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# Impact of Healthy Lifestyle Choices on Smoking Behavior Among College Students who Smoke Cigarettes

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**Impact of Healthy Lifestyle Choices on Smoking Behavior  
Among College Students who Smoke Cigarettes**

Impact of Healthy Lifestyle Choices on Smoking Behavior  
Among College Students who Smoke Cigarettes

A dissertation submitted in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy in Health Science

by

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Bachelor of Science in Education, 2007  
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May 2014  
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This dissertation is approved for recommendation to the Graduate Council.

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## **ABSTRACT**

This dissertation examines the impact certain healthy lifestyle choices had on smoking behavior among college students who smoke cigarettes. Even with continued reduction in prevalence, cigarette smoking is still the leading cause of preventable death in America. With that in mind, it is important to continue to identify factors that relate to decreased tobacco usage. Secondary data from the American College Health Association's bi-yearly National College Health Assessment was used for this study. This assessment/survey encompasses college students' habits, behaviors, and perceptions regarding prevalent health topics. The sample for this study consisted of 14,515 college students who identified themselves as having smoked within the last 30 days. Fruit and vegetable intake per day, days per week of vigorous exercise, Body Mass Index, and exercisers trying to lose weight were the healthy lifestyle choices this study related to smoking behavior. It was found that 1) college students who ate zero fruits and vegetables per day were likely to smoke 2.31 more days per month than those who ate five or more per day, 2) for every day per week a smoker partook in vigorous exercise, they smoked 0.76 days fewer per month, 3) for every one unit increase in participants Body Mass Index, an increase of 0.06 in days smoked per month can be expected, 4) College students who are not currently exercising to lose weight smoke 2.11 more days per month than those students who are currently exercising to lose weight. Overall, the majority of healthy lifestyle choices considered in this study significantly impacted the amount of days per month a college smoker, smoked cigarettes.

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## **DEDICATION**

I dedicate my dissertation work to my family. My beautiful wife, Christi, has supported me on a daily basis throughout my graduate studies, and I will forever be grateful. A very special gratitude is extended to my parents, Wayne and Melinda. I cannot begin to express the amount of influence they both have had on who I am, and who I will become as a person. My brother, Matt, and my sister, Carly, have created a support system that is as strong as any I have encountered.

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# CHAPTER 1

## INTRODUCTION

### Statement of the Problem

There is very little doubt as to the negative consequences associated with cigarettes. Smoking cigarettes is the leading cause of preventable death for Americans, and secondhand smoke is the third leading cause of preventable death in Americans (Hahn et al., 2009). Together, cigarette smoking and exposure to secondhand smoke cause more than 443,000 premature deaths each year (MMWR, 2008). This information presses the inherent importance of studying risk factors associated with tobacco usage. As tobacco usage is most associated with chronic disease, the earlier you start smoking the more likely you will be afflicted by tobacco related illness.

Young people are at an increased risk to start smoking, and college students are no exception (Rigotti, Regan, Moran, Wechsler, 2003). Understanding factors that predict tobacco initiation and continuation in college students is vital in producing effective youth cessation programs. If researchers can identify problem variables with strong relationships to tobacco usage, then programs focusing on such variables can be developed. Identifying variables that correlate to non-tobacco usage offers a great avenue in which programs can also be incorporated.

Tobacco products are readily available to college-aged students, and access to tobacco cessation services are limited (Wechsler, Kelly, Seibring, Meichun, Rigotti, 2001). The tobacco industry has consistently marketed to college students and around college campuses (Rigotti, Regan, Moran, Wechsler, 2003). With such commercial influence on students to use tobacco, it stands to reason that education programs need to be as efficient as possible. Better understanding behaviors with strong correlations to tobacco usage can only help this process.

The goal of this study was to better illustrate the impact healthy behavior choices had on smoking behavior among college students who smoked cigarettes. The results of this study illustrated a number of healthy behaviors that had a significant relationship to the number of days college smokers, smoked cigarettes. The information from this study is intended to help educators create insight driven programs relating to tobacco usage.

### **Purpose of the Study**

The purpose of this study was to evaluate whether college smokers who otherwise demonstrate healthy lifestyle behaviors, choose to disregard the positive impact of healthy behavior, and smoke at similar rates as college smokers who demonstrate unhealthy lifestyle behaviors. This is important because as this study's literature review illustrates, research indicates that people who make general healthy lifestyle choices do not smoke as much as their peers whom demonstrate general unhealthy lifestyle choices.

As the review of literature illustrates, most research assumes that college student smoking behavior will follow the trends of non-college student smoking behavior. This assumption minimizes how different the college campus environment, both socially and generationally, is compared to the rest of the population. College is a unique setting to say the least, and there are factors in this setting that are not recreated in any other setting. This is why evaluating college student as a particular cohort is important.

Gaining insight into patterns of behavior in college students can only help researchers build more focused and effective health programs; programs that account for factors within this specific group. Dissuading young adults from initiating smoking is vitally important, but health educators miss the mark if they do not appropriately assess the population that the program is

aimed at. This study addressed the relationship between healthy lifestyle choices and smoking behavior, uniquely within the college population.

## **Background of the Study**

### **Historical Background**

Over much of the past five decades no public health concern has been more emphasized than tobacco use, particularly smoking. In 1964, the Surgeon General's Advisory Committee on Smoking and Health evaluated more than 7,000 articles related to smoking and disease (CDC, 2006). The Advisory Committee then published its results, concluding that cigarette smoking “was: A cause for lung cancer and laryngeal cancer in men, a probable cause of lung cancer in women, and the most important cause of chronic bronchitis” (United States Surgeon General's Advisory Committee on Smoking, and Health, 1964). The Surgeon General's report was the catalyst for federal policy implementation that followed.

Prior to this report, the average American was relatively unaware of the harmful effects of smoking cigarettes. This is evident by the astonishing amount of people who smoked during this time period, approximately 42 percent (U.S. Department of Health, 1967). The initial federal response was to pass legislation primarily focused at illustrating the negative health consequences associated with smoking. Through the Federal Cigarette Labeling and Advertising Act of 1965 and the Public Health Cigarette Smoking Act of 1969, the United States Congress “required a health warning be placed on cigarette boxes, banned cigarette advertising in the broadcasting media, and called for an annual report of the health consequences of smoking” (CDC, 2006).

College campuses have long been a point of contention for both the tobacco industry and health advocacy groups. Even though college students who are everyday smokers have drastically decreased over the past years, there are still plenty of students who will leave college as smokers. It is important to note that the decrease in everyday smokers over the past decade is astonishing. In 1998, the prevalence of current everyday smokers on American campuses was 28.5 percent (Wechsler, Rigotti, Gledhill-Hoyt, Lee, 1998). As of 2009, the prevalence of everyday smokers on campuses was merely 5.2 percent (ACHA, 2009).

This significant decrease in everyday smokers is very promising to Public Health officials across America, but as long as there are daily uses of tobacco on campus, officials will continue to look for ways to improve. Non-everyday smokers offer another issue public health officials continue to battle. Many more students on campuses across America are smoking, only on a non-daily bases. Over 11 percent of college students smoked cigarettes in the last 30 days on a non-every day basis (ACHA, 2009).

### **Theoretical Background**

The Theory of Reasoned Action (TRA) focuses on theoretical constructs concerning individual motivational factors as determinants of the likelihood of performing a specific behavior (Ajzen, 1985; Fishbein, 1979; Fishbein, 2008). The TRA posits that an individual's intentions act as the best predictor of behavior, based on attitude and subjective norm regarding it. Martin Fishbein originally noted that attitude encompasses a person's beliefs that a given behavior leads to certain outcomes and his/her evaluations of these outcomes. He posits a few factors that significantly influence beliefs and attitudes. Subjective norm considers how a person's beliefs are guided by what friends and family, as well as society determine is or is not proper behavior. Additionally, TRA accounts for the individual perspective regarding attitude

and beliefs on which behavior to partake. When combined together, subjective norm and individual perspective create intention and that intention results in behavior action (Fishbein, 1979, p. 69).

This approach is used across academia and has proven itself to be a valuable tool in predicting human behavior (Armitage & Conner, 2001; Elliot, Armitage, & Baughan, 2003; Guo et al., 2007; Stead, Tagg, Mackintosh, & Eadie, 2005; Vanlandingham, Somboon, Suprasert, Grandjean, & Sittitrai, 1995). The TRA works on the principle that people act in a reasonable manner. This principle enables researchers to predict behavior based on an individual's appraisal of a given situation.

Following the paradigms of this theory, it occurs to me that a healthy approach to lifestyle choices may in fact be all encompassing. For instance, if one intended to make healthy lifestyle choices when it came to diet and exercise, he/she may be more inclined to make healthier lifestyle choices in regards to other behaviors related to health. If a student has determined that the benefits of eating well and exercising outweigh the barriers of finding quality food and making regular visits to the gym, he/she may very well decide that the benefits of not having a hangover outweigh the barriers of declining excessive drinking in a social setting.

College students tend to demonstrate little concern towards the long term effects of smoking. They rarely believe that their smoking behaviors will continue once college is over. In some cases, a student's intentions to change behavior would in fact predict their future behavior; however, with the highly addictive nature of tobacco, these intentions can quickly become null. Using this assumption, it is imperative that researchers discover which variables most often predict smoking behavior so as to help implement beneficial health education strategies. This

study's analytic plan results in better understanding which healthy behavior choices impact most closely predict the days of smoking per month a college smoker smokes.

The Theory of Reasoned Action and later modified Theory of Planned Behavior were used in this study to help format research questions, and explain variables of influence.

## **Personal Background**

Studying tobacco related issues and human behavior was a focus throughout my graduate school experience. Trying to understand why people behave the way they do has always intrigued me. The fact that cigarette smoking is catastrophic to your health is undeniable, yet individuals pick up the habit every day. This statement offers a paradox which interest me greatly, along with many other public health behaviorists.

Over the course of five years, I instructed classes within the department of Health Science. One of the entry level courses I taught, Personal Health and Safety, is classified as a general elective which customarily draws a large and quite representative sample of students. During my time teaching this course, it became quite apparent that college students are willing to go to great lengths to ensure that they will appear as physically healthy as possible. They will monitor their nutritional intake, develop extensive cardiovascular regiments, and spend hours in the weight room; yet many of them self-disclose enjoying smoking cigarettes.

This consistently puzzled me considering that in the general population, this is not the case. My literature review illustrates that those who smoke, outside of a college environment are not near as likely to demonstrate such emphasis in the care for their own physical health. This confounding information led my desire to better understand if some college students are really willing to stay in peak physical condition while also taking part in one of the least healthy licit behaviors possible.

## **Limitations and Delimitations**

The boundary for this study was intended to specifically evaluate college students. This study is not intended to compare college student behavior with any other population's behavior. The secondary data used for this study was only given to college students enrolled in the spring semester of 2009. The results from this study are only intended to cross-sectionally evaluate relationships in this sample. Though the ACHA-NCHA has data spanning over the past many years, this study is not representative of the previous data and will not be compared to it.

The ACHA-NCHA notes that their survey is not generalizable to college and university students in the United States, even "in light of the consistent and divergent means of demonstrating consistency and replication" (Generalizability, N.D.). The ACHA-NCHA's Reference Group is simply a set of schools with which researchers can compare data from. The goal of the survey is to help decision making for planning models on college campuses. The data offers a solid understanding of the healthy and unhealthy behaviors that occur on the campuses of schools within the sample.

## **Research Questions**

1. What relationship does the daily consumption of fruits and vegetables have on predicting smoking behavior in college students who currently smoke cigarettes?
2. What is the relationship between smoking behavior in college students who currently smoke cigarettes and the number of days per week one partakes in moderate/vigorous intensity cardio or aerobic exercise?
3. What is the relationship between higher body mass index and smoking behavior in college students who currently smoke cigarettes?

4. Is there a relationship between students who are currently exercising to lose weight and smoking behavior in college students who currently smoke cigarettes?

The research questions were designed to illustrate factors that may influence smoking behavior among college students who are currently smoking cigarettes. Previous research indicates that healthy behavior choices relate to decreased prevalence in smoking status in the general population. This study is interested in understanding the existing relationships between smoking behavior and healthy lifestyle choices for college students who participated in the National College Health Assessment. This is not meant to act as a comparison between the general population and college students overall.

### **Definition of Terms**

*National College Health Assessment-* This is the survey used to collect the data for this study. It was developed by the American College Health Association and encompasses a variety of health related topics. The survey is only given to a volunteer selection of college enrolled students from universities across The United States.

*Regular tobacco user-* In this particular study, the definition of a regular tobacco user is those individuals who smoke at least 20 days per month or more.

*Healthy lifestyle behavior choices-* This study defines healthy lifestyle behavior by vegetable intake, amount of cardiovascular exercise, and Body Mass Index.

*Body Mass Index (BMI) -* A number calculated from a person's weight and height. BMI provides a reliable indicator of body fatness for most people and is used to screen for weight categories that may lead to health problems ("Healthy Weight," 2011).

## **Summary**

Tobacco use is a very negative health behavior. There is little doubt to the ramifications associated with continued usage. Since tobacco related illness is usually attributed to long time usage, the college population is targeted by anti-tobacco advocacy groups. These groups goal is to decrease the incidence of young smokers so that later there will be a decrease in chronic tobacco related illness. College aged students are also targeted by the tobacco industry because the tobacco industry understands the importance of early onset regular smoking status.

College campuses are a unique environment, and this study is interested in better understanding factors pertaining specifically to this environment and to the people whom live in it. By gaining additional insights, programs can focus more centrally on factors that have the greatest influence on college smoking behaviors. There is an astronomical amount of literature pertaining to tobacco use and its impact on human behavior. Now that tobacco usage has undeniably been tied to negative health consequences, the goal of research seems more aimed at finding characteristics that better predict future smoking behavior.

## CHAPTER 2

### LITERATURE REVIEW

This chapter covers a review of research literature pertaining to this study. The main variable of concern is smoking incidence, with an emphasis on highlighting how specific healthy and unhealthy lifestyle choices impact said behavior.

#### **Weight gain after smoking cessation.**

Smokers have long expressed concerns about gaining weight after smoking cessation. O'Hara et al. (1998) found that men and women gain an average of 5.2 kg (11.5 lbs) the year after they quit smoking. Their results came from 5,887 randomized subjects who participated in the eight year Lung Health Study (O'Hara et al., (1998).

An additional study, Levine et al. (2001) found that women gained approximately 14 pounds when they previously tried to quit smoking. It was interesting that the weight actually gained was less than the participants expected to gain when they tried to quit smoking (2001). A troubling result was that 76.3% indicated that they would only be "willing" to gain a maximum of five pounds the next time they quit smoking (2001). This indicates a significant discrepancy in the amount of weight women expect to gain after quitting smoking and the amount of weight they are willing to gain. The researchers noted that this discrepancy between expected and acceptable weight gain could negatively impact the efforts to quit smoking (2001).

Mizes et al. (1998) also concluded that women who had concerns about gaining weight were more likely to quit a cessation program if they began to gain weight post-cessation. This study found that "dropout from a cessation program was related to smoking-related weight gain concern" (1998). Weight gain concern can impact cessation programs, so the researchers highlighted how important it is to consider this when creating a cessation program (1998).

### **Smoking as a weight loss supplement.**

A simple Google search of, “does smoking help you lose weight,” demonstrates the popular belief that smoking is associated with lower body weight. Americans may very well have always believed this, which may influence the decision process in regards to smoking. Whether smoking does influence an individual’s body weight has been contested in research for decades. Regardless of the results construed from such research the general population has maintained the inclination that smoking is a weight suppressant.

Individuals have forever held a belief that smoking can act as a weight loss supplement. In fact, Kitchen (1889) noted tobacco’s usefulness of “blunting appetite” over 120 years ago. In 1988, as many as “32.5 percent of all smokers reported using smoking as a weight loss strategy” (Klesges, Klesges, 1988). Some twenty years later, Ojala 2007, found that still 3-17 percent of dieters may use tobacco as a weight loss strategy.

Understanding young people’s motivation to smoke is vitally important in predicting behavior. Research indicates that weight control may be one of the motivations to smoke.

“Tobacco use is common among normal weight adolescents trying to lose weight” (Strauss, Mir, 2001). Their study demonstrates “over a two fold increase in smoking among normal-weight adolescent girls who have tried to lose weight in a large, cross-sectional national cohort” (ages 12-18) (pg. 1383, 2009). They did however find that overweight boys and girls did not use smoking in an attempt of losing weight (pg. 1383, 2009).

In another study, Johnson (2009) found “some students may smoke cigarettes as a method for weight control.” However, the research indicated that the students who used smoking as a weight management tool were significantly more likely to demonstrate other unhealthy weight management behaviors as well (pgs. 355-360, 2009). Examples of other unhealthy weight

control behaviors were: not eating for over 24 hours at a time, taking diet pills, vomiting, and taking laxatives (pg. 359, 2009). They also noted that students who “were engaging in healthy weight control behaviors (ie, exercising or eating less food, fewer calories, or foods low in fat) are no more likely to currently use cigarettes than students who are not engaging in this activity” (pg. 359, 2009).

Lowry et. al (2002) found female high school students who smoke cigarettes were associated with trying to lose weight, as well as using fasting, diet pills, and vomiting or laxatives in their attempt of managing weight. They found a similar association with male high school students. Current male students who smoke are more likely to use fasting, diet pills, and vomiting or laxatives for weight control” (pg. 138, 2009).

### **Smoking Status’ Impact on Nutritional Intake**

In a study previously noted, Strauss and Mir (2009) found that “dietary intake was worse in adolescents who smoked compared to those who did not.” They did not find any differences in caloric intake between non-smokers and smokers, but they did find that smokers ate significantly less fruit and vegetables (pg 1383, 2009).

A meta-analysis published in 1998, consisting of 51 studies, analyzed the differences between nutrient intakes of smokers and non-smokers (Dallongeville et. al, 1998). Although the study analyzed studies that ranged from 1981- 1997, and smoking prevalence today is less than in many of the research articles, the results give insight into nutritional behaviors and smoking status. The meta-analysis “show(ed) that smokers have unhealthy patterns of nutrient intake compared to non-smokers” (pg. 1451, 1998). The researchers noted that on average, smokers consumed: more fat (+3.5%), more alcohol (+77.5%), more calories (+4.9%), more saturated fat (+8.9%), more cholesterol (+10.8%), and less polyunsaturated fat (-6.5%), less fiber (-12.4%),

and significantly less vitamin C, E and B-Carotene than non-smokers (pg. 1483, 1998). The later part illustrates how smokers intake fewer fruits and vegetables.

Lowry et. al (2002) produced a study focused on examining high school students health behaviors in relation to weight management goals. One such behavior they looked at was cigarette smoking. A specific health behavior they related to cigarette smoking was serving per day intake of fruits and vegetables. Of the respondents who ate equal or greater than five servings of fruit and vegetables per day, 34.8% were current cigarette smokers (pg. 136). This indicates that significantly more non-smoking high school students are following the recommended allotment of fruits and vegetables.

Wilson et. al (2005) study included middle school students as well as high school students with similar outcomes. The researchers concluded that both middle school and high school students who smoke were “significantly less likely to consume vegetables and milk/dairy products” (pg. 877, 2005). For high school females the decreased odds of consuming vegetables alone was 0.70 (pg. 876, 2005).

### **Exercising to Lose Weight and Smoking**

A study by Lowery et. al (2009) found that high school males who were exercising to control their weight were “less likely to smoke cigarettes than male students who did not use exercise for weight control.” A similar study in 2005, which included a sample of over 10,000 middle and high school students in Virginia found similar results (Wilson et. al, 2005). The study found that both male and female high school smokers were significantly less likely to exercise more than three times per week (pg. 875, 2005). Another interesting result was how the data showed a decreased likelihood of teen smokers participating in organized sports (pg. 877, 2005).

In high school, organized sports offer students an opportunity to access structured exercise programs so as a health educator it is troubling to see this obstruction.

A Norwegian study whose sample consisted of 13-19 year old students, analyzed how different types of organized sports/exercise programs impacted smoking status (Holmen et. al, 2002). The researchers observed that a “much larger percent of smokers” quit organized sports than did their non-smoking counterpart (pg. 12, 2002). This result led to the suggestion of promoting physical activity in smoking prevention programs. Results also indicated that the more physical exercise a sport demanded, the less likely the participants would be current smokers (pg. 10, 2002). This is significant within the study because it is suggested that if these results are confirmed, “that type of sport should be considered when sports are recommended for smoking prevention or cessation” (pg. 12, 2002).

### **Smoking Status Related to Cardiovascular or Aerobic Exercise**

It might be impossible to cite the number of studies that conclude smoking cigarettes have a negative impact on cardiovascular and aerobic endurance ability. A consensus has been reached to say the least (Blair et al., 1984; Sorlie et al., 1987; Bernard et al., 1988; Conway and Cronan, 1992; Robbins et al., 2001; Macera et al., 2011). Smoking adversely impacts the amount, both duration and numbers of days, of aerobic exercise individuals partake.

### **Summary**

The long held belief that smoking aids in weight loss, and that quitting smoking will cause weight gain is apparent. Research indicates individuals are willing to only gain a percentage of weight when they quit smoking. Research also indicates that students who demonstrate an unhealthy approach to weight loss are more likely to use smoking as a weight

loss strategy. Decisions are made based on a person's attitudes and beliefs regarding the given options. There are many factors that influence tobacco behavior, but upon reviewing literature it seems as though the healthy or unhealthy approach to lifestyle influences tobacco usage. The question is whether this is also the case within the college population.

## **CHAPTER 3**

### **METHODOLOGY**

The purpose of this study was to see how healthy lifestyle choices impact smoking behavior among college students who currently smoke cigarettes. For this study, the components associated with healthy lifestyle choices were limited to college students' fruit and vegetable intake, body mass index, cardiovascular exercise, and exercising/dieting to lose weight. A secondary data analysis using the data collected from the Spring 2009 American College Health Association – National College Health Assessment II (ACHA-NCHA II) was conducted.

The American Health Association (ACHA) considers itself the nation's principal advocate and leadership organization for college and university health. The ACHA-NCHA II is a national research survey organized by the ACHA to, "assist college health service providers, health educators, counselors, and administrators in collecting data about their students' habits, behaviors, and perceptions on the most prevalent health topics" (ACHA, 2009).

The original ACHA-NCHA began in 2000 and was used until 2008. The new instrument, ACHA-NCHA II, began in the fall of 2008 and is recognized as the largest comprehensive data set on the health of college students. The survey is meant to cover a wide range of health issues, including but not limited to: alcohol use, tobacco use, drug use, sexual health, weight, nutrition, exercise, mental health, personal safety and violence.

The ACHA-NCHA II is a questionnaire that is given in the fall and spring semesters at participating colleges either by web or paper format. The institutions partaking in the study are self-selected and to date, over 273,803 college students have taken the ACHA-NCHA II (ACHA, WEB). The data is meant to help determine the most significant priorities and trends of each

specific participating institution, but also offers a large sample to consider for nationally inclusive research projects.

### **Study Methodology for ACHA-NCHA II**

The ACHA-NCHA II is a cross-sectional survey that is either given to college students by print or web format. The survey consists of 66 questions broken into seven different sections: 1) Health, Health Education and Safety, 2) Alcohol, Tobacco, and Drugs, 3) Sex Behavior and Contraception, 4) Weight, Nutrition, and Exercise, 5) Mental Health, 6) Physical Health, and 7) Impediments to Academic Performance.

The sample of participants included in the Spring 2009 ACHA NCHA II consisted of students from 130 postsecondary institutions. Of those participating institutions, 91,869 students completed the survey. “For the purpose of forming the Reference Group, only those institutions that surveyed all students, or used a random sampling technique are included in the analysis, yielding a final data set consisting of 87,105 students and 117 schools (Reference Group Executive Summary, 2009).

Demographic characteristics of postsecondary institutions included in this reference group were varied. Of the 117 institutions, 75 were public and 42 were private schools. Regionally, 31 campuses were located in the Northeast, 31 in the Midwest, 26 in the south, 23 in the west, and 6 were located outside of the United States. Campus size were broken into 5 variables: 1) 17 schools with less than 2500 students, 2) 12 schools with between 2500 and 4999 students, 3) 28 schools with between 5000 and 9999 students, 4) 31 schools with between 10000 and 19000 students, 5) 29 schools with greater than 20000 students.

## **Reliability and Validity**

The ACHA-NCHA was created by an interdisciplinary team of college health professionals, and was pilot tested in 1998-1999. The team “systematically evaluated with reliability and validity analyses comparing common survey items with the following national studies: The CDC 1995 National College Health Risk Behavior Survey, Harvard School of Public Health’s 1999 College Alcohol Study, and United States Department of Justice 2000 study - The National College Women Sexual Victimization Study (Generalizability, N.D.).

The analysis used to assess reliability and validity included, “comparing relevant percentages with nationally representative databases, performing item reliability analyses comparing overlapping items with a nationally representative database, conducting construct validity analyses comparing ACHA-NCHA results with a nationally representative database, and conducting measurement validity comparing results of the ACHA-NCHA with a nationally representative database” (para. 3, N.D.).

The series of comparisons and statistical analyses, in a sense, used triangulation, in that information from various resources were independently used to achieve the goal of demonstrating the reliability and validity of the ACHA-NCHA, and thus its utilization and its ability to represent the population of students. The analyses employed different national databases, covered different approaches, and utilized different statistical procedures to accomplish the evaluation. (para. 5, N.D.).

The interdisciplinary team concluded that the ACHA-NCHA appears to be reliable and valid and of “empirical value for representing the nation's students” (para. 5, N.D.)

## Secondary Data

For this study, a total of 37 variables within the survey were used. Descriptive and demographic questions accounted for the majority of variables. Eight variables were behavior based and developed by ACHA-NCHA. Below is the list of variable codes and the questions themselves used in the survey.

### *Behavior Questions*

*NQ8A*- Within the past 30 days, on how many days did you use Cigarettes: (1) Never used, (2) Have used, but not in the last 30 days, (3) 1-2 days, (4) 3-5 days, (5) 6-9 days, (6) 10-19 days, (7) 20-29 days, (8) Used daily.

*NQ26*- How do you describe your weight? (1) Very underweight, (2) Slightly underweight, (3) About the right weight, (4) Slightly overweight, (5) Very overweight

*NQ28*- . How many servings of fruits and vegetables do you usually have per day? (1 serving = 1 medium piece of fruit; 1/2 cup fresh, frozen, or canned fruits /vegetables; 3/4 cup fruit/vegetable juice; 1 cup salad greens; or 1/4 cup dried fruit). (1) 0 servings per day, (2) 1-2 Servings per day, (3) 3-4 servings per day, (4) 5 or more servings per day

*NQ29(A and B)*- On how many days of the past 7 days did you: (A) Do moderate-intensity cardio or aerobic exercise (caused a noticeable increase in heart rate, such as a brisk walk) for at least 30 minutes? (B) Do vigorous-intensity cardio or aerobic exercise (caused large increases in breathing or heart rate, such as jogging) for at least 20 minutes?

*NQ37*- Within the last 12 months, how would you rate the overall level of stress you have experienced? (1) No stress, (2) Less than average stress, (3) Average stress, (4) More than average stress, (5) Tremendous stress (Focusing on 4 and 5)

*NQ38A*- Within the last 30 days, did you do any of the following? (A) Exercise to lose weight

*NQ38B*- Within the last 30 days, did you do any of the following? (B) Diet to lose weight

*Demographic Questions*

*NQ46*- How old are you?

*NQ47*- What is your Gender? (1) Male, (2) Female. (3) Transgender

*NQ51*- What is your year in school? (1) 1<sup>st</sup> year undergrad, (2) 2<sup>nd</sup> year undergrad, (3) 3<sup>rd</sup> year undergrad, (4) 4<sup>th</sup> year undergrad, (5) 5<sup>th</sup> year undergrad, (6) Graduate or professional, (6) Not seeking a degree, (7) Other

*NQ52*- What is your enrollment status? (1) Full-time, (2) Part-time, (3) Other

*NQ54*-How do you usually describe yourself? (A) White, non-Hispanic (includes Middle Eastern), (B) Black, non-Hispanic, (C) Hispanic or Latino, (D) Asian or Pacific Islander, (E) American Indian, Alaskan Native, or Native Hawaiian, (F) Biracial or Multiracial, (G) Other

*NQ58*- Where do you currently live? (1) Campus residence hall, (2) Fraternity or sorority house, (3) Other college/university housing, (4) Parent/guardian's home, (5) Other off-campus housing, (6) Other

*NQ59*- Are you a member of a social fraternity or sorority? (e.g., National Interfraternity Conference, National Panhellenic Conference, National Pan-Hellenic Council, National Association of Latino Fraternal Organizations) (1) No, (2) Yes

This study also used ACHA-NCHA testing information that was coded as variables but was not a part of the questionnaire. For instance, Body Mass Index was calculated from questions 49A, 49B, and 50; then the outcome of those three questions was used to create a new variable within the data set. Along with this variable, ACHA-NCHA created variables for: college type (private or public and two or four year institution), city size where university is located, region of United States that survey was given, campus size, and when the survey was

completed. This study used these variables to account for factors, outside behavior and demographic information, that may influence statistical outcomes.

### **Ethical Consideration**

The survey administered by the participating schools was completely confidential. The student's email addresses or names were never attached to their responses (ACHA, 2009). The use of this secondary data followed protocol set by the University of Arkansas-Fayetteville Institutional Review Board. This particular study was classified as exempt. Defined as, "protocols which are exempt from federal regulations (that) do not need the approval of the Institutional Review Board. They can be reviewed and approved administratively" (University of Arkansas, Policy and Procedures Governing Research with Human Subjects, 1999)

## Analysis Plan

Table 1  
*Analysis Plan*

Research Question	Variables	Endpoint	Approach
What relationship does the daily consumption of fruits and vegetables have on predicting smoking behavior in college students who currently smoke cigarettes?	DV: Smoking Usage in college population. IV: Fruit and vegetable intake, year in school, race, sex, BMI, stress level, moderate and vigorous cardio levels, dieting/exercising to lose weight, fraternity/sorority member status.	Determined how fruit and vegetable intake impacted smoking behavior among college students who smoke.	Regress DV on IV using Linear Multiple Regression
2)What is the relationship between smoking behavior in college students who smoke and the number of days per week one partakes in moderate/vigorous intensity cardio or aerobic exercise?	DV: Smoking Usage in college population. IV: Fruit and vegetable intake, year in school, race, sex, BMI, stress level, moderate and vigorous cardio levels, dieting/exercising to lose weight, fraternity/sorority member status.	Determined how the number of days per week of cardiovascular activity impacted smoking behavior among college students who smoke cigarettes.	Regress DV on IV using Linear Multiple Regression
3)What is the relationship between body mass index and smoking behavior in college students who smoke?	DV: Smoking Usage in college population. IV: Fruit and vegetable intake, year in school, race, sex, BMI, stress level, moderate and vigorous cardio levels, dieting/exercising to lose weight, fraternity/sorority member status.	Determined the impact BMI had on smoking behavior among college students who smoke cigarettes	Regress DV on IV using Linear Multiple Regression
4)Is there a relationship between students who are currently exercising to lose weight and smoking?	DV: Smoking Usage in college population. IV: Fruit and vegetable intake, year in school, race, sex, BMI, stress level, moderate and vigorous cardio levels, dieting/exercising to lose weight, fraternity/sorority member status.	Determined how currently dieting/exercising to lose weight status impacted smoking behavior among college students who smoke cigarettes	Regress DV on IV using Linear Multiple Regression

Note. IV is Independent Variable and DV is dependent variable.

The above table illustrates the research design chosen to best answer the research questions.

### **Research Questions and Narrative Analysis**

1. What relationship does the daily consumption of fruits and vegetables have on predicting smoking behavior in college students who currently smoke cigarettes?

A linear multiple regression was run, to determine the impact fruits and vegetable intake had on the number of days smoked per month. Regressing smoking behavior on the daily allotment of fruits and vegetables.

2. What is the relationship between smoking behavior in college students who smoke cigarettes and the number of days per week one partakes in moderate/vigorous intensity cardio or aerobic exercise?

A linear multiple regression was run, to determine the impact moderate/vigorous intensity cardio or aerobic exercise had on the number of days smoked per month. Regressing smoking behavior on days per week one partakes in moderate/vigorous intensity cardio or aerobic exercise.

3. What is the relationship between body mass index and smoking behavior in college students who smoke cigarettes?

A linear multiple regression was run, to determine the impact body mass index had on the number of days smoked per month. Regressing smoking behavior on body mass index.

4. Is there a relationship between students who are currently exercising to lose weight and smoking behavior in college students who smoke cigarettes?

A linear multiple regression was run, to determine the impact students currently exercising/dieting to lose weight had on the number of days smoked per month. Regressing smoking behavior on students who are currently trying to exercise to lose weight.

## **CHAPTER 4**

### **RESULTS**

#### **Descriptive Analysis**

Data analysis initially began with descriptive statistics considering only students who are currently smoking cigarettes. Within this sample, demographic information was analyzed. Of the possible demographics within this survey, for this study the following were considered: gender, year in school, race, age, vegetable intake, exercising/dieting to lose weight status, stress level, and Fraternity/Sorority living status.

Table 2

*Demographic Frequencies and Participant Percentage Used in this Study*

Variable	Frequency		Days Smoked Per Month										
	N		1-2 days		3-5 days		6-9 days		10-19 days		20-29 days		Used daily
Servings of fruits and veg. per day													
0 servings	1083	287	26.5%	107	9.9%	73	6.7%	103	9.5%	78	7.2%	435	40.2%
1-2 servings	8888	2763	31.1%	1138	12.8%	715	8.0%	865	9.7%	615	6.9%	2792	31.4%
3-4 servings	3774	1247	33.0%	525	13.9%	345	9.1%	375	9.9%	266	7.0%	1016	26.9%
5 or more servings	669	227	33.9%	94	14.1%	49	7.3%	73	10.9%	50	7.5%	176	26.3%
Days of Moderate Cardio													
0 days	3781	996	26.3%	427	11.3%	258	6.8%	348	9.2%	257	6.8%	1495	39.5%
1 day	2054	639	31.1%	258	12.6%	162	7.9%	188	9.2%	158	7.7%	649	31.6%
2 days	2667	907	34.0%	349	13.1%	233	8.7%	273	10.2%	171	6.4%	734	27.5%
3 days	2226	748	33.6%	353	15.9%	183	8.2%	219	9.8%	146	6.6%	577	25.9%
4 days	1314	415	31.6%	175	13.3%	113	8.6%	143	10.9%	109	8.3%	359	27.3%
5 days	1172	403	34.4%	155	13.2%	121	10.3%	125	10.7%	82	7.0%	286	24.4%
6 days	475	183	38.5%	59	12.4%	43	9.1%	46	9.7%	43	9.1%	101	21.3%
7 days	599	193	32.2%	73	12.2%	52	8.7%	63	10.5%	37	6.2%	181	30.2%
Days of Vigorous Cardio													
0 days	6273	1647	26.3%	686	10.9%	439	7.0%	578	9.2%	433	6.9%	2490	39.7%
1 day	2328	747	32.1%	332	14.3%	227	9.8%	228	9.8%	171	7.3%	623	26.8%
2 days	2033	714	35.1%	280	13.8%	161	7.9%	214	10.5%	151	7.4%	513	25.2%
3 days	1623	605	37.3%	265	16.3%	135	8.3%	175	10.8%	100	6.2%	343	21.1%
4 days	883	335	37.9%	123	13.9%	88	10.0%	91	10.3%	64	7.2%	182	20.6%
5 days	668	257	38.5%	96	14.4%	77	11.5%	79	11.8%	41	6.1%	118	17.7%
6 days	281	121	43.1%	37	13.2%	29	10.3%	25	8.9%	24	8.5%	45	16.0%
7 days	171	58	33.9%	24	14.0%	15	8.8%	14	8.2%	9	5.3%	51	29.8%
Overall Stress Level													
No Stress	167	44	26.3%	21	12.6%	11	6.6%	21	12.6%	7	4.2%	63	37.7%

Less than average	919	306	33.3%	142	15.5%	76	8.3%	98	10.7%	60	6.5%	237	25.8%
More than average	6334	1944	30.7%	800	12.6%	513	8.1%	634	10.0%	474	7.5%	1969	31.1%
Tremendous	1827	461	25.2%	193	10.6%	137	7.5%	173	9.5%	128	7.0%	735	40.2%
Average	5080	1738	34.2%	700	13.8%	436	8.6%	477	9.4%	337	6.6%	1392	27.4%
Exercising to lose weight													
No	6491	1787	27.5%	773	11.9%	464	7.1%	618	9.5%	444	6.8%	2405	37.1%
Yes	7826	2701	34.5%	1083	13.8%	709	9.1%	789	10.1%	564	7.2%	1980	25.3%
Dieting to lose weight													
No	8150	2503	30.7%	1032	12.7%	644	7.9%	785	9.6%	548	6.7%	2638	32.4%
Yes	6114	1963	32.1%	817	13.4%	524	8.6%	611	10.0%	458	7.5%	1741	28.5%
Age													
18-24	11456	3886	33.9%	1560	13.6%	985	8.6%	1155	10.1%	813	7.1%	3057	26.7%
25-30	1872	439	23.5%	210	11.2%	138	7.4%	171	9.1%	130	6.9%	784	41.9%
31-40	641	115	17.9%	59	9.2%	35	5.5%	57	8.9%	44	6.9%	331	51.6%
41 plus	229	22	9.6%	11	4.8%	7	3.1%	8	3.5%	12	5.2%	169	73.8%
Gender													
Female	8257	2675	32.4%	1049	12.7%	644	7.8%	760	9.2%	557	6.7%	2572	31.1%
Male	5927	1775	29.9%	789	13.3%	519	8.8%	627	10.6%	433	7.3%	1784	30.1%
Year in school													
Not seeking degree	52	16	30.8%	10	19.2%	4	7.7%	3	5.8%	4	7.7%	15	28.8%
Graduate	1758	546	31.1%	252	14.3%	156	8.9%	174	9.9%	118	6.7%	512	29.1%
5th year + undergrad	927	229	24.7%	94	10.1%	71	7.7%	104	11.2%	75	8.1%	354	38.2%
4th year undergrad	2400	816	34.0%	293	12.2%	179	7.5%	261	10.9%	171	7.1%	680	28.3%
3rd year undergrad	2909	874	30.0%	373	12.8%	260	8.9%	259	8.9%	200	6.9%	943	32.4%
2nd year undergrad	2934	945	32.2%	379	12.9%	228	7.8%	300	10.2%	192	6.5%	890	30.3%
1st year undergrad	3083	1007	32.7%	425	13.8%	256	8.3%	276	9.0%	224	7.3%	895	29.0%
Race													
Asian	1137	372	32.7%	158	13.9%	91	8.0%	106	9.3%	67	5.9%	343	30.2%
Black	355	106	29.9%	40	11.3%	34	9.6%	32	9.0%	15	4.2%	128	36.1%

Hispanic	879	337	38.3%	129	14.7%	77	8.8%	84	9.6%	55	6.3%	197	22.4%
Other	935	245	26.2%	119	12.7%	86	9.2%	95	10.2%	64	6.8%	326	34.9%
White	11209	3484	31.1%	1426	12.7%	902	8.0%	1106	9.9%	816	7.3%	3475	31.0%
Fraternity/Sorority member													
No	12532	3817	30.5%	1627	13.0%	998	8.0%	1233	9.8%	886	7.1%	3971	31.7%
Yes	1595	620	38.9%	207	13.0%	158	9.9%	149	9.3%	109	6.8%	352	22.1%
BMI													
Below 18.5	576	167	29.0%	60	10.4%	48	8.3%	42	7.3%	60	10.4%	199	34.5%
18.5-24.9	8423	2763	32.8%	1157	13.7%	690	8.2%	877	10.4%	590	7.0%	2346	27.9%
25-29.9	3353	1026	30.6%	417	12.4%	279	8.3%	324	9.7%	239	7.1%	1068	31.9%
30 and above	1695	457	27.0%	188	11.1%	136	8.0%	133	7.8%	98	5.8%	683	40.3%

### Individual Variable Analysis

Every variable considered for this study was run against the dependent variable to ensure there were no confounding variables, no suppression variables, and each were significantly related. Since this study only considered students who were currently smoking, each individual variable is meant to show its relationship to the amount of days the student smokes per month. The number of days per month smoking is the dependent variable.

In this analysis, other than gender, every individual variable related significantly with smoking status. Below, highlights the variables considered, and their relationship to smoking behavior after univariate analysis of variance was run.

*NQ28-* . How many servings of fruits and vegetables do you usually have per day?

- Those who eat 0 fruits and vegetables per day, can expect to smoke 3.57 more days per month.

Table 3

*How many servings of fruits and vegetables do you usually have per days?*

	B	Std. Error	t	Sig.
0 servings per day	3.566	0.604	5.903	.000
1-2 servings per day	1.186	0.492	2.408	0.016
3-4 servings per day	0.056	0.515	0.108	0.914

Note. 5 or more servings per day is the reference group

NQ29a- On how many days of the past 7 days did you do moderate-intensity cardio or aerobic exercise?

- For every day increase of moderate-intensity cardio per week, one will likely smoke 0.571 days less per month.

Table 4

*On how many days of the past 7 days did you do moderate-intensity cardio or aerobic exercise?*

	B	Std. Error	t	Sig.
Days of Moderate Intensity Cardio	-0.571	0.051	-11.1	.000

NQ29b - On how many days of the past 7 days did you do vigorous-intensity cardio or aerobic exercise?

- For every day increase of vigorous exercise per week, one can expect to see 1.112 days less smoking per month

Table 5

*On how many days of the past 7 days did you do vigorous-intensity cardio or aerobic exercise?*

	B	Std. Error	t	Sig.
Days of Vigorous Intensity Cardio	-1.112	0.058	-19.1	.000

NQ37- Within the last 12 months, how would you rate the overall level of stress you have experienced? (1) No stress, (2) Less than average stress, (3) Average stress, (4) More than average stress, (5) Tremendous stress (Focusing on 4 and 5)

- Compared to those who responded having average stress; students who have no stress are likely to smoke 2.645 more days per month.
- Compared to those who responded having average stress; students who responded as having more than average stress are likely to smoke 1.268 more days per month.

- Compared those who responded having average stress, students who responded as having tremendous stress are likely to smoke 3.607 more days per month.

Table 6

*Within the last 12 months, how would you rate the overall level of stress you have experienced?*

	B	Std. Error	t	Sig.
No Stress	2.645	0.964	2.742	0.006
Less than average stress	-2.95	0.44	-0.67	0.502
More than average stress	1.268	0.231	5.491	.000
Tremendous stress	3.607	0.335	10.78	.000

Note. Average Stress is the Reference Group

*NQ38A- Within the last 30 days, did you do any of the following? (A) Exercise to lose weight*

- Students who are not exercising to lose weight are expected to smoke 3.029 more days per month.

Table 7

*Within the last 30 days, did you exercise to lose weight?*

	B	Std. Error	t	Sig.
Not exercising to lose weight	3.029	0.205	14.76	.000

Note. Those who are currently exercising to lose weight is the Reference Group

*NQ38B*- Within the last 30 days, did you do any of the following? (B) Diet to lose weight

- Students who are not currently dieting to lose weight are expected to smoke 0.828 more days per month.

Table 8

*Within the last 30 days, did you diet to lose weight?*

	B	Std. Error	t	Sig.
Not dieting to lose weight	0.828	0.208	3.976	.000

Note. Those that are currently dieting to lose weight is the Reference Group

*NQ46*- How old are you?

- For each year you are older, students are expected to smoke 0.476 days a month more.

Table 9

*How old are you?*

	B	Std. Error	t	Sig.
Age you are	0.467	0.02	23.62	.000

*NQ47*- What is your Gender? (1) Male, (2) Female. (3) Transgender (omitted)

- No significant difference between males and females.

Table 10

*What is your gender?*

	B	Std. Error	t	Sig.
Female	-0.081	0.21	-0.39	0.7

Note. Male is the Reference Group

*NQ51*- What is your year in school? (1) 1<sup>st</sup> year undergrad, (2) 2<sup>nd</sup> year undergrad, (3) 3<sup>rd</sup> year undergrad, (4) 4<sup>th</sup> year undergrad, (5) 5<sup>th</sup> year undergrad, (6) Graduate or professional, (6) Not seeking a degree, (7) Other

- Only two school year indicators resulted in significant differences in smoking behavior. 5<sup>th</sup> year and more students are expected to smoke 2.965 days more per month than 1<sup>st</sup> year undergraduate students. 3<sup>rd</sup> year undergraduates can expect to smoke 0.883 days more per month than 1<sup>st</sup> year students.

Table 11  
*What is your year in school?*

	B	Std. Error	t	Sig.
Not seeking a degree	-2.69	1.718	-0.16	0.876
Graduate or professional	0.07	0.367	0.191	0.848
5th year or more undergraduate	2.965	0.46	6.44	.000
4th year undergraduate	-0.071	0.335	-0.21	0.832
3rd year undergraduate	0.883	0.318	2.78	0.005
2nd year undergraduate	0.317	0.317	1.001	0.317

Note. First Year Undergraduate is the Reference Group

*NQ54*-How do you usually describe yourself? (A) White, non-Hispanic (includes Middle Eastern), (B) Black, non-Hispanic, (C) Hispanic or Latino, (D) Asian or Pacific Islander, (E) American Indian, Alaskan Native, or Native Hawaiian, (F) Biracial or Multiracial, (G) Other

- Only two ethnicities significantly impacted smoking behavior. Hispanic or Latino can expect to smoke 2.632 less days per month than white, non-Hispanic. The Other group consisted of respondents who selected American Indian, Alaskan Native, or Native Hawaiian, Biracial or Multiracial, and Other; as a whole this group can expect to smoke 1.109 more days per month than white, non-Hispanic.

Table 12  
*What is your Ethnicity?*

	B	Std. Error	t	Sig.
Asian or Pacific Islander	-0.601	0.383	-1.57	0.117
Black, non-Hispanic	0.683	0.663	1.029	0.303
Hispanic or Latino/a	-2.632	0.431	-6.11	0

Other	1.109	0.419	2.647	0.008
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Note. White, non-Hispanic (includes Middle Eastern) is the Reference Group

NQ59- Are you a member of a social fraternity or sorority? (1) No, (2) Yes

- Students who answered no to membership of a social fraternity or sorority can expect to smoke 2.744 more days per month than those who answered no to this question.

Table 13

*Are you a member of a social fraternity or sorority?*

	B	Std. Error	t	Sig.
Are not in social Fraternity or Sorority	2.744	0.327	8.401	0

Note. Students who responded yes to being in a Fraternity or Sorority is the Reference Group

*BMI Calculation* (based on input from Height and Weight questions)

- For every 1 point increase in BMI, expect to see an increase of 0.12 days per month of smoking.

Table 14

*BMI Calculation based on height and weight*

	B	Std. Error	t	Sig.
BMI	0.12	0.019	6.47	0

### Initial Model

The individual variable analysis was completed to find any variables considered in the study that did not significantly relate to smoking behavior. During this analysis, gender was eliminated from inclusion in the initial model due to its lack of significance. Other than gender, all above variables were introduced as independent variables in the initial linear multiple regression.

After running this initial analysis, the results indicated moderate-intensity cardiovascular exercise incidence did not significantly impact smoking behavior, when considering all other variables. As a result of this, the moderate-intensity cardiovascular exercise variable was omitted from any further analysis.

### Final Model

For the final model, a linear multiple regression using all accepted variables was run. Gender and moderate-intensity cardiovascular activity were omitted for their lack of significance. The variable regarding whether a student was dieting to lose weight was also omitted, due to it being found as a suppressing variable in the initial model.

Table 15  
*Final linear multiple regression*

	B	Std. Error	t	Sig.
How many servings of fruits and vegetables do you usually have per day?				
0 Servings Per Day	2.312	0.614	3.765	0
1-2 Servings per day	0.668	0.496	1.347	0.18
3-4 servings per day	-0.01	0.515	-0.01	0.99
5 or more servings per day	0 <sup>a</sup>			
On how many of the past 7 days did you (Do vigorous-intensity cardio)?				
Vigorous-Intensity Cardio	-0.76	0.062	-12.27	0
Within the last 12 months, how would you rate the overall level of stress you have experienced?				
No Stress	1.862	0.995	1.87	0.06
Less than average stress	-0	0.439	-0.003	1
More than average stress	1.022	0.228	4.474	0
Tremendous stress	2.586	0.334	7.741	0
Average stress	0 <sup>a</sup>			

Within the last 30 days, did you do any of the following?					
	No	2.106	0.218	9.663	0
	Yes	0 <sup>a</sup>			
What is your year in school?					
	Not seeking a degree	-5.97	1.753	-3.408	0
	Graduate or professional	-4.68	0.417	-11.24	0
	5 <sup>th</sup> year undergrad	-0.27	0.464	-0.588	0.56
	4 <sup>th</sup> year undergrad	-1.91	0.337	-5.658	0
	3 <sup>rd</sup> year undergrad	-0.64	0.317	-2.018	0.04
	2 <sup>nd</sup> year undergrad	-0.39	0.312	-1.25	0.21
	1 <sup>st</sup> year undergraduate	0 <sup>a</sup>			
How do you usually describe yourself?					
	Asian or Pacific Islander	-0.71	0.384	-1.843	0.07
	Black, non-Hispanic	-1.97	0.67	-2.938	0
	Hispanic or Latino/a	-3.05	0.428	-7.13	0
	American Indian, Biracial or Other	-0.09	0.5	-0.173	0.86
	White, not-Hispanic (includes Middle Eastern)	0 <sup>a</sup>			
Are you a member of a social fraternity or sorority					
	No	2.015	0.323	6.244	0
	Yes	0 <sup>a</sup>			
Calculation for BMI (Height and Weight)					
	BMI	0.057	0.02	2.863	0
Open response to age					
	Age	0.562	0.024	22.952	0

Note. This parameter is set to zero because it is the reference group

### Summary

Running the individual variable analysis independently, in relation to the number of days a student smoked per month, aided two-fold in this study. Firstly, it established which variables should be considered in the final model. Secondly, it acted as a great comparison to the outcome in the final model. As illustrated in the final model, when running a linear multiple regression

with several independent variables, the relationship each variable had on days a student smoked was different in every case.

When considering all independent variables in the final model, all of predictions for smoking outcome changed. The greatest differences in comparison were the following variables; vigorous exercise, no stress, tremendous stress, currently exercising to lose weight, and BMI.

There was one variable that completely changed the relationship to the outcome that it demonstrated in the individual variable analysis. The year in school variable redirected its prediction of outcome. The individual variable analysis saw each response relating to an increased expectation in days per month smoked, whereas the final model saw a decreased expectation in days per month smoked.

## CHAPTER 5

### DISCUSSION

The purpose of this study was to see if healthy lifestyle choices impacted smoking behavior for college students who currently smoke cigarettes. If indeed these healthy lifestyle choices did impact smoking behavior, the study aimed to illustrate which healthy lifestyle choice had the most impact. This outcome was meant to help guide college health programs, in an effort of better targeting influential factors that impact smoking behavior on college campuses.

In the general population, smokers tend to exhibit other unhealthy lifestyle choices more so than non-smokers. It makes sense that this same relationship exists in the college environment. However, there is very little empirical research focusing on whether smoking behavior in college students is impacted by other lifestyle choices.

It was hypothesized that college students who currently smoke are not significantly influenced by healthy lifestyle choices. This hypothesis stemmed from my time teaching in the college environment. I noticed that one's physical appearance and stated healthy behaviors did not necessary correlate with whether that person smoked or not. Specifically, within the students who demonstrated more social smoking tendencies.

The following research questions were developed to identify if certain healthy behaviors did influence the number of days a student smoked per month:

1. What relationship does the daily consumption of fruits and vegetables have on predicting smoking behavior in college students who currently smoke cigarettes?
2. What is the relationship between smoking behavior in college students who currently smoke cigarettes and the number of days per week one partakes in moderate/vigorous intensity cardio or aerobic exercise?

3. What is the relationship between higher body mass index and smoking behavior in college students who currently smoke cigarettes?
4. Is there a relationship between students who are currently exercising and/or dieting to lose weight and smoking behavior in college students who currently smoke cigarettes?

Each research question demonstrated a significant relationship, and did in fact contradict my hypothesis.

### **Findings and Interpretations**

This section highlights interesting findings from each of the four research questions posed in this study. Reference chapter four for table output, as this section is more interested in clearly depicting the findings of substance

#### **Fruit and vegetable intake significantly impacts smoking behavior**

The results indicated that the students in the survey that ate zero fruits and vegetables per day were likely to smoke 2.312 more days per month than those students who ate five or more fruits and vegetables per day. It is general health knowledge that the more fruits and vegetables one eats per day, the healthier that individuals diet is. In this instance, it could be interpreted that the more fruits and vegetables a smoker ate per day, the less days per month he/she smoked.

This is an interesting finding, in that it helps illustrate the importance of fruit and vegetable intake in not only the general population, but also for college students who are currently smoking. The results illustrate that putting emphasis on the importance of fruit and vegetable intake could help a college health program two-fold. One, by increasing the awareness of known health benefits associated with increased levels of fruit and vegetable intake; and two, the potential to influence the days of smoking per month a student smokes.

Another potential thing that was learned from this research question is that it illustrated that there was a quantifiable relationship between one unhealthy lifestyle choice and another unhealthy lifestyle choice. This resonated throughout the results, and tends to be the norm in the general population. Though, I hypothesized that college students may not react in this same manner, the results indicate that for this research question, college smokers act in a similar manner to the general population.

A particular study completed in Canada found similar results around the impact smoking behavior has on fruit and vegetable intake. Palaniappan et al. (2001) found that, “the average number of servings of fruits and vegetables was below the minimum recommended 5 servings/d for people of both sexes who smoked.” One possible reason given for this finding was that, “changes in taste acuity induced by smoking could influence food choices (pg. 1956).” Another study also found that smokers” tend to eat fewer fruits and vegetables (Serdula et al., 1996).”

Chiolero et al. (2006) completed a study looking at many risk behaviors association with cigarette consumption. Key findings from this study were that “smokers more frequently had low leisure time physical activity, low fruits/vegetables intake, and high alcohol consumption in both men and women (pg. 348).” It also found that, “heavy smokers were always involved more frequently in other risk behaviors than light smokers (pg. 351).”

### **Vigorous exercisers smoke fewer days per month**

Research question two focused on identifying a relationship between moderate/vigorous exercisers and their smoking behavior. The statistical analysis resulted in non-significant findings for moderate exercise’s impact on smoking behavior. There was, however, a significant relationship between vigorous exercise and smoking behavior. For every day per week a smoker partook in vigorous exercise, they smoked 0.757 days fewer per month.

Of the research questions, this relationship makes the most sense. The survey used for this study defined vigorous exercise as cardiovascular or aerobic exercise that lasted at least 20 minutes. This exercise needed to cause large increases in breathing or heart rate.

Smoking negatively impacts the lungs, which stands to reason, would make vigorous exercise more difficult for smokers than non-smokers. This may act as a barrier for smokers, especially in their effort to maintain or increase the days per week they exercise vigorously. Lung degradation increases with increased usage of cigarettes. The results from this study illustrated that fewer days smoked, related to more days of vigorous exercise. There could be many reasons why this relationship exists, one being that lung degradation acted as a barrier regular smoker's face and simply are unable to attempt/complete increased days of vigorous exercise.

It is interesting that moderate intensity exercise incidence did not significantly impact smoking behavior. There are a number of reasons this may be, however it could be interpreted that for exercise to impact smoking behavior, the exercise needs to significantly increase one's heart rate or breathing. The survey used in this study defined moderate exercise as cardiovascular or aerobic exercise that caused noticeable increases in heart rate. Clearly, there is a difference in "noticeable increase" and "large increase," which was used to describe vigorous exercise. Possibly, less strenuous exercise does not highlight the lung degradation caused by smoking; or at least not enough to be considered a barrier.

Research question two offered solid insights into which exercise plans impact smoking behavior the most. It is evident that vigorous exercisers smoke fewer days per month, and were significantly impacted by the healthy lifestyle choice of exercising vigorously. It is also apparent that the amount of days a smoker partakes in moderate exercise does not significantly impact

their smoking behavior. Future college health programs could use this information as rationale for including more activities in health plans that are classified as vigorous exercise.

Taylor et al. (2007) illustrated that, “low-moderate exercise intensity, may account for a shorter net effect of exercise on smoking behaviour.” Overall, it found that “a single session of exercise has an acute effect on smoking behaviour, cravings, withdrawal symptoms and affect (pg. 539).” This study was more focused on the impact exercise had on cravings and “net time to the next cigarette as an outcome,” but still yielded interesting results (pg. 539).

A 2008 research study by Moore and Werch, found that “frequent exercisers smoked cigarettes significantly less often than did infrequent exercisers.” This study aimed at exploring the relationship between vigorous exercise and substance abuse in college students (pg. 686). Their results correspond to the results found in this study regarding vigorous exercise, and its impact on smoking behavior.

### **Body Mass Index significantly impacts days per month of smoking**

Body Mass Index is a calculation using an individual’s weight and height as variables of consideration. After Body Mass Index reaches 25, for every unit increased so does the level of unhealthiness. The results of this study illustrated that as Body Mass Index increased, so did the days per month a student smoked. In fact, for every one unit increase in participants Body Mass Index, an increase of 0.057 days per month smoked occurred.

As illustrated in chapter two of this study, smoking has long been used as a weight suppressant. Ojala 2007, found that 3-17 percent of dieters may use tobacco as a weight loss strategy. As evidenced in this study, college smokers are not losing Body Mass Index units by increasing the number of days they smoke. These smokers are actually increasing Body Mass Index units when they increase days per month of smoking.

Chiolero et al., (2008) points out that “smokers tend to have lower body weight than nonsmokers,” but also found that heavy smokers tend to have greater body weight than do light smokers or nonsmokers.” “In a general adult population sample in Germany, male heavy smokers were more likely to be obese than were male light smokers (pg. 803).

### **Smokers who are currently exercising to lose weight, smoke less**

College smokers who are not currently exercising to lose weight smoke 2.106 more days per month than those smokers who are currently exercising to lose weight. An individual who is exercising to lose weight is actively choosing to participate in a healthy lifestyle behavior. Though this study only includes smokers, the results indicated that by choosing at least one healthy behavior (in this case, exercising to lose weight), an unhealthy behavior (in this case, smoking behavior) could be reduced.

Cavallo et al., (2010), found that “heavy smokers were significantly less likely to engage in healthy dietary restrictions than nonsmokers.” Bish et al., (2005) found that students doing nothing to lose weight were more likely to be smokers. This study also found that current women smokers who were trying to lose weight, were less likely to be exercising (pg. 602).

By engaging the student smoking population with an exercising to lose weight program, it can be reasonably assumed that the program could impact days of smoking per month for that population. This alone is a very important finding. Instead of chastising the student population for smoking, a health program could instead challenge the population to a weight loss competition. Assuming that a number of the participants would use exercise as the weight loss tool, this competition could actually reduce the smoking behavior for its participants.

Generally speaking, inciting individuals to exercise is a positive accomplishment. In this case, there seems to be little difference. Using a healthy lifestyle behavior to help decrease the

number of days per month a student smokes is a great approach. Not only does it decrease one unhealthy behavior - in days per month smoked, but it also positively impacts a number of physical health factors.

### **Future Research**

Future research could be aimed at discovering the impact each of the healthy lifestyle choices in this study has on the success of health programs that target reducing or quitting the use of tobacco. Results from this study indicate that by increasing the amount of certain healthy lifestyle choices, in many cases, it decreases the number of days per month a student smoked.

It would be interesting to see a college health program target smokers in a more covert manner. By focusing less on the act of decreasing/ceasing days per month a student in the program smoked, and more on some of the factors shown to significantly impact smoking behavior, a future researcher may find an influential way of impacting smoking behavior. For example, a health program extensively focusing on increasing the days per week the participants partake in vigorous exercise, could decrease the number of days per month its participants actually smoke. To its participants the program, the perceived position of the program would be to increase days of exercise when in reality it may be targeting the reduction of days per month a participant smokes.

Additional research could also be done in an effort to find out which healthy lifestyle choices influence non-smoking behavior. Though outside the scope of this survey, it would be interesting to see if certain healthy lifestyle choices significantly impact whether a college student smokes or not. Comparing the variables of influence with the results from this study could highlight similarities. It could be influential if one specific healthy lifestyle choice not only

decreased the likelihood of being a smoker, but also decreased the days per month a smoker smoked.

### **Summary**

Findings from this study indicate that healthy lifestyle choices do impact the amount of days per month a college student smokes. The college population does not necessarily react to behavioral choices in any different manner than any other population would. The ever present outcome of this study was that the more often a college student smokes, the more often that student demonstrated other unhealthy behavior choices. Interestingly, certain healthy behaviors correspond with the mitigation of one particular unhealthy behavior. This outcome alone provides relevant information that can be used in future health program planning.

A lot of emphasis is placed on smoking related programs that focus on cessation, as well as programs aiming at pushing participants to never start smoking. There may be a gap in programs that focus on reducing the number of days a participant smokes. Decreasing the number of days one smokes is a positive, and a harm reduction program aimed at decreasing the number of days one smokes could prove to be very beneficial. Traditional smoking-related programs have a proven track record of success, as evidenced by the United States continual decrease in smoking prevalence. Reduction programs may act as another avenue for health educators to consider.

Overall, smoking has been and will continue to be a significant healthcare issue. The decreased number of smokers over the past 60 years is a major positive, but for the healthcare industry to even further decrease smoking rates, new tactics need to innovate. Hopefully, the results of this study can assist with future innovation.

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## American College Health Association

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March 24, 2011

Mitchell Jenkins  
University of Arkansas

Dear Mitchell,

Thank you for submitting a request to utilize ACHA-NCHA data in your study, "Smoking Behaviors of College Spring 2009 and Fall 2009 ACHA-NCHA Reference Group datasets."

I have enclosed a copy of our data use guidelines and agreement for your information. Your signed copy is on file in my office. Please note that additional studies using the ACHA-NCHA data acquired through this request require submission of a new data use request to the ACHA-NCHA Program Office.

As stated in the agreement, we would appreciate a copy of any final products that result from your research.

Please don't hesitate to contact me if you have any questions.

Best of luck in your efforts,

Mary Hoban, PhD, CHES  
Director, ACHA-NCHA Program Office

Enclosure: ACHA-NCHA Data Use Guidelines and Agreement



### Data Use Guidelines

The ACHA-NCHA data contain information about high-risk behaviors, and all data are confidential. ACHA will not release data on any institution, nor will it release data sets where it is possible to identify any participating schools. Individuals who are granted access to any ACHA-NCHA data must adhere to ACHA's data use guidelines, which follow. Failure to sign or to adhere to the attached agreement will result in immediate termination of data use privileges.

The accuracy of the users' statistical analyses and the findings they report are not the responsibility of the American College Health Association. ACHA shall not be held liable for improper or incorrect use of the data.

### Data Use Agreement

**Signing this agreement does not guarantee your request will be approved; however, this section must be complete for your application to be considered.**

By signing below, I agree to the following:

- I will reference the American College Health Association when reporting any data obtained from the ACHA-NCHA utilizing the following standard format (items in Arial font are specific to the data you receive and must be completed appropriately):  
American College Health Association. American College Health Association-National College Health Assessment, Survey Period(s) [computer file]. Baltimore, MD: American College Health Association [producer and distributor]; (YYYY-MM-DD of distribution).
- I will grant access to ACHA-NCHA data to only those individuals specified in this *Data Use Request Form*. Should the need to grant access to additional individuals arise, I will contact the ACHA Research Director immediately.
- If my institution requires, I will obtain all necessary Institutional Review Board (IRB) approval for secondary data analysis prior to beginning my research, and I will provide ACHA with appropriate documentation of IRB approval.
- I will provide ACHA with any final products produced using ACHA-NCHA data, which include but are not limited to: professional journal manuscripts, professional conference presentations, student theses/dissertations, book chapters, policy documents, fact sheets, and brochures.

*Signed copy on file at ACHA, 02/17/11*



August 23, 2012

MEMORANDUM

TO: Mitchell Jenkins  
Ches Jones

FROM: Ro Windwalker  
IRB Coordinator

RE: New Protocol Approval

IRB Protocol #: 12-08-054

Protocol Title: *Healthy Lifestyle Choices Impact*

Review Type:  EXEMPT  EXPEDITED  FULL IRB

Approved Project Period: Start Date: 08/23/2012 Expiration Date: 08/22/2013

Your protocol has been approved by the IRB. Protocols are approved for a maximum period of one year. If you wish to continue the project past the approved project period (see above), you must submit a request, using the form *Continuing Review for IRB Approved Projects*, prior to the expiration date. This form is available from the IRB Coordinator or on the Research Compliance website (<http://vpred.uark.edu/210.php>). As a courtesy, you will be sent a reminder two months in advance of that date. However, failure to receive a reminder does not negate your obligation to make the request in sufficient time for review and approval. Federal regulations prohibit retroactive approval of continuation. Failure to receive approval to continue the project prior to the expiration date will result in Termination of the protocol approval. The IRB Coordinator can give you guidance on submission times.

If you wish to make any modifications in the approved protocol, you must seek approval *prior to* implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 210 Administration Building, 5-2208, or [irb@uark.edu](mailto:irb@uark.edu).