaction, child behaviors, current life events, and personality were assessed. Stressful life events were found to be moderately related to life satisfaction. Students who indicated a greater number of stressful life events had significantly lower levels of life satisfaction.

Doyle, Irons, Owens, and Nassar (2005) examined the relationship between stress and life satisfaction in a sample of 72 college students enrolled in a stress-management course. Doyle et al. found that frequent practice of stress-management behaviors significantly predicted higher life satisfaction ($r = .49, p < .05$). Deniz (2006) also examined the relationship between stress and life satisfaction in university students. A sample of 492 students completed measures on life satisfaction, coping, self-esteem and decision making. Life satisfaction was significantly related to problem-focused coping, seeking social support, and all decision-making styles.

Rode and colleagues (2005) examined the relationship between life satisfaction and

student academic achievement. A sample of 673 college students completed five online questionnaires related to student academic performance along with measures of subjective well-being, personality, and demographic items. Previous research by Astin (1993) found that overall satisfaction with college experience was only weakly related to student performance. Rode et al. (2005) found that although cognitive ability was the strongest predictor of academic achievement, life satisfaction had both a statistical and practical significance in relation to student performance as measured by grade point average.

Summary

Research has demonstrated that college students face a number of health challenges, and that poor health habits during this period of life may have both short- and long-term consequences. Subjective well-being (Diener, 2000) has been identified as a valid measure of psychological health, with life satisfaction being an important component of a good life. The bottom-up theory of life satisfaction supports the idea that accessible and stable sources of information and behaviors have an influence on life satisfaction. Evidence has demonstrated the importance of different health behaviors on life satisfaction, but there is limited research on the relationship of different sources of salient information to life satisfaction in college students. Therefore, the purpose of this research is to examine both how the level of college students current life satisfaction, and the relationship between health behaviors and life satisfaction in college students.

CHAPTER THREE

METHOD

The purpose of this chapter is to describe the research methods involved in the study. The following topics are reported : (a) participants, (b) instrumentation, c) data collection procedures, and (d) analysis.

Participants

Data were obtained from archival records of students in a large Midwestern university ($N=796$) enrolled in courses in Fall, 2006 and Spring, 2007. The *Health Behaviors Assessment* (HBA; Newton et al., 2006) was designed to measure current health behaviors in college students. Students completed the HBA electronically during the Fall, 2006 and Spring, 2007 semesters as part of the Healthy Personal Assessment Challenge-Choosing Activities for Today's Success (Healthy PAC-CATS) program developed and implemented by University Counseling Services staff with a grant from the Sunflower Foundation. Prior to completion of the HBA instrument, students gave electronic informed consent (IRB#3112) to allow the data to be used for research purposes. Using a unique electronic identifier and password, students logged into a secure Website where the survey was posted on the University Counseling Services server.

Instrument

The Health Behavior Assessment (HBA; Newton et al., 2006) is a 51-item online survey developed to measure current health behaviors in college-age students for the Healthy Personal Assessment Challenge-Choosing Activities for Today's Success (Healthy PAC-CATS) study. The Healthy PAC-CATS program was designed as a tracking and intervention program to assess and alter health behaviors in college-age students. The Internet-based HBA was developed to

assess self-reported demographic information, weight-loss practices, weight status, physical activity, eating behavior, stress-management strategies, and life satisfaction, as well as students' readiness to change (Prochaska & DiClemente, 1982) for exercise, fruit and vegetable consumption, and stress-management behaviors.

Demographic information. Self-reported information on age, gender, student status (full-time or part-time), race, residence (residence hall, fraternity or sorority, off-campus, fraternity/sorority involvement, work behavior (hours of work a week for pay), and height and weight were collected. Height (inches) and weight (pounds) were used to determine the Body Mass Index status of the individual. Body mass index is calculated using the formula of $BMI = [\text{weight} / (\text{height}^2)] \times 703$.

Body mass index results are used to classify weight status of an individual. Individuals with a BMI below 18.5 are classified as underweight, a BMI between 18.5 and 24.9 is considered normal weight, a BMI between 25 and 29.9 is overweight, and a BMI of 30 or more is considered obese.

Weight-loss practices. Weight-loss practice items were developed based on the weight-loss questions used in the Youth Risk Behavior Surveillance System (YRBSS, National Center for Chronic Disease Prevention and Health Promotions, 2006). The YRBSS measures students in Grades 9-12 in six categories of priority health-risk behaviors, including, violence, tobacco use, alcohol use, sexual behaviors, unhealthy dietary behaviors, and physical inactivity. Weight-loss practices were measured using a series of items related to behaviors in the past 30 days. The HBA has four yes-or-no items (Yes = 1, No = 2) assessing behaviors over the last 30 days related to dieting to lose weight, exercising to lose weight, vomiting or laxative use to lose weight, and

using diet pills or commercial weight loss products to lose weight.

Nutrition and caffeinated drinks. The HBA lists 11 items related to nutrition that were based on the YRBSS (2006) and from *Dietary Guidelines for Americans, 2005* (USDHHS, 2005). Single dietary items for fruit consumption, drinking fruit juices, eating green salad, eating other vegetables other than a green salad, eating foods high in fat and/or cholesterol, eating foods low in fat or fat-free (milk, yogurt, or cheese), eating whole grain foods (whole grain bread, brown rice, whole grain pasta, whole grain cereal) during a typical day were measured with choices of 0 times a day, 1 time a day, 2 times a day, or 3 or more times a day. Total fruit and vegetable consumption was scored by adding the items related to fruit, fruit juices, salad and vegetables other than salad.

The HBA also measures regular pop/soda use, caffeinated drink use, sweetened drink use, and alcohol use. Diet pop/soda use, caffeinated drink use, and sweetened drink use questions are based on survey items from the YRBSS (2006) instrument and the International Food Information Council Foundation (2006). For the regular pop/soda and caffeinated drink use question students indicate how many ounces of regular pop/soda they drink on a typical day (1 vending bottle being equal to 16 ounces). Response options are 0, less than 4 ounces, 4-12 ounces, 13-24 ounces, 25-32 ounces, and 33 ounces or more. The caffeinated drink item “on a typical day, how many ounces of caffeinated drinks do you drink” measures use with the same scale. The sweetened drink item measures how often on a typical day do students drink sweetened drinks such as Hawaiian punch, lemonade, Kool-aid, Fruitopia, sweet tea, Sunny D, Snapple, or sports drinks such as Gatorade or Powerade. Response options are 0 times, 1 time, 2 times, or 3 or more times. The alcohol question is based upon the campus alcohol norms

determined by the 2004 Kansas State University Alcohol survey to examine frequency of alcohol use. The single alcohol item asks: “How many drinks of alcohol do you usually have during a typical week.” One drink of alcohol is defined as 12 ounces of beer, 5 ounces of wine, or 1 ounce of liquor. Response options for this item are 0, 1-3, 4-6, 7-9, and 10 or more.

Physical activity. The HBA measures frequency of physical activity based on items from the 2006 YRBSS and on recommendations by the Centers for Disease Control and American College of Sports Medicine (ACSM, 2000). The ACSM recommends adults should engage in moderate-intensity physical activities for at least 30 minutes on 5 or more days of the week. The physical activity items include : “On how many of the past 7 days did you exercise or participate in sports activities for at least 20 minutes that made you sweat or breathe hard?”; “ How many days did you do stretching exercises?”; “How many days did you do exercises to strengthen or tone your muscles?”; “How many days did you walk or bicycle for at least 30 minutes at a time?”; “How many days did you participate in physical activity for at least 30 minutes that did not make you sweat or breathe hard?”; and “How many days were you physically active for at least 30 minutes per day?” Response options for each item are 0, 1, 2, 3, 4, 5, 6, and 7 days. Total frequency of physical activity was calculated by adding the four items related to participation in sport, walking and bicycling, participating in physical activity that did not make you sweat, and days of physical activity.

Sleep. The HBA has a single item related to sleep behavior : “I get 6-to-8 hours of sleep a night.” Response choices are *rarely, sometimes, half the time, more frequently than not, and most of the time.* The 6-to-8 hour range is based on recommendations from the University Counseling Center Staff and is supported by several epidemiological studies (Kato et al., 2000; Spiegel,

Leproult, & Van Cauter, 1999) that indicate sleep duration in this range is related to lower mortality and morbidity.

Life Satisfaction. The HBA assesses a measure of life satisfaction using 3 items from the five-item Satisfaction With Life Scale (SWLS; Diener et al., 1985). Life satisfaction on the HBA is calculated by summing the responses to the following three items : “In most ways my life is close to ideal”; “The conditions of my life are excellent”; and “I am satisfied with my life.” Each question has a five-option response ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). These three items are the items with the strongest internal consistency from the SWLS (Diener et al., 1985). The HBA inventory does not include all five items from the SWLS, and the HBA inventory has a different scaling system (5 choices) from the SWLS (7 choices). The internal consistency and validity of the HBA measure of life satisfaction were examined in college students enrolled in courses at the same Midwestern university ($N=82$), but who were not involved in the current study. Participants completed both the SWLS and the three items from the HBA measuring life satisfaction. A Pearson-product correlation was calculated between the responses on the SWLS and the HBA life satisfaction items ($r = .84, p < .001$) to establish concurrent validity. A Cronbach’s alpha measuring internal consistency of the three items on the HBA measuring life satisfaction was calculated with an inter-item correlation of $r = .81$. The results of this pilot study (IRB #4199) demonstrates that the three items in the HBA represent a valid and reliable measure of life satisfaction.

Stage of change for exercise, fruit and vegetable consumption, and stress management.

Prochaska and DiClemente (1982) developed the concept of stages of change to examine the process of smoking cessation. This model has been adapted for other health behaviors such as

physical activity and diet. The stage of change model examines current behaviors and places an individual in one of five stages : precontemplation, contemplation, preparation, action, or maintenance. The stage of change for exercise was assessed using four items, and a stage algorithm was used to assess the current stage. The items used to assess exercise stage were : (1) “I currently exercise, (2) I intend to exercise in the next 6 months, (3) I currently exercise regularly (“Regular” exercise means 3 times or more per week for 20 minutes or longer each time), and (4) I have exercised regularly for the past 6 months. Each item was a yes/no response. The stage of change was calculated using the following algorithm (Prochaska & Velicer, 1997) :

If question 1 = no and question 2 = no, then stage is precontemplation

If question 1 = no and question 2 = yes, then stage is contemplation

If question 1 = no and question 3 = no, then stage is preparation

If question 1 = yes, question 3 = yes, and question 4 = no, then stage is action

If question 1 = yes, question 3 = yes, and question 4 = yes, then stage is maintenance

Stage of change for fruit and vegetable (FV) consumption was based on the algorithm created by Ma et al. (2003). Items for the stage of change for fruit and vegetable consumption included: “How many servings (a serving being 1 cup of cooked vegetables, 1 cup of salad, 1 piece of fruit, or 1 cup of 100% fruit juice) of fruits and vegetables do you usually eat a day?” Response options included 0 servings, 1 serving, 2, 3, 4, 5 servings, and 6 or more servings. The second item was “Do you intend to start eating 5 or more servings of fruits and vegetables a day in the next 6 months?” The third item was “Do you intend to start eating 5 or more servings of fruits and vegetables a day in the next 30 days?” The fourth item was “Have you been eating 5 or more servings of fruits and vegetables a day for more than 6 months?” Stage of change for fruit

and vegetable consumption was calculated using the following algorithm (Ma et al., 2003) :

If servings of FV ≤ 4 and question 2 = no, then stage is precontemplation

If servings of FV ≤ 4 and question 2 = yes and question 3 = no, then stage is contemplation

If servings of FV ≤ 4 and question 2 = yes and question 3 = yes, then stage is preparation

If servings of FV ≥ 5 and question 4 = no, then stage is action

If servings of FV ≥ 5 and question 4 = yes, then stage is maintenance

The stage of change for stress-management is a single response to one of the following items the participant feels best describes them at the present time: “I have been using stress-management for the past 6 months or longer” (maintenance stage); “I have been using stress-management for less than 6 months” (action stage); “I intend to use stress-management in the next month” (preparation stage); “I am aware of stress-management and am thinking of using it in the next 6 months” (contemplation stage); or “I have little awareness of stress-management and have no intention to use it” (precontemplation stage). In this question, “using stress-management” refers to using effective time management, healthy relaxation strategies, and/or positive thinking techniques to deal effectively with stressors in my life.

Stress-management. The HBA assesses stress-management behaviors with items identified as stress-management skills by professional staff in University Counseling Services. The seven items related to stress and stress-management are all five-option items with response choices being: *rarely (1), sometimes (2), half the time (3), more frequently than not (4), and most of the time (5)*. Participants responded to the following items related to stress and stress management: (a) “I organize time each day in order to accomplish personal, social, academic,

and work activities that need to be completed”; (b) “When unexpected interruptions or distractions happen to me, I am able to make adjustments and still get my necessary tasks done”; (c) “When I feel stressed, my eating and/or physical activity behaviors become less healthy”; (d) “I use healthy ways to relieve the tension and anxiety that may occasionally build-up in me”; (e) “I stay positive in my attitudes and thoughts about tasks and objectives I want to achieve”; (f) “When thinking about or taking on a new endeavor, I am able to create a very clear picture of my goals and what I need to do to reach my goals”; and (g) “When solving a problem I can look at the whole picture and analyze what can be done”. For this study, responses to items a, b, d, e, f, and g were summed to create a single frequency of use of stress-management skills scale.

Procedures

Student volunteers ($N=796$) were recruited in a number of university courses in the Fall, 2006 and Spring, 2007 semesters to participate in the Healthy PAC-CATS program. Students listened to a description of the Healthy PAC-CATS program and watched a short video developed by the University Counseling Center. Individuals participating in the research study were given an Internet link connected to the Counseling Center server to access the HBA inventory. The initial website included the informed consent form for the student to complete prior to data collection. Students accessed the HBA instrument using a unique identifier and password. Students completed the 51-item inventory and were given a summary of current health behaviors compared to recommended standards. Interested students had the opportunity to be involved in the intervention stage of the Healthy PAC-CATS program. The HBA was initially piloted in a number of courses at the University. Feedback was provided about the instrument from the pilot group. The final instrument was developed and placed online for research

purposes. Data were automatically placed in spreadsheet form for future analyses.

Analyses

Individual items on the HBA were combined into health-related factors including fruit and vegetable consumption, frequency of physical activity, and frequency of use of stress-management skills. Cronbach alpha values were calculated based on factor loadings ($>.40$) of principal factors extraction to determine the validity of each factor for this data set. The combined factors and individual factors of sleep, alcohol use, stage of change, and BMI were examined to determine relationships to life satisfaction, using a significance level of $\alpha=.05$. The following research hypotheses were tested :

Hypothesis 1: College students' Body Mass Index (BMI) will be negatively correlated with life satisfaction. The relationship between BMI and life satisfaction was examined using a Pearson-product moment correlation ($p < .05$).

Hypothesis 2: College students' frequency of use of stress-management skills will be positively correlated with life satisfaction. The relationship between the frequency of use of stress-management skills and life satisfaction was examined using a Pearson-product moment correlation ($p < .05$).

Hypothesis 3: College students' frequency of physical activity behavior will be positively correlated with life satisfaction. The relationship between frequency of physical activity behavior and life satisfaction was examined using a Pearson-product moment correlation ($p < .05$).

Hypothesis 4: College students' consumption of fruits and vegetables will be positively correlated with life satisfaction. The relationship between consumption of fruit and vegetables and life satisfaction was examined using a Pearson-product moment correlation ($p < .05$).

Hypothesis 5: College students who have high levels of weekly alcohol use will have lower levels of life satisfaction than individuals who have no or low levels of weekly alcohol use. The relationship between weekly alcohol use and life satisfaction was examined using a Kruskal-Wallis nonparametric statistic for independent samples ($p < .05$).

Hypothesis 6: College students who regularly receive 6-8 hours of sleep per night will have higher levels of life satisfaction compared to individuals who do not regularly receive 6-8 hours of sleep per night. The relationship between hours of sleep per night and life satisfaction was examined using a Kruskal-Wallis nonparametric statistic for independent samples ($p < .05$).

Hypothesis 7: College students in later stages of change for physical activity, based on the Transtheoretical Model (TTM), will have higher levels of life satisfaction compared to individuals in earlier stages of change based on the TTM. The relationship between stage of change for physical activity and life satisfaction was examined using a Kruskal-Wallis nonparametric statistic for independent samples ($p < .05$).

Hypothesis 8: College students in later stages of change for fruit and vegetable consumption, based on the Transtheoretical Model (TTM), will have higher levels of life satisfaction compared to individuals in earlier stages of change based on the TTM. The relationship between stage of change for fruit and vegetable consumption and life satisfaction was examined using a Kruskal-Wallis nonparametric statistic for independent samples ($p < .05$).

Hypothesis 9: College students in later stages of change for use of stress-management skills, based on the Transtheoretical Model (TTM), will have higher levels of life satisfaction compared to individuals in earlier stages of change based on the TTM. The relationship between stage of change for use of stress-management skills and life satisfaction was examined using a Kruskal-Wallis nonparametric statistic for independent samples ($p < .05$).

CHAPTER FOUR

RESULTS

This chapter presents results organized into three sections. The first section reports demographic characteristics, the second section presents the psychometric properties of the measures, and the third section reports the results of the test of the hypotheses and summarizes findings.

Demographics

Participants were 794 students in a large Midwestern University enrolled in college courses during the Fall, 2006 and Spring, 2007 semesters. Table 1 presents the demographic characteristics of the sample. The two-semester sample consisted of 292 men and 502 women, and the majority of participants were White, female, full-time students, 18 years of age. Because of missing values, some analyses were conducted using fewer than 794 cases.

Psychometric Properties of the Measures

The health behavior factors of body mass index (BMI), physical activity frequency, fruit and vegetable consumption, and use of stress-management skills were calculated using the Health Behavior Assessment (HBA) responses. Means and standard deviations for these factors can be found in Table 2. The distribution of life satisfaction scores was normal for this sample. The factors of physical activity frequency and use of stress-management skills were derived from combining individual items on the HBA to increase the construct validity and internal consistency reliability of the behavioral constructs.

Table 1

Frequencies and Percentages for Demographic Characteristics

Variable	<i>n</i>	%
Gender		
Men	292	36.8
Women	502	63.2
Age		
18 years old	497	62.6
19 years old	149	18.8
20 years old	42	5.3
21 years old	31	3.9
22 years old or older	75	9.4
Ethnicity		
White Non-Hispanic	707	89.0
Black Non-Hispanic	38	4.8
Hispanic or Latino	15	1.9
Asian or Pacific Islander	10	1.3
American Indian or Alaskan native	4	0.5
Multi-racial	13	1.6
Other	7	0.9

Table 2

Means and Standard Deviations of Measures

Variable	All Students		Men		Women	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Life Satisfaction	10.99	2.31	11.20	2.22	10.91	2.25
BMI	23.86	4.38	24.70	4.39	23.69	4.31
F & V Consumption	4.21	1.95	4.13	2.03	4.26	1.90
Frequency of Physical Act	17.29	6.27	17.89	6.30	16.96	6.24
Stress Management Skills	21.98	4.63	22.24	4.68	21.81	4.68

Body Mass Index (BMI). Body Mass Index (BMI) was calculated for each individual using self-reported weight in pounds and height in inches, using the following formula

$$\text{BMI} = [\text{weight} / (\text{height}^2)] \times 703.$$

In the sample, approximately 4% of the students were underweight, 66% were normal weight, 21% were overweight, and 9% were obese according to BMI standards. In the male sample, 2% were underweight, 58% normal weight, 29% overweight, and 11% were obese. In the female sample, 5% were underweight, 70% were normal weight, 16% were overweight, and 9% were obese.

Physical activity frequency. Participants provided a response of from 1 to 7 days for the following items to calculate physical activity frequency : (a) “On how many of the past 7 days did you exercise or participate in sports activities for at least 20 minutes that made you sweat and

breathe hard, such as basketball, jogging, swimming laps, tennis, fast cycling, or similar aerobic activities”; (b) “On how many of the past 7 days did you walk or bicycle for at least 30 minutes at a time (Include walking or bicycling to or from class or work”; (c) “On how many of the past 7 days did you participate in physical activity for at least 30 minutes that did not make you sweat or breathe hard, such as fast walking, slow walking, slow bicycling, skating, pushing a lawn mower, or mopping floors”; and (d) “During the past 7 days, on how many days were you physically active for a total of at least 30 minutes per day.”

Individual items were summed to calculate a total frequency of physical activity bouts during the past 7 days. The items in the inventory were based on meeting recommended standards of moderate or vigorous physical activity (ACSM, 2000) and did not measure total minutes of physical activity performed during the week.

Principal component analysis was used to determine the minimum number of common factors (minimum eigenvalue of 1.0). The unrotated analysis indicated that the first factor explained 49.14% of the variance (eigenvalue of 1.966). The scree test revealed a relatively large drop-off to the second factor, which explained 23.48% of the variance (eigenvalue of .939), suggesting a single factor solution. Varimax rotation, with minimum pattern matrix coefficients set at .40, resulted in all four items loading on the single factor with component matrix coefficients ranging from .63 to .81. The Cronbach alpha measure of internal consistency yielded a value of .65, indicating a reasonably reliable factor. Physical activity frequency therefore, was calculated by summing responses on individual items to generate a single score representing total number of days the individual participated in physical activity.

Fruit and Vegetable Consumption. Responses to the following items were combined to calculate total fruit and vegetable consumption : (a) “On a typical day, how many times do you eat fruit?”, (b) “On a typical day, how many times do you drink 100% fruit juices such as orange juice, apple juice, or grape juice?”, (c) “On a typical day, how many times do you eat green salad?”, and (d) “ On a typical day, how many times do you eat other vegetables (do not count green salad)?” For each item the individual chose from among the following options : 0 times, 1 time, 2 times, and 3 or more times. Previous research (Kristal et al., 2000) has used this approach to measure fruit and vegetable consumption. Total fruit and vegetable consumption was calculated by adding the responses to the four items providing a range of scores from 0 to 12. Concurrent validity for this measure was examined by comparing this total to the following item on the HBA : “How many servings of fruit and vegetables do you usually eat each day? A serving is ½ cup of cooked vegetables, 1 cup of salad, a piece of fruit, ¾ cup of 100% fruit juice?” Students indicated fruit and vegetable consumption on this question by indicating 0, 1, up to 6 or more servings a day. A Cronbach alpha value was calculated to examine the reliability between the two measures of fruit and vegetable consumption. The calculated value of .72 demonstrates the reliability of the participant’s self-reported fruit and vegetable scores. Based on the national recommendations of five or more fruits and vegetables per day (USDA and USDHHS, 2000), 42% of participant in the study met recommendations, with 43% of women, and 35% of men reporting consumption at this level.

Use of Stress-Management Skills. Participants responded to the following items related to the use of stress-management skills :(a) “ I organize time each day in order to accomplish personal, social, academic, and work activities that need to be completed”; (b) “When

unexpected interruptions or distractions happen to me, I am able to make adjustments and still get my necessary tasks done”; (c) “ I use healthy ways to relieve the tension and anxiety that may occasionally build-up in me”; (d) “I stay positive in my attitudes and thoughts about tasks and objectives I want to achieve”; (e) “When thinking about or taking on a new endeavor, I am able to create a very clear picture of my goals and what I need to do to reach my goals”; and (f) “When solving a problem I can look at the whole picture and analyze what can be done.”

For each item, respondents chose from among the following options : *rarely* (assigned a value of 1), *sometimes* (2), *half the time* (3), *more frequently than not* (4), and *most of the time* (5). Principal component analysis was used to determine the minimum number of common factors (minimum eigenvalue of 1.0). The unrotated analysis indicated that the first factor explained 48.91% of the variance (eigenvalue of 2.935). The scree test revealed a relatively large drop-off to the second factor, which explained 12.87% of the variance (eigenvalue of .772), suggesting a single factor solution. Varimax rotation, with minimum pattern matrix coefficients set at .40, resulted in all six items loading on the single factor with component coefficients ranging from .60 to .79. An inter-item measure of internal consistency yielded a Cronbach alpha of .79, indicating a reliable factor. Frequency of use of stress-management skills was calculated by summing responses on individual items to generate a single score representing the frequency with which the individual utilized stress-management skills.

Correlations between Health Behaviors and Life Satisfaction

A number of hypotheses were tested to examine the relationship between the health factors of BMI, frequency of physical activity behavior, frequency of stress-management skill use, and fruit and vegetable consumption. Correlations between the health behaviors and life

satisfaction are presented in Table 3.

Hypothesis: College student's BMI will be negatively correlated with life satisfaction.

This hypothesis was tested by conducting a Pearson-product moment correlation for the respective variables. Significant negative correlations were found between BMI and life satisfaction for the entire sample ($r = -.16, p < .01$), for men ($r = -.12, p < .05$), and for women ($r = -.20, p < .01$), indicating that individuals with lower BMI scores had higher life satisfaction than individuals with higher BMI scores. The correlation between life satisfaction and BMI for women was not significantly different from that of men in this study (Fisher $z = -1.40, p > .05$). Previous research has not examined the relationship between life satisfaction and BMI in men, but Ball et al. (2004) reported being overweight/obese had a negative effect on young women's life satisfaction and future life aspirations.

Hypothesis: College students' frequency of use of stress-management skills will be positively correlated with life satisfaction.

This hypothesis was tested by conducting a Pearson-product moment correlation for the respective variables. Significant positive correlations were found between use of stress-management skills and life satisfaction for the entire sample ($r = .42, p < .01$), for men ($r = .35, p < .01$), and for women ($r = .45, p < .01$), indicating individuals who use more stress-management skills have higher life satisfaction than individuals who use fewer stress-management skills. The Fisher z test of difference among correlations ($z = 1.36, p > .05$) indicated no difference in the correlations for men and women on life satisfaction and stress-management use. Doyle, Irons, Owens, and Nassar (2005) examined the relationship between stress and life satisfaction and found frequent practice of stress-management behaviors significantly predicted life satisfaction.

Table 3

Correlations Between Life Satisfaction and Health Behaviors

	All students ($N = 794$)	Women ($n = 502$)	Men ($n = 292$)
	Life Satisfaction		
Health Behaviors			
Fruit & Vegetable Consumption	.12**	.11*	.13*
Stress-Management	.42**	.45**	.35**
Physical Activity	.13**	.13**	.13*
Body Mass Index (BMI)	-.16**	-.20**	-.12*

* $p < .05$ ** $p < .01$

Deniz (2006) examined the relationship between stress and life satisfaction in university students and found life satisfaction was significantly related to problem-focused coping and seeking social support.

Hypothesis: College students' frequency of physical activity behavior will be positively correlated with life satisfaction.

This hypothesis was tested by conducting a Pearson-product moment correlation for the respective variables. Significant positive correlations were found between frequency of physical activity behaviors and life satisfaction for the entire sample ($r = .13, p < .01$), for women ($r = .13, p < .01$), and for men ($r = .13, p < .05$), indicating individuals who have a higher frequency of physical activity behaviors have higher life satisfaction than individuals who have a lower

frequency of physical activity behaviors. Schnohr et al. (2005) found active individuals reported less life dissatisfaction than inactive individuals, and moderately active individuals had higher levels of life satisfaction compared to low active individuals.

Hypothesis: College students' consumption of fruits and vegetables will be positively correlated with life satisfaction.

This hypothesis was tested by conducting a Pearson-product moment correlation for the respective variables. Significant positive correlations were found between total daily fruit and vegetable consumption and life satisfaction for the entire sample ($r = .11, p < .01$), for women ($r = .10, p < .05$), and for men ($r = .13, p < .05$), indicating individuals who have a higher frequency of fruit and vegetable consumption have higher life satisfaction than individuals who have a lower frequency of fruit and vegetable consumption. A comparison of the correlations indicated no significant difference ($z = .42, p > .05$) between men and women. Previous research had not examined the relationship between life satisfaction and fruit and vegetable consumption.

Regression Analysis Examining Health Behaviors as Predictors of Life Satisfaction

To examine which health behaviors had the strongest relationship to life satisfaction, a simultaneous multiple regression analysis was conducted to examine the contribution of four health behaviors (BMI, fruit and vegetable consumption, frequency of physical activity, and stress-management skill use) on life satisfaction. Intercorrelations for the four health behaviors are presented in Table 4. Results of the multiple regression analysis are presented in Table 5. Use of stress-management skills, $t(782) = 12.01, p < .001$, and BMI, $t(782) = 4.52, p < .001$, were both significant predictors of life satisfaction. Stress-management skills had the highest standardized regression coefficient (β) and partial correlation with life satisfaction. Overall, the

Table 4

Intercorrelations Among Health Behaviors

	Total FV	Total PA	BMI	Stress-Man
Life Sat	.12**	.13**	-.16**	.42**
Total FV		.27**	.01	.19**
Total PA			-.02	.21**
BMI				-.04

** $p < .001$

Table 5

Regression Analysis Predicting Life Satisfaction From Health Behaviors

	β	Part correlations	R
Predictors of Life Satisfaction			
Stress Management	.40*	.39	
BMI	.14*	-.15	
Total Fruit and Vegetable	.04	.04	
Total Physical Activity	.03	.04	.45

* $p < .001$

total regression model accounted for a significant amount of variance in self-reported life satisfaction, $F(4,782) = 48.22, p < .001, R^2 = .20$. Collinearity diagnostics indicated redundancy among the predictor variables was minimal.

Alcohol Use, Sleep Behavior and Life Satisfaction

The relationships between the health behaviors of alcohol use, sleep behavior, and life satisfaction were examined using a Kruskal-Wallis nonparametric test. The Kruskal-Wallis test was chosen because both alcohol use and sleep behavior were measured on a single-item with a five-choice ordinal scale. The alcohol question asked “How many drinks of alcohol do you usually have during a typical week?” Response options were 0 (coded using the value 1), 1-3 (2), 4-6 (3), 7-9 (4), and 10 or more (5). Responses to the alcohol item are shown in table 6. The sleep item stated “I get 6 to 8 hours of sleep a night,” with response options of rarely (coded with the value of 1), sometimes (2), half the time (3), more frequently than not (4), and most of the time (5).

Hypothesis: College students who have high levels of weekly alcohol use will have lower levels of life satisfaction than individuals who have no or low levels of weekly alcohol use.

This hypothesis was tested by conducting a Kruskal-Wallis nonparametric test to examine differences among individuals with different levels of weekly alcohol use. No significant differences among levels of alcohol use were found for the entire sample ($\chi^2 = .95$, 4 df, $p = .92$), for women ($\chi^2 = 1.41$, 4 df, $p = .84$), and for men ($\chi^2 = 6.35$, 4 df, $p = .18$). Results therefore, indicated no significant relationship between alcohol use and life satisfaction. Murphy, McDevitt-Murphy, and Barnett (2005) examined the relationship between life satisfaction and alcohol use and found lower life satisfaction with women who used alcohol, but a curvilinear relationship between alcohol use and life satisfaction in men. Men who drank little or large amounts of alcohol showed lower life satisfaction, but men who drank moderate amounts of alcohol showed higher life satisfaction.

Table 6

Frequencies for Levels of Alcohol Use

How many drinks of alcohol do you usually have during a typical week?						
Number of Drinks	All Students <i>f</i>	%	Women <i>f</i>	%	Men <i>f</i>	%
Zero	371	46.7	235	46.8	136	46.6
1-3	183	23.0	142	28.3	41	14.0
4-6	91	11.5	64	12.7	27	9.2
7-9	51	6.4	28	5.6	23	7.9
10 or more	98	12.3	33	6.6	65	22.3
Totals	794		502		292	

Hypothesis: College students who regularly receive 6-8 hours of sleep per night will have higher levels of life satisfaction compared to individuals who do not regularly receive 6-8 hours of sleep per night.

This hypothesis was tested by using a Kruskal-Wallis nonparametric test to examine the differences among categories in life satisfaction based on response options to the question “I get 6 to 8 hours of sleep a night.” Response choices were *rarely* (coded as 1), *sometimes* (2), *half the time* (3), *more frequently than not* (4) and *most of the time* (5). The initial analysis identified a significant difference among the five sleep response options for all participants ($\chi^2 = 70.80$, 4 df, $p < .001$), for women ($\chi^2 = 47.18$, 4 df, $p < .001$), and for men ($\chi^2 = 25.60$, 4 df, $p < .001$).

Participants were collapsed into two groups based on sleep behaviors. A non-6 to 8 hour of sleep group was formed by combining responses *rarely, sometimes, and half the time*, and a recommended sleep group was formed by combining responses of *more frequently than not* and *most of the time*. A Mann-Whitney-U nonparametric test of two independent samples found life satisfaction for individuals who met sleep recommendations frequently or most of the time was higher than for individuals who did not (all participants, $z = -7.49, p < .001$, men, $z = -6.51, p < .001$, and women, $z = -3.74, p < .001$). Previous research indicated that college students who sleep less report more neuroticism (Kumar & Vaidya, 1982) and worry (Kelly, 2002). Kelly (2004) also found college students who had less sleep scored significantly lower on measures of life satisfaction compared to students who had more sleep.

Stage of Change and Life Satisfaction

Stage of change (Prochaska & DiClemente, 1982) for fruit and vegetable consumption, physical activity, and stress-management skill use was examined to determine whether stage of behavior is related to life satisfaction. A Kruskal-Wallis nonparametric test was used to examine this relationship. Significant differences were followed up using a Mann-Whitney-U nonparametric test to compare differences between consecutive stage of behavior and life satisfaction measures.

Hypothesis: College students in later stages of change for physical activity, based on the Transtheoretical Model (TTM), will have higher levels of life satisfaction compared to individuals in earlier stages of change based on the TTM.

This hypothesis was tested using a Kruskal-Wallis nonparametric test to examine differences in life satisfaction based on stage of change for physical activity. Number and

percentage of participants in each stage of change in physical activity, fruit and vegetable consumption, and stress-management are presented in Table 7. The initial analysis found significant differences among stages for all participants ($\chi^2 = 41.56, 4 \text{ df}, p < .001$), men ($\chi^2 = 17.18, 4 \text{ df}, p < .01$), and for women ($\chi^2 = 26.19, 4 \text{ df}, p < .001$). Follow-up tests were conducted using a Mann-Whitney-U nonparametric test to compare differences based on the current stage of the participant. No significant difference was found between the precontemplation and contemplation stages (all participants, $z = -.19, p = .85$; women $z = -1.07, p = .29$; men, $z = -.75, p = .46$), between the contemplation and preparation stages (all participants $z = -1.03, p = .30$; women, $z = -1.11, p = .27$; men, $z = -.75, p = .46$), and between the preparation and action stages (all participants, $z = -1.2, p = .21$; women, $z = -.27, p = .79$, men, $z = -1.45, p = .15$). A significant difference was found in life satisfaction between the action and maintenance stages for all participants, ($z = -5.18, p < .001$), for women ($z = -3.87, p < .001$), and for men ($z = -3.4, p < .001$). Participants who were engaged in long-term physical activity behavior (maintenance stage) showed a significant increase in life satisfaction for both genders compared to those in any other stage of physical activity behavior. In a study examining life satisfaction on 8000 pairs of twins, Stubbe, de Moor, Boomsma, and de Geus (2007) found exercisers more satisfied with life and happier than non-exercisers at all ages.

Hypothesis: College students in later stages of change for fruit and vegetable consumption, based on the Transtheoretical Model (TTM), will have higher levels of life satisfaction compared to individuals in earlier stages of change based on the TTM.

This hypothesis was tested using a Kruskal-Wallis nonparametric test to examine differences in life satisfaction based on stage of change for fruit and vegetable consumption. The

Table 7

Frequencies and Percentages for Stage of Change for Health Behaviors

	All Students		Women		Men	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Physical activity						
Precontemplation	33	4%	15	3%	18	6%
Contemplation	190	24%	134	27%	56	19%
Preparation	161	20%	112	22%	49	17%
Action	150	19%	102	20%	48	16%
Maintenance	261	33%	139	28%	122	42%
	<u>795</u>		<u>502</u>		<u>293</u>	
Fruit and Vegetable Consumption						
Precontemplation	383	48%	209	42%	174	59%
Contemplation	46	6%	30	6%	16	5%
Preparation	293	37%	216	43%	77	26%
Action	14	2%	9	2%	5	2%
Maintenance	58	7%	37	7%	21	7%
	<u>795</u>		<u>502</u>		<u>293</u>	
Stress Management Skill Use						
Precontemplation	121	15%	53	11%	68	23%
Contemplation	178	22%	107	21%	71	24%
Preparation	128	16%	98	20%	30	10%
Action	95	12%	65	13%	30	10%
Maintenance	273	34%	179	36%	94	32%
	<u>795</u>		<u>502</u>		<u>293</u>	

initial analysis found no significant difference in life satisfaction among the different stages of change for all participants ($\chi^2 = 7.63$, 4 df, $p = .11$), men ($\chi^2 = 1.39$, 4 df, $p = .85$), and women ($\chi^2 = 6.53$, 4 df, $p = .16$). The hypothesis that stage of change for fruit and vegetable consumption would influence level of life satisfaction was not supported.

Hypothesis: College students in later stages of change for use of stress-management skills, based on the Transtheoretical Model (TTM), will have higher levels of life satisfaction compared to individuals in earlier stages of change based on the TTM.

This hypothesis was tested using a Kruskal-Wallis nonparametric test to examine differences in life satisfaction based on stage of change for use of stress-management skills. The initial analysis found a significant difference in life satisfaction based on stage of change for all participants ($\chi^2 = 44.26$, 4 df, $p < .001$), for women ($\chi^2 = 39.84$, 4 df, $p < .001$), and for men ($\chi^2 = 13.52$, 4 df, $p < .01$). Follow-up tests were conducted using a Mann-Whitney-U nonparametric test to compare differences based on the current stage of the participant. No significant difference was found between the precontemplation and contemplation stages (all participants, $z = -.34$, $p = .73$; women $z = -1.85$, $p = .07$; men, $z = -1.74$, $p = .08$), between the contemplation and preparation stages (all participants $z = -1.01$, $p = .31$; women, $z = -.77$, $p = .44$; men, $z = -.70$, $p = .49$), and between the preparation and action stages (all participants, $z = -.51$, $p = .61$; women, $z = -.20$, $p = .84$, men, $z = -.45$, $p = .66$). A significant difference was found in life satisfaction between the action and maintenance stages for all participants ($z = -3.59$, $p < .001$), for women ($z = -3.14$, $p < .002$), but not for men ($z = -1.78$, $p = .08$). Although no previous research has examined how stage of change for stress management use relates to life satisfaction, Harris et al. (2006) found perceived stress a significant predictor of life satisfaction. Individuals' who

manage stress effectively, have higher levels of life satisfaction compared to peers who have difficulty managing stress. Doyle et al. (2005) found that frequent practice of stress-management behaviors significantly predicted life satisfaction.

Summary

Previous research has shown that a number of factors influence life satisfaction, although limited research has examined the health behavior and life satisfaction relationship in college students. The majority of hypotheses examining the relationship between health behaviors and life satisfaction were supported for this sample. The hypothesis relating higher alcohol use with lower life satisfaction was not supported. One possible explanation may be in the way that alcohol use was measured on the HBA. Frequency of alcohol use, not total amount of alcohol use was measured. The majority of studies relating alcohol use to lower life satisfaction examined problems related to alcohol use, not actual alcohol use frequency. Also, the hypothesis examining stage of change for fruit and vegetable consumption to life satisfaction was not supported. Although there was a significant correlation between fruit and vegetable consumption and life satisfaction, the evidence did not support the idea that the stage of change for consumption would be related to life satisfaction. The findings in this section nonetheless suggest that a number of health behaviors are related to life satisfaction in this sample of college students.

CHAPTER FIVE

DISCUSSION

The primary objective of this study was to examine how different health behaviors are related to life satisfaction in college students. The findings indicated that BMI, physical activity, fruit and vegetable consumption, stress-management skills, and sleep were related to life satisfaction. College students in this study who practiced recommended and healthy behaviors showed higher levels of life satisfaction compared to those who did not practice these behaviors.

Summary of Findings

Although some of the hypotheses set out prior to this investigation were not supported, a number of hypotheses were supported. The findings in this study are discussed in the following sections.

Correlations Between Life Satisfaction and Health Behaviors

This study explored the relationship between BMI, physical activity frequency, fruit and vegetable consumption, the use of stress-management skills, and life satisfaction. As predicted, life satisfaction was correlated with these variables, with the use of stress-management skills having the strongest relationship to life satisfaction. Thus, the hypothesis that students who use more stress-management skills have higher life satisfaction was supported, and this relationship was stronger for women than for men. Recent evidence indicates stress is a major health problem in the United States (APA, 2007), and up to 60% of college students rated current stress levels as high or very high (Makrides et al., 1998). Furthermore, Benton et al. (2003) found that students who were seen in a university counseling center in recent years frequently had more complex problems, including anxiety and depression. Students who stay organized, make adjustments to

change, use healthy techniques to relieve anxiety, stay positive, focus on goals they can control, and look for solutions to problems are more likely to deal with stress effectively. The Satisfaction With Life Scale (SWLS; Diener et al., 1985) measures life satisfaction with items related to an ideal, excellent, and satisfactory life. Individuals who have high stress levels have been shown to have lower levels of life satisfaction (McKnight, Huebner, & Suldo, 2002), whereas individuals who practice stress-management behaviors have higher predicted life satisfaction (Doyle et al., 2005). Results from this study demonstrated a significant positive relationship between the use of stress-management skills and life satisfaction.

As predicted, Body Mass Index (BMI) was negatively correlated with life satisfaction. Ball et al. (2004) found obese young women were more dissatisfied with themselves and their lives than normal weight women. With a growing focus on the obesity epidemic, there has been an increased recognition of the social stigmatization of the obese (Puhl & Brownell, 2001). Weight-based stigmatization has been documented in the workplace (Paul & Townsend, 1995), in educational settings (Canning & Mayer, 1966), and even in healthcare environments (Kristeller & Hoerr, 1997). Stereotypes against individuals begin in early childhood (Brylinsky & Moore, 1994), and evidence indicates these biases translate into discriminatory behaviors against the obese (Carr & Friedman, 2005). Obesity has also been shown to increase the risk of developing Type-2 diabetes, hypertension, and hypercholesterolemia (Allison, Gallagher, Heo, Pi-Sunyer, & Heymsfield, 1997), and obesity is inversely related to self-esteem and academic performance (Gortmaker, Must, Perrin, Sobol, & Dietz, 1993). Awareness of the health risks of obesity, lower feelings of self-esteem, and the stigma of obesity have the potential to negatively influence feelings of life satisfaction.

The hypothesis that frequency of physical activity would be positively correlated with life satisfaction was supported in this study. Individuals who indicated more frequency of physical activity behaviors of low, moderate, and vigorous intensity showed higher life satisfaction scores than less active individuals. Elavsky et al. (2005) found physical activity had a positive effect on Quality of Life as measured by the SWLS. Schnohr et al. (2005) found lower life dissatisfaction for joggers, and increased life satisfaction with increased intensity of physical activity. Valois et al. (2004b) found low levels of exercise associated with reduced life satisfaction. Furthermore, Nguyen-Michel, Unger, Hamilton, and Spruijt-Metz (2006) found higher levels of physical activity led to lower perceived stress and hassles in college students, and evidence from McKnight et al. (2002) indicated that lower stress levels are related to higher life satisfaction.

In this study, significant correlations were found between fruit and vegetable consumption and life satisfaction. Students who indicated a greater frequency of consumption of fruits and vegetables also reported higher levels of life satisfaction. There has been limited research on this relationship. Seo, Nehl, Agle, and Ma (2007) did find students who ate more fruit were more likely to engage in vigorous and moderate physical activity. It is possible that the relationship between fruit and vegetable consumption and life satisfaction may be somewhat explained by the physical activity behavior of the student. Future research may should address how fruit and vegetable consumption and physical activity interact and possibly affect psychological measures.

Alcohol Use and Life Satisfaction

The hypothesis that students who have higher levels of weekly alcohol use would have lower levels of life satisfaction was not supported. There was no significant difference on life

satisfaction related to total number of weekly alcoholic drinks. Alcohol consumption has been identified as a pervasive and persistent problem on most college and university campuses (Casper et al., 2006), and 68% of colleges conduct programs to curb drinking (Wechsler, Seibring, Liu, & Ahl, 2004). Heavy episodic drinking is associated with academic difficulties (Benton et al., 2004, 2006a, 2006b; Paschall & Freisthler, 2003); physical injury to self and others (Benton et al., 2004, 2006a, 2006b); legal repercussions (Benton et al., 2004, 2006a, 2006b); failure to achieve milestones like graduation, marriage, and full-time employment (Gotham, Sher, & Wood, 2003); and persistent psychological difficulties (Camatta & Nagoshi, 1995). But alcohol use has also been shown in some research to have positive outcomes, including social benefits, increased optimism, and interpersonal problem solving (Nystrom, 1992). Park (2004) found college students evaluated the positive outcomes from drinking as more common than negative outcomes. Clifford, Edmundson, Koch, and Dodd (1991) found a nonsignificant positive relationship between alcohol use and life satisfaction, whereas Murphy and colleagues (2005) found alcohol-related problems diminished life satisfaction in both male and female college students.

Sleep and Life Satisfaction

The hypothesis that college students who regularly receive the recommended 6 to 8 hours of sleep a night (Kato et al., 2000; Spiegel, Leproult, & Van Cauter, 2001) would have higher levels of life satisfaction than students who did not have the recommended amount of sleep was supported. Participants who indicated they more frequently than not or most of the time got 6 to 8 hours of sleep a night demonstrated greater life satisfaction than those who rarely-to-half the time got 6 to 8 hours of sleep. Kelly (2004) found individuals who reported habitually attaining

less sleep a night reported lower life satisfaction, but Pilcher and Ott (1998) found sleep quality versus sleep quantity was more strongly related to life satisfaction. Other research has found college students who attain less sleep at night report higher levels of neuroticism (Kumar & Vaidya, 1982), worry (Kelly, 2002), and lower grade-point averages (Kelly, Kelly, & Clanton, 2001). The results of the current study support a relationship between sleep behavior and life satisfaction, but sleep quality was not assessed. College students who reported too much or too little sleep rated life satisfaction lower than students who met the recommended 6 to 8 hours, suggesting a curvilinear relationship between sleep and life satisfaction.

Stage of Change for Physical Activity, Fruit and Vegetable Consumption, Stress-management and Life Satisfaction

The hypothesis that college students in later stages of change for physical activity, based on the Transtheoretical Model (TTM), would have higher levels of life satisfaction was supported in this study. Individuals in the maintenance stage (6 months or longer in the behavior) had significantly higher life satisfaction than individuals in the earlier stages of change. Research on life satisfaction and stage of change for physical activity has shown that as individuals move through the stages of change, self-efficacy increases (Prochaska & Marcus, 1994). Perhaps individual's who have a long-term involvement in an activity identified as healthy and positive, and who have a high level of self-efficacy about that activity, perceive their life as more fulfilling and satisfying. Physical activity behavior has been shown to have a positive effect on stress (Blumenthal & McCubbin, 1987), anxiety (Long, 1984), and depression (Kugler, Seelbach, & Kruskemper, 1994), all of which may negatively affect life satisfaction.

The hypothesis that college students in later stages of change for fruit and vegetable

consumption would have higher levels of life satisfaction was not supported in this study. Only 9% of participants reported being in the action and maintenance stages of fruit and vegetable consumption, even though the health benefits of fruit and vegetable consumption have been well-documented (Van Duyn & Pivonka, 2002). The American College Health Association (2002) reported that only 7.4% of college students currently consume the minimum number of daily servings of fruit. Although eating fruits and vegetables is beneficial, it is a behavior that is less prevalent in the college population. The literature on the physical benefits of fruit and vegetable consumption has been demonstrated, but research on the psychological benefits of a healthy diet is less prevalent.

The hypothesis that college students who are using or have been using stress-management skills would have higher life satisfaction was supported in this study. Stress is a serious issue in the college-age population, and the ability to manage stress seems to be beneficial in self-reported life satisfaction. College students who have the ability to manage stress perform better socially (McCubbin, Thompson, Thompson, & Fromer, 1993) and in the classroom (Arnett, 2004), which might be supportive of higher levels of life satisfaction. Individuals in the maintenance stage of stress-management in this study were apparently applying skills that would be conducive to limiting the negative influences of stress. These participants showed significantly higher life satisfaction than participants in all other stages of change for stress-management use.

Implications for Research

A variety of health behaviors show a relationship to life satisfaction in college-age students. The physical and psychological benefits of healthy behaviors have been widely

examined and supported, but less research has been conducted on life satisfaction. One issue to address is how this relationship is structured. Does involvement in healthy behaviors such as physical activity, healthy diet, adequate sleep, and stress-management increase life satisfaction, or are individuals higher in life satisfaction more prone to engage in healthy behaviors? This problem could be examined by conducting interventions on healthy behaviors and examining any changes that occur in life satisfaction. This could also be accomplished by conducting a cross-lagged longitudinal design to examine whether healthy behaviors at Time 1 predict life satisfaction at Time 2, and whether life satisfaction at Time 1 predicts healthy behaviors at Time 2. The traditional college-age population is a critical age group in which to promote healthy behaviors (Newton, Kim, & Newton, 2006) because the individual has increased autonomy and is at an age when behaviors can be changed (Shive & Morris, 2006). There is a critical need for health behavior-based interventions in this age group (Huang et al., 2003), and changed behaviors may have a sustained impact on long-term health (Paffenbarger et al., 1986).

The findings from this study support the relationship between life satisfaction and healthy behaviors in college students. Although no cause-effect relationships were established, researchers might now develop and assess whether interventions designed to increase physical activity, promote healthy diet, and improve self-management skills also affect life satisfaction. Research in this area is important, because life satisfaction is related to students' academic achievement (Rode et al., 2005), and may, therefore, play a role in not only student success but student retention.

Future research can also address how health behaviors are related to each other. A better understanding of the different roles of sleep, physical activity, fruit and vegetable consumption,

stress-management, and BMI play in the psychological well-being of the individual will allow the development of stronger, more effective interventions for the college-age population.

Implications for Practice

Individuals working with college students, especially beginning freshmen, should consider integrating healthy behaviors and practices into the college experience. Providing stress-management training for college students in orientation and freshmen courses, similar to Kansas State University's EDCEP 103, Healthful and Safe College Life, may be beneficial to the success of the student. Dealing with chronic stress can leave students feeling personally and psychologically inept (Jackson & Finney, 2002). Evidence suggests some students have difficulty dealing with the mounting stress of college (Greenberg, 1990).

Research by Paffenbarger and colleagues (1986) showed the long-term impact of health behaviors formed during the college years. The drop-off of physical activity from high school to college (Douglas et al., 1997) and increase in obesity (Mokad et al., 1999) has been well documented. Institutions of higher learning have the capability to provide systematic programming to influence these changes. Wellness policies that integrate food services, recreation, and planning services may have the potential to alter the adaptation of unhealthy behaviors in the college setting. Results from this study indicate the majority of students are physically active, but a very low percentage are eating adequate amounts of fruits and vegetables. Changes in health behaviors have the potential to change the physical health of the students, and may alleviate some of the psychological issues such as anxiety and depression (Benton et al., 2003) that hinder students success and may lower life satisfaction.

Limitations of the Study

A number of limitations need to be considered when evaluating the results of this study. These limitations include (a) measurement of health behaviors and life satisfaction, (b) the use of self-report instruments, and (c) alternative explanations for the results. Each of the limitations is described below.

Measurement of Health Behaviors and Life Satisfaction

The Health Behaviors Assessment (HBA) was designed as a tool to categorize current student health behaviors and to provide feedback to students about how their own behaviors compared to recommended standards. Concurrent validity of the items had not been previously established against more objective and valid instruments. However, some concurrent validity was established in this study because several sub-scales correlated with life satisfaction. Items on fruit and vegetable consumption were adapted from inventories based on the YRBSS (2006), but response items for consumption were limited to 0, 1, 2, and 3 or more, so actual total consumption was not directly assessed. The physical activity measures examined bouts of recommended standards of activity by days of week but did not provide a specific total for minutes of physical activity or for caloric expenditure. Life satisfaction on the HBA was measured using only three of the five items from the SWLS (Diener et al., 1985). However, the internal consistency and validity of the three items was established as acceptable, and the three-item scale correlated with the 5-item SWLS (Diener et al., 1985) scale.

Use of a Self-Report Instrument

Participants in this study completed the online HBA inventory. Some of the items on the inventory measure personal information such as weight, activity behavior, and stress-

management skills. Response bias is possible with any self-reported behaviors, especially when individuals are reporting personal information such as height and weight. However, when researchers follow certain procedures, validity of responses improves (Babor, Stephens, & Marlatt, 1987). For example, participants were guaranteed anonymity and confidentiality, which was intended to decrease bias and increase response validity. Also, the use of a convenience sample of college students enrolled in certain courses has the potential to misrepresent the results for the actual student body of the university. However, the distribution of participants based on gender and ethnicity was a fair representation of the college student population at the university.

Alternative Explanations for the Results

Life satisfaction is related to weight (Ball, Crawford, & Kenardy, 2004), alcohol use problems (Rudolf & Watts, 2002), physical activity (Schnohr et al., 2005), and stress (McKnight, Huebner, & Suldo, 2002) in different populations. One issue that may impact the results would be the difficulty of measuring many of these constructs. Physical activity is difficult to measure by self-report (Troiano et al., 2008) because individuals often over-report the amount of activity. Dietary behavior is dependent on recall of behavior, and diet has a number of different influences including time, money, and convenience. Stress can also be influenced by the measurement time frame and the type of activities that are currently affecting the individual. This is especially troublesome because the stability of these measures was not examined in this research study.

Life satisfaction has been shown to have some level of fluidness and can be affected by variables such as the presence of a handicapped confederate (Shimmack, Diener, & Oishi, 2002) and current weather (Schwarz & Clore, 1983). With the majority of students completing the

HBA inventory early in the semester, and many of the participants being new to the university setting, outside factors may have influenced the responses provided. The relationships between the health behaviors and life satisfaction were significant, but the modest strength of the majority of these relationships cast some level of doubt on the meaningfulness of the relationship.

Recommendations

For this sample of college students, a relationship did exist between many of the health behaviors and life satisfaction. There is enough evidence to justify a potential intervention to examine how altering health behaviors influences life satisfaction. An intervention designed to increase physical activity, increase fruit and vegetable consumption, teach stress-management skills, and lower BMI could have a number of health benefits and might also lead to increased life satisfaction in the participants. With evidence that increased life satisfaction influences academic performance, the benefits of this type of intervention would be numerous and worthy of further investigation.

Professionals working with college students should be provided with additional training and awareness of the health behaviors of the college population. These behaviors have both short- and long-term implications related to mental and physical health. Although the relationships in this study are not causal, there is sufficient evidence to indicate that health behaviors are important for life satisfaction in this population. Programs that provide opportunities for improved health behaviors have the potential to not only improve the physical health of students, but the mental health as well.

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