STUDENT WELLNESS: TRACKING DEMOGRAPHIC CHARACTERISTICS, HEALTH RISK TRAITS, AND HEALTH INFORMATION OF STUDENTS OVER A SIXTEEN-YEAR PERIOD

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Abstract

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This study explored student wellness over a sixteen-year period from 1989 to 2005 on the following six health traits: cholesterol, diastolic blood pressure, systolic blood pressure, body composition, aerobic capacity, and health risk age. Further, this study collapsed the data set into two generational groups: Thirteeners or Generation X based on birth years including 1981 and before and Millennials with birth years including 1982 and older. This study investigated the difference among generational group, age group, and gender. Astin’s (I-E-O) Input-Environment-Outcome Model was utilized as the conceptual and empirical framework, however, the data focused on the student input of the six health risk traits to question current wellness assessment practices and to inform higher education professionals in the field of student wellness of the importance of the environment and outcome components in Astin’s I-E-O model.

The Fitwell Center at Bowling Green State University provided access to multiple student databases from 1989 to 2005. The individual years of data were merged into one database to include 1957 students for this study. The students were characterized as predominately female (71%). The age distribution included participants ranging from 18-19 years of age (20%), 20-21 years of age (41%), 22-23 years of age (32%), and 24-25 years of age (7%). The year group distribution included 77% in Generation X or the Thirteenth Generation and 23% in the Millennial Generation. National norms from the Center for Disease Control (CDC) and the American College of Sports Medicine (ACSM) established a comparative value for the college student age group of 18-25 years of age on the six health risk traits: cholesterol, body composition, diastolic blood pressure, systolic blood pressure, aerobic capacity, and health risk age.
The results indicated that Millennial students have higher reported levels of blood pressure but were similar on the other variables. Further insight on gender, age group, and year group were also important in the study of generational characteristics and health traits. This study supported previous literature findings that only some key health traits are going in the wrong direction and supports further research on the Thirteenth Generation to the current Millennial Generation.
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The years between 1989 and 2005 not only crossed over the new Millennium but also appear to be significant as national health researchers at the American College of Sports Medicine and the Center for Disease Control (2004) cited significant change in student health. Higher education professionals in the field of student wellness should examine how students’ wellness has changed and study the complexities of student life to help improve the wellness environment and encourage healthy behavior by college students. In order to improve students’ health and wellness, higher education professionals must recognize and understand the history of wellness, generational influence, and current public health issues to suggest a broader measure of wellness to encompass changing student health risks.

Increasing the consciousness of health risks has proven to be an effective way of improving the wellness of the general population. During the 1980s there were major declines in rates for three of the leading causes of death among Americans: heart disease, stroke, and unintentional injuries (Center for Disease Control, 2004). Much of that progress in reducing the death rate was attributed to reduction in risk factors.

The drop of more than 40 percent drop in heart disease mortality since 1970 was due to high blood pressure detection and control, a decline in cigarette smoking, and increased awareness of blood cholesterol and dietary fats. The precipitous drop in stroke death rates also reflected gains in hypertension control and declines in smoking.

Health risk traits routinely assessed by wellness programs include total cholesterol, systolic blood pressure, diastolic blood pressure, body composition levels or body mass
index, aerobic capacity, and a health risk assessment or a similar form of a lifestyle questionnaire. The Center for Disease Control (2004) has indicated that these risk traits are key measures of health and important factors to gauge personal wellness. Despite the overall health and wellness improvements in the 1980s and the use of these personal wellness assessments, the nation continues to be burdened by preventable illness, injury, and disability even into the new millennium.

Buchanan’s (2000) list of public health challenges for current college students included the impact of technology, the obesity epidemic, and the lack of physical education in secondary schools as factors that did not exist ten years ago. Yet, as college students’ collective needs change, current public health challenges should be placed in a wellness assessment model to understand the impact on students and to begin to explore the changing generational and health issues that may result. A wide lens must be applied by higher education professionals in the field of wellness through a generational approach to examine demographics, health risk traits, and current health information to improve wellness programming.

Jamner and Stokols (2000) defined wellness “as a concept that promotes higher levels of health with the focus on prevention of chronic illness or the reduction of an impairment of health” (p. 41). The concept of campus wellness is to provide programs, education, and services to help educate students on preventative health aspects to reduce health risks. Current public health factors that impact college students include the lack of physical activity in secondary schools and a growing obesity epidemic in all age groups.

Researchers at the Center for Disease Control (2004) argued that obesity has increased at epidemic proportions and is threatening to become the leading cause of death in
the twenty-first century. The rate of obesity among Americans is twice as high today as it was in the early 1960s. Twenty-five percent of children under eighteen are considered obese, and many college freshmen typically are at risk for obesity. If this health risk is not addressed, obesity could become prevalent on the college campuses and create related health problems for students. A direct link must be made to thoughtfully consider the impact of public health issues on student wellness such as reducing chronic illness through a preventative wellness program.

Student Wellness Implications

What is unique for college students is that group characteristics exist in the form of gender, age group, and generational group which may provide insight into specific wellness concerns. Certain public health challenges may influence groups differently and this difference creates new meaning across the generations. Howe and Strauss (2000) placed importance on generational change and exploring group characteristics because the Millennial students have created new implications for wellness practice and policy. The importance of how students have changed suggests the need for a generational lens to examine student wellness issues.

Howe and Strauss (2000) defined the Millennial students as the current generation of college students who were born after 1982. Prior to the Millennials, “Thirteeners” or Generation X, included the birth years 1961 to 1981. For this study, there will be two groups: Millennials and Thirteeners.

Seven key characterizations of Millennial students included the terms special, sheltered, confident, team-oriented, conventional, pressured, and achieving (Howe & Strauss,
These characteristics are important when working with the current generation of college students and identifying specific wellness needs.

Pascarella and Terenzini (2005) have studied over three decades of student change in college. They challenge professionals to use a broader vision to describe how students learn so as to provide innovative approaches to stimulate new policies to influence student development. The role that higher education professionals have in nurturing a healthy learning environment must become a part of the environmental press created by educators outside the classroom.

Student wellness must be advanced through broader assessment practices. Wellness assessment must account for change in student characteristics, address public health issues for students, provide for institutional accountability, and contribute directly to student wellness. Important information on student inputs must inform current wellness assessment practices, create a healthy campus environment, and lead to wellness outcome components suggested by Astin’s I-E-O model (1993).

Public Health Threats

Callahan (2000) noted specific health dangers caused by excessive drinking, smoking, poor nutrition, and overeating, which taken together or individually can lead to an increase in cholesterol, blood pressure, body composition, and health risk age. In addition, poor health practices associated with sedentary living also lower aerobic capacity. These poor health practices often set the stage for physical disease by lowering the body’s resistance to fight illness and create inefficiencies in the cardiovascular and cardiopulmonary systems (Wells, 2001).
In addition, Buchanan (2000) listed twenty-first century public health challenges, including the impact of technology and the obesity epidemic, which must be researched to understand the implications on student wellness. These symptoms, challenges, and behaviors negatively contribute to the dynamic process of human wellness and require the recognition of key forces that impact wellness. These public health threats must be addressed or may lead to a major decline in student health and wellness.

Buchanan (2000) suggested that many traditional wellness programs chipped away at surface needs often in the form of personalized wellness profiles which only examined physiological risk factors and did not provide for a broader scope of wellness. These traditional approaches only worked at the programmatic level to help eliminate a single health issue such as quitting smoking, without addressing other stressful factors that might have led to the smoking behavior. Such approaches are single-shot approaches and do not examine student characteristics, environmental concerns, or specific outcomes for student wellness programs.

What is missing is a comprehensive approach to measuring wellness. Currently, the health behaviors of students are measured through the use of assessment tools which include health-risk appraisals, blood pressure screening, cholesterol, and fitness profiles, but do not account for information on generational nuances such as changing student characteristics, public health concerns, or wellness outcomes unique to college students. A broader assessment approach as suggested by Upcraft and Schuh (1996) should create a better understanding of students’ input characteristics and aid in the wellness effort to improve student health and wellness outcomes.
As higher education professionals in the field of student wellness are in the middle of an educational era that includes increasing higher education costs and decreasing state support, pressure is placed on gaining as much from the collegiate experience as possible. A comprehensive wellness approach should include an emphasis on measuring student wellness components in the college environment as well as student behavior within such an environment (Pascarella & Terenzini, 2005). The need to conceptualize wellness from a comprehensive assessment approach would allow for a broader perspective that includes information on changing student characteristics, environmental and public health issues, and specific wellness outcomes.

Astin’s I-E-O Model

The need for a complex study of student wellness requires a comprehensive assessment model. Astin’s I-E-O model provides a framework to examine student wellness from the input (characteristics of students), environment (public health concerns), and outputs (accountability measures). The unique combination of assessment categories in the I-E-O model must expand the current wellness assessment practice and inform policy and practice. This enhanced version of student wellness connects the bigger picture to the rising health care costs and communicates the importance of wellness initiatives on student development and economic efficiency.

Astin (1993) emphasized the need for assessment as state support for higher education decreases and as public criticism about quality and efficiency increases. The formidable task for higher education professionals in the area of wellness is to justify current wellness programs that fit with the needs of the current generation of students. The economic
benefit of preventing chronic illness must be part of the justification of wellness programs as stated in the following quote.

College and university administrators live in a world in which others expect them to do things that make a difference, yet at the same time they find their discretion to act constrained by existing structures, ongoing routines, the professional prerogatives of others, the lack of slack resources, and the loose coupling that characterizes academic governance. (Birnbaum, 1988, p. 182)

This study probes the topic of change by exploring the student characteristics from a generational perspective to study student wellness over time and question the current wellness paradigm. This wellness initiative is important because positive wellness measures have the potential to lower health care costs at a time when current health care spending has increased in many sectors of the American economy.

Generational Theory

Certain events affect the lifecycle of generations of students such as the impact of internet on Millennial college students which did not exist in college in the 1980s. The notion that peer groups may fit into an on-going story and that each generation has a special role provides a sense of understanding and insight into wellness. Strauss and Howe (1991) described the benefit of studying the generational influence by stating that “the rhythm of this drama will enable us to foresee much of what the future holds for your own lifecycle, as well as what it holds for your children or grandchildren after your own time has passed” (p. 8). One example is how technology has greater influence over Millennial students than Thirteeners making sedentary lifestyles the norm.
Generational behavior seems to determine how and when individuals begin to participate in social change or social upheaval. This is important to determine through a wellness study in order to anticipate societal change about the future especially in light of technology use; the rising costs of health care; and the increased utilization of prescription drug care for cholesterol, blood pressure, antidepressants, and other “lifestyle” drugs (Callahan, 2000).

This study casts aside traditional assessment approaches to explore data from 1989 to 2005 to determine if any differences exist among the 13th Generation, Tweeners, and the Millennials in the six health traits: cholesterol, blood pressure, body composition, aerobic capacity, and health risk age. Additional analysis examines differences among genders, age group, and generation group to encourage flexibility in design and delivery of future wellness programs.

Students are changing; as cited by the U. S. Census Bureau (2000), 39.1% of college students are students of color (Asian, Black, Hispanic, or Native American), which suggests the Millennial students are the most ethnically and racially diverse group of students to date. The Millennial students are preparing themselves to live in a global society and expect an educational environment supportive of this objective. Females are also entering higher education at a higher rate than males in the United States. These demographic characteristics of the Millennial students represent new patterns and types of involvement and impact wellness assessment from all three areas: inputs, environment, and outcomes.

**Significance of Study**

Currently many higher education professionals in the field of student wellness only collect information on physiological health traits including cholesterol, blood pressure, body
composition, aerobic capacity, and health risk age. However, there is no comprehensive
evaluation tool suggested by either the National Intramural Recreational Sports Association
(1996) or the higher education CAS standards (Miller, 1997). Traditional assessments
include satisfaction surveys, usage statistics, and program surveys. Without a higher
education tool, NIRSA and CAS suggest wellness should be a part of the campus recreation
program but do not provide a specific assessment method to address change in student inputs.

In order to understand student wellness, assessment tools must become more
sophisticated. Many institutions require further information on accountability through
program review to demonstrate effectiveness. Yet, Palomba and Banta (1999) suggested that
program requirements from CAS and NIRSA on student wellness are not specific enough to
guide wellness programs and have not changed in order to address generational change or
group needs. These examples of program outcomes are not sufficient because they do not
examine change in students over time. Longitudinal assessment using Astin’s I-E-O model
would help address generational change and benefit higher education professionals in the
field of campus wellness.

The scope of this dissertation explores student wellness at a large regional state
university over a sixteen-year period to note change in student behaviors. The data collected
represented established measurements on key health traits to associate these measurements
over the years with generational theory, and finally, to discern whether such measurements
provided an effective assessment of wellness that can inform practices within the
environment of higher education. In summary, this study examined the trends over the past
16 years to determine where the differences are among certain age groups, generational
groups, and genders on the key health traits: cholesterol, blood pressure, body composition,
aerobic capacity, and health risk age. In addition, this study suggested strategies for improving the college student’s health and challenged the current wellness paradigm.

Organization of the Dissertation

Chapter one includes an introduction aimed at establishing the need for the study. Chapter two includes the literature review to provide a broad overview of the history of student wellness, address public health concerns for the Millennial student, and highlight the challenges campus administrators face regarding assessment of student wellness to justify program existence. Chapter three, or the methodology section, discusses the selected research design and its assumptions, explains the processes used to select participants and to collect and analyze data, and reviews the measures used to ensure validity of data and confidentiality of the participants’ information. Chapter four provides the results of the statistical analysis of the data. Chapter five synthesizes the discussion of the results, implications of the research and conclusions of the study. Future research implications are also discussed in chapter five.
CHAPTER TWO

Review of Literature

This chapter focuses on the historical perspective of wellness. Challenges with measuring wellness are discussed. Limitations with typical assessment methods and the broader wellness needs of college students suggested the use of Astin’s (1993) I-E-O Model as the theoretical framework to examine student characteristics and how these characteristics impact wellness. An overview of the reasons that cholesterol, blood pressure, body composition, aerobic capacity, and health risk age are assessed is presented. The connection among students, wellness, and generational change suggests the need to explore change in public health factors that influence college students as well as generational characteristics of Millennial students as compared to the Thirteeners. The issue of generational change questions how growing use of technology among students plays a role in student health. The chapter concludes with the rationale for a more comprehensive assessment model and specific strategies for assessment.

Historical Perspectives on Wellness

From a historical perspective prior to the 1970s, few efforts to improve the health of the individual or the population focused on preventative treatment of disease. The concepts of health promotion and wellness were little known, and financial investment in preventative health care was limited. Erfurt, Foote, and Heirich (1991) reported that in 1982 only 2.5% of the nation’s annual health care expense was in prevention. Less than three decades later, societal commitment to disease prevention strategies has increased dramatically. Local, state, and federal governments have enacted public policy to curtail individuals’ use of tobacco
products, to protect worker safety, and to reduce drunk driving related injuries and fatalities (Breslow & Johnson, 1993). Businesses and managed care organizations have invested substantial funds toward the development and implementation of disease prevention programs (Erfurt et al., 1991).

The growing interest in disease prevention and health promotion over the past thirty years has been prompted by several societal developments and concerns. According to the 1979 Surgeon General’s Report on Health Promotion and Disease Prevention, cigarette smoking was a behavioral factor and a direct cause of lung cancer and other serious diseases. This landmark investigation linked behavioral issues to health related concerns. In recent years, other developments, including the exponential rise in national health care expenditures, growing concerns about the health care system, and evidence for health and financial benefits of disease prevention, have brought the concept of wellness and health promotion to the forefront (Breslow & Johnson, 1993; Buchanan, 2000; Callahan, 2000).

The rise in health care expenditures has been due to many factors. One factor, sedentary living has become common practice even among college students. Numerous statements document that sedentary living increases the risk of chronic health conditions:

- Center for Disease Control/American College Sports Medicine (1995):
  Epidemiologic research has demonstrated protective effects of varying length between physical activity and risk for several chronic diseases, including coronary heart disease, hypertension, non-insulin dependent diabetes mellitus, osteoporosis, colon cancer, anxiety, and depression. (Pate, Pratt, Blair, Haskell, Macera, Bouchard, Buchner, Ettinger, Heath, & King, 1995, p. 405)
- The Surgeon General’s Report on Physical Activity and Health (1996) findings suggest that endurance-type physical activity may reduce the risk of developing obesity, osteoporosis, and depression and may improve psychological well-being and quality of life. There is promising evidence that muscle strengthening (resistance) exercise reduces the risk of falling and fractures.

- The consensus statement from Dose-Response Issues Concerning Physical Health (2001)/ An Evidence-Based Symposium: Regular physical activity is associated with a reduction in all-cause mortality, fatal and nonfatal total cardiovascular disease, and coronary artery disease. It is also associated with a reduction in the incidence of obesity and non-insulin dependent diabetes mellitus or Type Two diabetes. Furthermore, physical activity is associated with a reduction in the incidence of colon cancer and osteoporosis. Further benefits of regular physical activity include improved physical function and less likely to develop depressive illness. (Kesaniemi, Danforth, Jenson, Kopelman, Lefebvre, & Reeder, 2001, p. S357)

Thus it is clear from these consensus statements that sedentary lifestyle increases the risk of chronic health conditions. College students are beginning to establish physical and mental health patterns as part of the developmental process. Stress, one such health pattern, is a common experience for many students according to the National Council of Health Administrators (NCHA) annual survey (2004):

- In the NCHA self-reported survey, close to 40 percent of women identified themselves as feeling hopeless at least three times during the past year compared...
to 30 percent of men. More than one of five (22%) reported being very sad at least nine times during the previous year, compared to 15% of men. And close to one half of women (48%) felt so depressed least once over the past year that they were dysfunctional with one of four (26%) experiencing depression at least three times.

- In the NCHA survey, students identified “stress” as the top impediment to academic performance with 36% of women and 26% of men reporting stress symptoms.

It is important for college students to lay the foundation of good health practices to promote a healthy lifestyle. The adoption of physical activity patterns, education on health risk, sound nutrition practices, proper sleep patterns, and moderation in alcohol consumption will help prevent chronic illnesses such as obesity, non-insulin dependent diabetes mellitus, coronary heart disease, high blood pressure, and other disease and illness (Kesaniemi, 2001; Pate et al., 1995; Todaro, 1993). Further, these positive health practices will help reduce the economic cost of chronic illness.

College students are still forming health patterns, and once students leave college they may lose the physical and social supports and incur time restraints that can lead to decreased levels of physical activity. It is especially important that positive health practices are supported in the college environment and provided through collaborative efforts on campus.

Improving the health of students requires a wide range of wellness programs to foster healthful behaviors and help prevent hazardous ones, especially in the areas of physical fitness, stress management, alcohol education, smoking, and proper nutrition. Educational programs should become part of the wellness offerings on these topics and readily accessible
A sound wellness program will create a positive health environment to encourage a lifetime approach to wellness habits that can help foster long-term health. Campus wellness programs must make a difference in the health of college students in order to protect the nation’s economic future.

Limitations of Current Assessment Practices

Current wellness strategies include health risk appraisals, counseling, and lifestyle change programs (Erfurt et al., 1991; Fries, Koop, & Beadle, 1993). Although many wellness programs have been effective, others have failed. For example, although employers have made substantial efforts to bring their workplaces into compliance with state and federal regulations aimed at reducing occupational injuries, workers compensation claims related to chronic illness continue to rise.

Individuals with chronic health conditions accounted for disproportionately large utilization and cost of health care resources. Booth (2002) suggested that almost 96% of home care visits, 83% of prescription drug use, 66% of physician visits, and 55% of emergency department visits were made by people with chronic health conditions. They also represented 69% of hospital admissions and required longer hospital stays (7.8 days), compared to individuals without chronic health conditions (4.3 days). It would be logical to target the largest health care expense if attempts were made to reduce the incidence of chronic illness.

In 1995, occupational injuries accounted for $121 billion in lost wages and health care costs. Lifestyle change programs that narrowly focused on modifying specific behavior often neglected the circumstances that led to high relapse and attrition rates once the interventions ended (Callahan, 2000). In addition, certain health risks such as violence,
obesity, teen pregnancy, substance abuse, and financial barriers to medical care and preventative services have remained segmented in certain populations, particularly low-income and minority groups (Adler, Boyce, & Chesney, 1994; Fontanarosa, 1995). These statistics associated with negative health risks suggest a need for a more comprehensive assessment method to include inputs, environment, and outcomes for specific groups. The purpose would be to reduce the proportion of sedentary lifestyles, reverse chronic health conditions, and improve the economic impact of health care spending.

The arrival of the twenty-first century beckons both challenge and opportunity. The century began with the obesity epidemic and the crushing cost of health care. However, great strides have been made regarding public smoking bans and overall reduction in smoking patterns (Erfurt et al., 1991). Biomedical research continues to offer sophisticated techniques for diagnosing and intervening against disease. Scientists have revealed much about the factors that predispose to various health risks and suggest positive health behaviors to reduce that risk (Buchanan, 2000; Callahan, 2000; CDC, 2004).

This information provides new hope that better health is within personal grasp. If smoking stopped today, an estimated 390,000 fewer Americans would die this year (CDC, 2004). If Americans reduced their consumption of foods high in fat and engaged in physical activity, additional health benefits would occur. If alcohol was not abused, 100,000 fewer people would die from unnecessary illness and injury (CDC, 2004). Together, deaths from these personal lifestyle choices would be reduced and positively impact the destiny of individuals and the future of our nation.

These problems suggest the importance of wellness programs and the need to review college student’s health. Callahan (2001) suggested that new knowledge would help propel
the benefits of wellness education, and provide hope for the problems of obesity, alcohol abuse, physical inactivity, high blood pressure, high cholesterol, and poor nutrition. This perspective has the potential to change unnecessary illness and death, help students achieve better health, and stimulate economic recovery in health care costs.

The Need for a Paradigm Shift in Wellness Assessment

To improve the health of vulnerable populations and reduce the self-selection biases and attrition rates associated with many intervention programs, broader strategies must be used that combine research efforts, specific outcomes, and generational information sources to alleviate chronic health problems and establish sound patterns of good health (Adler, Boyce, & Chesney, 1994; Fontanarosa, 1995).

The limitations of these earlier wellness programs highlight the need for a major paradigm shift away from narrowly focused interventions aimed at primarily changing individuals’ health behavior toward more comprehensive formulations that address the interdependencies among student characteristics, public health environment, and wellness outcomes. (Jamner & Stokols, 2000; Stokols, 1996; Winett, King, & Altman, 1989).

Researchers in the field of public health have recognized that patterns of behavior are closely linked to a variety of cultural, political, and physical-environmental conditions within communities (Stokols, 1996, Winett et al., 1989). The college environment presents additional challenges including important considerations such as changing student characteristics and the changing campus community.

These problems suggest change has occurred on many levels. Culturally, students are changing as technology has created a more global environment. However, the use of
technology has created new problems such as sedentary lifestyles and an increased incidence of chronic health problems that must be addressed through student wellness programs.

Wellness Environment Change: Public Health

At the same time, other public health factors are impacting college students. These factors include the lack of physical activity in secondary schools, decrease in leisure-based physical activity, and a growing obesity epidemic in all age groups. Researchers at the Center for Disease Control (2004) argued that obesity has increased at epidemic proportions and is threatening to become the leading cause of death in the twenty-first century. The rate of obesity among Americans is twice as high today as it was in the early 1960s.

College students are at risk. Twenty-five percent of children under eighteen are considered obese and many college freshmen typically are under eighteen. If this health risk is not addressed, an obesity epidemic could become the norm for the college campus. The Center for Disease Control (2004) has observed that rarely do chronic conditions such as obesity spread with such speed and dispersion characteristic of a communicable disease epidemic. The increasing prevalence of chronic health disorders is frightening and better preventative measures must be taken to educate students on the benefits of regular physical activity (Booth, 2002; Buchanan, 2000).

What has caused this rapid change in the weight of the nation? In the United States, leisure scholars argued the increasingly sedentary behavior of technology such as television viewing contributes directly to the rise in obesity (Robinson & Godbey, 1997). Technology has become infused in the American college experience in most aspects of residential, academic, and social life. The current college student expects to live in a global society and will rely heavily on the use of technology. However, if work and education continue in a
sedentary form and leisure continues on the same sedentary path, a new way of thinking about leisure must include more physically active pursuits.

A historical perspective may shed light on the division of work (labor) and leisure. Sahlins (1988) argued that prehistoric people were the original leisure society because they did not have material goods, so they were free from the labors of protecting and maintaining them, and consequently had time for leisure. The lessons from ancient civilizations may provide the modern society with insight into the important benefits of leisure. But, the cost of technology may be in the American obesity epidemic and extend far beyond the emotional pain and mental anguish that may negatively impact students’ development.

Importance of Measuring Risk Factors

Developing strategies to address chronic health conditions must include an understanding of risk factors. The risk factors for this study include cholesterol, blood pressure, body composition, aerobic capacity, and health risk age. One or more of these indicators can have a profound effect on increasing the quality of life and add years of healthy life (Wells, 2001).

Total cholesterol is evaluated because an increased level of cholesterol is a key risk factor for heart disease. Cholesterol is a waxy substance found in the bloodstream, but is also found in animal fats and many other food products. High levels of cholesterol can lead to arterial plaque and eventually close off the blood flow and lead to a heart attack. Hypertension or high blood pressure is tested due to the increased risk of heart disease or stroke and the compounding of other cardiovascular events such as congestive heart failure. Body composition testing is done to measure levels of obesity and is an independent risk factor for coronary artery disease. Obesity is also associated with hypertension, glucose
intolerance, and unfavorable lipid profiles. Aerobic capacity is the volume of oxygen consumed during exercise and represents fitness level. Individuals undergoing an exercise program or an exercise and counseling program have been reported to demonstrate an increase in aerobic capacity and an improved quality of life. Furthermore, exercise has been documented to reduce depression in clinically depressed patients. Health risk age is measured to assess the relationship of various factors to quality of life. From the health risk age assessment, wellness professionals may develop and provide a variety of wellness programs and services. The United States Department of Health and Human Services (2000) suggested that all of these assessments are important in improving health.

Sedentary behavior negatively impacts cholesterol, body composition, blood pressure, aerobic capacity, and health risk age (The Center for Disease Control, 2004). Elevated levels in any of these values may contribute to cardiovascular, cardiopulmonary, musculoskeletal, immunological, and psychological illness. The body works in complex and connected pathways; in order to achieve good health, these health risk values should be monitored for change.

Behavioral changes to help lower these health risks may save lives. For example, declines in coronary heart disease are associated with reduced rates of cigarette smoking, lower mean blood cholesterol, and control of blood pressure. Lower alcohol use may lower blood pressure. Regular exercise, proper sleep, and sound nutrition practices will help lower the risk in all categories. Twenty-first century lifestyle-related illness and or death rates typically begin with a change in health risks (Schlosser, 2002). Campus wellness programs must focus on education regarding these key health risks.
Physical activity is a key ingredient to a healthy life. Physiological decline is often associated with inactivity. Less than a third of adults participate in regular physical activity. Yet, regular physical activity is a critical component of health promotion for adults. Increased physical activity is associated with reduced incidence of coronary heart disease, hypertension, non-insulin dependent diabetes, and depression or anxiety (Booth, 2002; Kesaniemi et al., 2001; Pate et al., 1996).

Moreover, increased physical activity also increases bone density, reduces the risk of osteoporotic fractures, helps maintain appropriate body weight, and increases longevity. It may also be that increased physical activity levels can improve balance, coordination, strength, and proprioception which are factors that help reduce the likelihood of falls and injuries. In addition, these health benefits of physical activity appear to help maintain function independence through adulthood and the later years of life (Booth, 2002; Kesaniemi et al., 2001).

Increased Use of Technology

The domination of technology for a leisure purpose has shifted the scale away from the balance of a healthy mind and body to a healthy mind with a sedentary body. Physical inactivity has become unintended effect of increased technology use. The complex interplay between the mind and the body is lacking as the current students’ use of technology typically results in decreasing physical activity (Lewis, Barcelona, & Jones, 2001). College students need to thoughtfully consider the amount of time spent using technology as compared to leisure and wellness. If not, the impact of physical inactivity may begin to shape students’ health in negative ways.
Ackerman (1999) suggested leisure provides for freedom, intrinsic reward, pleasure, happiness, spirituality, solitude, ritual, laughter, game, play, risk, and relaxation. These qualities are important dimensions for personal development and can provide balance for a college student to counter the stress of academic life. Huizinga (1955) described play as an activity and said that our culture thrives on play which is an important part of balanced leisure. Ackerman (1999) compared the concept of play to “playful reverberations of the mind that can impersonate physical objects and abstract ideas” (p. 4). The benefits from a playful society may help form creative outlets for the human experience both mentally and physically (Ackerman, 1999, Huizinga, 1955). If physical activity is lost, students will suffer both mentally and physically.

Jackson (2002) warned that postmodern societies must create boundaries between technology for work and technology for leisure and include time for human connection and physical activity. Wilson (1994) also placed importance on leisure and defined leisure as the “time which an individual has free from work, or other duties, and which may be utilized for the purposes of relaxation, diversion, social achievement, or personal development” (p. 38). Robinson and Godbey (1997) suggested that the line between work and home has become blurred and that many work environments are driven by the personal computer and high-speed internet connections.

A clear opportunity exists to examine student health and the generational impact on students. Efforts must be made to study impact of technology on college students. Use of time, physical activity patterns, and mode of leisure must be studied to determine how the campus culture is changing. Of overarching importance is the complexity of student health as examined by individual health risk traits, but connected to generational change.
To explore the generational change, two key groups will be discussed. Over the course of this data set from 1989 to 2005, two generational groups exist; Thirteenth Generation which includes students born 1981 and before and Millennials born 1982 and after. To explain the basis for change, it is necessary to describe characteristics of each generation.

**Generation X or Thirteeners**

The Generation Xers or “Thirteenth Generation” has many unique characteristics and they are often called the “generation after.” For those born in 1960, many major world events marked their lives including Woodstock (8 years old), Watergate (13 years old), and the oil crisis (18 years old). In 1979, as this generation was beginning to make major life-decisions about school and careers, the older generations were sinking into a state of national pessimism (Strauss & Howe, 1991). Many major events from the 1960s and 1970s including Vietnam, Watergate, and Three Mile Island created a sense of instability in the country. This generation struggled with the real world as if the world would punish them later in life.

Annual polls of high school seniors showed that those born after 1960 were more fearful of national catastrophe than those born before 1960. Those same babies born in the early 1960s also had a higher rate of crime, suicide, substance abuse, and lower test scores and marked a postwar extreme for this age group (Strauss & Howe, 1991). These same indicators did not improve among those born in the late 1960s and 1970s. Older generations viewed this group as frenetic and physical, and often described them as shocking on the outside, unknowable on the inside. Elders found it hard to hide feelings of disappointment and often dismissed them as “lost,” “ruined,” or “wasted” (Strauss & Howe, 1991).
Older generations were shocked that this group’s chemicals of choice were steroids that augmented the body and dimmed the mind which is the opposite of the psychedelics of earlier generations. Jose Canseco was often described as the perfect athlete because he was pumped up on steroids but oblivious to the negative impact to his personal health and the tarnished image of baseball (Strauss & Howe, 1991). The media also portrayed Thirteeners by their appetites more often than their ideas in commercials: leisure was filled with drinking soda pop and eating junk food.

The academic concern was declared in the 1983 report, *A Nation at Risk*, which reported that a “rising tide of mediocrity” was emerging from the secondary school system (Strauss & Howe, 1991). Right or wrong, the Thirteeners and their future employers were sent the message that this generation received an inferior education and were equipped with inferior minds. The Thirteeners students were quick to repute this criticism. They looked upon themselves as pragmatic, quick, sharp-eyed, and able to understand the game of life.

The Thirteeners did have concerns about their economic future. Since the mid 1970s, the costs of college tuition and campus housing increased ahead of inflation. The rewards for young employees in terms of benefits and salaries lagged behind. This created a certain survival tactic around money. At every phase of life, the Thirteeners encountered a world of more punishing consequence than previous generations (Strauss & Howe, 1991). The Thirteeners were resilient and developed a “patchwork self” to preserve some sense of optimism and self-esteem. Yet, Strauss and Howe (1991) labeled this generation with the number “thirteen,” which could be seen either as a gauntlet, or an obstacle to overcome.
The Millennial Generation

The Millennial generation was often described as cute, cheerful, scout-like, and most importantly “wanted.” Even the timing of this generation was historic. Its birth years stretched to and just beyond the year 2000, the end of the second millennium. The goals and aims of this generation were set high, as in 1990 the nation’s governors set a goal to include a 90% high school graduation rate for the “Class of 2000.” Future health was also important for this group, as Former Surgeon General C. Everett Koop declared a national challenge to produce a “smoke free” high school class of 2000 (Howe & Strauss, 2000).

Many of the negative feelings about the previous “lost” or 13th Generation turned into higher expectations for the Millennials. First wave Millennials were riding a highly protective “baby on board” status. Many authors began to criticize the human consequence of the 1980s high rate of divorce, increasing number of latchkey households, and value-neutral education system. The parents of the Millennials set out to protect their children from the social and chemical residue left over from the 1960s. At dinner tables, many conversations from parents included telling small children about the perils of drugs, alcohol, AIDS, and teen pregnancy (Howe & Strauss, 2000).

This generation is treated as more precious than their parents. The same media that once urged parents to allow children room for discovery drew back and prodded parents to control their child’s environment. Howe and Strauss (2000) suggested this control created tough new laws that also made parents civilly or criminally liable for their child’s behavior.

The Millennials also showed every sign of being a generation of trends toward improved education and health care, strengthened families, and a rising sense that youth need a national mission. Yet early signs do not show an improvement. Divorce and abortion rates
continue to rise. Sex, violence, alcohol, and cigarettes still remain in the media, and new problems grow on the internet with pornography, internet predators, and adult chat sites (Jamner & Stokols, 2000). This contradiction for Millennial students suggests the importance of providing wellness education to address this situation.

If the current wellness model does not address the change in generational characteristics, including use of technology, increased obesity epidemic, and lack of physical activity, then student development will suffer and our health care system will continue to be stressed financially (Fries et al., 1993). Will future researchers describe the Millennial student as sedentary, bored, depressed, tense, anxious, and isolated from each other, but connected to technology?

Wellness Environment

The work of the higher education professional in the field of campus wellness must include an understanding of generational characteristics and create a supportive campus environment for student wellness. Wellness programs should provide students with leisure opportunities that will allow for intellectual, social, and physical growth for holistic development. A visionary perspective of a connected student community is one where technology and community co-exist in harmony and health. In order to achieve this vision of harmony, educational programs must emphasize the benefits of an active, playful society where opportunities exist for personal development and remind students of the importance of a healthy mind and healthy body (Jamner & Stokols, 2000; Lewis et al., 2001).

Students, Change, and Wellness

College campuses can support technology, but need to be mindful of wellness and encourage physical activity and balanced leisure. Changing leisure patterns have provided
insight into the passive nature of current technology use (Hill, Wyatt, & Reed, 2003; Jackson, 2002; Lewis et al., 2001). It is important to view the technological impacts from a different set of assumptions or change from passive to active use. The expectation of the latest technology by students may generate discussions on how students might use technology for physical activity by providing heart monitors, pedometers, or other personal monitoring devices for student use. Using a wellness perspective, students could benefit from technology by understanding the purpose and philosophy of leisure and learning to balance the two. The notion of changing public health questions the current student wellness model.

One area often overlooked is the importance of a preventative health model on a college campus. Good health can help students alleviate stress, improve overall health during college, and have a more satisfying and effective higher education experience (Dalgarn, 2001). Student health risk will continue to rise if students are not educated about personal wellness. Wellness programs must be readily available and focus on preventative education, collaboration, and assessment (Fries et al., 1993; Hill et al., 2003; Lewis et al., 2001). Students should learn how to monitor their health risks, and counseling must be available to guide students on how to change negative behaviors and lower their health risk.

Technology can be an important part of the wellness program. Street, Gold, and Manning (1997) suggested interactive web sites that allow students to electronically navigate their health concerns and seek professional help that would be appropriate. Educational chat rooms may allow for a student forum to address issues when face to face contact may not be preferred. Monitoring activity levels and providing incentives may also be an attractive use of technology with the end result of encouraging more physical activity.
Wellness promotion is at a critical junction in the new Millennium as researchers have developed methods for identifying the most effective strategies for improving the health-related quality of life in humans. Jamner (2000) suggested that the wellness influence extends beyond the morbidity and mortality rates and into a greater realm of social, political, and environmental determinants. Therefore, the potential for promoting human wellness demands a broader scope of elements that impact health. Research must examine the complexities of health throughout various stages of the lifespan (Lewis et al., 2001) and include a focus on gender differences (Wells, 2001).

A current strategy is to examine health behaviors through the use of a health-risk appraisal. “This type of self-reported appraisal may identify certain behaviors, social roles, and situational conditions that exert a disproportionate influence on personal and collective well-being” (Stokols, 1996, p. 291). But, this is a one-shot assessment and it is just as important to connect the environmental concerns with the appraisals, and to thoughtfully consider program outcomes in wellness. There is a limitation with the self-reported testing of the health risk appraisal as it collects information that students may not self-report such as amount of alcohol consumed or riding with drunk drivers. Thus, it has the potential to misrepresent the true health risk, if a student does not self-disclose accurate information.

Gender and Wellness

On the issue of gender, Wells (2001) suggested that males and females responded differently on many health variables. Males tend to have a higher health risk for blood pressure problems. Females were at a greater risk for higher body composition and cholesterol levels. Wells (2001) suggested that health risk and gender created unique programming needs. Creative programs need to be developed to address unique gender
issues. Educational campaigns must focus on gender to help educate students on health risks such as high blood pressure and male health. It is imperative for wellness professionals to address gender issues on a college campus.

College campuses have experienced growth in recreation and wellness programs. Numerous campus recreation programs have been built on college campuses and include both programs and facilities for fitness, wellness, leisure, and holistic development (Todaro, 1993). But, there is real concern that without a theoretical assessment model, programs will only be evaluated by participation numbers. Campus recreation programs are defined as informal or formal, cooperative or competitive sports, which may include a variety of physical activities offered to students in a higher education setting for the sake of participation, leisure, fitness, social interaction, and learning (Eitzen & Sage, 1989). Campus recreation is an important part of the wellness environment, but intentional outcomes including gender outcomes should be established to impact students’ wellness through education, information, and assessment.

Researchers have found that campus recreation programs may contribute significantly to recruitment, retention, student satisfaction, and quality of life (Ellis, Compton, Tyson, & Boling, 2002). Yet, quality of life is an elusive concept. Jamner (2000) described quality of life “as a complex web of interrelated influences that operate dynamically to determine health and wellness” (p. 1). Campus recreation assessment must examine the broader scope of college students’ health risk, participation patterns, and leisure environment. A comprehensive assessment model like Astin’s I-E-O model will help clarify wellness outcomes and directly impact at-risk groups and address generational change through a broader model of wellness.
Astin’s I-E-O Model

Astin’s (1993) I-E-O model allows for a focus on student inputs that should also be explored for growing recreational and wellness programs. Due to risks such as obesity and physical inactivity, the proximity of recreation services need to be addressed. The emergence of centralized recreation facilities on campus should be questioned as students often suggest time is one of the barriers to exercise (Bryant, Banta, & Bradley, 1995). A decentralized approach may be preferred and allow greater access to facilities that accommodate students’ busy schedules. With the growing number of overweight and obese students, the decentralized approach may provide a less intimidating environment. This group of students must be considered for new programs and services such as personal training, weight loss groups, or support groups.

Collaborations with student health services, counseling centers, and dining services may create new programs and services to impact students’ health. The broader connection of a wellness environment must extend beyond the recreation center or the mindset of only “working out” and enter into behavior change programs (Barcelona & Ross, 2002). Stress management programs may directly impact alcohol consumption and help students understand the connection to their health. A shift in the wellness paradigm may help students understand health risks and learn new strategies to improve their health.

Higher education must support the benefits of an active leisure lifestyle through a comprehensive approach (Bryant et al., 1995). Designing a new paradigm for student wellness will be challenging, yet the increasing health risk of the obesity epidemic and the reliance on technology cannot be ignored. As technology continues to impact society, a new way of thinking about wellness must occur.
Hill, Wyatt, and Reed (2003) suggested obesity and the environment must be explored to further elucidate the connection. Campus activities must focus on movement based programs and encourage active lifestyles. A fundamental reorientation for campus leisure should emphasize physical activity. Wellness education can address the passive, isolated activities through encouraging programs that focus on participation. Street, Gold, and Manning (1997) envisioned that the future will continue to be dominated by technology, but in order for college students to lead a healthy life, wellness must be addressed from a broader approach.

Public health, the parent discipline to wellness promotion, permeates through the social, environmental, and many other activities of the population (Hill et al., 2003). Likewise, although the promotion of human wellness is often identified with orchestrating a change in lifestyle, such individual modifications usually require some combination of educational, organizational, economic, and environmental change (Buchanan, 2000; Callahan, 2000; Lewis et al., 2001). Appropriate targets for change in the pursuit of enhanced health and wellness for a population include elements within the individual, the social milieu, the physical environment, the medical care system, the economy, and the political arena (Kanters, 2000). The point is drawn to clarify the complexity of health behaviors and to apply a lens to the topical area of student wellness. The economy may benefit from a comprehensive approach to student wellness with the result of lower health care utilization and a healthier society (Fries et al., 1993).

New Strategies for Wellness

Erwin (1991) suggested that the student assessment movement provides an opportunity for student affairs professionals to demonstrate their contribution to students’
success. Unfortunately, how and to what extent the recreational sports program may impact students at Bowling Green State University has been limited to basic survey methods of participation rates, and individual program satisfaction studies. Bryant, Banta, and Bradley (1995) reported that during the 1990s, the recreational sports programs nationally experienced significant growth and expansion of services and programs.

New programs in campus recreation across the nation during the last decade included an outdoor adventure program with a climbing wall, adventure trips such as downhill skiing, canoeing, and programs to explore the various national parks. Fitness programs grew to include nationally certified personal trainers, nationally certified group exercise instruction on Pilates and Yoga, and advanced strength and cardiovascular classes. Additional programs such as the first aid and safety training classes, included Red Cross programs on blood borne pathogens, automatic external defibrillator (AED), advanced first aid, cardiopulmonary resuscitation (CPR). Other programs focused on aquatics: boating safety, deep water exercise, therapeutic senior exercise, and a master’s swim team were added to student development but not given an intentional outcome.

Kanters (2000) suggested that recreational sport participation is a good moderator of college stress. However, with the decline in physical activity and the increase in obesity, programs must be created for obese students. Watson and Platt (2000) suggested more specific intended outcomes should be established within campus recreation programs to address the changing needs of college students.

If programs are added without specific outcomes attached, how will administrators produce more than just numbers of participants? Desired outcomes must be attached to new programs to gain insight into how these new initiatives may help students improve quality of
life. Wellness measures should include assessment to examine health traits, health behaviors, or health knowledge.

Lewis, Barcelona, and Jones (2001) connected a student’s leisure satisfaction to quality of life and placed importance on quality of life assessment for the justification of campus recreation. Watson and Platt (2000) suggested that the missing piece is connecting a generational approach to wellness with future health of our people and wealth of our economy. The connection of all three variables of the I-E-O model; inputs, environment, and outcomes, have the potential to contribute to excellence in higher education and must become an intentional part of wellness outcomes (Astin, 1993).

Summary

Wellness outcomes with generational information on students’ health will help answer the questions that legislators, governors, parents, and taxpayers have about the quality of higher education and the impact of wellness programs on student development (Astin, 1993). The field of wellness must move beyond participation patterns and examine quality of student efforts (Barcelona & Ross, 2002). The wellness question can be elucidated through a specific educational outcome to provide a clear indicator of how a program may impact a student’s health.

Astin (1993) also suggested assessment may serve additional purposes including political, economic, and educational. Political forces perceive weakness in higher education and continue to question whether the expenditures are justified. The benefits of wellness are complex, and campus recreation professionals must continue to document the benefits of their programs and services and clarify elusive concepts including “student wellness” (Bryant et al., 1995).
The short-term and long-term health of the students gained from wellness programs will help regional, state, and local economies. The National Governors’ Association prompted the assessment movement because of its shared vision that assessment can serve as a catalyst for improving quality (Astin, 1993). The wellness outcomes from a healthier, more knowledgeable citizen will result in students using these talents in economically productive work and lowered health care costs. Erwin (1989) pointed out that state planners must view education as an economic investment. Higher education professionals in the field of student wellness must intentionally assess programs (Upcraft & Schuh, 1996). The budgetary concerns, state pressure, and auxiliary nature of student wellness present a challenge to think more broadly about the goals of education and call for the broader assessment of wellness.
CHAPTER THREE
Methodology

The purpose of this study is to explore changes in college student health risks over time, based on participation in the Fitwell Wellness Program at Bowling Green State University over a 16-year period. The Fitwell is a fitness and wellness program designed to impact students’ health and wellness through fitness screening, education, and resources. This study investigated existing Fitwell data from 1989-2005 on student birth age, gender, total cholesterol, systolic blood pressure, diastolic blood pressure, body composition, aerobic capacity, and health risk age. The Centers for Disease Control and the American College of Sports Medicine (2004) indicated these traits are key measures of health, and they have been routinely assessed at the Fitwell.

These leading health risk traits are routinely tested in the Fitwell Center to help educate and inform students on the importance of health promotion and disease prevention and to encourage wide participation in improving health throughout the lifespan. Total cholesterol is evaluated because an increased level of cholesterol is a key risk factor for heart disease. Hypertension or high blood pressure is tested due to the increased risk of heart disease or other cardiovascular events. Body composition testing is done to measure levels of obesity and is an independent risk factor for coronary artery disease. Obesity is also associated with hypertension, glucose intolerance, and unfavorable lipid profiles. Aerobic capacity is the volume of oxygen consumed during exercise and represents fitness level. Health risk age is measured to assess the relationship factors to quality of life. Wells (2001)
suggested the benefit from this type of assessment is for higher education professionals in the field of wellness to gain an understanding of student health risk on six key variables.

A two-level risk stratification was set a priori for each of the dependent measures; people with cholesterol (Chol) at > 200 were considered at risk, people with blood pressure systolic (BPS) > 130 were considered at risk, people with blood pressure diastolic (BPD) > 85 were considered at risk, people with body composition (Body Comp) > 20 for males and > 30 for females were considered at risk, people with aerobic capacity (MAX) > 40 were considered at risk, and people with health risk age (HRA) > 22 were considered at risk (Center for Disease Control, 2004).

A major problem for the Fitwell staff was the lack of quantitative information on what central aspects of student wellness have changed as reported through a comparative health profile of this data set. This study determined whether student health traits within gender, age, and generation groups have changed over time and what implications exist for campus administrators wishing to foster student wellness.

Data Source

The data were retrieved from the Fitwell Center, which electronically archived the student database since 1989. The Fitwell Center is a fitness testing center within the Student Recreation Center at Bowling Green State University. It was established in 1986 as a joint venture between the Student Recreation Center and the Health Physical Education and Recreation Department (HPER). Over the past 19 years, information has been collected and recorded for students.

The tests were administered by the Fitwell Staff which included an American College of Sports Medicine Director supervising the program and student interns. The students were
trained to measure blood pressure using a standard mercury column and blood pressure cuff, cholesterol with a LDX whole blood analyzer, body composition assessment with a three-site skinfold, the University of Michigan Health Risk Appraisal, and the Balke I and Balke II treadmill protocol for aerobic capacity. The American College of Sports Medicine (ACSM) has established guidelines for the above tests, and the Fitwell has followed appropriate training and administration of all tests using the recommendations from ACSM. The mission of the University of Michigan Health Management Research Center (HMRC) and the use of the Health Risk Appraisal is to study lifestyle behaviors and how they influence one’s health, quality of life, and health care utilization throughout a lifetime.

In order to participate in the Fitwell Center, students were informed of all procedures involved in the Fitwell test. Then they completed an informed consent (see Appendix A), and the Health Risk Appraisal (see Appendix B).

Data Collection

The information was coded and entered into SAS by the researcher. Data were then sorted by year from 1989 to 2005. Each year was checked for incomplete data and those participants were removed from the data set. Additional data collected on non-students and students who were not within the age range were also taken out of data set. Demographic data regarding the student sample included (a) age group, (b) gender, (c) generational group and (d) year the test was completed so that comparisons could be made.

Ethnicity was not recorded by the Fitwell Center, but attempts were made through the Office of Institutional Research to retrieve the data. The results produced ethnicity on less than ten percent of the sample. Therefore, ethnicity was not examined as a variable. Each student’s health information included (a) total cholesterol level, (b) systolic blood pressure,
Data Analysis

Descriptive statistics were used to describe the sample and summarize the responses of the total sample by each year the data were collected. An ANOVA was run on each year to explore mean differences between years on the variables (a) systolic blood pressure, (b) diastolic blood pressure, (c) total cholesterol level, (d) percent of body fat, (e) aerobic activity, and (f) health risk age. The level of significance for the ANOVA was selected a priori at $p < .05$.

Generational Analysis

Students were then collapsed into two peer groups based on generational group with Thirteeners represented by students born in 1981 and before and Millennials represented by those born in 1982 and after. ANOVAs were run on each year to explore mean differences between generational groups on the variables (a) systolic blood pressure, (b) diastolic blood pressure, (c) total cholesterol level, (d) percent of body fat, (e) aerobic activity, and (f) health risk age. The level of significance for the ANOVA was selected a priori at $p < .05$.

Prediction of Risk Equations

Logistic regressions were also run to determine if gender or age group could predict risk levels of the variables (a) systolic blood pressure, (b) diastolic blood pressure, (c) total cholesterol level, (d) percent of body fat, (e) aerobic activity, and (f) health risk age. The level of significance for the regressions was selected a priori at $p < .05$. 
Null Hypothesis

The null hypothesis stated there is no difference among students at Bowling Green State University who completed the Fitwell Assessment over a sixteen year period on student health risk traits.

Three Primary Research Questions

1. What are the changes in health risk traits expressed by college students overall and based on demographic characteristics including age and gender over the 16-year period for which data have been collected?

2. Are there significant differences among groups (gender, age group, or generation group) and certain self-reported health risk traits data are collapsed into two groups based on birth age?

3. Are there significant differences among gender or age group in predicting risk level of the six health traits?

Dependent and Independent Variables

The independent variables are student characteristics including age group, gender, generational group. The dependent variables are the measured levels of student health including blood pressure, body composition, cholesterol, aerobic capacity, and health risk age. The hypothesis stated that there is no difference among students at Bowling Green State University over a sixteen year span of student health risk traits. Confounding variables may exist in that fact that other information that may impact their health was not collected such as health history, prior experience of exercise, and socioeconomic status. This group of students voluntarily chose to participate in the Fitwell program and may be more interested in their overall health and as a result bias towards a higher level of overall health.
Description of the Population

The population included undergraduate students who completed a Fitwell profile at Bowling Green State University between 1989 and 2005. Prior to conducting all analyses, three steps were taken to screen the data set and target the sample to college students. First, data from 2532 subjects were collected from the Fitwell Center and checked for missing or incomplete information and fifteen subjects were eliminated for incomplete data. Second, the data were loaded into SAS and screened for participants who did not meet the age range of 18-25 years of age and 560 participants were eliminated from the study for failing to meet the age range. Third, of the remaining 1957 participants the data were reduced from fifty cells of information per participant to eleven cells of information pertinent to this study: identification number, age, gender, cholesterol (Chol), blood pressure systolic (BPS), blood pressure diastolic (BPD), body composition (Body Comp), aerobic capacity (MAX), health risk age (HRA), and year the test was completed.

Validity and Reliability

To assure reliability, the fitness assessment instruments have been standardized from industry standards and past research in this area. To assure validity, any incomplete student records were dismissed. I also sought the opinion of an external reviewer, who was the former Fitness director at the Bowling Green State University. The expertise from the Fitwell staff was essential to review the survey instrument and provide suggestions. However, with validity and reliability, the tests were completed by different individuals during the sixteen-year timeframe which creates a level of instability in such data collection.
Limitations of Study

One of the limitations of this study was that the population characteristics included undergraduate students at Bowling Green State University who completed a health profile between 1989 and 2005. Although, this selection method did allow for student health traits to be analyzed over an extended period of time, the Fitwell student population may be more interested in health than the general population. The population of the Fitwell included 71% female which when compared to the current BGSU student population over that timeframe only included 56% female students, thus the study represented a higher female population.
CHAPTER FOUR

Results of Study

This chapter is divided into two sections. The first section includes a description of the population, a frequency table on each individual year of the data set, age groups, and year groups. The category of year group represents the two generational groups with Thirteeners represented by birth year 1981 and before and Millennials represented by birth year 1982 and above. The mean data were described on cholesterol (Chol), blood pressure systolic (BPS), blood pressure diastolic (BPD), body composition (Body Comp), aerobic capacity (MAX), and health risk age (HRA). This information answers research question number one.

The second section includes the inferential procedures used to analyze the data to answer research question number two. This section includes description of the ANOVA procedures used for the analysis. Specifically, ANOVAs were run to determine the level of significance among gender, age groups, and year groups on the six variables; cholesterol (Chol), blood pressure systolic (BPS), blood pressure diastolic (BPD), body composition (Body Comp), aerobic capacity (MAX), and health risk age (HRA). Bonferroni’s multiple comparison procedure was used to compare group means among age groups and year groups. This section also incorporates the logistic regression and risk stratification in order to answer research question number three.

Description of the Population

The final population consisted of 1957 students who completed the Fitwell program from 1989 to 2005 and fit the age group and year group requirements. They were characterized as predominately female (71%) with males representing (29%) of the sample.
The age distribution was concentrated in the middle categories with participants ranging from 18-19 years of age (20%), 20-21 years of age (41%), 22-23 years of age (32%), and 24-25 years of age (7%). The year group distribution included 77.11 % in the Thirteenth Generation and 22.89 % in the Millennial Generation. Table 1 represents the frequencies of the number of subjects of each year, age group, and year group as well as the percentages.
Table 1

Frequency Procedure by Year

<table>
<thead>
<tr>
<th>Year</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>89-90</td>
<td>173</td>
<td>8.84</td>
</tr>
<tr>
<td>91-92</td>
<td>135</td>
<td>6.90</td>
</tr>
<tr>
<td>92-93</td>
<td>87</td>
<td>4.45</td>
</tr>
<tr>
<td>93-94</td>
<td>87</td>
<td>4.45</td>
</tr>
<tr>
<td>94-95</td>
<td>145</td>
<td>7.41</td>
</tr>
<tr>
<td>95-96</td>
<td>158</td>
<td>8.07</td>
</tr>
<tr>
<td>96-97</td>
<td>177</td>
<td>9.04</td>
</tr>
<tr>
<td>97-98</td>
<td>190</td>
<td>9.71</td>
</tr>
<tr>
<td>98-99</td>
<td>129</td>
<td>6.59</td>
</tr>
<tr>
<td>99-00</td>
<td>166</td>
<td>8.48</td>
</tr>
<tr>
<td>00-01</td>
<td>36</td>
<td>1.84</td>
</tr>
<tr>
<td>02-03</td>
<td>89</td>
<td>4.55</td>
</tr>
<tr>
<td>03-04</td>
<td>154</td>
<td>7.87</td>
</tr>
<tr>
<td>04-05</td>
<td>231</td>
<td>11.80</td>
</tr>
</tbody>
</table>

Note. N =1957.

Frequency Procedure by Age Group

<table>
<thead>
<tr>
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<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-19</td>
<td>394</td>
<td>20.13</td>
</tr>
<tr>
<td>20-21</td>
<td>803</td>
<td>41.03</td>
</tr>
<tr>
<td>22-23</td>
<td>631</td>
<td>32.24</td>
</tr>
<tr>
<td>24-25</td>
<td>129</td>
<td>6.59</td>
</tr>
</tbody>
</table>

Note. N =1957.

Frequency Procedure by Year Group

<table>
<thead>
<tr>
<th>Year Group</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thirteeners</td>
<td>1509</td>
<td>77.11</td>
</tr>
<tr>
<td>Millennials</td>
<td>448</td>
<td>22.89</td>
</tr>
</tbody>
</table>

Note. N =1957.
Question 1: What are the changes in health risk traits expressed by college students overall?

The year data were described by mean scores on cholesterol (Chol), blood pressure systolic (BPS), blood pressure diastolic (BPD), body composition (Body Comp), aerobic capacity (MAX), and health risk age (HRA) in Table 2.

Table 2

<table>
<thead>
<tr>
<th>Year</th>
<th>M Bod Comp</th>
<th>M Chol</th>
<th>M BPS</th>
<th>M BPD</th>
<th>M MAX</th>
<th>M HRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>89-90</td>
<td>21.96</td>
<td>171.46</td>
<td>119.42</td>
<td>78.33</td>
<td>45.39</td>
<td>19.70</td>
</tr>
<tr>
<td>91-92</td>
<td>20.15</td>
<td>164.24</td>
<td>116.44</td>
<td>77.93</td>
<td>45.28</td>
<td>20.46</td>
</tr>
<tr>
<td>92-93</td>
<td>20.99</td>
<td>165.49</td>
<td>114.61</td>
<td>74.37</td>
<td>45.41</td>
<td>18.91</td>
</tr>
<tr>
<td>93-94</td>
<td>20.60</td>
<td>173.86</td>
<td>116.06</td>
<td>76.04</td>
<td>46.40</td>
<td>19.29</td>
</tr>
<tr>
<td>94-95</td>
<td>22.45</td>
<td>170.63</td>
<td>112.93</td>
<td>74.74</td>
<td>46.16</td>
<td>18.83</td>
</tr>
<tr>
<td>95-96</td>
<td>22.18</td>
<td>169.06</td>
<td>119.84</td>
<td>76.56</td>
<td>46.20</td>
<td>20.01</td>
</tr>
<tr>
<td>96-97</td>
<td>21.27</td>
<td>169.98</td>
<td>115.30</td>
<td>75.79</td>
<td>47.79</td>
<td>19.40</td>
</tr>
<tr>
<td>97-98</td>
<td>22.20</td>
<td>169.338</td>
<td>115.25</td>
<td>73.99</td>
<td>44.65</td>
<td>17.77</td>
</tr>
<tr>
<td>98-99</td>
<td>21.84</td>
<td>182.97</td>
<td>112.68</td>
<td>73.16</td>
<td>43.68</td>
<td>19.60</td>
</tr>
<tr>
<td>99-00</td>
<td>22.77</td>
<td>183.90</td>
<td>118.20</td>
<td>75.60</td>
<td>44.05</td>
<td>17.82</td>
</tr>
<tr>
<td>00-01</td>
<td>21.07</td>
<td>178.70</td>
<td>115.19</td>
<td>76.14</td>
<td>43.37</td>
<td>19.19</td>
</tr>
<tr>
<td>02-03</td>
<td>22.12</td>
<td>186.82</td>
<td>119.46</td>
<td>78.11</td>
<td>43.98</td>
<td>18.26</td>
</tr>
<tr>
<td>03-04</td>
<td>21.07</td>
<td>186.92</td>
<td>122.23</td>
<td>77.91</td>
<td>46.25</td>
<td>17.82</td>
</tr>
<tr>
<td>04-05</td>
<td>21.85</td>
<td>179.19</td>
<td>121.32</td>
<td>78.47</td>
<td>43.15</td>
<td>18.47</td>
</tr>
</tbody>
</table>
Interpretation of Table 2

- The mean body composition ranged from 20.15 to 22.77 which was slightly over the 20% standard for males and under the 30% standard on obesity for females.
- The mean cholesterol levels ranged from 164.24 to 186.92 which were below the 200 level and did not indicate risk.
- The mean systolic blood pressure ranged from 112.68 to 122.23 and were only above 120 for two years and mostly under the acceptable level of 120.
- The mean diastolic blood pressure ranged from 73.16 to 78.47 and did not indicate risk because mean scores were below risk value of 85.
- The mean aerobic capacity (MAX) ranged from 43.15 to 47.79 and did not indicate risk as mean scores were over value of 40 for normal.
- The mean health risk age ranged from 17.77 to 20.46 which were also below the risk age of 22.

In summary, all of the means were below risk levels indicated by either the American College of Sports Medicine or the Centers for Disease Control. However, the analysis on research questions two and three provides more detailed information on group risk.
Question 2 Are there significant differences among groups (gender, age group, or generation group) and certain self-reported health risk traits as collapsed into two groups of Thirteeners and Millennials?

The means for year groups are listed and six ANOVAs provided information on each of the variables and the analysis suggested the following results.

Table 3

Means Procedure for Year Groups

<table>
<thead>
<tr>
<th>Year</th>
<th>M Bod Comp</th>
<th>M Chol</th>
<th>M BPS</th>
<th>M BPD</th>
<th>M MAX</th>
<th>M HRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thirteeners</td>
<td>21.64</td>
<td>182.56</td>
<td>121.12</td>
<td>78.12</td>
<td>44.12</td>
<td>17.68</td>
</tr>
<tr>
<td></td>
<td>N = 1509</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Millennials</td>
<td>21.73</td>
<td>172.73</td>
<td>116.35</td>
<td>75.79</td>
<td>45.49</td>
<td>19.27</td>
</tr>
<tr>
<td></td>
<td>N = 448</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Interpretation of Question 2

In order to answer research question number two, and to determine if a generational effect existed, the collapsed data for each of the two generational groups in this study were described by mean scores on cholesterol (Chol), blood pressure systolic (BPS), blood pressure diastolic (BPD), body composition (Body Comp), aerobic capacity (MAX), and health risk age (HRA) in Table 3.

- The mean for body composition was slightly different from 21.64 for Millennials and 21.73 for Thirteeners which indicates Millennials have better mean body composition than Thirteeners.
- The mean for cholesterol for Millennials was 182.56 and 172.73 for Thirteeners which indicated a slightly higher cholesterol levels for Millennials; but none were over the 200 level.
- The mean for systolic blood pressure was 121.12 for Millennials and 116.35 for Thirteeners; but both were below the 130 level for risk.
- The mean for diastolic blood pressure was 78.12 for Millennials and 75.79 for Thirteeners: both groups were under the 85 level for risk.
- The mean for aerobic capacity (MAX) was 44.12 for Millennials and 45.49 for Thirteeners: but they were still over 40 which are acceptable.
- The mean for health risk age was 17.68 for Millennials and 19.27 for Thirteeners suggesting that Millennials had a lower health risk overall.
ANOVA analysis suggested the following results on each generation group (Millennials and Thirteeners):

Table 4  
One-Way Analysis of Variance Summary for Body Composition

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>1</td>
<td>8131.38</td>
<td>8131.38</td>
<td>6.05**</td>
</tr>
<tr>
<td>Age Group</td>
<td>3</td>
<td>5089.05</td>
<td>1696.35</td>
<td>1.26</td>
</tr>
<tr>
<td>Year Group</td>
<td>1</td>
<td>.00266</td>
<td>.00266</td>
<td>.9937</td>
</tr>
</tbody>
</table>

**p < .05

Body Composition (BODYCOMP)

Body composition testing was done to measure levels of obesity and is an independent risk factor for coronary artery disease. Obesity is also associated with hypertension, glucose intolerance, and unfavorable lipid profiles. Biologically males have less body composition than females which need more body fat to aid in the child bearing process. College aged males should range between 10-16% body fat and females should range 18-26% of body fat. Obesity levels for men are considered over 20% and for females over 30%.

Significance

- There was a significant difference in mean body composition due to gender (males and females) as adjusted for age group and year group (F=1118.88,
p<.0001). The mean body composition for males was 13.83 and for females was 25.11.

No Significance

- There was no significant difference in mean body composition due to age group as adjusted for gender and year group (F=1.49, p=.2141).
- There was no significant difference in mean body composition due to year group (F=0.00, p=.9937) as adjusted for gender and age group. This finding suggests age group and year group were not significant for body composition and gender.

Table 5

One-Way Analysis of Variance Summary for Cholesterol

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>1</td>
<td>8131.38</td>
<td>8131.38</td>
<td>6.05**</td>
</tr>
<tr>
<td>Age Group</td>
<td>3</td>
<td>5089.05</td>
<td>1696.35</td>
<td>1.26</td>
</tr>
<tr>
<td>Year Group</td>
<td>1</td>
<td>286.93</td>
<td>286.93</td>
<td>.6434</td>
</tr>
</tbody>
</table>

**p < .05

Cholesterol (CHOL)

Total cholesterol was measured because an increased level of cholesterol is a key risk factor for heart disease. Cholesterol is found naturally in the body and is used to build cell walls and produce hormones. Too much cholesterol in the bloodstream can clog arteries and lead to heart disease.
• There was a significant difference in mean cholesterol due to gender as
  adjusted for age group and year group (F=6.05, p<.0140). The mean
  cholesterol for females (177.50) is slightly higher than the mean for males
  (172.88).

No Significance

• There was no significant difference in mean cholesterol due to year group as
  adjusted for gender and age group (F=.21, p=.6434).

• There was no significant difference in mean cholesterol due to age group as
  adjusted for gender and year group (F=1.26, p<.2857).

Table 6

One-Way Analysis of Variance Summary for Blood Pressure Systolic

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>1</td>
<td>18608.52</td>
<td>18608.52</td>
<td>224.32**</td>
</tr>
<tr>
<td>Age Group</td>
<td>3</td>
<td>86.53</td>
<td>28.84</td>
<td>7908</td>
</tr>
<tr>
<td>Year Group</td>
<td>1</td>
<td>3795.10</td>
<td>3795.10</td>
<td>45.94**</td>
</tr>
</tbody>
</table>

**p < .05

Systolic Blood Pressure (BPS)

Hypertension or high blood pressure is tested due to the increased risk of heart
disease or other cardiovascular events. It is the force of blood against the artery wall.

Significance
There was a significant difference in mean blood pressure systolic (BPS) due to gender as adjusted for age group and year group (F=224.32, p<.0001). The mean blood pressure systolic was 115.96 for females and 122.96 for males.

There was a significant difference in mean blood pressure systolic (BPS) due to year group as adjusted for gender and age group (F=45.94, p<.0001).

No significance

There was no significant difference in mean blood pressure systolic (BPS) due to age group as adjusted for gender and year group (F=7908, p<.035).

Table 7
One-Way Analysis of Variance Summary for Blood Pressure Diastolic

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
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<td>Gender</td>
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<td>3455.47</td>
<td>.0001**</td>
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<td>Age Group</td>
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<td>484.83</td>
<td>161.61</td>
<td>2.28</td>
</tr>
<tr>
<td>Year Group</td>
<td>1</td>
<td>2646.54</td>
<td>2646.54</td>
<td>37.37**</td>
</tr>
</tbody>
</table>

**p < .05

Diastolic Blood Pressure (BPD)

Hypertension or high blood pressure is tested due to the increased risk of heart disease or other cardiovascular events.

Significance

There was a significant difference in mean blood pressure diastolic (DBP) due to gender as adjusted for age group and year group (F=48.79, p<.0001). The mean value of blood pressure diastolic was 76.05 for females and 79.03 for males.
• There was a significant difference between blood pressure diastolic due to year group as adjusted for gender and age group (F=37.37, p<.0001).

No Significance

• There was no significant difference in mean blood pressure diastolic (DBP) due to age group as adjusted for gender and year group (F=2.28, p=.0773).

Table 8

One-Way Analysis of Variance Summary for Aerobic Capacity (MAX)

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>1</td>
<td>9297.27</td>
<td>9297.27</td>
<td>121.23**</td>
</tr>
<tr>
<td>Age Group</td>
<td>3</td>
<td>790.26</td>
<td>263.42</td>
<td>3.43**</td>
</tr>
<tr>
<td>Year Group</td>
<td>1</td>
<td>92.46</td>
<td>92.46</td>
<td>1.20</td>
</tr>
</tbody>
</table>

**p < .05

Aerobic Capacity (MAX)

Aerobic capacity is the volume of oxygen consumed during exercise and represents fitness level. Through routine aerobic training, the body learns to process oxygen more efficiently. Over time, this training effect means more energy, less fatigue, and an increased sense of well-being.

Significance

• There was a significant difference in mean aerobic capacity (MAX) due to gender as adjusted for age group and year group (F=121.23, p<.0001). The mean value of aerobic capacity (MAX) was 43.44 for females and was 48.34 for males suggesting males have a higher aerobic capacity.
• There was a significant difference in mean aerobic capacity (MAX) due to age group as adjusted for gender and year group (F=3.43, p<.0163). The mean value for group one (18-19 years) was 45.41, (20-21 years) was 45.84, (22-23 years) was 47.00, (24-25 years) was 45.36 which suggests a mild decline between the last two age groups.

No Significance

• There was a significant difference in mean aerobic capacity (MAX) due to year group as adjusted for gender and age group (F=1.20, p=.2727).

Table 9

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>1</td>
<td>306.01</td>
<td>306.01</td>
<td>11.61**</td>
</tr>
<tr>
<td>Age Group</td>
<td>3</td>
<td>5515.77</td>
<td>1838.59</td>
<td>69.78**</td>
</tr>
<tr>
<td>Year Group</td>
<td>1</td>
<td>32.13</td>
<td>32.13</td>
<td>1.22</td>
</tr>
</tbody>
</table>

**p < .05

Health Risk Age (HRA)

Health risk age is measured to assess the relationship factors to quality of life. The health risk age is predicted based on health behavior and is estimated to positively or negatively impact current age. If an individual is predicted to be younger than the actual age, health risk is low. If an individual is predicted to be older than the actual age, health risk is increasing.

Significance
• There was a significant difference in mean health risk age (HRA) due to gender as adjusted for age group and year group (F=11.61, p<.0007). The mean value of health risk age (HRA) for females was 19.05 and for males was 19.92 suggesting males have a higher health risk age.

• There was a significant difference in health risk age (HRA) due to age group as adjusted for gender and year group (F=69.78, p<.0001). The mean value for group one (18-19 years) was 16.39, (20-21 years) was 18.65, (22-23 years) was 20.60, (24-25 years) was 22.29 which suggests a linear health risk age.

No Significance

• There was no significant difference in mean health risk age (HRA) due to year group as adjusted for gender and age group (F=1.22, p=.2693).
Question 3: Are there significant differences among gender or age group in predicting risk level of the six health traits?

Following the ANOVA analysis, Chi square analyses were conducted to determine statistical significance in predicting risk level of the six health traits between two risk levels among each dependent variable; cholesterol (Chol), blood pressure systolic (BPS), blood pressure diastolic (BPD), body composition (Body Comp), aerobic capacity (MAX), and health risk age (HRA).

A two-level risk stratification was set a priori for each of the dependent measures; cholesterol (Chol) at > 200 were considered at risk, blood pressure systolic (BPS) > 130 were considered at risk, blood pressure diastolic (BPD) > 85 were considered at risk, body composition (Body Comp) > 20 for males were considered at risk, >30 for females were considered at risk, aerobic capacity (MAX) > 30 were considered at risk, and health risk age (HRA) > 22 were considered at risk.
Table 10

Prevalence of Risk Level between Males and Females

<table>
<thead>
<tr>
<th>Health Risk</th>
<th>Males</th>
<th>Females</th>
<th>$\chi^2$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholesterol</td>
<td>21.52</td>
<td>21.79</td>
<td>.0178</td>
<td>.8940</td>
</tr>
<tr>
<td>Systolic B P</td>
<td>17.18</td>
<td>3.13</td>
<td>118.611</td>
<td>&lt;.0001**</td>
</tr>
<tr>
<td>Diastolic B P</td>
<td>20.07</td>
<td>9.05</td>
<td>45.1570</td>
<td>&lt;.0001**</td>
</tr>
<tr>
<td>Aerobic Capacity</td>
<td>1.45</td>
<td>4.13</td>
<td>8.7729</td>
<td>.0031**</td>
</tr>
<tr>
<td>Body Composition</td>
<td>16.09</td>
<td>21.37</td>
<td>6.9276</td>
<td>.0085**</td>
</tr>
<tr>
<td>Health Risk Age</td>
<td>24.95</td>
<td>12.04</td>
<td>50.0535</td>
<td>&lt;.0001**</td>
</tr>
</tbody>
</table>

**$p < .05$**

Table 11

Prevalence of Risk Level among Age Groups

<table>
<thead>
<tr>
<th>Health Risk</th>
<th>18-19</th>
<th>20-21</th>
<th>22-23</th>
<th>24-25</th>
<th>$\chi^2$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholesterol</td>
<td>21.57</td>
<td>21.92</td>
<td>20.76</td>
<td>25.58</td>
<td>1.4964</td>
<td>.6831</td>
</tr>
<tr>
<td>Systolic B P</td>
<td>5.58</td>
<td>6.35</td>
<td>8.56</td>
<td>9.30</td>
<td>5.0359</td>
<td>.1692</td>
</tr>
<tr>
<td>Diastolic B P</td>
<td>8.88</td>
<td>11.96</td>
<td>13.31</td>
<td>17.83</td>
<td>8.6574</td>
<td>.0342**</td>
</tr>
<tr>
<td>Aerobic Capacity</td>
<td>3.05</td>
<td>2.99</td>
<td>3.17</td>
<td>7.75</td>
<td>8.1640</td>
<td>.0427**</td>
</tr>
<tr>
<td>Body Comp</td>
<td>19.54</td>
<td>19.68</td>
<td>19.81</td>
<td>22.48</td>
<td>.5988</td>
<td>.8967</td>
</tr>
<tr>
<td>Health Risk Age</td>
<td>5.84</td>
<td>11.96</td>
<td>22.19</td>
<td>37.21</td>
<td>102.6883</td>
<td>&lt;.0001**</td>
</tr>
</tbody>
</table>

**$p < .05$**
Gender and Age Group as Predictors of Risk

Chi Squares were used to determine if either of the independent variables gender or age group could be used to predict whether students were at risk for each of the six dependent variables cholesterol (Chol), blood pressure systolic (BPS), blood pressure diastolic (BPD), body composition (Body Comp), aerobic capacity (MAX), and health risk age (HRA).

Table 12

**Logistic Regression Predicting Risk Level for Cholesterol**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>( B )</th>
<th>SE</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.001**</td>
<td>.0664</td>
<td>1.83</td>
</tr>
<tr>
<td>Age Group</td>
<td>.6613</td>
<td>.1159</td>
<td>1.03</td>
</tr>
</tbody>
</table>

**\( p < .05 \)**

Table 13

**Logistic Regression Predicting Risk Level for Blood Pressure Systolic**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>( B )</th>
<th>SE</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.001**</td>
<td>.0973</td>
<td>1.82</td>
</tr>
<tr>
<td>Age Group</td>
<td>.9687</td>
<td>.1969</td>
<td>1.67</td>
</tr>
</tbody>
</table>

**\( p < .05 \)**
Table 14  
**Logistic Regression Predicting Risk Level for Blood Pressure Diastolic**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>B</th>
<th>SE</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.001**</td>
<td>.0853</td>
<td>2.42</td>
</tr>
<tr>
<td>Age Group</td>
<td>.2677</td>
<td>.1548</td>
<td>1.35</td>
</tr>
</tbody>
</table>

**p < .05**

Table 15  
**Logistic Regression Predicting Risk Level for Body Composition**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>B</th>
<th>SE</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.007**</td>
<td>.0798</td>
<td>1.87</td>
</tr>
<tr>
<td>Age Group</td>
<td>.6613</td>
<td>.0677</td>
<td>1.23</td>
</tr>
</tbody>
</table>

**p < .05**

Table 16  
**Logistic Regression Predicting Risk Level for Aerobic Capacity (MAX)**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>B</th>
<th>SE</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.001**</td>
<td>.1937</td>
<td>1.57</td>
</tr>
<tr>
<td>Age Group</td>
<td>.0058**</td>
<td>.2512</td>
<td>1.13</td>
</tr>
</tbody>
</table>

**p < .05**
Table 17

Logistic Regression Predicting Risk Level for Health Risk Age

<table>
<thead>
<tr>
<th>Predictor</th>
<th>B</th>
<th>SE</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.0001**</td>
<td>.0668</td>
<td>1.06</td>
</tr>
<tr>
<td>Age Group</td>
<td>.0001**</td>
<td>.1734</td>
<td>1.27</td>
</tr>
</tbody>
</table>

**$p < .05$**

Summary

Gender, age group, and year group all play a role in understanding health risks. This type of analysis provided insight into understanding student’s health and explored generational differences. Significant changes have occurred in college student’s health over the past sixteen years. These changes are highlighted by the descriptive analysis of 1957 student who participated in the Bowling Green State University Fitwell Center program between 1989 and 2005 and measured on the following six variables; cholesterol (Chol), blood pressure systolic (BPS), blood pressure diastolic (BPD), body composition, aerobic capacity (MAX), and health risk age (HRA).

When gender, age group, and year group were analyzed with inferential techniques, gender was slightly different on all six independent variables. Year group was second with statistical significance on three independent variables (cholesterol, blood pressure systolic, blood pressure diastolic, aerobic capacity, and health risk age). Age group had the least significance with health risk appraisal (HRA) and aerobic capacity as the only two independent variables with significance.

To further study the question of risk, logistic regressions were used to predict risk for each of the six independent variables: cholesterol (Chol), blood pressure systolic (BPS),
blood pressure diastolic (BPD), body composition (Body Comp), aerobic capacity (MAX), and health risk age (HRA). Predictions that were significant included gender in predicting male health risk in blood pressure systolic (BPS), blood pressure diastolic (BPD), and health risk age (HRA). Females were significant in predicting risk in cholesterol (CHOL), aerobic capacity (MAX), and body composition (Body Comp). Age group was also a significant predictor with aerobic capacity (MAX), and health risk appraisal (HRA). Year group was also a significant predictor for risk in blood pressure systolic (BPS), and in blood pressure diastolic (BPD) but was not significant in the other variables.

Clearly, this study provided more detailed information that will help inform wellness programs’ policies and begin to study change in student’s health. Student wellness efforts can provide effective programs and services, accurate health information, and a positive environment. The ideal situation would be a positive pattern of student wellness that will directly impact the health and well-being of students at Bowling Green State University but also to impact the state’s health and economic future.

Higher education professionals in the field of wellness must recognize change in student health traits and create a wellness environment with cutting-edge programs, assessment services, accurate health information, and create a supportive environment. The ideal situation would include a campus environment that supports student wellness with specific program outcomes to directly impact the current health and well-being of students but also establish positive health and physical activity patterns to reduce society’s future health care costs.
CHAPTER FIVE

Discussion, implications, and recommendations

This chapter is divided into three sections. The first section includes a discussion of the results related to the three research questions. The second section considers the gender, age group, and generational group implications to inform campus wellness in policy and practice. In the third section, recommendations for future research and conclusions are offered from this study.

Discussion of the Results

Buchanan (2000) suggested that assessment of health risk traits has become a popular method of assessing student wellness. In fact, many institutions perform this type of assessment in wellness centers across the country. However, this form of assessment is typically performed once and not studied over time by gender, age group, or year group to provide generational information. This study explored student health traits over a sixteen-year period to note change of student health traits with regards to six key variables: cholesterol (Chol), blood pressure systolic (BPS), blood pressure diastolic (BPD), body composition (Body Comp), aerobic capacity (MAX), and health risk age (HRA) as examined by three groups; gender, age group, and year group. The age groups were formed by the following groups: 18-19 years of age, 20-21 years of age, 22-23 years of age, and 24-25 years of age. The year groups were formed to study the generational characteristics associated with Thirteenth Generation and Millennial students as data were collapsed into two groups based on birth year. This study was not able to longitudinally examine student
health but rather to suggest what is lacking in wellness assessment and to suggest future research ideas for improvement in wellness policy and practice.

This study intended to investigate three primary research questions. (1) What are the changes in health risk traits expressed by college students overall and based on demographic characteristics including age, gender, and student rank over the 16-year period for which data have been collected? (2) Are there significant differences among groups (gender, age group, or year group) and certain self-reported health risk traits? (3) Are there significant differences among gender or age group in predicting risk level?

General Implications of this Study

Wellness assessments typically include the six health traits as represented by this study, but are often one time assessments. This often creates a gap in the delivery of wellness education as follow-up and counseling are essential after an assessment is completed. A key implication of this study suggests that student health traits have declined and that it is important that wellness assessments be available each year a student is in college. Pascarella and Terenzini (2005) suggested that higher education professionals must move beyond one time assessments and begin to examine change over time. The National Governors’ Association prompted the assessment movement because of its shared vision that assessment can serve as a catalyst for improving quality of education (Astin, 1993). The wellness question should be elucidated through specific educational outcomes to address how students change over time and address current health risks. Wellness assessment allows for diagnostic information to inform students of their current health status and educate them if they are a risk for health issues with elevated levels of cholesterol, blood pressure, and body composition.
The position stands from the American College of Sports Medicine and The Center for Disease Control document research that suggests sedentary living increases the risk of many chronic health conditions. If left unchecked, public health in all age groups will continue to decline. The toll will result in rising health care costs in the areas of heart disease, non-insulin dependent diabetes mellitus, obesity, hypertension, and obesity-related disorders such as osteoarthritis and gallbladder disease. Thus, it is logical to expect the prevalence of modern chronic disorders to rise in the future unless health and wellness programs take a stronger focus on preventative measures against chronic health conditions (CDC, 2004; Kesaniemi, 2001; Pate et al., 1995).

Hence, there is a need for the study of health risk traits for higher education professionals in the field of wellness and a model of counseling about health risks. The scope of wellness programs must include a broader assessment such as Astin’s (1993) I-E-O model to examine inputs but must also include educational models to impact health risk outcomes. The expansion of assessment to explore generational change, gender differences, and age group differences allows the wellness goals to include excellence. In other words, the value of wellness is expanded to social purposes in higher education. The social purpose will allow wellness to grow and achieve higher levels of public health by research, education, and public service in the wellness sector.

Upcraft and Schuh (1996) explained the importance of assessment in student affairs. Professionals in wellness must turn to assessment as a means to demonstrate the value of their programs and services for student learning and satisfaction. If wellness professionals connect the students needs to the campus wellness environment, then wellness outcomes
such as increasing awareness of health risks, monitoring physical activity levels, or reducing rates of obesity will be achieved.

Gender and Wellness Implications

This study provided valuable information to examine gender, age group, and generational group to analyze risk level of the six variables. On the issue of gender, the statistical significance suggested that males and females respond differently across the six variables. Males tend to have a higher health risk for blood pressure problems and scored higher on the health risk age. Females were at a greater risk for higher body composition and cholesterol levels. Wells (2001) explored the gender differences and the results of this study supported her research. The difference is important and suggests a need for different programs for each gender to address unique risk level between males and females.

Creative programs need to be developed to address unique gender issues. Collaborative efforts with the student health center and residence halls might encourage gender specific programming on these health topics. Educational campaigns focused on gender would help educate students on health risks such as high blood pressure and male health. Assessment opportunities aimed at male fraternities or female sororities would also be effective such as body image sessions for females with body composition testing available. A wellness newsletter could be used as an educational tool on gender health issues. It is important for higher educational professionals to target key gender health issues on a college campus.

Age Group and Wellness

Age group was also a factor in the study of wellness. As students increased in age group, they were at a greater risk for health concerns. This is an important concept for
wellness programming to help establish positive health habits throughout the college experience. Freshman orientation would be significant in educating students about risk and helping to establish physical activity patterns. Callahan (2000) suggested the use of pedometers and walking programs may help create a physically active environment and encourage physically active lifestyles. Freshman residence halls could promote competitions on physical activity levels and be rewarded with healthy incentives such as exercise equipment. Jamner and Stokols (2000) warned of the increased sedentary behavior of technology use; therefore, students should be educated on the risk and provided with options to stay active. Technology can be used as a tool to help educate students on physical activity but students must be warned of the risks of sedentary lifestyles.

Students need constant reinforcement and innovative programming to achieve an active lifestyle. Throughout their college experience new programs must be offered. The emphasis for sophomores and juniors could be to foster physical activity programs and closely monitor health risks. A collaborative program with the career center could connect physical activity and health risk for graduating seniors such as a Fit-for-Hire certificate. Pate et al., (1996) suggested that students must be educated on public health factors and programs to address topics such as obesity, sedentary lifestyles, and chronic illness such as non-insulin dependent diabetes mellitus. Jamners and Stokols (2000) suggested the future of wellness is in a vision to create harmony through an educational program that places emphasis on the benefits of an active, playful society where opportunities exist for personal development. The challenge is the modern sedentary lifestyle and the threat of chronic illness if this threat is left unchecked.
Campus wellness programs must take an active role in enhancing and maintaining the health of college students. Bryant et al., (1995) suggested wellness programs must foster healthful behaviors and help prevent hazardous ones, especially in the areas of physical fitness, stress management, alcohol education, smoking, and proper nutrition. Standard education programs should become part of the offerings on these topics and applied through campus resources. Dalgarn (2001) suggested that a wellness program that creates a positive campus environment will support the acquisition of lifetime wellness habits that can help foster long-term health.

Responsibility also falls to other campus providers. A collaborative approach utilizing numerous campus services such as student health services, counseling services, and campus recreation can provide for interdisciplinary consulting among physicians, educators, administrators, health educators, and other professionals (Todaro, 1993). This approach can facilitate a broader dissemination of health and wellness information to create a knowledge base through their established disciplines.

Generational Group and Wellness

A key finding of the study found the current Millennial Generation students appear to be slightly less healthy than members of the Thirteenth Generation. The literature suggested that the Millennial generation readily utilizes technology but needs more physical activity. Mixing technology with activity would create a unique environment to stimulate change in college students. Jamner and Stokols (2000) challenged wellness professionals to create balance through holistic development. The concept of balance must be part of a wellness program and adapted to Millennial student’s needs. Howe and Strauss (2000) suggested there were higher expectations for the Millennials which created more stress and pressure in their
lives. Millennials have been riding a highly protective “baby on board” life and may be reluctant to explore a lifestyle change. Therefore, wellness assessment must be intentional and repeated throughout a Millennial student’s college career.

A positive wellness outcome would be to create healthier, less stressed, more active students and reduce the strain on the health care system. The future must begin now with a reverse of the health care spiral of increased utilization and failing health by creating intentional wellness programs to fight obesity, high cholesterol, high blood pressure, increased cardiovascular problems that continue to challenge our society and increase health care costs.

A campus-wide effort to create a public service message towards students should encourage students to become physically active or maintain physically active lifestyles (Palomba & Bryant, 1999). Wellness information must be made readily available and prominent in all aspects of campus life. Blackboard communities could be formed from the campus homepage to establish “myfitness” or “myhealth” accounts to track personal health information and access campus resources. Positive images of physically active students or students participating in leisure-based programs should be part of orientation, campus involvement, and student health programs. Technology use will grow as students’ access websites, blogs, chat rooms, and gain much of their campus information from the internet. The use of these electronic tools can contribute to the exchange of health information between students and professionals. Students must have access to numerous health and wellness sites to gain health information and the sites must be current.
Predictors of Risk

Watson and Platt (2000) placed importance on monitoring health risks. This study found significant change in health risks based on generational characteristics. The risk of suffering from high cholesterol of a Millennial student was almost twice as great as it was for a Thirteenth Generation student. This coincided with the literature from the CDC (2004) concerning a sedentary lifestyle and the threat of obesity. Based on this information, the first-year orientation program should include information about this finding to students and their parents as well as include potential use of the Recreation Center in the activities of the first week of school. Programs such as “Late Night at the Rec” could be used as both an educational tool to inform students of health risks but also to encourage regular use of the student recreation center to combat weight gain during college.

Another prediction that was significant included gender in predicting male health risk in blood pressure systolic (BPS), blood pressure diastolic (BPD), and health risk age (HRA). Based on this information, males should be targeted through campus efforts to learn their health risk information and be counseled on ways to lower their risk levels (Wells, 2001). Specific efforts should be targeted through intramural or fraternity programs with a high percentage of male participants.

Females were significant in predicting risk in aerobic capacity (MAX), and body composition (Body Comp). Females may be targeted through sororities, social organizations, residence halls, or educational programs. Specific efforts would include behavioral change and educational program efforts. The student health center could also provide effective gender based programs to educate and inform females on effective weight loss strategies and sound nutritional practices. Buchanan’s (2000) concern of the one-shot assessment of health
risks should not be ignored as students should be encouraged to follow up with assessments throughout the college experience.

Recommendations for Further Study

The benefits of personal wellness are complex, and higher education professionals in the field of wellness must continue to document the benefits of their programs and services but must study generational change to understand the dynamic state of student health and wellness (Palomba & Banta, 1999). The short-term and long-term health of the students gained from effective wellness programs will help regional, state, and local economies (Astin, 1993). The wellness outcomes from a healthier, more knowledgeable citizen will result in students using these talents in economically productive work. The national health care crisis will continue to challenge our economy from a financial perspective if we do not look for new ways to improve the health of our citizens (Pate et al., 1996; Booth, 2002). College students are at a stage of their life to learn positive and preventative health measures and must begin to take care of their health.

Clearly, to meet the challenge of a positive wellness environment, campus efforts must be improved. A three part strategy must be utilized to improve wellness outcomes. Assessment is the first part of the wellness equation that must be improved. Buchanan (2000) suggested current methods lacked a comprehensive approach as students are at greater risk for changing levels of cholesterol, body composition, blood pressure, aerobic capacity, and health risk age. Astin’s (1993) I-E-O Model will provide a structure for more comprehensive assessment including student inputs, environment, and wellness outcomes. The second part is to include generational study of student inputs and public health threats to the environment. It is important to capture student information on health risks and understand public health
threats to the current generation of college students. The third piece is to develop clear wellness outcomes. The outcomes should include participation levels, personal health improvements, and lifestyle change results.

Higher education professionals in the field of wellness must bring resources together to bring about change to help students live longer, healthier lives. Through new efforts, students will benefit by becoming more physically active, have access to wellness education, and be supported to make positive changes in their lives. These efforts will move students to a healthier future.

Today’s wellness administrators do not want to make the same mistakes their predecessors made with one-shot assessment. This study of health traits from 1989-2005 with collapsed data from Millennial and the Thirteenth Generation of students presented new information to address generational influence and challenge the current wellness paradigm. The benefit of a broader approach will result in greater number of students enjoying a healthier and more balanced life.

Conclusions

The future of wellness assessment must include a broader scope by using a comprehensive assessment model like Astin’s I-E-O model. This model will help clarify wellness outcomes and directly impact at-risk groups. This model will also help study and address generational change. This study demonstrated that student health traits have changed and based on the literature, the increase in sedentary living, passive use of technology, and decrease in physical education all of these factors will continue to impact the future health of college students.
Generational issues will continue to influence groups of students and if ignored the results may be increased obesity, pressure, and stress in student’s lives. Higher education professionals must address this public health problem and provide physical activity programs and expanded wellness services. Wellness outcomes must be intentional and address gender age group, and generation group needs and foster positive health patterns.

As the Millennial students continue to ride the technology wave, the heavy use of technology strongly suggests a new way of thinking about leisure and must include more physically active pursuits. A wider wellness lens will help campus administrators understand the impact of change of student wellness through a generational approach examining demographics, health risk traits, and health information and lead to more effective wellness programming. This lens will help connect the rising cost of health care and the economic impact to our country and place importance on monitoring health traits and educating students at an early stage of their health to help reduce costs. A focus on holistic wellness programs would help to address the physical concerns of health as well as the psychosocial elements of health to create a balanced wellness program.
References


Appendices

Appendix A  Fitwell Informed Consent Document

Appendix B  Fitwell Database Documents 1989 to 2005
INFORMED CONSENT
for
Exercise Test Performance
Bowling Green State University
FITWELL Program

I hereby consent to voluntarily participate in a graded exercise test to determine the physical fitness status of my heart and circulation. In addition and prior to a treadmill or bicycle test, I will have my blood pressure and percentage body fat recorded. The information obtained from all tests will serve as a basis for recommendations of various physical activities in which I choose to engage. I understand that I am taking part in a physical fitness evaluation and not a medical examination.

The exercise test that I will undergo will be performed on a motor driven treadmill or stationary cycle with the workload gradually increased. The grade on the treadmill will be raised from 2.5 to 7.5 percent every three minutes dependent upon my responses (Note: the cycle, if used, will be loaded in a similar manner). The speed of the treadmill will be constant at 3.0 MPH unless otherwise indicated by the exercise assistant. The grade will be increased until one of the following occurs:

1) My heart rate reaches the range of 70 to 80 % of my estimated maximum heart rate, or
2) I experience and report symptoms such as undue fatigue, shortness of breath, chest pain, extreme dizziness or other symptoms which indicate I should stop, or
3) The exercise administrator directs that the test should be stopped.

Prior to the exercise test, if asked by the program director (or authorized person), I will have an interview with and/or examination by my personal physician to determine if there is any condition which would contraindicate an exercise test. I understand that a written report of the physician's opinion will be submitted to the testing personnel.

RISKS:
I understand that there exists the possibility of certain changes occurring during or after the test. They include, but are not limited to, abnormal blood pressure, fainting, disorders of heart rhythm, and in very rare instances, heart attack (statistically, 3.7 per 10,000 in a susceptible population), or death. Other risks include, but are not limited to, possible stroke, or other cerebrovascular incident or occurrence of mental, physiological, motor, visual or hearing injury, deficiencies, difficulties or disturbances, partial or total paralysis, slips, falls, or other unintended loss of balance or bodily movement related to the exercise treadmill (or cycle) which may cause muscular, neurological, orthopedic, or other bodily injury as well as a variety of other possible occurrences any one of which could conceivably, however remotely, cause bodily injury, impairment, disability, or death. Any procedure of this nature carries with it some risk, however unlikely or remote. Efforts will be made to minimize such undesirable changes by use of examination and by observation during the test.

I understand that the information obtained from the tests will be treated as privileged and confidential, and will not be released to any non-medical personnel without my express written consent. The information obtained, however, may be used for a statistical or scientific purpose with my right of privacy retained.

I have been given an opportunity to ask questions as to the procedures. Generally, these requests have been noted by the staff and their responses are as follows: (Make your notations).

__________________________________________________________

IF THIS NOTATION IS COMPLETE AND CORRECT, PLEASE INITIAL HERE_____

Signed: Participant _______________________________ DATE of BIRTH _________

Witness _______________________________ TODAY'S DATE ___________________

Signature of Parent or Guardian if under 18 years of Age _________________________

11/22/91, 5/22/98
Health Risk Appraisal

Complete each question as best you can, paying particular attention to the questions in bold. Your results will be kept strictly confidential. Please mark or enter your answers in the empty boxes.

(Examples: ☑ or ☐  2 3)

1. Sex  1 ☐ Male  2 ☐ Female

2. Age (At last birthday)
   ☐ Years old

3. Height (without shoes)  Example: 5 feet, 7 1/2 inches = 5'08"
   ☐ 08"

4. Weight (without shoes)
   ☐ pounds

5. Body Frame Size (About eighty percent of the population is medium frame).
   1 ☐ Small  2 ☐ Medium  3 ☐ Large

6. What is your blood pressure now?
   Systolic (high number) ☐
   Diastolic (low number) ☐
   If you do not know the numbers, which best describes your blood pressure?
   1 ☐ High  2 ☐ Normal or low  3 ☐ I'm not sure

7. What is your total cholesterol level (based on a blood test)?
   ☐ mg/dl
   If you do not know the numbers, which best describes your cholesterol?
   1 ☐ High  2 ☐ Normal or low  3 ☐ I'm not sure

8. What is your HDL cholesterol level (based on a blood test)?
   ☐ mg/dl

Health Related Behaviors

9. Cigarette Smoking
   How would you describe your cigarette smoking habits?
   1 ☐ Still smoke ................. Go to question 10
   2 ☐ Used to smoke ................. Go to question 11
   3 ☐ Never smoked ................. Go to question 12

10. Still Smoke
    ☐ Cigarettes per day
    (go to question 12)

11. Used to Smoke
    a. How many years has it been since you smoked cigarettes on a fairly regular basis?
    ☐ Years
    b. What was the average number of cigarettes per day that you smoked in the 2 years before you quit?
    ☐ Cigarettes per day

12. How many cigars do you usually smoke per day?
    ☐ Cigars per day