An Evaluation of Health Behavior Change During a General Education Health Course

Lynn M. Merklin
Andrews University

Follow this and additional works at: https://digitalcommons.andrews.edu/dissertations

Part of the Christian Denominations and Sects Commons, and the Higher Education Commons

Recommended Citation
https://digitalcommons.andrews.edu/dissertations/574

This Dissertation is brought to you for free and open access by the Graduate Research at Digital Commons @ Andrews University. It has been accepted for inclusion in Dissertations by an authorized administrator of Digital Commons @ Andrews University. For more information, please contact repository@andrews.edu.
Thank you for your interest in the Andrews University Digital Library of Dissertations and Theses.

Please honor the copyright of this document by not duplicating or distributing additional copies in any form without the author’s express written permission. Thanks for your cooperation.
ABSTRACT

AN EVALUATION OF HEALTH BEHAVIOR CHANGE DURING A
GENERAL EDUCATION HEALTH COURSE

by

Lynn M. Merklin

Chair: Larry D. Burton
ABSTRACT OF GRADUATE STUDENT RESEARCH

Dissertation

Andrews University
School of Education

Title: AN EVALUATION OF HEALTH BEHAVIOR CHANGE DURING A GENERAL EDUCATION HEALTH COURSE

Name of researcher: Lynn M. Merklin

Name and degree of faculty chair: Larry D. Burton, Ph.D.

Date completed: February 2010

Problem

There have been no studies as to the effectiveness of the one-credit general education health course at Andrews University, Fit for Life, in promoting the adoption of healthy lifestyle behaviors. Because behavior change is a process that occurs over time, any measurement of student health behaviors must be sensitive enough to detect the early stages of behavior change as well as the behaviors themselves.

Method

The purpose of this study was to determine the degree to which students enrolled in Fit for Life adopted the health behaviors promoted in the course, evidenced by progress through the stages of change, as described by the transtheoretical model. This
was a descriptive evaluation study utilizing a mixed-methods approach with simultaneous quantitative and qualitative methodology. The Health Risk Intervention survey, modified to meet the needs of undergraduate students, was used in a pretest/posttest design to measure the stages of change for Fit for Life students and controls for nine health behaviors. Face-to-face interviews were conducted at the beginning and end of the course with five Fit for Life students to validate and corroborate the results of the survey.

Results

Participation in the Fit for Life course was significantly correlated with higher stages of change for getting optimal sleep ($R = .200$) and for fruit and vegetable consumption ($R = .145$) at posttest. Students also reported significantly higher rates of stress management than controls ($\chi^2(1) = 4.205$). Overall, Fit for Life students progressed through the stages of change for significantly more health behaviors ($t(167) = 4.420, p < .001$), and reported practicing significantly more health behaviors at the end of the course than did controls ($t(167) = 2.582, p = .011$). Besides the statistically significant changes, half of all students stated that they were exercising more and half said they were eating better as a direct result of the course.

Significant differences were seen between males and females, with females less likely to exercise regularly than males ($R = -.276$). Significant differences were also observed between ethnic groups, with Hispanic students being less likely to exercise regularly ($R = -.150$), and Asian students being less likely to be practicing depression prevention ($R = -.199$), less likely to be managing their stress ($R = -.214$), and more likely to have used or be using alcohol ($R = -.209$).
Conclusion

The Fit for Life course was effective at promoting behavior change among its students. Most students made progress through the stages of behavior change for one or more health behaviors. This progress was corroborated by student comments about changes they had made in their health behaviors, such as getting more exercise, eating better, being more aware of what they ate, getting better sleep, and practicing stress management.
Andrews University
School of Education

AN EVALUATION OF HEALTH BEHAVIOR CHANGE DURING A
GENERAL EDUCATION HEALTH COURSE

A Dissertation
Presented in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

by
Lynn M. Merklin
February 2010
AN EVALUATION OF HEALTH BEHAVIOR CHANGE DURING A GENERAL EDUCATION HEALTH COURSE

A dissertation presented in partial fulfillment of the requirements for the degree Doctor of Philosophy

by

Lynn Marie Merklin

APPROVAL BY THE COMMITTEE:

Chair: Larry D. Burton

Dean, School of Education
James Jeffery

Member: Alice Williams

Member: Tevni Grajales

External: Wayne Perry

Date approved
Dedicated to my husband, Lester,
Who patiently supported and encouraged me,
And to Shawna and Graeme,
Who believed I could do this.
TABLE OF CONTENTS

LIST OF FIGURES ........................................................................................................ vii

LIST OF TABLES .......................................................................................................... viii

LIST OF ABBREVIATIONS ........................................................................................ x i

Chapter
I. INTRODUCTION .................................................................................................... 1

  Statement of the Problem .................................................................................. 5
  Purpose of the Study ......................................................................................... 6
  Research Questions .......................................................................................... 6
  Significance of the Study .................................................................................. 7
  Philosophical Assumptions ................................................................................ 7
  Theoretical Propositions .................................................................................... 8
  Organization of the Study ................................................................................. 14

II. LITERATURE REVIEW .......................................................................................... 15

  Health Status in the United States .................................................................... 15
  Health Variations by Ethnicity and Gender ................................................... 17
  Lifestyle Behaviors and Health ....................................................................... 17
  Not Smoking ...................................................................................................... 19
  Eating a Healthy Diet ......................................................................................... 20
  Being Physically Active .................................................................................... 21
  Maintaining a Healthy Weight .......................................................................... 22
  Avoiding Alcohol ............................................................................................... 22
  Preventing Depression and Stress ................................................................... 24
  Getting Enough Sleep ........................................................................................ 25
  Caffeine ............................................................................................................... 25
  Combination of Healthy Lifestyle Behaviors .................................................. 26
  Health of College Students .............................................................................. 28
  Health and Education ........................................................................................ 30
  Education of College Students and Habit Formation ..................................... 32
  Health Education as Part of a Holistic Curriculum .......................................... 34
  Seventh-day Adventist Health Philosophy ....................................................... 37
  The University’s Focus on Health ................................................................. 39
Health Education to Change Knowledge, Attitudes, and Behavior ...... 41
Anatomy of Change and the Transtheoretical Model ......................... 44
Research on Health Education and Behavior Change ...................... 48
Use of the Transtheoretical Model in Health Education Research ........... 55
Conclusion ........................................................................ 60

III. METHOD ........................................................................ 61

Research Questions and Hypotheses ............................................. 62
Research Design ...................................................................... 63
The Sample ........................................................................... 67
Survey Instrument .................................................................... 68
The Fit for Life Course ............................................................. 70
Data Collection Procedures ....................................................... 75
Treatment of Human Subjects ...................................................... 77
Analysis of Results ................................................................... 78
Limitations and Delimitations ....................................................... 82

IV. RESULTS ......................................................................... 84

The Sample ........................................................................... 84
Primary Research Question .......................................................... 87
Getting Regular Exercise ............................................................ 87
Eating a Healthy Diet ................................................................. 89
Eating Five or More Fruits and Vegetables ....................................... 92
Not Smoking ........................................................................... 93
Avoiding Caffeine .................................................................... 95
Not Drinking Alcohol ................................................................. 97
Practicing Depression Prevention ................................................ 98
Practicing Stress Management ..................................................... 100
Getting Optimal Sleep ................................................................ 103
Total Number of Health Behaviors Practiced ................................. 108
Research Subquestions ................................................................ 112
Qualitative Analysis of Changes Attributable to the Course .............. 122
Regular Exercise ..................................................................... 124
Eating a Healthy Diet ................................................................. 126
Eating Five or More Fruits and Vegetables ....................................... 127
Avoiding Caffeine .................................................................... 128
Depression Prevention ................................................................. 128
Stress Management ................................................................... 129
Getting Enough Sleep ................................................................ 129
Changes in Knowledge, Attitude, and Motivation ............................. 130
Student Recommendations for the Course ...................................... 132
V. CONCLUSION AND DISCUSSION ................................................................. 134

Description of this Study ........................................................................... 138
Summary of Results .................................................................................... 141
  Primary Research Question ....................................................................... 141
  First Subquestion ...................................................................................... 143
  Second Subquestion .................................................................................. 143
  Instructor Effect ....................................................................................... 145
Discussion of Results .................................................................................. 146
  Exercise ................................................................................................... 147
  Eating a Healthy Diet ................................................................................ 150
  Eating Fruits and Vegetables .................................................................... 152
  Use of Alcohol, Tobacco, and Caffeine .................................................... 153
  Depression Prevention and Stress Management ...................................... 156
  Sleep ....................................................................................................... 158
  Instructor Effect ....................................................................................... 158
  Interpreting Behavior Change .................................................................. 162
  Effectiveness of the Fit for Life Course ................................................... 163
Limitations .................................................................................................. 167
Recommendations ....................................................................................... 170
  Recommendations for Future Study ....................................................... 170
  Recommendations for the University and the Fit for Life Course .......... 171

Appendix

A. HEALTH BEHAVIOR SURVEY ............................................................... 175
B. INTERVIEWS .......................................................................................... 192
C. TABLES .................................................................................................. 196
D. AMOS STRUCTURAL EQUATION MODEL OUTPUT .............................. 199

REFERENCE LIST ..................................................................................... 210

CURRICULUM VITAE .................................................................................. 226
LIST OF FIGURES

1. A Graphic Summary of the Theoretical Framework of the Study ..................12
2. The Structural Equation Model (SEM) of Potential Effects of Personal Factors and the Fit for Life Course on Health Behaviors .............................13
3. The Structural Equation Model (SEM) Used for Testing the Potential Effects of Personal Factors and the Fit for Life Course on Stages of Change for Each of the Health Behaviors .................................................................81
4. A Comparison of Optimal Versus Non-Optimal Sleep Times at Pretest and Posttest, Rounded to the Nearest Hour .................................................................105
5. A Comparison of Fit for Life and Control Group Sleep Times at Pretest and Posttest, Rounded to the Nearest Hour .................................................................107
6. The Structural Equation Model (SEM) of Significant Correlations in the Study, Using Standardized Regression Weights .........................................................115
# LIST OF TABLES

1. Course Topic Schedule by Teacher ........................................................................72
2. Summary of Quantitative Data Analysis Procedures .................................................80
3. Participation Rates by Group and Survey ..............................................................85
4. Demographics of Participants .............................................................................86
5. Status of Regular Exercise ....................................................................................88
6. Stages of Change for Regular Exercise .................................................................88
7. Changes of Stage for Regular Exercise ..................................................................89
8. Status of Eating a Healthy Diet .............................................................................90
9. Stages of Change for Eating a Healthy Diet ............................................................91
10. Changes of Stage for Eating a Healthy Diet ...........................................................91
11. Status of Eating 5 or More Fruits and Vegetables ................................................92
12. Stages of Change for Eating 5 or More Fruits and Vegetables .............................93
13. Changes of Stage for Eating 5 or More Fruits and Vegetables .............................93
14. Status of Smoking ..............................................................................................94
15. Stages of Change for Quitting Smoking ...............................................................94
16. Changes of Stage for Quitting Smoking ...............................................................94
17. Status of Caffeine Use .........................................................................................95
18. Stages of Change for Avoiding Caffeine ..............................................................96
19. Changes of Stage for Avoiding Caffeine ..............................................................96
20. Status of Alcohol Use ...........................................................................................................97
21. Stages of Change for Quitting Alcohol...........................................................................97
22. Changes of Stage for Quitting Alcohol............................................................................98
23. Little Interest in Doing Things in 2 Weeks Prior to Survey .........................................99
25. Status of Practicing Depression Prevention or Never Being Depressed.....................100
26. Stages of Change for Practicing Depression Prevention ..........................................100
27. Changes of Stage for Practicing Depression Prevention ..........................................101
28. Status of Practicing Stress Management or Having No Stress .................................101
29. Stages of Change for Practicing Stress Management .............................................102
30. Changes of Stage for Practicing Stress Management .............................................103
31. Status of Getting Optimal Sleep .............................................................................104
32. Average Nightly Hours of Sleep ..............................................................................106
33. Stages of Change for Getting Optimal Sleep .........................................................108
34. Changes of Stage for Getting Optimal Sleep .........................................................109
35. Number of Healthy Behaviors at Pretest and Posttest .........................................110
36. Number of Behaviors for Which Students Progressed Through the Stages .......111
37. Number of Behaviors for Which Students Regressed Through the Stages .......112
38. Regression Weights, Standardized and Unstandardized .......................................116
39. Stages of Change for Exercise at Pretest, by Gender........................................117
40. Stages of Change for Exercise at Pretest, by Ethnicity........................................118
41. Stages of Change for No Alcohol at Pretest, by Ethnicity..................................119
42. Stages of Change for Depression Prevention at Pretest, by Ethnicity ..........119
43. Stages of Change for Stress Management at Pretest, by Ethnicity .................120
44. Reported Behavior Changes as Result of Course ........................................121
45. Other Factors Affecting Health Behavior .....................................................122
46. Students’ Stages of Change for Each Health Behavior .................................123
47. Positive Changes in Health Behaviors or Stages of Change Among FFL Students ..........................................................145
LIST OF ABBREVIATIONS

ACHA    American College Health Association
AHA     American Heart Association
AICR    American Institute for Cancer Research
CDC     Centers for Disease Control and Prevention
DHHS    Department of Health and Human Services
FFL     Fit for Life
NCHA    National College Health Assessment
NCHS    National Center for Health Statistics
NHLBI   National Heart Lung & Blood Institute
QDA     Qualitative Data Analysis
SEM     Structural Equation Model
WCRF    World Cancer Research Fund
WHO     World Health Organization
CHAPTER I

INTRODUCTION

The health of a nation’s citizens is of great importance. A healthy population is better equipped to participate in the workforce, and can remain productive longer. A healthy citizenry also places fewer demands on a country’s economic resources. In 2005, 16% of the Gross Domestic Product was spent on health care in the United States, more than was spent by other developed countries (National Center for Health Statistics [NCHS], 2007).

Many of the leading causes of death in the United States are directly related to lifestyle behaviors. Almost half of all deaths in 2005 were from heart disease and cancer (Kung, Hoyert, Xu, & Murphy, 2008), both of which are related to lifestyle. Behaviors such as smoking, using alcohol or drugs, engaging in unhealthy sexual practices, eating a nutritionally poor diet, and being physically inactive, as well as being exposed to infectious organisms and toxins are considered to be the leading underlying causes of death in the United States (Mokdad, Marks, Stroup, & Gerberding, 2004). Risky behaviors also contribute to accidents and assault, the two leading causes of death among young people aged 15 to 24 (Kung et al., 2008). Conversely, lifestyle behaviors of not smoking, limiting alcohol, eating a plant-based diet, with whole grains and five or more fruits and vegetables per day, getting 30 minutes or more of moderate aerobic exercise on most days of the week, managing stress, and practicing good hygiene have been shown to

In the college-age group, a number of health risk behaviors have been identified. Alcohol consumption and the combination of drinking and driving put them at greater risk of accidents. Smoking and marijuana use are not uncommon. College young people are frequently deprived of sleep. Their diets are less than desirable, often high in calories and fat. Fast food is common fare, and few eat the recommended five servings of fruit and vegetables. In addition, many are getting very little exercise. The results of this combination of poor diet and little exercise are evident, as about a third of college students are overweight or obese. It is clear that the college-age population has already begun the harmful lifestyle behaviors that can reduce quality of life and lead to premature death (American College Health Association [ACHA], 2009; Centers for Disease Control and Prevention [CDC], 1997).

The major focus for those in the fields of health education and health promotion is to promote the health behaviors that improve quality of life and reduce the incidence of chronic and infectious disease (Gochman, 1997; U.S. Department of Health and Human Services [DHHS], 1998). This focus fits within the philosophy of the Seventh-day Adventist Church, which promotes a lifestyle of holistic health, encompassing the “physical, mental, spiritual, social, and emotional” aspects of life (General Conference of Seventh-day Adventists, 2007, p. 287). The U.S. DHHS (2000) encourages colleges and universities to include health education emphasizing good nutrition, physical activity,
mental health, avoidance of harmful substances, sanitation, and a healthy environment. Andrews University, as a Seventh-day Adventist institution, challenges its students to “embrace a wholesome way of life” (Andrews University, 2009, p. 10), and to apply healthy lifestyle principles in their personal lives.

Classroom education is an effective means of increasing students’ awareness, knowledge, and skills, and contributing to attitude formation in the area of health (McKenzie & Smeltzer, 2001). As students gain health knowledge and learn how to assess their personal health practices and status, they become more aware of their own health risks. They learn which practices can improve their quality of life now and in the future, and can reflect on which behaviors may be useful for them to adopt. All of this prepares them for behavior change, in which students reduce the number and frequency of unhealthy behaviors and adopt healthy ones (Prochaska, Norcross, & DiClemente, 1994). A one-credit health and wellness course, Fit for Life, is part of the general education requirements at Andrews University.

The Healthy People 2010 goal for educational programs is to “increase the quality, availability, and effectiveness of educational . . . programs designed to prevent disease and improve health and quality of life” (U.S. DHHS, 2000, p. 7-3). In formal health education, as is conducted in a college or university, routine classroom assessment practices determine students’ knowledge and understanding of health principles (Anderson & Krathwohl, 2001). However, what is often not known is to what degree students actually change their behavior and adopt healthy lifestyle practices as a result of this learning. Yet this information is crucial to the faculty and administration for determining the quality and effectiveness of the health education. Further research and
evaluation are needed to determine the impact of educational interventions on students’ lifestyle behaviors (McKenzie & Smeltzer, 2001).

Of the recent studies done on the impact of health education courses on college student behaviors, results have been mixed. Welle and Kittleson (1994) compared the effect of lecture-based general health education courses with physical education courses on personal wellness and found significant increases in overall wellness scores in students who had attended the lecture-based courses, but not in students who had attended the activity courses. Marion Askegaard (2000) studied the effect of instruction in nutrition, physical activity, and stress management. She found significant improvements in students’ behavior in both nutrition and physical activity, but not in stress management. Grimm (1996) examined two different methods of teaching wellness, one traditional lecture-based and one that added behavior contracts. She found significant differences at posttest in behaviors related to diet, exercise, and weight control for both treatment groups compared with the control group, but no differences in stress management, addictive and abusive behaviors, or in behaviors related to unintentional injuries. When comparing the two methods of instruction, the group that did behavior contracts in the areas of diet, exercise, and weight control did score significantly better in overall scores at posttest than the traditionally taught group. Thomas (2006) studied behaviors related to calcium consumption following a women’s wellness course, and found no increase in milk consumption after instruction. Gines (2006) studied health behaviors such as consumption of breakfast, fruit and vegetables, and fast foods; aerobic activity and strength training; and use of alcohol and drugs among college students in a required health education course. He found that there were no statistically significant
differences between pretest and posttest for any of the behaviors following the health education course.

Changing one’s behavior is a process that occurs over time, and generally does not come easily (Hall & Hord, 2006; Rogers, 1995). Hall and Hord (2006) note that as individuals move through the change process, there is a gradual growth in their understanding and skills. Gines (2006), in the discussion of his results, noted that change may indeed be occurring despite a lack of statistically significant outcomes. Prochaska et al. (1994), in their transtheoretical model, identify six stages of behavior change. These stages are precontemplation, when a person sees no need for behavior change, followed by contemplation, preparation, action, maintenance, and, finally, termination, when the person has successfully changed his/her behavior and is no longer tempted to return to old ways. A person may cycle through the stages several times before reaching maintenance, and may never reach termination. Individual students enrolled in a health education course would be expected to be at varying stages for each particular health behavior. Over a semester-long college course, they may not have sufficient time to fully adopt a new behavior, but they may begin the process of doing so, moving from one stage to the next. According to Prochaska et al., “any movement from one stage . . . to the next represents considerable progress” (1994, p. 45).

**Statement of the Problem**

All of the aforementioned studies on behavior change occurring during college health and wellness courses were specific to particular colleges and universities. They varied in methodology, attributes studied, and results. They indicate that some behaviors may be changed through general health education. All of them, however, focused on
overt behavior change. This methodology did not consider the change process, nor take into account those students who were in the earlier stages of change. Yet this information is important to truly assess the effectiveness of a health education course. To fully understand the effectiveness of Andrews University’s health course in promoting healthy behaviors among students, a study of Andrews’ students should be conducted. This study must be sensitive enough to detect movement through the stages of change, not just identify those who are ready for action.

**Purpose of the Study**

The purpose of this study was to determine the degree to which students enrolled in HLED120 Fit for Life adopted the health behaviors promoted in the course. The health behaviors promoted in the course are eating a healthy diet, eating fruit and vegetables, getting regular exercise, preventing depression, managing stress, not smoking, not drinking alcohol, avoiding caffeine, and getting enough sleep. The degree to which students adopt these health behaviors can be measured by their movement through the stages of change, as described by the transtheoretical model of behavior change (Prochaska, Johnson, & Lee, 1998; Prochaska et al., 1994). The five stages of change that were identified in this study are precontemplation, contemplation, preparation, action, and maintenance.

**Research Questions**

There were three questions to be answered by this study. The key question was, “To what extent have students moved through the stages of change by the end of the course, for each of the health behaviors promoted?” The subquestions were as follows:
a. What influence, if any, do gender, ethnic background, class standing, or previous exposure to health education have on students’ stages of change?

b. What changes in health behavior are attributable to the course?

**Significance of the Study**

This study has practical importance for three different groups. The University needs information regarding the effectiveness of courses within its program to determine whether University goals are being met. This information is crucial for planning and budgetary decisions. The Department of Nutrition and Wellness is interested in the course’s performance since it is directly responsible for facilitating the course, and makes decisions regarding content, format, class size, etc. Instructors want to know whether they are making a difference in students’ lives and health practices. Having taught this course for 3 years, I have a personal interest in the results of this study. Though this study is not generalizable to settings outside of Andrews University, this research may still be useful to other college health educators. By examining related studies, educators may be better informed as to what outcomes can be expected from general health and wellness courses.

In addition, because this study focuses on stages of behavior change, it should be more sensitive to changes that are not identified by standard behavioral surveys. This study will contribute to the overall body of knowledge available regarding the effectiveness of health education on changing behavior among college students.

**Philosophical Assumptions**

There are several philosophical assumptions upon which this research is based. First is the assumption that a college education should provide a broad knowledge base.
Second is that an understanding of health and wellness is an important part of that knowledge (Andrews University, 2009). The third assumption is that knowledge can be gained, attitudes shaped, and behaviors changed through education. Fourth is the assumption that the adoption of healthy lifestyle behaviors will result in better health throughout life. Fifth, as a person moves towards the adoption of a new behavior, he/she will go through specific stages. These stages are identified in the transtheoretical model of behavior change. Lastly, one can assess a person’s stage of change through self-reported responses on a questionnaire.

**Theoretical Propositions**

This section describes the theory and rationale of this study. This includes the purpose of health education in college, the effect of individuals’ personal characteristics on health, the benefits that health education can bring to students, especially as they adopt healthy behaviors, and the way that the impact of health education can be measured.

Many of the leading causes of death and disability in the United States are the result of modifiable lifestyle factors (Mokdad et al., 2004), which may begin early in life. College students are already known to engage in risky behaviors that can affect their health now and in the future (CDC, 1997). Making changes in lifestyle to adopt healthier behaviors can reduce the risk of chronic disease and increase longevity (Fraser, 2003; Mokdad et al., 2004; Rippe, Angelopoulous, & Zukley, 2007). Therefore, it is important that the population, particularly young people, are informed about the behaviors that can lead to improved health.

As young people mature, and learn more about the link between behaviors and health, they are better equipped to choose those behaviors that will help them to lead
healthy and productive lives (Cockerham, 1997, Ewles & Simnett, 1985). Since college students are still shaping attitudes and developing habits for adulthood, and over half of all adults in the U.S., aged 25 years and older, have attended some college (U.S. Census Bureau, 2008), college is a good place to provide young people with health education. Health education can be an effective means of improving awareness and knowledge, and developing attitudes that support behavior change (McKenzie & Smeltzer, 2001).

Various aspects of people’s background may affect their health practice and long-term health. Health and longevity vary among different ethnic groups, and between males and females (NCHS, 2007; U.S. DHHS, 2000). Higher levels of education are also associated with better health (NCHS, 2007; Wirt et al., 2004). In any health education program, then, it is important to understand the students’ background characteristics and how those characteristics might affect their health behaviors, so as to better meet their needs through education.

Lifestyle practices espoused by Seventh-day Adventists, and promoted by Andrews University, have been shown to improve the quality of life, reduce the incidence of diabetes, heart disease, and most cancers, and increase longevity (Buettner, 2005; Fraser, 2003). The church discourages the eating of flesh foods, promoting, instead, a balanced vegetarian diet. Alcohol, tobacco, and other harmful substances are not to be used. The use of caffeine, found in coffee, tea, and other beverages, is also discouraged. Recognizing the interdependence of physical and mental health, the church encourages members to seek optimal health in mind, body, and spirit (General Conference of Seventh-day Adventists, 2007).
The philosophy of general education, promoted at liberal arts colleges such as Andrews University, is that an educated person is one who has gained a well-rounded understanding of the world around them, one who can think and converse intelligently about a number of subject areas, including health and wellness (Andrews University, 2009). True education is education for the mind, body, and soul (White, 1903). A healthy body can improve the functioning of the mind and vice versa (American Psychological Association, 2004; White, 1905). One of the general education goals of Andrews is that “students will study and apply the principles of health and fitness to their own lives” (Andrews University, 2009, p. 38). Therefore, most bachelors and associate degree students at Andrews University are required to take the health course, HLED 120 Fit for Life (Andrews University, 2009).

According to the Andrews University bulletin, the general education health and wellness course, Fit for Life, is designed to inform students about critical areas of health and wellness, and to assist them to “adopt healthier lifestyles” (Andrews University, 2009, p. 190). In 2003, however, a major change occurred which may have affected its ability to do this, as the course was reduced from two semester credits (and formerly three quarter credits) to one (Andrews University, 2003). This abbreviated format allows only cursory coverage of the many aspects of health and wellness, and limited student contact. A wellness survey was given to Andrews University graduating seniors in the year 1999-2000 to assess students’ attitudes and behaviors related to health, and to identify differences between students taking different versions of the health course requirements at that time (A. Williams, personal communication, September 5, 2007). No study of student health behaviors has been done since the course became one credit,
however. While classroom tests have assessed students’ knowledge and understanding of health principles, we do not know what impact, in terms of adoption of healthy lifestyle behaviors, this course has on Andrews’ students. Therefore, research on health behaviors is needed in order for the course’s instructors, the Department of Nutrition and Wellness, and the University to determine the effectiveness of the current course.

With the understanding that behavior change is a process, it is important to be sensitive to students’ movement through that process. One cannot expect that every student will be ready to adopt a new behavior and succeed in doing so during one semester. Norcross and Prochaska (2002) say that the percentage of a population that is actually ready to take action is less than 20% at any one time, while approximately 40% are not aware of their need to change, and 40% are aware but are not yet ready to do anything about it. The transtheoretical model has been used extensively in the public health arena to evaluate behavior change for a wide variety of behaviors (Prochaska et al., 1998; Prochaska et al., 1994), including diet (Chung, Hoerr, Levine, & Coleman, 2006) and exercise (Bulley, Donaghy, Payne, & Mutrie, 2007). Identification of a person’s stage of change is accomplished by asking questions on a survey instrument regarding that person’s intention and practice related to the specific behavior. Each stage is defined by specific characteristics and time periods (Norcross & Prochaska, 2002).

This study used the transtheoretical model to look for students’ movement through the stages of change for each of nine behaviors promoted in the Fit for Life course. Figure 1 summarizes the theoretical framework that supports this study. Figure 2 uses a structural equation model (SEM) to illustrate the potential effects of gender, ethnicity, class standing, and previous health instruction on students’ stages of change for
Figure 1. A graphic summary of the theoretical framework of the study.
Figure 2. The structural equation model (SEM) of potential effects of personal factors and the Fit for Life course on health behaviors.
each health behavior, and of instruction on students’ stages of change at the end of the course.

**Organization of the Study**

The following chapter is a review of the literature to support this study. The literature review includes discussions on the relationship of behavior to health, the role of health education in promoting healthy behaviors among college students, and the behavior change process. Chapter 3 presents the methodology used for this study, the rationale for the mixed-methods approach, and specific information on the Fit for Life course, as taught in spring of 2009. Chapter 4 details the results of the analyses, and chapter 5 presents the discussion and conclusion of the study.
CHAPTER II

LITERATURE REVIEW

What is health and why is it important? Health does not just refer to a person’s physical state, but to his or her whole being. It includes the mental, emotional, social, and spiritual condition of a person (Ewles & Simnett, 1985; World Health Organization [WHO], 1948). On the individual level, a person who is healthy in all aspects of their life is in a better position to seek personal growth and fulfillment (Jenkins, 2003), or, as Abraham Maslow puts it, to achieve “self actualization” (Alters & Schiff, 2003). From the societal perspective, good health provides the foundation from which people can reach out to help others, and participate constructively and productively as a citizen (Jenkins, 2003). As Jenkins says, health is a “nation’s fundamental natural resource” and the “most important form of wealth” (p. 3).

**Health Status in the United States**

In our country, health care and its related costs have become a major issue. More money is spent on health per capita than in any other country (NCHS, 2007). According to the National Center for Health Statistics (2007), health care expenditures have increased at a faster rate than the gross domestic product since 2003. In 2005, 16% of the Gross Domestic Product was spent on health care; and federal, state, and local government paid for 45% of personal health care expenditures (p. 11).
Six of the top seven causes of death in the United States are chronic diseases, related to lifestyle. They begin to develop earlier in life, causing chronically poor health and the need for long-term medical intervention. These major killer diseases are heart disease, cancer, cerebrovascular disease (stroke), chronic respiratory diseases, diabetes, and Alzheimer’s (NCHS, 2007; National Heart Lung & Blood Institute [NHLBI], 2007). While it is true that the highest death rates are among the aged, many people are dying prematurely. Almost 17% of deaths from heart disease in 2001 (CDC, 2004) and almost 12% of deaths from stroke in 2002 (CDC, 2005) occurred in people less than 65 years of age.

Chronic disease, along with degenerative diseases and mental health issues, takes its toll on people’s quality of life. In a national survey in 2006 (CDC, 2008b), depending on the state, up to 32.9% of adults aged 18 and older reported fair or poor health. Up to 27.7% reported limited activities because of physical, mental, or emotional problems. Survey respondents reported suffering from chronic health conditions such as overweight and obesity, diabetes, asthma, and cardiovascular diseases (CDC, 2008b). Recent figures from the NCHS list arthritis and other musculoskeletal conditions as the “leading causes of activity limitation among working-age adults 18-64 years of age” and mental illness as the “second most frequently mentioned condition . . . among adults 18-44 years of age” (2007, p. 10). Depression is the most common form of mental illness, and is the leading cause of disability (Ratey, 2008; U.S. DHHS, 2000). According to a study in the United Kingdom, those who suffer from major depression are more than two and a half times more likely to die of ischemic heart disease than those who do not (Surtees et al., 2008). In addition, depression is at the root of over two-thirds of suicides (US DHHS, 2000).
Approximately two-thirds of the adult population are overweight or obese, which increases the risk for hypertension, cardiovascular disease, and diabetes (NCHS, 2007), as well as putting strain on joints.

**Health Variations by Ethnicity and Gender**

Health and health practices are known to vary between genders and among different ethnic groups. In the 2008 National Health Interview Survey (U.S. DHHS, 2009), Asian and White adults were more likely to report being in very good or excellent health compared with Blacks and Hispanics. Hispanics were more likely to be obese than either Blacks or Whites. Whites were more likely to engage in leisure-time physical activity than either Blacks or Hispanics. Men were more likely than women to engage in regular leisure-time activity. Whites were more likely to be regular alcohol drinkers than Hispanics, Blacks, or Asians. Asians were about half as likely to be current smokers than either Whites or Blacks. Men were more likely to smoke or be regular alcohol drinkers than women. For symptoms of depression, Whites were less likely than Blacks or Hispanics to report feelings of sadness some, most, or all of the time, while females were more likely than males to report feeling sad, hopeless, or worthless. Further information from the literature regarding differences in health practices by gender and ethnicity, as well as by college class standing, is presented in the section on Research on Health Education and Behavior Change.

**Lifestyle Behaviors and Health**

Many of the leading causes of death and disability in the United States are directly related to lifestyle behaviors. Behaviors such as smoking, using alcohol or drugs, eating a
nutritionally poor diet, and being physically inactive are considered to be the leading underlying causes of death in the population (Mokdad et al., 2004). Almost half of all deaths in 2005 were from heart disease and cancer (Kung et al., 2008), both of which are related to lifestyle. Smoking, and even second-hand smoke, increases risk for heart disease, stroke, lung cancer, and chronic lung diseases, as well as causing increased risk of complications for pregnant women and their babies (Nainggolan, 2008a; U.S. DHHS, 2000). Alcohol and drug use contribute to accidents and assault, the two leading causes of death among young people (Kung et al., 2008), as well as to violence and non-fatal injuries, and HIV infections (U.S. DHHS, 2000). Alcohol use increases risk of cancers of the mouth, pharynx, larynx, esophagus, colon, and breast (World Cancer Research Fund [WCRF]/American Institute for Cancer Research [AICR], 2007). The consumption of animal fat and red meat is associated with colon and prostate cancers (Willett, 2000). “Dietary factors are estimated to account for approximately 30% of cancers in industrialized countries” (WHO, 2003, p. 95). Eating a poor diet and being physically inactive can lead to overweight and obesity; and excess body fat, particularly around the abdomen, is associated with hypertension, cardiovascular disease, several cancers, and diabetes (NCHS, 2007; WHO, 2003; Willett, 2000). According to a study done by Calle, Rodriguez, Walker-Thurmond, and Thun (2003), overweight and obesity could be responsible for 14 to 20% of all cancer deaths in U.S. adults. The World Health Organization estimates that excess “body weight and physical inactivity together . . . account for approximately one-fifth to one-third of several of the most common cancers, specifically cancers of the breast . . ., colon, endometrium, kidney, and esophagus” (2003, p. 95).
Just as certain behaviors can negatively impact health and reduce quality of life, other behaviors can improve health and prevent disability and premature death (U.S. DHHS, 2000). According to Last, “lifestyle strongly influences patterns of health and sickness. Diet, exercise, use of tobacco, alcohol, tea and coffee . . . are aspects of lifestyle that demonstrably are related to health and to the risk of disease, injury, or premature death” (1998, pp. 254-255). Not smoking, limiting alcohol, eating a plant-based diet including five or more fruits and vegetables per day, getting regular exercise on most days of the week, and managing stress have been shown to reduce the incidence of disease, improve quality of life, and increase life expectancy (Aiello et al., 2007; Åkesson et al., 2007; Djoussé & Gaziano, 2007; Frattaroli et al., 2008; U.S. DHHS, 2000; WCRF/AICR, 2007). Lifestyle behaviors that support good health are discussed in more detail in the following paragraphs, along with current recommendations and government objectives for public health.

Not Smoking

According to the U.S. DHHS, “smoking is the single most preventable cause of disease and death in the United States” (2000, p. 30). While the incidence of smoking has decreased markedly since 1964, 2005 figures still showed that 23% of men and 18% of women smoked (NCHS, 2007). Smoking usually begins during adolescence, so many prevention strategies are aimed at young people. Jenkins says it powerfully when he states that “the greatest single life-long health gift families and communities can present to their youth is freedom from tobacco addiction” (2003, p. 83). The Healthy People 2010 objectives include reducing smoking among adults and adolescents (U.S. DHHS, 2000).
Eating a Healthy Diet

Eating a healthy diet can go a long way towards maintaining health and preventing disease. In the large Nurses Health Study, over 85,000 women were followed for 14 years. Despite a 38% increase in overweight among this group, incidence of heart disease showed a 31% decline from the baseline rate. When controlling for decreased smoking and other factors, improvements in diet explained 16% of this decrease (Hu et al., 2000). Compared to the typical Western diet, high in meat, eggs, and fried foods, which increases risk for heart disease; a diet that includes plenty of fruit, vegetables, and fiber from whole grains, and is low in fat protects against heart disease (Djoussé & Gaziano, 2007; Last, 1998; Nainggolan, 2008b; WHO, 2003). Fruit and vegetable consumption also reduces risk for a variety of cancers (Jenkins, 2003; WCRF/AICR, 2007; Willet, 2000) and type 2 diabetes (WHO, 2003), and is associated with improved bone health (New, 2003). The World Health Organization states that diet is “second only to tobacco as a theoretically preventable cause of cancer” (WHO, 2003, p. 95).

Recommendations from the World Cancer Research Fund and the American Institute for Cancer Research (2007) are to eat at least five fruits and vegetables each day and to eat unprocessed grains and/or legumes at every meal. In the year 2000, the average consumption of fruit and vegetables by U.S. adults was 3.37 servings per day (Serdula et al., 2004). Only about 25% of adults ate five or more fruit and vegetables per day, with the 18-24-year-old group being somewhat less, at just under 22% (Serdula et al., 2004). The *Dietary Guidelines for Americans* recommendation is to “choose a healthful assortment of foods that includes vegetables; fruits; grains (especially whole grains); fat-
free or low-fat milk products; and fish, lean meat, poultry, or beans ... low in saturated fat and added sugars” (US DHHS, 2000, p. 29).

Being Physically Active

Physical activity throughout the lifespan is a powerful factor in maintaining health. Regular weight-bearing exercise strengthens bones, building up bone density in young adults, and preventing excessive bone loss and osteoporosis in older adults (Greer, 2005; WHO, 2003). Exercise that involves muscle strength, coordination, and balance can prevent debilitating falls in older adults, as well as improving fitness for all ages (Jenkins, 2003; WHO, 2003). Regular physical activity strengthens the cardiorespiratory system, lowers blood pressure and LDL cholesterol, and helps in weight control, reducing the risk of premature death from cardiovascular disease and diabetes (Jenkins, 2003; Manson et al., 2002; U.S. DHHS, 2000; WCRF/AICR, 2007; WHO, 2003). Greater amounts of exercise are associated with less colon cancer, and there is a probable relationship between exercise and both breast and endometrial cancers (US DHHS, 2000; WCRF/AICR, 2007; Willett, 2000). Physical activity is also important for good mental health. Those who exercise more have an enhanced sense of well-being, with less depression, anxiety, anger, and stress (Ratey, 2008; U.S. DHHS, 2000). In 2006, only 31% of adults reported regular leisure time activity. Activity levels were greater for young adults than for older adults (NCHS, 2007).

The *Dietary Guidelines for Americans* recommend that all adults be more active throughout the day and get at least 30 minutes of moderate physical activity most, or preferably all, days of the week. Adults who are trying to maintain healthy weight after weight loss are advised to get even more physical activity. (U.S. DHHS, 2000, p. 29)
Maintaining a Healthy Weight

According to the U.S. DHHS, “overweight and obesity are major contributors to many preventable causes of death” (2000, p. 28). Maintaining a healthy weight can help prevent individuals from developing conditions such as hypertension, dyslipidemia and heart disease, glucose intolerance and diabetes, kidney disease, and several cancers (Eckel, 2008). Maintaining a healthy weight is best done from childhood on, as losing additional pounds gained can be difficult (U.S. DHHS, 2000). The Healthy People 2010 objectives concerning body weight are to “reduce the proportion of children and adolescents who are overweight and obese” and the “proportion of adults who are obese” (U.S. DHHS, 2000, p. 20).

Several health behaviors can help a person to maintain a healthy weight. Eating a healthy diet that is slightly lower in calories and getting regular physical activity can help overweight individuals to successfully lose some weight and reduce risk of disease (Eckel, 2008; U.S. DHHS, 2000). Important habits for both maintaining weight and facilitating weight loss include eating breakfast; eating high fiber foods such as whole grains, legumes, fruits, and vegetables; choosing fat-free or low-fat dairy products and lean meats; monitoring portion sizes; and being active at least 30 minutes on most or all days (Eckel, 2008; U.S. DHHS, 2000). Behavioral modification strategies such as goal setting and self-monitoring can also help to support weight loss efforts (Eckel, 2008).

Avoiding Alcohol

Alcohol is a commonly used substance in our society, yet its use includes risks to life and health. Alcohol consumption “lowers self-control, dissolves good judgment, distorts perception, and impairs physical skills” (Jenkins, 2003, p. 85). It is associated
with risk-taking and thrill-seeking behavior, particularly in adolescents and young adults (NCHS, 2007), as well as with violence, injury, and sexually transmitted diseases (U.S. DHHS, 2000). Its use during pregnancy can result in fetal alcohol syndrome, and long-term use can cause pancreatitis, liver disease, obesity, heart disease, and cancer (American Heart Association [AHA], 2009; U.S. DHHS, 2000). According to the Department of Transportation, National Highway Traffic Safety Administration (2008), alcohol was involved in almost one-third of all fatal traffic accidents in the U.S. in 2007. Recommendations from the WCRF/AICR are to “limit alcoholic drinks” and “if alcoholic drinks are consumed, limit consumption to no more than two drinks a day for men and one drink a day for women” (2007, p. xix). This coincides with the American Heart Association recommendation to drink moderately (2009). Moderate alcohol consumption is associated with reduced levels of heart disease, but this benefit must be weighed against the risks of accidents and addiction (AHA, 2009; Willett, 2000). “Given these and other risks, the American Heart Association cautions people NOT to start drinking . . . if they do not already drink alcohol” (AHA, 2009, para. 2). From the perspective of cancer prevention, however, “the best level of alcohol consumption is zero” (WCRF/AICR, 2007, p. iv), and “even small amounts of alcoholic drinks should be avoided” (WCRF/AICR, 2007, p. xix). Alcohol is linked to cancers of the mouth, pharynx, larynx, esophagus, breast, colon, and liver (WCRF/AICR, 2007). Results from the Million Women Study in the United Kingdom are that “even low to moderate alcohol consumption significantly increases the risk for cancer, both overall and at specific sites” (Chustecka, 2009, para. 1).
Preventing Depression and Stress

Both stress and depression can be severely debilitating. Extreme stress can overwhelm a person so that he or she is no longer able to function normally (Ratey, 2008). As previously stated, depression is the biggest cause of disability in this country (Ratey, 2008; U.S. DHHS, 2000). Stress and depression are related, in that traumatic life events and stress, particularly during transitions, can lead to depressive disorders (Mrazek & Haggerty, 1994). According to Last, “there is a close relationship between stressful life events and health and longevity” (1998, p. 250). Steps to manage stress include simplifying one’s life, managing time wisely, anticipating challenges, exercising regularly, eating healthfully, taking time to relax, developing a positive attitude, and laughing (Mayo Foundation, 2009). Physical exercise can control the “emotional and physical feelings of stress” (Ratey, 2008, p. 60), and can be effective at preventing and treating depression by changing brain chemicals (Jenkins, 2003; Ratey, 2008). Ratey states that “exercise regulates all of the neurotransmitters targeted by antidepressants” (2008, p. 121). Interacting with others and participating in pleasurable activities are also useful for preventing depression and lessening its symptoms (Jenkins, 2003; Mrazek & Haggerty, 1994). Last also notes that “people with “extensive [social] networks generally have longer life expectancy” (1998, p. 243). Certain cultural and religious groups have successfully promoted good mental health by taking a balanced approach, including the physical, psychological, and spiritual aspects of a person. They recognize that “lifestyle choices are a prominent feature of the means by which the desired state of well-being can be attained” (Mrazek & Haggerty, 1994, p. 343). Lastly, spending time in bright light can
lessen depressive symptoms and prevent depression from occurring, particularly for those suffering from Seasonal Affective Disorder (Jenkins, 2003).

**Getting Enough Sleep**

Sleep is an essential part of our lives, and is the means by which the body is rejuvenated for the next day’s activities. During sleep, hormones are released that affect growth and repair of tissues, appetite, and alertness (National Sleep Foundation, 2009b). In cross-sectional studies, 5 hours or less of sleep per night are associated with increased body mass index and waist circumference, poorer health status in general, and greater incidence of depressive symptoms compared with getting 7 hours (Stranges et al., 2008). A consistent lack of sleep over time results in significant mood changes, tension, confusion, and decreased performance and reaction times (Dinges et al., 1997; Philip et al., 2004). In a study of 40 healthy university students, for example, 24 hours of being awake resulted in cognitive impairment approximately equal to having a blood alcohol concentration of 0.05% (Maruff, Falleti, Collie, Darby, & McStephen, 2005). The National Sleep Foundation (2009a) recommends 8 and a half to 9 and a half hours of sleep for adolescents, and 7 to 9 hours for adults.

**Caffeine**

The Dietary Guidelines for Americans 2005 (U.S. DHHS/ U.S. Dept. of Agriculture, 2005) make no statements regarding the use of caffeine or caffeinated beverages. In a proposed beverage guidance system, Popkin et al. (2006) suggest a six-level rating system to indicate which beverages are preferred for fluid intake versus which should be limited. Water, the best beverage, is rated at level one. Coffee and tea,
both mild diuretics, are rated at level two. According to the authors, a moderate intake of caffeine (up to 400 mg, or three cups of coffee) “is not associated with an increased risk of heart disease, hypertension, osteoporosis, or high cholesterol” (p. 533). They do note that intake of greater than 300 mg/day is not advised for pregnant women because of increased risk for miscarriage and low birth-weight babies. However, Cnattingius et al. (2000) have said that an intake above 100mg/day of caffeine is associated with increased risk of spontaneous abortion in the first trimester of pregnancy, and the risk increases by dose. Willett (2000) acknowledges that coffee has several mutagenic substances that may contribute to cancer, but results of studies are mixed. Interestingly, consumption of green tea, which is lower in caffeine, has been inversely associated with gastric cancers (Willett, 2000). Therefore, from the perspective of healthy lifestyle behaviors, other than during pregnancy, there are no recommendations in place for caffeine.

Combination of Healthy Lifestyle Behaviors

While each of the behaviors listed above are important for improving quality of life and preventing chronic conditions, embracing a healthy lifestyle in general is the most powerful.

Findings from the Nurses' Health Study suggest that 74% of cardiovascular disease cases, 82% of coronary heart disease cases, and 91% of diabetes cases in women could be prevented by not smoking, engaging in regular physical activity, maintaining a healthy weight, eating healthier food, and drinking moderate amounts of alcohol. (Bassuk & Manson, 2008, abstract)

The EPIC-Norfolk Prospective Population Study, which followed 20,444 men and women for 11 years, examined the effect of not smoking, drinking (alcohol) moderately, eating five or more fruits and vegetables per day, and being physically active. They found a progressively increasing mortality risk with less health behaviors. Those with none of
the health behaviors had a relative risk of 3.41 for death from all causes compared with those who practiced all four health behaviors (Khaw et al., 2008).

A Swedish mammography study examined 24,444 postmenopausal women. Those with waist-hip ratio of less than 0.85, who were non-smokers, physically active, had a high intake of fruit, vegetables, whole grains, fish, and legumes, and moderate alcohol consumption had a 92% decreased risk of heart attack compared with those who did not have these attributes. The authors estimated that three quarters of all myocardial infarctions in the population might be prevented by these healthy behaviors (Åkesson et al., 2007). When 757 men and 395 women with stable coronary artery disease participated in a program that included dietary changes (10% calories from fat), moderate exercise (3 hours per week), and stress management, 74% became angina free within 12 weeks (Frattaroli et al., 2008).

In the Nurse’s Health Study, researchers found that women who maintained a healthy weight, ate a high-fiber, low-fat diet, exercised regularly, did not smoke, and drank alcohol only moderately had 90% less incidence of type 2 diabetes than women who did not practice those behaviors (Hu et al., 2001). In the EPIC study, 25,038 men and women were followed for an average of 4.6 years. Greater physical activity and greater consumption of green leafy vegetables, fresh fruit, and whole grain bread were significantly associated with less incidence of diabetes at follow-up 4.6 years later (Simmons, Harding, Wareham, & Griffin, 2007).

A study of 522 subjects with impaired glucose tolerance found that those who lost 5% of body weight in a program of eating healthfully and exercising moderately for 30 minutes per day had a 58% lower incidence of diabetes at 4 years follow-up than those
who did not follow the program (Tuomilehto et al., 2001). The Diabetes Prevention Program Research Group (2002), studying over 3,000 individuals with impaired glucose tolerance, found that intensive lifestyle modification (150 minutes of exercise per week plus at least 7% body weight lost and maintained with low calorie, low fat diet) was more effective than the drug metformin at reducing the incidence of diabetes. The incidence of diabetes after 3 years was 58% less in the lifestyle group compared to controls, and 39% less compared with the metformin group. The World Health Organization (2003) also promotes these same behaviors to minimize the risk for developing cancer. To lessen disease risk, individuals should maintain a healthy body weight, exercise on most days of the week, preferably 60 minutes per day, not smoke, avoid alcohol, and eat plenty of fruit and vegetables (WHO, 2003).

**Health of College Students**

Often we think of the college years as years of vibrant health and youthful vigor. College students, however, are beginning to develop habits that can help or harm their health. In 1995, a nationwide survey was conducted among college students for the first time (Centers for Disease Control, 1997). In the 30 days prior to the survey, approximately 68% had had one or more drinks of alcohol, more than one-third had ridden in a car with a driver who had been drinking, and 27% had driven under the influence. Almost 75% had tried smoking, and approximately one-fourth had smoked one or more cigarettes in the previous month. Only about 26% had eaten five or more servings of fruit and vegetables, while 22% had eaten more than two servings of high-fat foods on the day before the survey. At that time, 20% of college students were overweight. In the week before the survey, approximately 37% had participated in
vigorous physical activity on 3 or more days, and 19% had had 30 minutes or more of moderate exercise on 5 or more days, meaning that approximately half had fallen short of either of those ideals.

In the spring of 2008, 80,121 students from 106 colleges from across North America took the American College Health Association’s (2009) National College Health Assessment (NCHA). Overall, 8.5% of the students reported eating five or more servings of fruits and vegetables per day. Approximately 45.5% engaged in at least 30 minutes of moderate or 20 minutes of vigorous physical activity on at least 3 of the days in the previous week, and 49% had done some type of muscle toning or strengthening exercise on at least 2 of the days. From self-reported weight and height measurements, almost 22% were overweight, and 10% were obese. On the positive side, 66% reported never using cigarettes. However, only about 17% of students reported that they never used alcohol. Among those students who both drive a vehicle and drink alcohol, 34% admitted to driving after drinking in the preceding month. Concerning mental health, almost 15% had been diagnosed with depression at some time in their lifetime, while 32% of these were diagnosed in the previous year. Approximately 23% had felt hopeless, 33% had felt sad, and 16% had felt so depressed it was difficult to function at least five times in the past school year. Most college students were not getting enough rest. Only about 7% reported getting enough sleep to wake up feeling rested every day in the previous week, while just over 30% said they got enough sleep on at least 5 of the previous 7 days. The top health complaints among students over the school year, in order, were allergies (48%), back pain (46%), sinus infection (31%), depression (17%), strep throat (14%),
anxiety disorder (13%), asthma (12%), ear infection (9.5%), bronchitis (8%), and seasonal affective disorder (8%).

**Health and Education**

Education itself contributes to health and health literacy. Independent of income, age, or poverty status, people with higher levels of education are more likely to report being in very good or excellent health (U.S. DHHS, 2009; Wirt et al., 2004). Those with a bachelor’s degree or higher have less than one-third of the smoking rates compared with those not earning a high-school diploma or equivalent (NCHS, 2007, p. 32). Those with a college degree are almost three times more likely to exercise regularly than those who have not completed high school (CDC, 2009). Health literacy is defined by the DHHS as “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions” (as cited in Kutner, Greenberg, Jin, & Paulsen, 2006, p. iii).

Health literacy is important for people to understand public health information, to communicate with and understand medical personnel, to utilize health insurance, and to make personal decisions regarding their health. Overall results of the 2003 National Assessment of Adult Literacy, which surveyed 19,000 adults, showed 14% of Americans with less than basic, 22% with basic, 53% with intermediate, and 22% with proficient health literacy. Health literacy improved substantially with higher levels of education. Almost half of those who had not finished high school had less than basic health literacy levels, compared with 14% of those who had completed high-school equivalency, and only 5% for those with some college. Among those who had completed a bachelor’s
degree, only 3% were less than basic, while 10% were basic, 60% were intermediate, and 27% were proficient (Kutner et al., 2006).

Higher levels of education are associated with lower death rates. In 2005, the age-adjusted death rate for persons 25-64 years of age with less than 12 years of education was 650.4 per 100,000 from all causes and 484.4 from chronic and noncommunicable diseases. For those having had 12 years of school, the death rates were 477.6 from all causes, and 358.8 from chronic diseases. For those with 13 or more years of education, death rates were only 206.3 for all causes and 162.0 from chronic diseases (NCHS, 2007, p. 195). The premature death rates of those with more education were just one-third those of people who did not finish 12 years of school! These statistics illustrate how education, particularly college education, can influence the health of Americans.

The overarching goals of the federal government’s Healthy People 2010 program are to “increase quality and years of healthy life” and to “eliminate health disparities” (U.S. DHHS, 2000, p. 2). Because so many of the nation’s health problems are preventable, it is important for people to learn what to do to prevent them. As Jenkins puts it, “prevention saves individuals, and their families, from pain, suffering, loss of function, prolonged disability, or premature death” (2003, p. 5). Health education provides people with the knowledge and understanding needed to achieve these goals. The knowledge gained through health education is a “tool which enables people to take more control over their own health, and over the factors which affect their health” (Ewles & Simnett, 1985, p. 11). As the public becomes more aware of the link between lifestyle practices and chronic disease, they are in a better position to take this control by adopting healthy behaviors (Cockerham, 1997).
Health education has been a part of the school program in the United States since 1937, when Horace Mann called for the subject of hygiene to be a mandatory part of education. Through this, students would learn about the “relationship between their behaviors and their health” (Cottrell, Girvan, & McKenzie, 1999, p. 60). In 1987, Allensworth and Kolbe proposed a comprehensive school health program coupled with comprehensive school health education (Cottrell et al., 1999). There were four underlying assumptions established by the Committee on Comprehensive School Health Programs:

1. The primary goal of schools is education.
2. Education and health are linked. Educational outcomes are related to health status, and health outcomes are related to education.
3. There are certain basic health needs of children and young people. These include nurturing and support; timely and relevant health information, knowledge, and skills necessary to adopt healthful behavior; and access to health care.
4. The school has the potential to be a crucial part of the system to provide these basic health needs. Schools are where children and youth spend a significant amount of their time, and schools can reach entire families. (Allensworth, Lawson, Nicholson, & Wyche, 1997, p. 17)

Though the Commission was working on health education for Grades K through 12, the principles can also be applied to the college level. In 1995, the National Health Education Standards for primary and secondary schools were established (Cottrell et al., 1999). According to Cottrell et al. (1999), however, this program has failed to meet its full potential because of lack of leadership, and because it has been a low priority among administrators.

**Education of College Students and Habit Formation**

College is a good place for health education. According to the U.S. Census information for 2006 (2008), approximately 54% of all adults 25 years and older, and
almost 60% of 25 to 34 years old, have completed at least some college. Thus, a good percentage of the population could gain health information through college attendance.

The college years are also prime years for lifelong habit formation. Horneffer-Ginter states that “health habits may be more easily shaped [in young people] than in older adults” (2008, p. 351). College students are not naturally thinking about their health. They tend to live for the present, be impulsive in their decision-making, and feel invulnerable or invincible, that health risks do not apply to them (Horneffer-Ginter, 2008; Jenkins, 2003). However, according to Erik Erikson’s stages of psychosocial development, young people entering college are in the identity-versus-role-confusion stage of development. In this stage, they are beginning to develop their own identity, separate from their parents. They begin to recognize the association of short-term goals with long-term plans. They become open to others’ points of view, developing their own opinions on things as well as ways of doing things. They are learning to make decisions and take responsibility for themselves (Hamachek, 1988). Adolescents and young adults are “beginning to take over the responsibilities formerly borne by their parents, including that of promoting their own health and self-care for minor health problems” (Jenkins, 2003, p. 79).

Piaget describes this period as that of formal operational thought. In Piaget’s view, college-aged young people are learning to step back and reflect on their past, and to consider the future (Fowler, 1981). Kohlberg adds that as they become able to consider more than one perspective, they can take on a “third-person” perspective of themselves to gain a deeper understanding of a situation (Fowler, 1981). Gardiner (1994) says that as students develop their ability for formal operational thought, they can engage in
metacognition “the critical examination of their own thinking for inconsistencies” (p. 11). They begin to realize that they “must . . . construct personal values and principles for living and make personal commitments to people, causes and career” (Gardiner, 1994, p. 13). This is important as they determine their own paths, and take responsibility for their actions, including those related to their health. Therefore, it is appropriate to encourage good health habits and discourage harmful ones during the college years.

Health Education as Part of a Holistic Curriculum

Graduates of today are expected to have a broad base of knowledge and skills. Education is to be for the whole person, and should equip young people for “the realities they will face as citizens and workers” (Gardiner, 1994, p. 9). The philosophy of general education is that an educated person is one who has gained a well-rounded understanding of the world around them, one who can think and converse intelligently about a number of subject areas, including health and wellness (Andrews University, 2009). A person’s health affects his/her ability to function in a social environment such as school or work, and to learn and grow academically. Likewise, a person’s social environment and academic satisfaction are a part of his/her health. Religious convictions, attitudes, and ways of behaving are all affected by health and have an effect on health.

Since health is so multifaceted, and integral to the person’s whole being, learning how to achieve and maintain health is an important part of a well-rounded education (Ewles & Simnett, 1985). Health promotion is seen as going hand-in-hand with other academic purposes, in that it “support[s] the academic mission of student learning by assisting students in leading healthier lives” and “engage[s] individuals who will become political, social, and economic decision makers, thereby advancing the collective health
of the community” (ACHA, 2005, p. 2). According to Maslow’s hierarchy of human needs all people need to fulfill their basic human needs before they can reach self-actualization. These include the basic needs for food, water, and sleep, followed by the need for safety, which includes personal health, then love and belonging, and self-esteem. For students to be able to reach their highest potential, health and quality of life must be considered (Alters & Schiff, 2003).

According to the Centers for Disease Control, “more effective school health programs . . . are needed to reduce risk and improve health outcomes among youth” (2008a, p. 2). A quality health education program should be well rounded and consider all aspects of a person (Cottrell et al., 1999). Effective health education helps people to change and adapt to life stages and needs (Ewles & Simnett, 1985). Last (1998) notes that nutrition education is often one of the most effective forms of health education. Foreman and O’Malley (1985) point out the importance of teaching stress management techniques. Stress can lead to physical illness, mental illness, poor academic and job performance, and low quality of life. Teaching coping strategies such as relaxation techniques can help students to get through stressful life events, and focus better on their schoolwork. With depression being a major mental health issue in colleges (ACHA, 2009), Zins and Ponti (1985) feel that health education should include prevention and early detection of mental disorders such as depression, as well as teaching students how to cope with life problems, stresses, and transitions. Health education in the school must seek to help young people develop a sense of responsibility for their own health. This can be facilitated by putting emphasis on the interests, needs, and goals that are pertinent to them (Kuntzeleman, 1985).
The American College Health Association set up a task force in 1996 to study health promotion practices in colleges and universities (ACHA, 2005). From this study, the ACHA developed standards for practice to help improve the quality of health promotion in higher education. In their paper, they state three basic assumptions of health promotion for colleges. These are that “health encompasses the capacity of individuals and communities to reach their potential,” “health transcends individual factors and includes cultural, institutional, socioeconomic, and political influences,” and “health is not solely a biomedical quality measured through clinical indicators” (ACHA, 2005, p. 1). Through these assumptions, they acknowledge that health is multifaceted, and not just concerned with the physical body. The statement of mission that the ACHA developed for college and university health promotion is “to advance the health of students and to contribute to the creation of healthy and socially just campus communities” (ACHA, 2005, p. 2). Several purposes for college health promotion were identified, including to “reduce risk for individual illness and injury,” to “enhance health as a strategy to support student learning,” and to “advocate for safety, social justice, economic opportunity, and human dignity” (ACHA, 2005, p. 2).

Through Healthy People 2010 and the ACHA, goals and objectives have been developed to help colleges be more effective in their health education. The Healthy People 2010 goal for educational programs is to “increase the quality, availability, and effectiveness of educational . . . programs designed to prevent disease and improve health and quality of life” (U.S. DHHS, 2000, p. 7-3). The DHHS (2000) encourages colleges and universities to include health education emphasizing good nutrition, physical activity, mental health, avoidance of harmful substances, sanitation, and a healthy environment.
The American College Health Association (2002) health objectives for colleges are as follows:

- Increase the proportion of college students who have received information on physical activity and fitness. Baseline 33.5%, Target for 2010, 55% (slide 26)
- Increase the proportion of college students who engage in physical activity at least 3 days/week at moderate intensity for at least 30 minutes, or vigorous physical activity for 20 minutes or more. Baseline 40.3%, Target 55% (slide 26)
- Increase the proportion of college students who have received information on dietary behaviors and nutrition. Baseline 32.7%, Target 55% (slide 30)
- Reduce the proportion of adolescents and college students who are overweight and obese. Baseline 29.5%, Target 16% (slide 30)
- Increase the proportion of college students who have received information on tobacco use prevention. Baseline 22.1%, Target 55% (slide 34)
- Reduce cigarette smoking by college students. Baseline 25.1%, Target 10.5% (slide 34)
- Increase the proportion of college students who have received information on alcohol and drug abuse prevention. Baseline 19.1%, Target 55% (slide 38)
- Increase the proportion of college students who have received information on suicide prevention. Baseline 12.2%, Target 55% (slide 46)
- Reduce the rate of suicide attempts by adolescent and college students (12-month average rate). Baseline 1.5%, Target 1.0% (slide 46)

**Seventh-day Adventist Health Philosophy**

The philosophy of the Seventh-day Adventist Church promotes a lifestyle of holistic health, and encourages its members to seek optimal health in mind, body, and spirit (General Conference of Seventh-day Adventists, 2007). The lifestyle practices that the church has promoted since the late 1800s and early 1900s are similar to the latest health recommendations. According to one of the church’s founders, “pure air, sunlight, abstemiousness [temperance], rest, exercise, proper diet, the use of water, [and] trust in divine power – these are the true remedies” (White, 1938, p. 301). The church recommends a balanced vegetarian diet (General Conference of Seventh-day Adventists, 2007), including an abundance of whole grains, fresh fruits, vegetables, and legumes, as
well as some nuts. Animal fats should not be eaten because of their link with disease. In its place, olive oil is recommended (White, 1938). Regular exercise is important, and children should be encouraged to exercise as a foundation for later in life (White, 1954). The principles are that “healthful exercise of the whole being will give an education that is broad and comprehensive” (White, 1952, p. 508), and “health cannot be preserved unless some portion of each day is given to muscular exertion in the open air” (White, 1954, p. 342). Alcohol, tobacco, and other harmful substances should not be used (General Conference of Seventh-day Adventists, 2007; White, 1954; 1890), as “intemperance saps the energies of both mind and body” (White, 1923, p. 139). Though the government health guidelines do not address the use of caffeine, the Adventist church discourages its use because of its stimulating effect, and the dependence that a person can develop on it (General Conference of Seventh-day Adventists, 2007; White, 1954). Sleep is an important part of good health; and students particularly are advised to have regular hours for sleep and avoid “burning the midnight oil” (White, 1954, p. 363). In regard to managing stress and preventing depression, the church encourages members to seek balance in all aspects of life (General Conference of Seventh-day Adventists, 2007; White, 1998). White states that “intemperance in eating, drinking, . . . labor, . . . almost everything . . . reduces vitality and energy” (1998, p. 161), and the use of stimulants like caffeine can leave a person feeling down and depressed when the effect wears off (White, 1954). As treatment for depression White says, “useful labor that affords physical exercise will often have a more beneficial influence upon the mind, while at the same time it will strengthen the muscles, improve the circulation, and prove a powerful agent in the recovery of health” (1923, p. 627). The philosophy of the Seventh-day Adventist
Church promotes a lifestyle of holistic health, and encourages its members to seek optimal health in mind, body, and spirit (General Conference of Seventh-day Adventists, 2007).

The lifestyle practices espoused by Seventh-day Adventists, and validated by research, can improve quality of life, reduce the incidence of diabetes, heart disease, and most cancers, and increase longevity (Buettner, 2005; Fraser, 2003). According to Last,

Seventh-day Adventists, who follow strict dietary customs, demonstrate the value of these customs by more favorable health experiences than otherwise comparable individuals in the same community and socioeconomic class. Vegetarians on the whole have more favorable health experience than meat eaters, other things being equal. (1998, p. 222)

The University’s Focus on Health

Instruction in health is an important part of education in Seventh-day Adventist schools. White says, “The first study of youth should be to know themselves, and how to keep their bodies in health” (1893, p. 12). She also states that “they [youth] should become well informed on this matter [preservation of health], that every muscle and organ may be so strengthened and disciplined that . . . the best of health may result, and the brain be invigorated to sustain the taxation of study” (White, 1893, p. 125). Andrews University, a Seventh-day Adventist institution, challenges its students to “embrace a wholesome way of life” (Andrews University, 2009, p. 10). One of the university’s general education goals is that “students will study and apply the principles of health and fitness to their own lives” (Andrews University, 2009, p. 38).

Living a life of health and wellness is an integral part of the education offered at Andrews University, as evidenced in the Student Planner (Andrews University, 2008), or handbook, put out by the Department of Student Life. There, the University’s mission
statement says, “Andrews University, a distinctive Seventh-day Adventist Christian institution, transforms its students by educating them to seek knowledge and affirm faith in order to change the world” (p. 146). A further explanation is given, that “they can affirm faith as they . . . demonstrate personal and moral integrity [and] embrace a wholesome way of life” (p. 147). Student Life keeps the University’s mission in mind in its responsibility statement: “We support the mission of the University by nurturing students for . . . developing personal integrity reflected in a balanced spiritual, mental, and physical lifestyle” (p. 150). The handbook gives four hallmarks of student life, in that students have chosen to “attend a faith-based university,” to “live on a residential campus,” to “be part of a gathered community,” and that they are agreeing to “adopt a wholesome lifestyle” (p. 151). The wholesome lifestyle, as described in the section on core values, includes “honesty, modesty, sexual purity, respect for others, healthful living, and safety” (p. 156). The handbook goes on to include an explanation of the school’s zero-tolerance position on drugs and substance abuse (p. 162).

Instruction in health and wellness is included in the general education requirements for Bachelor of Arts, Bachelor of Science, and associate degrees (Andrews University, 2009, pp. 36, 37). For most bachelor degree students, this includes Fit for Life, two exercise and fitness courses, and one life science course. Three of the four possible life science courses are also health related: biology, nutrition, and environmental science. Fit for Life is required for all of the associate degrees.

Though Andrews University is not a member school of the American College Health Association, they are addressing many of the ACHA objectives (2002). Students receive instruction on physical activity and fitness through the Fit for Life and activity
courses. Most of the activity courses meet twice per week or require conditioning outside of class. Nutrition and healthy dietary behaviors are taught in Fit for Life, and are covered extensively in the general nutrition course, which is one of the life science requirement options. Students hear about the benefits of not smoking and not using alcohol or drugs in the Fit for Life course, and understand that they are mandated to follow a substance-free lifestyle while at the University. The Fit for Life course also addresses stress management and depression prevention, both of which are a part of suicide prevention.

**Health Education to Change Knowledge, Attitudes, and Behavior**

The major goal of health education is to encourage people to adopt healthy behaviors (Glanz & Oldenburg, 1997; Last, 1998). The control of chronic diseases is “dependent on lifestyles, behavior modification, and coping strategies” (Bruhn, 1997, p. 11). Therefore, it is important to promote healthy lifestyle behaviors in health education. As Jenkins puts it, “the strategy . . . is to move groups or individuals forward one step at a time through the stages of change” (2003, p. 285) towards the adoption of healthy behaviors. Green and Ottoson state that health education is based on the idea “that beneficial health behavior . . . will result from a combination of planned, consistent, integrated learning opportunities” and that “this assumption rests on direct evidence from the evaluation of health education programs” (as cited in Cottrell et al., 1999, p. 14).

To change people’s behavior, more is needed than just the transmission of information. Jenkins makes an important point when he says that “logic and facts [alone] can be slow motivators” (2003, p. 264). Hall and Hord, while primarily working with institutional change, note that “attitudes, beliefs, and values of the individuals . . . as well
as the relationships and norms . . . guide behavior” (2006, p. 14). Health education, then, is about knowing, feeling, and doing. To be most effective, teachers must focus on raising awareness or consciousness, developing students’ knowledge and understanding, changing attitudes, and guiding students to decision-making and behavior change (Ewles and Simnett, 1985). In this way, health education can be an effective means of improving awareness and knowledge, and developing attitudes that support behavior change (McKenzie & Smeltzer, 2001).

As with all health promotion efforts, health education for college young people must be tailored to fit the audience. As Last points out, “health education must deal with beliefs, motives, behaviors, and habits and the social environment to which people belong” (1998, p. 263). Since youth are not generally thinking about their health when they make choices, they are unlikely to change their behavior “until health motives become a part of the decision-making equation” (Jenkins, 2003, p. 94). Instructors need to emphasize the advantages and rewards of a health behavior. Truth must be presented fairly about the results of unhealthy behaviors, noting both pros and cons. It is important to communicate that, while a specific behavior may seem good for a while, it is not wise in the long run. Students must come to feel that the benefits of engaging in a new behavior outweigh the costs (Jenkins, 2003). In addition, it is important for the teacher to be a good role model so that students can develop a vision that it is “cool” to be health conscious (Jenkins, 2003; Kuntzleman, 1985).

There are several theories that explain how people might choose to change their behavior through health education. In Fishbein and Ajzen’s theory of reasoned action, a person’s intention is the most important determinant of whether or not a new behavior
will be initiated, and intention is determined by both the individual’s attitude and what others might think (Maddux & DuCharme, 1997; McKenzie & Smeltzer, 2001). Kelder, Edmundson, and Lytle stress that “instruction . . . in behavioral skills to promote health . . . may have limited impact if most of the students’ other sources of socialization are delivering a contradictory message” (1997, p. 279). Following this theory, education should be aimed at changing attitudes, presenting benefits to change, and showing how change is socially desirable. In Ajzen’s later theory of planned behavior, the element of an individual’s perceived control of the situation is added (Maddux & DuCharme, 1997; McKenzie & Smeltzer, 2001). Bandura’s term for perceived behavioral control is self-efficacy, or a person’s feeling of competence for changing a particular behavior (Maddux & DuCharme, 1997; McKenzie & Smeltzer, 2001). What an individual believes about his/her own control over a situation, then, is considered to be a good predictor of behavior (Bruhn, 1997). McKenzie and Smeltzer (2001) list four ways to improve self-efficacy: through mastery of necessary tasks or skills, observation of others who have been successful at change, persuasion from other significant individuals, and arousal of emotions. With this theory, health education must clearly present the risks of unhealthy behaviors, and provide the skills, practice, and social support to enable students to feel that they do indeed have control over their ability to change.

The health belief model is a popular model in health education. It also recognizes the importance of motivation, and states that education can provide a “cue to action,” in which the target audience discovers their susceptibility to disease and the threat that it presents to them personally. Students must come to believe that the benefits of behavior change outweigh the barriers, and that they will reduce their own risk by making the
behavior change (McKenzie & Smeltzer, 2001; Strecher, Champion, & Rosenstock, 1997).

**Anatomy of Change and the Transtheoretical Model**

The transtheoretical model of behavior change focuses on intentional change, where change is viewed as a process (Glanz & Oldenburg, 1997; Jenkins, 2003; Prochaska et al., 1998; Prochaska et al., 1994). While other models of behavior change focus on one or two constructs, the transtheoretical model integrates several. The two major constructs of the transtheoretical model are the stages of change and the processes of change (McKenzie & Smeltzer, 2001; Prochaska et al., 1998; Prochaska et al., 1994).

Six stages of change are identified in the model (McKenzie & Smeltzer, 2001; Norcross & Prochaska, 2002; Prochaska et al., 1998, Prochaska et al., 1994). Precontemplation is the stage in which a person has no intention to change, because of either not recognizing a need for change or actively resisting it. Contemplation is when the person is beginning to see some benefit in making a behavior change, and is gathering more information. This stage is generally identified when the person intends to change in the next 6 months. Preparation is when the benefits of a new behavior outweigh the cons, and the person is planning to make a change in behavior in the coming month. Action is the stage when the person is actively beginning to engage in a new behavior. The action stage generally lasts about 6 months, but relapses are common. Maintenance is the stage in which a person is committed to the new behavior, and has been doing it for 6 months or more. A person’s progress through these stages of change may be linear. Often, though, it is more cyclical in nature, as the person drops back one stage or more, and then comes back up, even doing this several times (Norcross & Prochaska, 2002). While
regression may appear to onlookers like failure, “people who take action and fail . . . are twice as likely to succeed over the next six months than those who don’t take any action at all” (Prochaska et al., 1994, p. 50). Termination, the ultimate end product, is the stage in which a person is no longer tempted to revert to old ways. The new behavior is now part of that person’s repertoire of behaviors. For some behaviors, a person may never reach this stage. In health promotion, the focus of intervention is on the first five stages (Jenkins, 2003; McKenzie & Smeltzer, 2001).

When a person changes his or her behavior, many emotional, cognitive, and behavioral processes occur before a change is actually made and seen by onlookers. The transtheoretical model recognizes five experiential and five behavioral processes of change (Cancer Prevention Research Center, n.d.; Prochaska et al., 1998; Prochaska et al., 1994). The experiential processes include consciousness raising, dramatic relief, environmental (social) reevaluation, social liberation, and self-reevaluation.

Consciousness raising is the process of increasing awareness of a problem behavior. Dramatic relief refers to an experience that heightens emotions, such as a powerful film or life event; followed by the realization that similar negative effects can be reduced or avoided by a particular action. Environmental, or social, reevaluation is a cognitive and affective assessment of how things could be better in one’s environment if one changed his or her behavior. Social liberation involves outside circumstances or forces, such as policies or opportunities that make it easier for a person to change behavior. Self-reevaluation is the process by which an individual pictures life for himself or herself after adopting a new behavior.
The behavioral processes include stimulus control, helping relationships, counter conditioning, reinforcement management, and self-liberation. Stimulus control involves removing cues to the unwanted behavior and/or replacing them with cues for the desired behavior. Helping relationships are those relationships that are supportive of the person’s desire to make a positive change in behavior. Counter conditioning involves learning new techniques or behaviors to replace unhealthy behaviors. Reinforcement management is the process of giving oneself rewards for positive behaviors and/or punishments for negative ones. Self-liberation occurs when one believes he or she can change and commits to it. The various processes are used to a different degree during the five stages of change. Generally, the experiential processes are used more in the early stages of change, while the behavioral processes are utilized more in the later stages (Cancer Prevention Research Center, n.d.). These processes are considered to be useful for the purpose of matching appropriate health interventions to individuals’ stages of change (Chung et al., 2006).

The other constructs of the transtheoretical model are decisional balance, self-efficacy, and temptation. Decisional balance refers to a person’s feelings about the pros and cons of a new behavior. In the early stages of change, a person may be unaware of the benefits of changing their behavior. When they do become aware, the cons of changing still outweigh the pros. As the person learns more, however, this slowly changes, so that by the action stage, the pros far outweigh the cons. As with Bandura’s definition, self-efficacy refers to a person’s confidence in being able to make the change, and to cope with the stress of changing. The more self-efficacy a person feels, the more likely he or she is to move forward. Temptation refers to the urges that a person has to
revert to old behaviors in certain situations; and temptation declines as a person moves through the stages (McKenzie & Smeltzer, 2001; Prochaska et al., 1998).

In a group of people, many stages of change will be represented, and proponents of the model feel that it is important to aim health promotion at the individuals’ stages of change to help them move from one stage to the next (Jenkins, 2003; Prochaska et al., 1994). A person in precontemplation, for example, is not ready for a health program that focuses on action. Likewise, those in the preparation or action stages already know the benefits of the new behavior. They do not need more consciousness-raising activities. Instead, they may need to be given skills training and support to help them move into action or into maintenance. Advancement through the stages, though, paves the way for successful behavior change. In the Working Well Trial, for example, 2,379 participants were studied as they attempted to quit smoking. It was found that “advancement from precontemplation to contemplation increases the likelihood of future [smoking] cessation by 40%, and advancement to preparation increases the likelihood of future cessation by 80%” (Abrams, Herzog, Emmons, & Linnan, 2000, p. 228). Health promotion programs that meet the needs of all participants will be more likely to succeed in bringing about positive behavior change, or setting the stage for it.

Classroom education can help to initiate several of the processes of change, thereby facilitating movement through the stages towards behavior change (Cancer Prevention Research Center, n.d.; McKenzie & Smeltzer, 2001; J. M. Prochaska, personal communication, October 8, 2008). Education is especially suited to consciousness raising. Through health education, students gain an understanding of things that may negatively impact their health. They also become aware of the risks or benefits of specific
lifestyle behaviors. Education may play a role in facilitating dramatic relief and environmental reevaluation if the instructor incorporates role-playing, emotionally focused media clips, or documentaries. Depending on the format of the course, other processes may come into play as well. With this understanding, education is particularly suited to meeting the needs of those in the earlier stages of change. Many students, for example, may move from precontemplation to contemplation for a particular behavior, a significant step. The classroom may provide the stimulus for those in preparation to move into the action stage as well, which could then be identified as observable behavior. Unfortunately, with standard behavioral assessments, the progress made by many students would not be recognized. By assessing students’ stages of change at the beginning and end of a course, we can get a more complete picture of the changes that are occurring among the students.

**Research on Health Education and Behavior Change**

In a review of the literature, not very many studies were found that focused on the impact of health education on college students. According to Kelder, Edmundson, and Lytle (1997), early research of school health education was focused on knowledge-based courses that taught students about nutrition and healthy eating. “Early studies reported positive changes in student knowledge and attitudes regarding healthful eating, but generally failed to demonstrate improvement in adolescent eating behavior or positive changes in physiological risk patterns” (Kelder et al., 1997, p. 269). According to Gardiner (1994), few colleges or college programs have clearly specified outcomes for health education. Assessment is vital to “demonstrate that the curriculum is having its intended effects” (p. 25). The studies described in this section are specific to college
health and wellness courses. They vary in the focus of study in terms of knowledge, attitudes or behavior, and in the specific aspects of health examined (diet, exercise, etc.), and their results are mixed. Thus, it seems that is not possible to generalize as to the effectiveness of health education in changing college students’ health behaviors.

Welle and Kittleson (1994) compared the effect of lecture-based health education courses with physical education courses on measures of students’ overall wellness in a large public university. In this analysis, they examined five different teaching methods. The five lecture-based health courses were 3 credit hours each, taught over a 10-week period. They covered the same material and required the same reading assignments. Three of these sections, however, followed only the usual lecture and discussion format, while two devoted one-third of class time to student groups working on specific goals in the areas of diet, exercise, stress management, or stopping smoking. The five physical activity courses were one credit each, meeting twice per week for 10 weeks. Two of them were jogging classes, two focused on non-impact activities such as swimming, and one was a general conditioning course. A three-credit physical education lecture course served as the control group. Students were tested at the beginning and end of the ten weeks using a 70-item wellness assessment survey. Significant increases in posttest scores were seen in all five lecture-based health courses (n = 177), but not in the physical education courses (n = 85) or in the control group (n = 18). No significant differences were seen between the two teaching methods used in the lecture-based health courses. No significant differences were observed for differences in age, class, or gender.

The purpose of Grimm’s study (1996) was to compare the impact of traditional lecture-based college health courses with those that added behavior contracting on
students’ health behaviors. She used a quasi-experimental design, giving a pretest at the beginning of the course, a posttest at the end, and a follow-up test 3 months later to 210 students. The 75-item survey was adapted from national youth health behavior surveys administered by the Centers for Disease Control and Prevention and the American College Health Association. The instrument assessed students’ perceived locus of control over their health, and behaviors related to diet, exercise, weight control, stress management, addictive and abusive behavior, and unintentional injuries. The first treatment group was the traditional lecture-based health course that met three times per week for 10 weeks, and presented a variety of health topics. The second treatment group was the same lecture-based health course, but with students doing behavior contracts in (a) diet, exercise, and weight management, (b) stress management, (c) addictive or abusive behaviors, or (d) unintentional injuries, according to their choice following a health risk assessment. The control group consisted of English composition students not enrolled in the health course.

Grimm’s (1996) results showed no significant difference in perceived locus of control at posttest or follow-up compared with the pretest. There were significant improvements in scores at posttest for both treatment groups compared with controls in behaviors related to diet, exercise and weight control, but no differences in stress management practices, addictive and abusive behaviors, or in behaviors related to unintentional injuries. When comparing treatment groups, the treatment group that did behavior contracts relating to diet, exercise, and weight control showed a significant difference between pretest and posttest for total scores, whereas there was no significant difference for the lecture-only group, or other behavior contract groups. The author
concluded that “behavior contracts in the area of diet, exercise and weight control were effective in producing behavior change” (Grimm, 1996, p. 91). Significant differences existed between genders in the areas of stress management, addictive and abusive behaviors, and unintentional injuries with males showing higher levels of stress than females, and greater risk taking in terms of addictive and abusive behaviors and unintentional injuries.

Marion Askegaard (2000) studied the effect of a college wellness course on students’ knowledge, attitudes and behaviors in the areas of nutrition, physical activity, and stress management. The course was a mix of classroom instruction, physical activity, and evaluation, including fitness assessment labs. Different sections of the course met two or three times per week for 8 weeks. Thirteen sections were included in the study, and 348 students completed the 69-item instrument for both the pretest and posttest. Significant differences were seen between pretest and posttest for knowledge in physical activity, nutrition, stress management, and overall. Though improvements were seen for attitudes in physical activity, nutrition, stress management and overall between pretest and posttest, none of these changes were statistically significant. Significant differences were seen between pretest and posttest for reported behaviors in physical activity, nutrition, and overall, but not for stress management. Attributes such as gender, class standing, and ethnicity were also analyzed. Upperclassmen scored significantly higher than freshmen in both pretest and posttest in nutrition and total knowledge. Females scored significantly higher than males at posttest in stress management knowledge, and at both pretest and posttest in attitudes relating to nutrition and total wellness. At both pretest and posttest, females scored significantly better in nutrition behaviors, while
males scored higher in behaviors relating to physical activity. No differences were seen by ethnicity; however, over 90% of students were White.

Gender differences in regard to dietary practices were also observed in a health-needs assessment administered to 94 undergraduate college students. Males ate more fast food and more animal and dairy products than females, and were less likely to use the food pyramid to guide their food choices (Cason, 2002). Thomas (2006) studied the knowledge, attitudes, and behaviors related to calcium consumption of 46 female college students in a women’s wellness course. Thomas hypothesized that there was a positive relationship between a young woman’s knowledge of calcium and the health benefits of milk, and milk consumption, and that an educational intervention that focused on improving that knowledge would result in an increased consumption of milk. One of the research questions was, “To what extent does an educational intervention increase knowledge regarding calcium and improve milk intake?” (p. 5). The educational intervention consisted of lecture and activities relating to calcium and the health benefits of milk incorporated into an 8-week women’s wellness course. The pretest and posttest were given during the first and last weeks of the course, respectively. Results did not support a relationship between knowledge of calcium or the health benefits of milk and milk consumption. Thomas also found no increase in milk consumption after instruction.

Gines (2006) examined the effect of a required semester-long college health course on students’ health choices and health behaviors. Course content included topics such as nutrition, physical activity, and safe lifestyle choices. Research questions focused on the likelihood that a student would change his or her health behavior for the better
following the health course, which gender would be more likely to change behaviors, whether ethnicity or personal history would influence a person’s level of behavior change, and what variable (nutrition, physical activity, or substance abuse) would show the most behavior change. A pretest and posttest at the beginning and end of the course were used to assess behavior change. Over three school years, 257 students completed both surveys. An analysis of the results showed no significant changes between pretest and posttest for any of the behaviors tested. These included aerobic activity, strength training, level of exercise, breakfast consumption, eating at least five fruits and vegetables per day, frequency of fast food meals, and alcohol and drug use. The only significant difference by gender was that men drank significantly more alcohol than women. No significant differences were seen between groups by ethnicity or personal background.

Jackson and Howton (2008) undertook a study of physical activity among 326 students enrolled in a required health and fitness course in a large public university. The intervention was a requirement for students to wear a pedometer at least 5 days per week for 12 weeks and log their steps onto a spreadsheet. Grades were not dependent on results. Students were instructed in goal setting and behavior change at the beginning of the course. They were also given tips for increasing steps, ideas for walking workouts, and information regarding walking trails in the area. Of the 290 students who qualified for the final analysis, results showed significant increases in the average number of steps per day at week 6 and at week 12, compared with week 1, in underweight, normal weight, and overweight groups. Interestingly, underweight students averaged fewer steps per day than did overweight students, and significantly fewer steps than normal weight.
participants. The pedometer program was considered to be a useful intervention for encouraging physical activity, in that at the beginning of the course, 65% of participants were classified as sedentary or low active, while at the end, only 25% fit this classification.

Andrews University’s Office of University Assessment conducted a study several years ago to assess the outcomes of its wellness and fitness curriculum at that time (Williams, 2000). A wellness survey was given during the 1999-2000 school year to graduating seniors who had completed one of three different options for the wellness/fitness component of the general education curriculum. Those options were three 1-credit wellness courses; one 3-credit wellness course; activity courses only; or another combination of these. Results were as follows. Of 178 females and 125 males, the mean BMI was 23.9 for females, and 23.6 for males. Exercise levels showed significant differences between men and women. During the 7 days prior to the survey, students engaged in vigorous activity on 2.2 days overall, with 2.0 days for females and 2.5 days for males; and engaged in moderate activity on 2.8 days overall, with 2.7 days for females and 3.0 days for males. During the 7 days prior to the survey, students engaged in strength training on 1.9 days overall, with 1.8 days for females and 2.0 days for males. In the 30 days preceding the survey, 9 of 291 students reported smoking cigarettes; and 47 of 290 had had at least one drink of alcohol; with 7 responding that they had consumed five or more drinks on a single occasion. There were no significant differences between groups taking the various options (A. Williams, personal communication, September 5, 2007). A major limitation of the study was that no type of
baseline data had been collected when students began their studies at Andrews University.

**Use of the Transtheoretical Model in Health Education Research**

In a discussion of his research results on behavior change, Gines (2006) noted that many students in a health education course may be in early stages of change for a health behavior, as described by the transtheoretical model, and not be ready for action. According to Prochaska et al., “fewer than 20% of a problem population are prepared for action at any given time” (1994, p. 15). Assessment instruments that measure only behavioral endpoints are not able to identify these students. Much of the focus of health education, however, is on increasing knowledge and raising awareness, both of which must precede behavior change. From the instructor’s viewpoint, students who move from naivety or resistance to an awareness of their need to change unhealthy behaviors have taken a big step in the right direction. There must be some method by which to measure this progress as well. The identification of stage of change can be useful for describing the practices of individuals, for targeting health education, and as an outcome measure, as will be illustrated in the following paragraphs (Bulley et al., 2007).

As a descriptive tool, stage of change was used to assess the health behaviors in a convenience sample of 98 women college students at one Midwestern university (Clement, Schmidt, Bernaix, Covington, & Carr, 2004). Interestingly, results showed an unusually high percentage engaging in recommended amounts of physical exercise (20 minutes or more, 3 or more days/week) compared to the general population. Of these young women, only 0.8% were in precontemplation, 17.2% were in contemplation,
23.3% were in preparation, 38% were in action, and 20.7% were in maintenance. The results of this descriptive study were useful for helping to focus health education efforts.

At another university, college women were assessed for their readiness to eat fruits and vegetables using the stages of change combined with a food frequency instrument (Chung et al., 2006). Young women, ages 18-24, were recruited from a college nutrition course. From the 236 who completed the surveys, results showed 6.8% in precontemplation for eating two or more fruits per day, 12.6% in contemplation, 15.3% in preparation, 15% in action, and 50.3% in maintenance. For eating three or more servings of vegetables per day, 20.1% were in precontemplation, 16.6% were in contemplation, 21.8% were in preparation, 6.8% were in action, and 34.7% were in maintenance.

Karen Horneffer-Ginter (2008) did a descriptive study of college students enrolled in a general education health course using the stages of change. She assessed students’ habits in the areas of exercise, diet, smoking, alcohol, managing stress, and managing depression. She found that the majority of the 304 students were in precontemplation, followed by contemplation, for dietary change. By contrast, very few were in precontemplation for exercise. Most were in maintenance, followed by action for exercise. Most students (70%) did not smoke. The majority of students were in precontemplation for alcohol use. The majority (50%) were in maintenance for stress management. Most students reported no problems with depression. The next highest group was in maintenance for managing depression. The majority of students answered that they were in maintenance in regard to managing stress. She found positive correlations between diet and exercise, and between smoking and alcohol consumption.
Horneffer-Ginter notes the importance of assessing the stage of change for each different target behavior to best plan health promotion efforts, since Prochaska’s general population guidelines of 40% in precontemplation, 40% in contemplation, and 20% prepared for action may not hold true for a particular behavior in a particular group of subjects (2008, pp. 353, 355).

Suminski and Petosa (2002) used the stages of change to assess differences between men and women, and between different ethnic groups for regular exercise (20 minutes or more for 3 or more days per week). The sample consisted of 3,099 students enrolled in the university’s required health and fitness course over the period of 1 year. Men were more likely to be in maintenance than women, and less likely to be in contemplation. The distribution for all women was 16% precontemplation, 20.5% contemplation, 46.7% preparation, 13.6% action, and 16.9% maintenance. Significant differences existed between women of different ethnic groups in precontemplation, contemplation, and maintenance, with Asian women making up more of the precontemplators, and White women making up less of the contemplators and more of the maintainers. The overall stage distribution for men was 2.9% in precontemplation, 14.8% in contemplation, 44.8% in preparation, 12.5% in action, and 25.0% in maintenance. Significant ethnic differences occurred in contemplation, action, and maintenance stages, with Asian men making up the lowest proportion in the action stage, and Blacks making up the lowest proportion of the contemplators and the highest proportion of the maintainers.

An important part of Suminski and Petosa’s study (2002) was that participants’ identified stages of change were compared with self-reported physical activity levels.
(over the previous month). The results of this comparison show that errors can occur in classification. Based on the previous month’s activities, 22.5% of active Asian women, and 21.0% of active Hispanic women, compared with only 9.7% of active White women, were not classified accordingly in the stages of change. Among the men, 17.8% of active Asians, and 15.7% of active Hispanics, compared with 11.5% of Whites and 8.9% of Blacks, were not classified accordingly in the stages of change. More importantly, 71.4% of sedentary Black men were misclassified in the stages of change. Overall, 25% of Asians, 22.5% of Hispanics, 21.5% of Blacks, and 17.8% of Whites were misclassified. As the authors note, classification errors using the stages of change could have been partly due to inaccurate reporting on the physical activity questionnaire.

In the Working Well Trial (Sorensen et al., 1996), the transtheoretical model’s stages of change, along with consumer information processing, social cognitive theory, and diffusion of innovations theories were employed to develop and test a worksite nutrition program. To meet the needs of workers in varying stages of change, the 2-year intervention had three distinct phases: health promotion and raising awareness, giving skills training, and maintaining health behaviors and preventing relapse. Workers completed self-assessments, received materials and education, and participated in events and contests. The cafeteria menu and vending machine fare were also modified to provide healthier food choices. The control worksites received only the result summary of an employee health survey, and printed health materials and newsletters. Workers at both control and treatment worksites were eating less dietary fat at follow-up, but the worksites receiving the intervention made significantly more progress than did the control groups. The treatment group also showed a small but significant increase in fruit
and vegetable consumption at follow-up. This increase translated into one additional daily serving of fruit or vegetables for every fifth person.

Cardinal and Spaziani (2007) studied the effectiveness of a theory-based college fitness course on modifying students’ exercise behavior outside of class when instruction was tailored to meet the needs of students in each stage of change. An earlier study of the course, prior to its application of the transtheoretical model, had shown “little positive influence on students’ outside of class exercise behavior” (2007, para. 3). Research was conducted over 10 weeks with 67 students enrolled in a classroom-based version of the course, 15 students in the web-based version, and 69 controls from a separate college. Results showed significant differences between treatment and control at posttest, with the classroom-based intervention group showing a 133% increase in exercise behavior, and the web-based intervention group showing a 53% increase compared with controls.

Fischer and Bryant (2008) used stages of change to investigate the effect of a semester of personal trainer services on exercise behavior in female college students. The exercise criterion was 20 minutes or more of exercise at least 3 times per week. In both the experimental group (31 students who received personal trainer services) and control group (31 who did not receive personal trainer services), there was 1 student in precontemplation, 1 in contemplation, 4 in preparation, 7 in action, and 18 in maintenance at the pretest. At the follow-up, 3 in the experimental group maintained their sedentary status (stages 1-3), 3 progressed into action or maintenance, 22 maintained their active or maintenance status, and 3 regressed (back to stages 1-3), compared with 6 controls who maintained sedentary status, 0 who progressed, 15 who maintained active or maintenance status, and 10 who regressed. This difference between the experimental
group and controls was significant, and controls had significantly more stage regression
by the end of the semester.

**Conclusion**

After reviewing the literature, it appears that most studies on the health behaviors
of college students focus on actual behaviors. I found few studies that used the
transtheoretical model to assess students’ stages of change. Among those that did, stage
information was often used to inform instruction rather than being used to assess a
difference in readiness to change from the beginning to the end of a course. However,
since change is a process that occurs over time, a change of stage can be a significant step
for an individual. This information is crucial to truly understand the effectiveness of
health instruction.

Many of the studies in the literature focused on only a few health behaviors, or
even on only one. Health and wellness instruction in colleges, however, is multifaceted.
To truly determine the effectiveness of instruction, it is important that the majority of
health behaviors promoted in a course be examined. In addition, students enter health
instruction with different needs, being well grounded in some healthy behaviors, while
needing improvement in others. Therefore, this study assessed students’ stages of change
for nine health behaviors promoted in the Fit for Life course at the beginning and end of
the semester to look for evidence of behavior change.
CHAPTER III

METHOD

College health education is considered to be an important means of delivering health messages to the population. The effectiveness of college health education, however, in terms of changing the health behaviors of students, is often not known, particularly in individual colleges and universities. Studies of individual programs have shown mixed results across a variety of health behaviors. A major challenge of measuring behavior change that results from health education is one of time. The duration of a college course is generally 10 to 15 weeks. Changing one’s behavior, however, is a process that may take much longer than the length of a college term. Those students who are changing attitudes and preparing to make a behavior change are not detected by behavioral measures, yet their change is no less significant to the health educator. A study of behavior change must take into account the stages of change that a person goes through to truly assess the effectiveness of a course. Few studies have used the transtheoretical model to measure change from the beginning to the end of a course. No study has been done to determine the effectiveness of the one-credit general education health course at Andrews University in changing students’ health behaviors.

The purpose of this study was to determine the degree to which students enrolled in HLED120 Fit for Life adopted the health behaviors promoted in the course. The transtheoretical model of behavior change (Norcross & Prochaska, 2002; Prochaska et al.,
1998; Prochaska et al., 1994) was chosen as the framework for this study because of its attention to the stages of change that people go through before their successful adoption of a new behavior. Forward movement through the stages for any one behavior indicates that a student is in the process of adopting that particular behavior. The stages of change identified in this study, in order of occurrence, are precontemplation, contemplation, preparation, action, and maintenance. Through this study, I evaluated the effect of the Fit for Life course on students’ health behaviors.

This chapter describes the methodology used in the study. It includes information about the research design, the sample, limitations and delimitations, and the analysis of data.

**Research Questions and Hypotheses**

The primary research question was, “To what extent have students moved through the stages of change by the end of the course, for each of the health behaviors promoted?” The health behaviors promoted in the course, and included in this study, were eating a healthy diet, eating fruit and vegetables, getting regular exercise, preventing depression, managing stress, not smoking, not drinking alcohol, avoiding caffeine, and getting enough sleep. The research question arose from the hypothesis that individual students would show forward movement through the stages of change for one or more health behaviors by the end of the course. The null hypothesis was that no change would occur.

There were two subquestions addressed in this study. The first subquestion was, “What influence, if any, do gender, ethnic background, class standing, or previous exposure to health education have on students’ stages of change?” This question was
based on the realization that students come into a course with varying backgrounds, which may affect their health behaviors. The second subquestion was, “What changes in health behavior are attributable to the course?” This question was important to link the movement that students made through the stages of change for the various health behaviors with the activities of the course. The desired effect was that the Fit for Life course had an effect on students’ health behavior changes. Both of these questions were exploratory in nature.

**Research Design**

This was a descriptive evaluation study utilizing a mixed-methods approach with simultaneous quantitative and qualitative methodology. The quantitative aspect employed survey methodology in a quasi-experimental, non-equivalent control group, pretest/posttest design. The qualitative side of the study used interviews to collect data in a multiple case study design.

In a community setting, such as exists at a university, many factors contribute to students’ knowledge and attitude formation and, thus, their development of particular behaviors. Goodman (2001) notes that in such a setting, it is not possible to regulate these multiple factors, as is done in experimental research. Multiple methods of data collection enhance understanding, and are important for validating results through triangulation, or cross-checking (Creswell, Plano Clark, Gutmann, & Hanson, 2003; Goodman, 2001; Guba & Lincoln, 1981; Johnson & Christensen, 2004; Yin, 1994). In this study, quantitative and qualitative methods were used concurrently, with the qualitative data being used to validate and corroborate the quantitative (Creswell et al., 2003; Greene, 2007, Yin, 1994). Quantitative measures describing what movement students made
towards adopting healthy behaviors were complemented by qualitative data to provide a better understanding of how students’ health behavior changes were related to the course (Creswell et al., 2003; Greene & Caracelli, 2003). This approach recognized the social context in which this study occurred, and methods were chosen to maximize the ability to draw conclusions from the data.

This study was both descriptive and evaluative. According to Best and Kahn (2003), descriptive research is particularly suited for the behavioral sciences and describing what happens in real-life settings such as a classroom. Through this study, I sought to describe the changes that occurred in students’ health behavior from the beginning of enrollment in Andrews University’s health and wellness course to the end. More specifically, I was looking for students’ movement through the stages of change that precedes obvious behavior change (Prochaska et al., 1994). Part of the descriptive aspect of this study was also exploratory in nature, in that I sought to determine what differences in health behaviors might exist, if any, by gender, ethnicity, class standing, or prior exposure to health instruction among Andrews University’s students. This study was also an objectives-oriented evaluation (Fitzpatrick, Sanders, & Worthen, 2004). One of the University’s general education goals is that students will “apply the principles of health and fitness to their own lives” (Andrews University, 2009, p. 38). Through this study I sought to evaluate the effectiveness of the course, Fit for Life, on the achievement of that goal by looking for evidence that students are adopting the health behaviors promoted in the course, and by soliciting direct student input as to how the course has impacted their health behaviors. The behavioral outcomes that the course seeks to promote are regular exercise, eating a healthy diet that supplies sufficient calories and is
low in fat, eating at least five fruits and vegetables daily, getting enough sleep, not smoking or drinking alcohol, avoiding caffeine, managing stress, and preventing depression.

The quantitative aspect of this study employed survey methodology in a quasi-experimental, non-equivalent control group, pretest/posttest design. Surveys are well suited to the collection of information for describing particular characteristics of a population at a particular time (Best & Kahn, 2003; Creswell, 2003; Fowler, 2002; Yin, 1994). Data can be obtained quickly from many participants. Changes in the participants' characteristics can be identified by administering the survey at two different times, as is done with a pretest and posttest (Best & Kahn, 2003). When it is not possible to randomize participants, or to control extraneous variables, as was the case with this study, a quasi-experimental design is most appropriate for collecting quantitative data and making inferences regarding the effectiveness of the treatment (Cohen, Manion, & Morrison, 2007; Johnson & Christensen, 2004; Mertens, 1998; Wiersma, 1995). A control group experiencing the same conditions as the study group, except for the treatment of the course, and tested in the same way, at the same times as the study group, was used to improve internal validity of the study (Mertens, 1998). In this study, a pretest and a posttest were administered to students enrolled in Fit for Life, as well as to the non-equivalent control group of students who were not enrolled in the course. This was done in order to identify changes in behavior occurring during the course, and to determine what health behavior change was unique to those who were enrolled in Fit for Life in the spring of 2009. Two open-ended questions were included on the posttest to get the students’ perspectives (Johnson & Turner, 2003) as to what behavior changes they
attributed to the course and what other events may have had an influence on their health behaviors.

The qualitative aspect of this study involved multiple case studies. Qualitative methodologies are useful in natural settings such as a classroom because of the in-depth understanding they can provide (Mertens, 1998). A case-study design is a good way of providing that in-depth understanding (Creswell, 1998; Fitzpatrick et al., 2004; Lincoln & Guba, 1985), particularly when there are many outside influences that cannot be controlled by the researcher (Yin, 1994). In this study, selected students were interviewed at the beginning and end of the course to gain their personal perspectives on health and determine how the course affected them in terms of their health behaviors (Creswell, 1998). Face-to-face interviews allowed me to lead the discussion along the lines that were most productive and related to the topic (Creswell, 2003; Yin, 1994). People are more likely to discuss a topic in detail with someone during an interview than they are to write their feelings on paper. Thus, interviews can be an excellent means for collecting rich qualitative data (Best & Kahn, 2003; Lincoln & Guba, 1985). Most important, through interviews, inferences can be made about perceptions of causation (Yin, 1994), which was crucial for evaluating the effectiveness of the course. While the quantitative methodology was used to detect and describe behavior change in Fit for Life students, quantitative methodology alone would be weak at attributing change to the course because of the many variables that could not be controlled in this natural school setting. The inclusion of qualitative methodology in this study allowed me to make connections between behavior change outcomes and the course (Creswell et al., 2003; Mertens, 1998; Yin, 1994).
The Sample

The population of interest was students at Andrews University who enroll in the required general education health course, HLED120 Fit for Life. Students are encouraged to take the Fit for Life course in the first 2 years of their studies. Thus, the course has a larger percentage of freshmen and sophomores than the general undergraduate student population. The convenience sample for the survey aspect of this study consisted of 132 students from three sections of Fit for Life, and 138 students from eight sections of English composition in the Spring 2009 semester. Participants were those students, aged 18 and older, who were present in the Fit for Life course during the first and last weeks of the semester, and submitted a survey on both occasions. The non-probability, convenience sample was appropriate for this study, since it was not possible to predetermine or select which students would be enrolled in the course during the research (Best & Kahn, 2003). The non-equivalent control group was recruited from the general education English composition courses, with the hope that the distribution by ethnicity, gender, and class standing would be similar to that of students enrolled in the Fit for Life course.

A sample of five Fit for Life students was purposefully chosen for the multiple case studies from among the 30 who indicated at the end of the pretest that they would like to volunteer for further involvement in the study (Creswell, 1998; 2003). Students were chosen to represent different stages of change in the various health behaviors, as well as to represent both genders, different class standings, diverse ethnicities, and varying backgrounds in health. Four of the five initially chosen responded positively, but one did not reply. Therefore, a replacement was chosen for that person.
Survey Instrument

The survey chosen for this study was the Health Risk Intervention survey produced by Pro-Change Behavior Systems, Inc. (1999). Health behavior surveys such as the Youth Risk Behavior Survey (National Center for Chronic Disease Prevention and Health Promotion, Division of Adolescent and School Health, 2008) and the National College Health Assessment (ACHA, 2008), and the Behavioral Risk Factor Surveillance System Questionnaire (National Center for Chronic Disease Prevention and Health Promotion, 2007) have proven useful in providing data on the health behaviors of children, teens, college students, and adults in the United States. However, in order to be more sensitive to the change process itself and be able to detect movement towards behavior change, the transtheoretical model (Prochaska et al., 1994) was more appropriate.

The Health Risk Intervention survey (Pro-Change Behavior Systems, Inc., 1999) is a validated instrument that uses the principles of the transtheoretical model to determine stages of behavior change as well as whether or not individuals practice specific health behaviors. For each behavior, validation was done through studies comparing other predictors of change, such as decisional balance, self-efficacy, and processes of change, and by comparing stage results with behavioral frequency (Pro-Change Behavior Systems, 2004). The survey assesses practices and stages of behavior change for the healthy behaviors of getting regular exercise, eating a healthy diet that provides appropriate calories and is low in fat, eating five or more fruits and vegetables per day, taking steps to prevent depression and manage stress, drinking alcohol in moderation, and not smoking.
To meet the needs of this study, some modifications and additions were made. The question on alcohol was changed to ask about total abstinence, to reflect what is promoted in the course. One of the answer choices for the question on smoking was omitted in order to make the question more appropriate for the college-age group, since it referred to having quit smoking more than 5 years earlier. One question was added to assess regular caffeine use, and two were added to assess sleep. The questions were reviewed and approved by Dr. Janice Prochaska, president and CEO of Pro-Change (personal communication, October 14, 2008). They were also shared with six colleagues involved in some form of wellness education. According to their suggestions, some changes were made in wording (E. Cross, M. Hernandez, L. Merklin, P. Pribis, R. Thomas, D. Wakefield, personal communication, October 14-18, 2008). In particular, one of the questions on sleep was divided into three questions for better clarification. Besides the behavioral questions, demographic questions regarding gender, ethnicity, class standing, height and weight, and a question about previous health education were included on the survey instrument to further describe and classify the sample.

Open-ended questions were included on the posttest to provide information on the influence of the course, Fit for Life, and other outside events on health behaviors. For the Fit for Life group, the two questions were, “What changes have you made in your health behaviors/practices as a direct result of HLED120 Fit for Life?” and “Other than this course, what other events have affected your health behaviors/practices this semester?” For the control group, only one question was used. That question was, “What events of this semester (films, health day, fitness club membership, etc.) have caused you to change your health behaviors/practices or your attitudes about them? Please explain.” The
complete survey, minus the open-ended questions described here, is presented in Appendix A.

**The Fit for Life Course**

The treatment in this study was the one-credit general education health and wellness course, Fit for Life. The course is designed to inform students about health and wellness. The course description says that the course is “a balanced up-to-date coverage of all critical areas of wellness including physical fitness, nutrition, weight management, stress, cardiovascular disease, cancer, addictions, and injury prevention. Practical tools will be given to help [students] adopt healthier lifestyles” (Andrews University, 2009, p. 190).

Within the Fit for Life course description, teachers have the freedom to personalize the course and make it their own. Two instructors taught Fit for Life in spring of 2009. They created their own course outlines, and chose their own course materials. Each teacher had a different content focus, used a different approach, and taught the course from a different philosophical base. The differences between the two teachers, designated Teacher A and Teacher B, are discussed in the following paragraphs.

Teacher A’s course was multidimensional in scope, with a different aspect of health and wellness being addressed each week. The course objectives (Anonymous Teacher A, 2009, p. 1) were for students to be able to:

- Understand the relationship between lifestyle and health
- Embrace healthful nutrition and exercise in personal life
- Develop strategies to integrate positive lifestyle principles into daily living
- Apply simple stress management techniques
- Grow closer to God
The textbook was created by the instructor for the course and was printed at the university, and its chapters correspond with classroom topics. A list of the weekly topics, taken from the course outline, is shown in Table 1.

The stated purpose of Teacher B’s course was “to provide an opportunity to develop and implement a personal wellness program of nutrition, physical activity, stress management, and spiritual enrichment” (Anonymous Teacher B, 2009, p. 1). The course objectives (Anonymous Teacher B, 2009, p. 1) were for students to be able to:

- Understand the relationship between lifestyle and health
- Understand the significance of developing a regular exercise program in pursuit of a wholesome way of life
- Embrace a complete exercise program and healthful nutrition in their personal life
- Develop a personal fitness plan and monitor the progress effectively
- Develop strategies to integrate positive lifestyle principles into daily living, incorporating the dimensions of wellness

Teacher B’s course had a strong emphasis on physical fitness. Nine of the 15 class periods corresponded directly with the eight chapters of the fitness-oriented textbook (Fahey, Insel, & Roth, 2009). A list of the weekly topics, taken from the course outline, is shown in Table 1.

Ewles and Simnett (1985) identify several approaches to health education. The “social change approach” aims at changing the “environment to facilitate the choice of healthier life-styles” (p. 34). The “medical approach” is more of an intervention for a person whose health is compromised. The “educational approach” to health education is to “give knowledge and ensure understanding of health issues, based on the notion that this will enable well-informed decisions to be made and acted upon” (p. 32). By contrast, the “behavior change approach” to health education seeks to change attitudes and
Table 1

*Course Topic Schedule by Teacher*

<table>
<thead>
<tr>
<th>Teacher A</th>
<th>Teacher B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction</td>
<td>1. Introduction to course</td>
</tr>
<tr>
<td>2. Healthy nutrition</td>
<td>2. Introduction to wellness, fitness, &amp; lifestyle management</td>
</tr>
<tr>
<td>3. Water</td>
<td>3. Principles of physical fitness</td>
</tr>
<tr>
<td>4. Rest</td>
<td>4. Cardiorespiratory endurance, 1</td>
</tr>
<tr>
<td>5. Relationships</td>
<td>5. Cardiorespiratory endurance, 2</td>
</tr>
<tr>
<td>7. Sunshine &amp; air</td>
<td>7. Flexibility and low-back health</td>
</tr>
<tr>
<td>10. Optimism</td>
<td>10. Nutrition</td>
</tr>
<tr>
<td>11. Exercise</td>
<td>11. Alcohol/caffeine/substance abuse</td>
</tr>
<tr>
<td></td>
<td>15. Interpersonal wellness/relationships</td>
</tr>
</tbody>
</table>
behaviors, so that students adopt healthy lifestyles. The “client-directed approach” works with individuals to help them identify their specific needs and make their own choices. In practice, several approaches may be appropriate.

Cottrell et al. (1999) discuss five major philosophies of health education that have been identified over approximately 50 years of study. The predominant philosophy is a decision-making philosophy, which presents students with cases and situations to stimulate discussion, encourage critical thinking, and help them to seek a best solution. The second preferred philosophy is that of behavior change, using goal setting, behavior contracts, and self-monitoring. Third is the social change philosophy, in which the educator emphasizes “creating social, economic, and political change that benefits the health of individuals and groups” (Cottrell et al., 1999, p. 83). Fourth is the freeing/functioning philosophy, which tries to “free people to make the best health decisions possible based on their needs and interests” (Cottrell et al., 1999, p. 83). The least preferred philosophy among health educators is cognitive based, focusing on presenting facts and increasing students’ knowledge. Again, educators may use more than one philosophy according to what they perceive is the best fit for the situation.

Teacher A reported taking the educational approach first and the behavior change approach second. Teacher A’s philosophy for this course was primarily cognitive-based, followed by the freeing/functioning philosophy. Teacher A reported using the decision-making philosophy as third, however this was in a more general sense, since discussion, a key element of this philosophy, was not part of the teaching strategy (Anonymous Teacher A, personal communication, April 2009). In accordance with the identified approaches and philosophies, classes with Teacher A consisted of lecture and PowerPoint
presentations. Course requirements included two unit exams and a comprehensive final, worth 300 of the 540 points; the MicroFit evaluation (a fitness assessment), worth 100 points; attendance, worth 70 points; and weekly quizzes, worth 70 points total (Anonymous Teacher A, 2009).

In terms of the transtheoretical model, Teacher A’s style is particularly suited to moving students through the early stages of behavior change, by initiating the experiential processes of change (Prochaska et al., 1994). Teacher A provides students with information about important health problems, and how these problems can be prevented, thereby increasing students’ knowledge and understanding, and raising their consciousness of crucial health issues. Students learn the risks and benefits of particular behaviors, and how these behaviors can affect them personally. Statistics presented from current health research give a powerful testimony to the benefits of healthy behaviors. Thus, students may experience dramatic relief as they realize their own susceptibility to poor health, and that they may prevent illness by adopting healthy behaviors.

Teacher B reported using the behavior change approach first, the educational approach second, and the client-directed approach third. Teacher B’s philosophy was said to be an equal mix of the behavior change and decision-making philosophies, with some aspects of the other philosophies included (Anonymous Teacher B, personal communication, April 2009). Teacher B used a combination of lecture, PowerPoint presentations, and discussion time. The major assignment was the FITT project, in which students were required to create a fitness plan, with goals for cardiorespiratory endurance, muscular strength and endurance, and flexibility; document how they followed their plan for 5 weeks; and reflect on the experience. Students also had to check their pulse, and
calculate their target heart rate zone. The FITT project was worth 30% of the grade. The rest of the grade was distributed as follows: 5% for the completion of the MicroFit, 40% for eight quizzes, 20% for the final exam, and 5% for students’ professionalism (Anonymous Teacher B, 2009).

Teacher B’s approach would initiate a mix of experiential and behavioral processes of behavior change for both the early and later stages of change (Prochaska et al., 1994). Through providing information about health and healthy behaviors, students’ consciousness would be raised about their own risks and the benefits of adopting healthy behaviors. Through discussions, students could engage in both self and social reevaluation. By having students set goals, keep records of their progress, and evaluate their experience at the end of the course, students experienced some counter-conditioning and reinforcement management. The minimum requirements that were set for exercise helped to push students into the action stage, whether or not they had progressed that far through the stages previously.

Data Collection Procedures

The survey instrument was administered twice during the spring semester to the Fit for Life classes and the English composition classes that served as controls. One administration was in January, during the first week of classes, and the other was done in April, during the last week of classes and the final exam week, according to teacher preferences. During the first administration, students signed an informed consent form to indicate their willingness to participate. Students were asked to put their student ID numbers on the surveys, which were then used to match pretests with posttests, and were
then removed for analysis. I personally collected all surveys and maintained them to protect identities.

Personal face-to-face interviews were arranged by email and telephone with the five selected Fit for Life students within 1 week after the first class period. Students were interviewed during the end of the 2nd week and in the beginning of the 3rd week of classes. Each of the students signed a consent form before the initial interview began. Follow-up interviews, also face-to-face, were arranged with the same five students via email, and were conducted during the second to last and last week of classes, as well as during the exam week, according to the students’ availability. The interviews were mainly unstructured and open-ended (Creswell, 2003) in format, using an interview guide approach (Johnson & Christensen, 2004; Johnson & Turner, 2003). Each interview was recorded and transcribed for reference and analysis (Creswell, 2003; Goodman, 2007). The interview protocols for the initial and follow-up interviews are available in Appendix B.

I, the researcher, was the instrument of data collection for interviews with each of the students involved in the case studies (Goodman, 2007; Mertens, 1998). There are both advantages and disadvantages to this arrangement. Since I had taught the course for the 3 years prior to the study, I am well acquainted with the course content (Yin, 1994) and with student responses to the content. For this reason, I believe that I had a good understanding of the type of information that would be helpful for the study. I also understood what questions to use to probe further or follow up on student responses. In addition, since I was not teaching the course during the semester of the study, I did not have the familiarity of being the instructor, so students could feel free to share things with
me that they might not have shared openly with the instructor. The disadvantages to me being the interviewer have to do with bias. Participant responses could be biased; as students might not have shared some sensitive information, and might have been inclined to give answers they believed I wanted to hear (Creswell, 2003). Knowing that this could happen, however, I was aware of the importance of avoiding facial expressions or responses that might have caused participants to interpret my emotions. The possibility also existed for researcher bias to interfere with the qualitative analysis and interpretations (Yin, 1994). By recording interviews, giving careful attention to transcription and coding of responses, and maintaining a constant awareness of the many factors that might contribute to behavior change, I attempted to keep the impact of my bias to a minimum. Though I did know the students’ survey responses to the pretest at the initial interviews, I did not know their posttest results at the second interview. Therefore, I had no foreknowledge that might bias my line of questioning for any particular student. In addition, since I had no personal connection to the department of Nutrition and Wellness during or immediately after my research, there were no personal benefits for achieving specific results.

**Treatment of Human Subjects**

Participation in the study was voluntary, by informed consent, for students 18 years or older. The age requirement was explained in the survey instructions, and students submitted their ages on one of the survey questions. Surveys submitted by students younger than 18 were destroyed. Students selected for interviews were also 18 years or older. Students were allowed to withdraw from the study at any time without penalty or fear of embarrassment. There were no known physical, psychological, or
social discomforts involved with participation in the study. Students who agreed to be interviewed were given $10 gift certificates to the University bookstore at the end of each interview as a token of thanks.

The rights and privacy of all subjects and controls were guarded carefully throughout the study. Surveys were kept anonymous by having students separate their completed survey from the informed consent form at the time of submission. Though student ID numbers were used on the surveys to match pretest with posttest, I had no access to student records, and made no attempt to determine student identities. Student ID numbers were removed for analysis. Students who volunteered for the interviews did provide their names and contact information at the time of the initial survey. However, I was the only one who had access to that information, and I did not share it with anyone. Teachers did not know who had volunteered or who were chosen for the interviews. All interviews were done privately, and information from individual surveys and interviews has only been disclosed anonymously to maintain confidentiality. Gender information and which teacher the interviewee studied with has been disclosed in this study to better understand the effect of the course. However, because of the number of students involved, it is not possible to identify any particular student from this information. All data were kept in a secure, locked location, accessible only by myself, and no identifying information has been disclosed about any individual.

**Analysis of Results**

Quantitative data obtained from the survey were analyzed descriptively and inferentially using SPSS 17.0 and AMOS 17.0 software. Responses to the two open-ended questions on the posttest were itemized and tabulated. Qualitative data obtained
from interviews with the five case studies were transcribed and coded using Weft QDA (Qualitative Document Analysis) software. Quantitative and qualitative data analysis procedures for each research question are described in greater detail in the following paragraphs.

To describe the demographics and health behaviors of the students in this study, and to answer the primary research question and the second subquestion, frequencies and Chi-Square analyses were the primary procedures used. Chi-Square is appropriate for categorical ordinal data, such as that produced in this study. Students’ health behavior practices and their stages of change for each behavior were determined from their ordinal responses to the questions for each health behavior (Appendix A). Posttest scores were compared with pretest, to look for changes in the score for each behavior. An increase in score, or forward movement, meant movement to adopt that particular health behavior, whereas a decrease in score, or backward movement, was understood to mean regression (Prochaska et al., 1998; Prochaska et al., 1994). Fit for Life students were compared with controls to determine what behavior change was unique to students in the course (Howell, 2007). In instances where metric numbers were available, such as for sleep times and the number of behaviors that students practiced or for which students made forward or negative movement through the stages, t tests were also used.

The structural equation modeling (SEM) program, AMOS, was used to answer the first research subquestion and to verify the second subquestion. Structural equation modeling is well suited to non-experimental data, because it is able to handle ordinal data that cannot be analyzed with ANOVA. It is particularly useful for analyzing correlations when there are multiple independent variables acting on multiple dependent variables,
and when some variables act as both cause and effect, since the entire model is evaluated together (Kline, 2005). The theoretical model of the potential relationships in this study is shown in Figure 3. The effects of students’ background information on each health behavior at pretest and the effect of instruction on each of the students’ health behaviors at posttest were tested to confirm or negate these potential relationships.

The second subquestion was also answered by tabulating responses to the two open-ended questions on the posttest. Responses to the open-ended questions were counted and compared with the rest of the survey results to get a better picture of the effect of the course on students’ health behaviors. A summary of the quantitative procedures for data collection and analysis for each research question is shown in Table 2.

Table 2  
*Summary of Quantitative Data Analysis Procedures*

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Data Collection Method</th>
<th>Analysis Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>To what extent have students moved through the stages of change by the end of the course, for each of the health behaviors promoted?</td>
<td>Survey instrument</td>
<td>Chi-Square; ( t ) test</td>
</tr>
<tr>
<td>What influence, if any, do gender, ethnic background, class standing, or previous exposure to health education have on students’ stages of change?</td>
<td>Survey instrument</td>
<td>SEM</td>
</tr>
<tr>
<td>What changes in health behavior are attributable to the course?</td>
<td>Survey instrument</td>
<td>Chi-Square; ( t ) test; SEM; Tabulation &amp; quantification of open-ended responses</td>
</tr>
</tbody>
</table>
Figure 3. The structural equation model (SEM) used for testing the potential effects of personal factors and the Fit for Life course on stages of change for each of the health behaviors.
Qualitative data from the case study interviews were transcribed and coded using Weft QDA software. I then interpreted the data using both inductive and deductive reasoning, looking for coherence and patterns, and examining contrasts and extremes to reach conclusions and rule out alternate possibilities (Creswell, 1998; 2003; Yin, 1994). A time-series analysis of individuals’ knowledge, attitudes, concerns, and expectations about their health and the course at the initial and final interviews was done to validate the changes seen in survey results (Yin, 1994). Increased knowledge, more positive attitudes, reduced concerns, and fulfilled expectations would all substantiate movement towards adoption of new health behaviors (Prochaska et al., 1994).

**Limitations and Delimitations**

There were several limitations involved with this study. As descriptive research, this study sought to describe what happened to students enrolled in the course, Fit for Life. One limitation was that it was not possible to randomize students into treatment versus control groups. The course Fit for Life is required of most undergraduate students, and they enrolled according to their schedule and personal choice. The second limitation was the small sample size in comparison to the numbers of students who take the Fit for Life course at Andrews University. Third, because this is a required course, students may or may not have been interested in the subject and may not have put their best effort into it, which may have affected results. Fourth, instructors for the course and methodology of teaching vary over the semesters and years, depending on faculty availability. It was not possible, therefore, to manipulate the treatment in any way. There may have been differences, too, in how each instructor affected students for change. Lastly, the movement that students made through the stages of change may or may not have been the
result of the instruction given in class. In this setting, it was not possible to control for outside influences that might have affected a student’s health behavior. While an experimental research design was not possible for this study, it is hoped that the quasi-experimental design coupled with the qualitative data were sufficient to make accurate interpretations concerning the effect of the course on students’ health behavior. Because of these limitations, however, results of this study, conducted in the spring semester of 2009, may not be generalizable to other semesters with other instructors.

This study was delimited to students at Andrews University who were enrolled in the Fit for Life course, and the control group of English composition students, during the spring semester of 2009, who voluntarily completed both a pretest and a posttest. The results and conclusions drawn from this study were for the purpose of evaluating students’ adoption of health behaviors while enrolled in this particular course. Therefore, no attempt has been made to include students in other health or activity courses on the same campus, or students from other schools.
CHAPTER IV

RESULTS

This chapter presents the results of this study. Information about the demographics of the participants is presented first. Next are results from the pretest and posttest surveys to address the primary research question. This is followed by the quantitative analysis of the data for the two research sub-questions. Lastly, the qualitative analysis of the five case studies is presented to specifically answer the question of what changes are attributable to the course.

The Sample

This study focused on students enrolled in the general education health course, Fit for Life, and a corresponding control group of English composition students, not enrolled in the health course. The sample consisted of students in all three sections of HLED120 Fit for Life (FFL) and eight sections of two English composition courses (five sections of the 1st-year course, and three of the 2nd-year course). Participants included those students who were present on the days the surveys were given, who submitted a completed survey, and who were 18 years of age or older. Two hundred and five students responded to the pretest, with 36 of these taking only the pretest and 169 taking both pre-and posttest. An additional 32 students responded only to the posttest. For the analysis, only those students completing both pretest and posttest were included. Total participation rates are shown in Table 3.
Table 3

*Participation Rates by Group and Survey*

<table>
<thead>
<tr>
<th>Group</th>
<th>Pretest only</th>
<th>Posttest only</th>
<th>Pretest &amp; Posttest</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>Fit for Life</td>
<td>13</td>
<td>11</td>
<td>18</td>
<td>15</td>
</tr>
<tr>
<td>Teacher A</td>
<td>7</td>
<td>12</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td>Teacher B</td>
<td>6</td>
<td>10</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>Control</td>
<td>23</td>
<td>19</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>15</td>
<td>32</td>
<td>14</td>
</tr>
</tbody>
</table>

Demographic information has been limited to the 169 students who took both pretest and posttest, and have been included in the analysis. During the 2008-2009 school year, the population of undergraduates consisted of 27% freshmen, 23% sophomores, 21% juniors, and 29% seniors (Andrews’ Department of Enrollment Management, personal communication, October 23, 2009). In this study, freshmen made up 46%, with a greater percentage in the Fit for Life group, while the percentages of juniors and seniors were lower than the undergraduate student population. Just over half (53%) of the participants were female, 89% were 18 to 22 years of age, and 81% had had a prior health course. Ethnically, 35% of participants were White, 27% were Black, and Hispanics and Asians made up most of the rest. In this study, 21% of students were overweight and 8% were obese. These figures were similar to the Spring 2008 NCHA figures of 22% and 10% (ACHA, 2009), respectively. Demographic details are shown in Table 4.
Table 4

Demographics of Participants (n = 169)

<table>
<thead>
<tr>
<th>Demographic Characteristic</th>
<th>Fit for Life</th>
<th>Control</th>
<th>Total Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>%</td>
<td>#</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>40</td>
<td>46</td>
<td>39</td>
</tr>
<tr>
<td>Female</td>
<td>47</td>
<td>54</td>
<td>43</td>
</tr>
<tr>
<td>Class Standing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freshman</td>
<td>46</td>
<td>53</td>
<td>32</td>
</tr>
<tr>
<td>Sophomore</td>
<td>20</td>
<td>23</td>
<td>31</td>
</tr>
<tr>
<td>Junior</td>
<td>12</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>Senior</td>
<td>9</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>23</td>
<td>26</td>
<td>23</td>
</tr>
<tr>
<td>19</td>
<td>27</td>
<td>31</td>
<td>20</td>
</tr>
<tr>
<td>20</td>
<td>12</td>
<td>14</td>
<td>20</td>
</tr>
<tr>
<td>21</td>
<td>10</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>22</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>23 &amp; older</td>
<td>14</td>
<td>16</td>
<td>5</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>33</td>
<td>38</td>
<td>27</td>
</tr>
<tr>
<td>Black</td>
<td>17</td>
<td>20</td>
<td>28</td>
</tr>
<tr>
<td>Hispanic</td>
<td>15</td>
<td>17</td>
<td>13</td>
</tr>
<tr>
<td>Asian</td>
<td>15</td>
<td>17</td>
<td>10</td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Prior Health Course</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>22</td>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>Yes</td>
<td>65</td>
<td>75</td>
<td>72</td>
</tr>
<tr>
<td>Body Mass Index(^a)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>6</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Normal Weight</td>
<td>54</td>
<td>62</td>
<td>52</td>
</tr>
<tr>
<td>Overweight</td>
<td>18</td>
<td>21</td>
<td>18</td>
</tr>
<tr>
<td>Obese</td>
<td>6</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

Note. Demographic information is for participants who took the pretest; percentages that do not add up to 100% are due to rounding.

\(^a\)Numbers for Body Mass Index do not include 5 missing cases.
Primary Research Question

The primary research question was, “To what extent have students moved through the stages of change by the end of the course, for each of the health behaviors promoted?” The stages of behavior change that were examined in this study are precontemplation, contemplation, preparation, action, and maintenance. The health behaviors promoted in the course, and included in this study, were eating a healthy diet, eating fruit and vegetables, getting regular exercise, not smoking, not drinking alcohol, avoiding caffeine, preventing depression, managing stress, and getting enough sleep. The research question arose from the hypothesis that individual Fit for Life students would show forward movement through the stages of change for one or more health behaviors by the end of the course. The null hypothesis was that no change would occur.

Getting Regular Exercise

The first healthy behavior was getting regular exercise. Regular moderate exercise was defined as any planned physical activity of 30 minutes or more that increased breathing rate and caused a light sweat, and was done five to seven times per week (Pro-Change Behavior Systems, Inc., 1999). Exercise rates are shown in Table 5. Among all of the participants, 48% reported getting regular exercise at pretest and 63% at posttest. Fit for Life students were slightly higher at posttest (69%) compared with controls (57%), but this difference was not significant. There was, however, a significant difference at posttest between students with different Fit for Life teachers ($\chi^2(1) = 3.940$). Of the students enrolled with Teacher B, 78% reported getting regular exercise at posttest, compared with 58% of students with Teacher A.
Table 5

*Status of Regular Exercise (n=169) (in Percentages)*

<table>
<thead>
<tr>
<th>Regular Exerciser?</th>
<th>Participants Pre</th>
<th>Participants Post</th>
<th>Teacher A Pre</th>
<th>Teacher A Post</th>
<th>Teacher B Pre</th>
<th>Teacher B Post</th>
<th>Total FFL Pre</th>
<th>Total FFL Post</th>
<th>Control Pre</th>
<th>Control Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>52</td>
<td>37</td>
<td>63</td>
<td>42*</td>
<td>46</td>
<td>22*</td>
<td>54</td>
<td>31</td>
<td>50</td>
<td>43</td>
</tr>
<tr>
<td>Yes</td>
<td>48</td>
<td>63</td>
<td>37</td>
<td>58*</td>
<td>54</td>
<td>78*</td>
<td>46</td>
<td>69</td>
<td>50</td>
<td>57</td>
</tr>
</tbody>
</table>

*p < .05.

The distribution of students in each stage, and the amount of stage change that occurred between pretest and posttest are shown in Tables 6 and 7, respectively. It appears that there is a greater shift out of contemplation and preparation into action among Fit for Life students compared with controls (Table 6). Table 7 shows that among Fit for Life students, 45% showed no change of stage, 39% moved forward through the stages, and 16% regressed. Among controls, 49% made no change, 27% moved forward, and 24% regressed. Between teacher groups, 46% of Teacher B’s students showed some positive movement through the stages, compared with 32% of students with Teacher A. These differences, however, were not statistically significant.

Table 6

*Stages of Change for Regular Exercise (n=169) (in Percentages)*

<table>
<thead>
<tr>
<th>Stages of Change</th>
<th>Participants Pre</th>
<th>Participants Post</th>
<th>Teacher A Pre</th>
<th>Teacher A Post</th>
<th>Teacher B Pre</th>
<th>Teacher B Post</th>
<th>Total FFL Pre</th>
<th>Total FFL Post</th>
<th>Control Pre</th>
<th>Control Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precontemplation</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Contemplation</td>
<td>20</td>
<td>13</td>
<td>32</td>
<td>15</td>
<td>15</td>
<td>6</td>
<td>23</td>
<td>10</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Preparation</td>
<td>30</td>
<td>23</td>
<td>32</td>
<td>27</td>
<td>26</td>
<td>11</td>
<td>29</td>
<td>18</td>
<td>32</td>
<td>27</td>
</tr>
<tr>
<td>Action</td>
<td>20</td>
<td>33</td>
<td>10</td>
<td>29</td>
<td>26</td>
<td>46</td>
<td>18</td>
<td>38</td>
<td>21</td>
<td>28</td>
</tr>
<tr>
<td>Maintenance</td>
<td>28</td>
<td>30</td>
<td>27</td>
<td>29</td>
<td>28</td>
<td>33</td>
<td>28</td>
<td>31</td>
<td>29</td>
<td>29</td>
</tr>
</tbody>
</table>

*Note.* Percentages that do not add up to 100% are due to rounding.
Table 7

Changes of Stage for Regular Exercise (n = 169) (in Percentages)

<table>
<thead>
<tr>
<th>Changes of Stage</th>
<th>Participants</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total - Change</td>
<td>20</td>
<td>15</td>
<td>17</td>
<td>16</td>
<td>24</td>
</tr>
<tr>
<td>-3</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>-2</td>
<td>3</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>-1</td>
<td>15</td>
<td>15</td>
<td>11</td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td>No Change</td>
<td>47</td>
<td>54</td>
<td>37</td>
<td>45</td>
<td>49</td>
</tr>
<tr>
<td>+1</td>
<td>17</td>
<td>7</td>
<td>30</td>
<td>20</td>
<td>13</td>
</tr>
<tr>
<td>+2</td>
<td>14</td>
<td>24</td>
<td>13</td>
<td>18</td>
<td>9</td>
</tr>
<tr>
<td>+3</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Total + Change</td>
<td>33</td>
<td>32</td>
<td>46</td>
<td>39</td>
<td>27</td>
</tr>
</tbody>
</table>

Note. Percentages that do not add up to 100% are due to rounding.

Eating a Healthy Diet

The second healthy behavior was that of eating a healthy diet. Eating a healthy diet was defined as eating the appropriate amount of calories for one’s weight, and eating a low-fat diet (Pro-Change Behavior Systems, Inc., 1999). Students were given examples of what these two aspects of a healthy diet meant, and were asked about their practices regarding each separately. They were then asked about their intention to change their eating practices, or their stage of change, so as to practice both aspects of eating healthfully. The percentages of students who reported practicing each of these aspects separately and both together are shown in Table 8. Overall, 53% of students reported eating the appropriate amount of calories for their weight at pretest, and 64% at posttest. A greater percentage of Fit for Life students (70%) reported doing so at posttest than the control group (57%). Thirty-six percent reported eating a low-fat diet at pretest, while slightly more (41%) reported doing so at posttest. Only 24% at pretest and 32% at posttest said they were eating a healthy diet by doing both (being in either the action or
maintenance stages). There were no significant differences between Fit for Life students and controls at pretest or posttest.

Table 8

Status of Eating a Healthy Diet (n=169) (in Percentages)

<table>
<thead>
<tr>
<th>Eats Calories For Weight?</th>
<th>Participants Pre</th>
<th>Participants Post</th>
<th>Teacher A Pre</th>
<th>Teacher A Post</th>
<th>Teacher B Pre</th>
<th>Teacher B Post</th>
<th>Total FFL Pre</th>
<th>Total FFL Post</th>
<th>Control Pre</th>
<th>Control Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>47</td>
<td>36</td>
<td>44</td>
<td>24</td>
<td>50</td>
<td>35</td>
<td>47</td>
<td>30</td>
<td>47</td>
<td>43</td>
</tr>
<tr>
<td>Yes</td>
<td>53</td>
<td>64</td>
<td>56</td>
<td>76</td>
<td>50</td>
<td>65</td>
<td>53</td>
<td>70</td>
<td>53</td>
<td>57</td>
</tr>
</tbody>
</table>

| Eats Low Fat?            |                  |                  |              |               |              |               |               |               |            |
|--------------------------|------------------|------------------|--------------|---------------|--------------|---------------|---------------|---------------|-----------|-------------|
| No                       | 64               | 59               | 58           | 58            | 61           | 54            | 60            | 56            | 70         | 62          |
| Yes                      | 36               | 41               | 42           | 42            | 39           | 46            | 40            | 44            | 30         | 38          |

| Eats Healthy?            |                  |                  |              |               |              |               |               |               |            |
|--------------------------|------------------|------------------|--------------|---------------|--------------|---------------|---------------|---------------|-----------|-------------|
| No                       | 76               | 68               | 73           | 63            | 74           | 61            | 74            | 62            | 79         | 73          |
| Yes                      | 24               | 32               | 27           | 37            | 26           | 39            | 26            | 38            | 21         | 27          |

Note. Eating calories for weight and eating a low-fat diet are both part of eating a healthy diet; information is missing from one control in the pretest for calories for weight.

Students’ intentions to practice eating healthfully, or their stages of change for this behavior, are shown in Table 9. Only about 20% of students (19% at pretest and 22% at posttest) were in precontemplation, with no intention to change their behavior so as to eat a healthy diet in the next 6 months. Slight movement through the stages of change was seen at the posttest, with slight regression to precontemplation and some progress towards preparation and action. Table 10 shows the distribution of students who reported no change, or forward or backward movement through the stages from pretest to posttest. Twenty-four percent of Fit for Life students and 18% of controls reported being one stage higher at posttest. Overall, 40% of students reported no change at posttest, while 36% reported a higher stage, and 24% reported a lower stage (20% of Fit for Life students and
27% of controls). Any apparent differences between Fit for Life students and controls were not statistically significant.

Table 9

*Stages of Change for Eating a Healthy Diet (n = 169) (in Percentages)*

<table>
<thead>
<tr>
<th>Stages of Change</th>
<th>Participants</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>Precontemplation</td>
<td>19</td>
<td>22</td>
<td>17</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Contemplation</td>
<td>28</td>
<td>17</td>
<td>32</td>
<td>15</td>
<td>29</td>
</tr>
<tr>
<td>Preparation</td>
<td>29</td>
<td>29</td>
<td>23</td>
<td>37</td>
<td>29</td>
</tr>
<tr>
<td>Action</td>
<td>3</td>
<td>11</td>
<td>5</td>
<td>17</td>
<td>4</td>
</tr>
<tr>
<td>Maintenance</td>
<td>21</td>
<td>21</td>
<td>23</td>
<td>19</td>
<td>22</td>
</tr>
</tbody>
</table>

*Note.* Information is missing from two controls in pretest and posttest, two FFL in pretest (one from each teacher), and one FFL in posttest (from Teacher B).

Table 10

*Changes of Stage for Eating a Healthy Diet (n = 162) (in Percentages)*

<table>
<thead>
<tr>
<th>Changes of Stage</th>
<th>Participants</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total - Change</td>
<td>24</td>
<td>18</td>
<td>23</td>
<td>20</td>
<td>27</td>
</tr>
<tr>
<td>-4</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>-3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>-2</td>
<td>7</td>
<td>5</td>
<td>7</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>-1</td>
<td>10</td>
<td>8</td>
<td>11</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>No Change</td>
<td>40</td>
<td>40</td>
<td>43</td>
<td>42</td>
<td>38</td>
</tr>
<tr>
<td>+1</td>
<td>21</td>
<td>20</td>
<td>27</td>
<td>24</td>
<td>18</td>
</tr>
<tr>
<td>+2</td>
<td>10</td>
<td>20</td>
<td>2</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>+3</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>+4</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Total + Change</td>
<td>36</td>
<td>42</td>
<td>34</td>
<td>38</td>
<td>35</td>
</tr>
</tbody>
</table>

*Note.* Percentages that do not add up to 100% are due to rounding.
Eating Five or More Fruits and Vegetables

The third healthy behavior was eating five or more fruits and vegetables per day. Students were given examples of what a serving is, such as a half cup of cooked vegetables, a cup of salad, or a piece of fruit (Pro-Change Behavior Systems, Inc., 1999). Overall, 31% of students reported practicing this healthy behavior at pretest and 38% at posttest. Slightly more Fit for Life students reported eating five or more fruits and vegetables than did students in the control group in both pretest and posttest (Table 11), but this difference was not statistically significant.

Table 11

*Status of Eating 5 or More Fruits and Vegetables (n=169) (in Percentages)*

<table>
<thead>
<tr>
<th></th>
<th>Eats 5 or More Fruits &amp; Veges?</th>
<th>Participants</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Pre</td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>No</td>
<td></td>
<td>69</td>
<td>68</td>
<td>54</td>
<td>61</td>
<td>59</td>
</tr>
<tr>
<td>Yes</td>
<td></td>
<td>31</td>
<td>32</td>
<td>46</td>
<td>39</td>
<td>41</td>
</tr>
</tbody>
</table>

The distribution of students in each stage of change for eating five or more fruits and vegetables is shown in Table 12. Only 11% at pretest and 6% in posttest reported being in precontemplation, not intending to eat more fruits and vegetables in the next 6 months. Most of the students were in preparation or contemplation. Overall, 43% of students reported no change of stage over the course of the semester (Table 13). At posttest though, 40% of Fit for Life students reported a higher stage of change, and 18% reported a lower stage, compared with 29% higher and 27% lower for the controls. The apparent difference, however, was not statistically significant.
Table 12

*Stages of Change for Eating 5 or More Fruits and Vegetables (n=169) (in Percentages)*

<table>
<thead>
<tr>
<th>Stages of Change</th>
<th>Participants</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>Precontemplation</td>
<td>11</td>
<td>6</td>
<td>7</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Contemplation</td>
<td>27</td>
<td>23</td>
<td>32</td>
<td>17</td>
<td>24</td>
</tr>
<tr>
<td>Preparation</td>
<td>31</td>
<td>33</td>
<td>29</td>
<td>32</td>
<td>22</td>
</tr>
<tr>
<td>Action</td>
<td>10</td>
<td>14</td>
<td>5</td>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td>Maintenance</td>
<td>21</td>
<td>24</td>
<td>27</td>
<td>27</td>
<td>24</td>
</tr>
</tbody>
</table>

*Note.* Percentages that do not add up to 100% are due to rounding.

Table 13

*Changes of Stage for Eating 5 or More Fruits and Vegetables (n = 169) (in Percentages)*

<table>
<thead>
<tr>
<th>Changes of Stage</th>
<th>Participants</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>Total - Change</td>
<td>22</td>
<td>17</td>
<td>20</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>-4</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>-3</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>-2</td>
<td>8</td>
<td>10</td>
<td>4</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>-1</td>
<td>11</td>
<td>7</td>
<td>11</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>No Change</td>
<td>43</td>
<td>44</td>
<td>39</td>
<td>41</td>
<td>41</td>
</tr>
<tr>
<td>+1</td>
<td>17</td>
<td>17</td>
<td>20</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>+2</td>
<td>14</td>
<td>22</td>
<td>17</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>+3</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>+4</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total + Change</td>
<td>35</td>
<td>39</td>
<td>41</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

*Note.* Percentages that do not add up to 100% are due to rounding.

Not Smoking

The next healthy behavior was not smoking. Only 1-2% of the participants reported being active smokers (Table 14), while 95% reported never having smoked (Table 15). Table 16 shows the amount of stage change that occurred in students who were or had been smokers. No statistically significant changes were observed.
### Table 14

**Status of Smoking (n=169) (in Percentages)**

<table>
<thead>
<tr>
<th>Current Smoker?</th>
<th>Participants Pre</th>
<th>Post</th>
<th>Teacher A Pre</th>
<th>Post</th>
<th>Teacher B Pre</th>
<th>Post</th>
<th>Total FFL Pre</th>
<th>Post</th>
<th>Control Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>99</td>
<td>98</td>
<td>98</td>
<td>95</td>
<td>100</td>
<td>100</td>
<td>99</td>
<td>98</td>
<td>100</td>
<td>99</td>
</tr>
<tr>
<td>Yes</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note. Percentages that do not add up to 100% are due to rounding.*

### Table 15

**Stages of Change for Quitting Smoking (n=169) (in Percentages)**

<table>
<thead>
<tr>
<th>Stages of Change</th>
<th>Participants Pre</th>
<th>Post</th>
<th>Teacher A Pre</th>
<th>Post</th>
<th>Teacher B Pre</th>
<th>Post</th>
<th>Total FFL Pre</th>
<th>Post</th>
<th>Control Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precontemplation</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Contemplation</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Preparation</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Action</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Maintenance</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Never a Smoker</td>
<td>95</td>
<td>96</td>
<td>98</td>
<td>95</td>
<td>91</td>
<td>94</td>
<td>94</td>
<td>94</td>
<td>96</td>
<td>98</td>
</tr>
</tbody>
</table>

*Note. Percentages that do not add up to 100% are due to rounding.*

### Table 16

**Changes of Stage for Quitting Smoking (n = 169) (in Percentages)**

<table>
<thead>
<tr>
<th>Changes of Stage</th>
<th>Participants</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total - Change</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>-5</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>-3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>-2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>No Change</td>
<td>96</td>
<td>95</td>
<td>94</td>
<td>94</td>
<td>98</td>
</tr>
<tr>
<td>+1</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>+2</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Total + Change</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note. Percentages that do not add up to 100% are due to rounding.*
Avoiding Caffeine

The fifth healthy behavior was avoiding regular caffeine use. Regular caffeine use was defined as drinking coffee, tea, energy drinks, or cola drinks more often than once or twice per week. The majority of students reported that they were not currently using caffeine regularly (Table 17). Of the participants, 28% reported using caffeine regularly at pretest, compared with 22% at posttest. Table 18 shows the distribution of students in the different stages of change. At pretest, 21% of participants, including 24% of Fit for Life students and 18% of controls, were in precontemplation, using caffeine regularly with no intent to avoid it in the next 6 months. Fewer students were in precontemplation at posttest, with 20% of Fit for Life students, and 12% of students in the control group, but differences in stage distribution were not statistically significant. At posttest 25% of Fit for Life students had moved forward through the stages and 18% had regressed (Table 19), compared with 22% and 17%, respectively, for controls. Again, differences were not statistically significant.

Table 17

Status of Caffeine Use (n=169) (in Percentages)

<table>
<thead>
<tr>
<th>Regular Caffeine Use?</th>
<th>Participants Pre</th>
<th>Participants Post</th>
<th>Teacher A Pre</th>
<th>Teacher A Post</th>
<th>Teacher B Pre</th>
<th>Teacher B Post</th>
<th>Total FFL Pre</th>
<th>Total FFL Post</th>
<th>Control Pre</th>
<th>Control Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>28</td>
<td>22</td>
<td>29</td>
<td>27</td>
<td>35</td>
<td>24</td>
<td>32</td>
<td>25</td>
<td>23</td>
<td>20</td>
</tr>
<tr>
<td>No</td>
<td>72</td>
<td>78</td>
<td>71</td>
<td>73</td>
<td>65</td>
<td>76</td>
<td>68</td>
<td>75</td>
<td>77</td>
<td>80</td>
</tr>
</tbody>
</table>
### Table 18

**Stages of Change for Avoiding Caffeine (n=169) (in Percentages)**

<table>
<thead>
<tr>
<th>Stages of Change</th>
<th>Participants</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>Precontemplation</td>
<td>21</td>
<td>16</td>
<td>22</td>
<td>17</td>
<td>26</td>
</tr>
<tr>
<td>Contemplation</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Preparation</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Action</td>
<td>10</td>
<td>12</td>
<td>10</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>Maintenance</td>
<td>19</td>
<td>22</td>
<td>17</td>
<td>22</td>
<td>13</td>
</tr>
<tr>
<td>Never regularly uses caffeine</td>
<td>43</td>
<td>43</td>
<td>44</td>
<td>39</td>
<td>43</td>
</tr>
</tbody>
</table>

*Note.* Percentages that do not add up to 100% are due to rounding.

### Table 19

**Changes of Stage for Avoiding Caffeine (n = 169) (in Percentages)**

<table>
<thead>
<tr>
<th>Changes of Stage</th>
<th>Participants</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total - Change</td>
<td>18</td>
<td>20</td>
<td>17</td>
<td>18</td>
<td>17</td>
</tr>
<tr>
<td>-5</td>
<td>2</td>
<td>0</td>
<td>7</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>-4</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>-3</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>-2</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>-1</td>
<td>11</td>
<td>15</td>
<td>7</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>No Change</td>
<td>59</td>
<td>59</td>
<td>54</td>
<td>56</td>
<td>61</td>
</tr>
<tr>
<td>+1</td>
<td>9</td>
<td>10</td>
<td>7</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>+2</td>
<td>6</td>
<td>7</td>
<td>4</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>+3</td>
<td>5</td>
<td>5</td>
<td>9</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>+4</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>+5</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Total + Change</td>
<td>24</td>
<td>22</td>
<td>28</td>
<td>25</td>
<td>22</td>
</tr>
</tbody>
</table>

*Note.* Percentages that do not add up to 100% are due to rounding.
Not Drinking Alcohol

The sixth healthy behavior was not drinking alcohol. Table 20 shows the status of alcohol use among the students in the study. Only 6% of students reported being current alcohol drinkers at pretest and 8% at posttest. Table 21 shows the distribution of students in the stages of change at pretest and posttest. Among the participants, 80% to 83% said they had never been alcohol drinkers (Table 21). The amount of stage change is shown in Table 22. There were no statistically significant differences between Fit for Life students and controls.

Table 20

Status of Alcohol Use (n=169) (in Percentages)

<table>
<thead>
<tr>
<th>Current Drinker?</th>
<th>Participants Pre</th>
<th>Post</th>
<th>Teacher A Pre</th>
<th>Post</th>
<th>Teacher B Pre</th>
<th>Post</th>
<th>Total FFL Pre</th>
<th>Post</th>
<th>Control Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>94</td>
<td>92</td>
<td>98</td>
<td>95</td>
<td>89</td>
<td>89</td>
<td>93</td>
<td>92</td>
<td>95</td>
<td>93</td>
</tr>
<tr>
<td>Yes</td>
<td>6</td>
<td>8</td>
<td>2</td>
<td>5</td>
<td>11</td>
<td>11</td>
<td>7</td>
<td>8</td>
<td>5</td>
<td>7</td>
</tr>
</tbody>
</table>

Table 21

Stages of Change for Quitting Alcohol (n=169) (in Percentages)

<table>
<thead>
<tr>
<th>Stages of Change</th>
<th>Participants Pre</th>
<th>Post</th>
<th>Teacher A Pre</th>
<th>Post</th>
<th>Teacher B Pre</th>
<th>Post</th>
<th>Total FFL Pre</th>
<th>Post</th>
<th>Control Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precontemplation</td>
<td>4</td>
<td>6</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>9</td>
<td>3</td>
<td>7</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Contemplation</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Preparation</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Action</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Maintenance</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>7</td>
<td>7</td>
<td>11</td>
<td>9</td>
<td>9</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Non-Drinker</td>
<td>83</td>
<td>80</td>
<td>85</td>
<td>88</td>
<td>76</td>
<td>74</td>
<td>81</td>
<td>81</td>
<td>87</td>
<td>81</td>
</tr>
</tbody>
</table>

Note. Percentages that do not add up to 100% are due to rounding.
Table 22

Changes of Stage for Quitting Alcohol \((n = 169)\) (in Percentages)

<table>
<thead>
<tr>
<th>Changes of Stage</th>
<th>Participants</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total - Change</td>
<td>7</td>
<td>5</td>
<td>9</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>-5</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>-3</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>-2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>-1</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>No Change</td>
<td>86</td>
<td>88</td>
<td>80</td>
<td>84</td>
<td>89</td>
</tr>
<tr>
<td>+1</td>
<td>5</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>+2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>+4</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total + Change</td>
<td>7</td>
<td>7</td>
<td>11</td>
<td>9</td>
<td>4</td>
</tr>
</tbody>
</table>

*Note.* Percentages that do not add up to 100% are due to rounding.

Practicing Depression Prevention

The seventh healthy behavior was practicing depression prevention to both prevent depression and lessen its effects. Among the participants in this study, approximately 33% reported having little interest in doing things (Table 23) or feeling down, depressed, or hopeless (Table 24) on at least several days in the 2 weeks prior to the surveys. Both of these feelings are symptoms of depression (National Institute of Mental Health, 2009). Only 29% said they had never been depressed (Table 26).

Depression prevention was defined as controlling negative thinking, engaging in pleasant activities, practicing stress management, exercising regularly, and getting professional help when needed (Pro-Change Behavior Systems, Inc., 1999). Among Fit for Life students, 69% reported either never being depressed or practicing depression prevention at pretest and 82% at posttest, compared with 73% of controls at pretest and 69% at posttest (Table 25). The distribution of students in the stages of change for practicing depression prevention is shown in Table 26. Table 27 shows changes of stage
for depression prevention. Among Fit for Life students, 33% showed forward movement through the stages of change for depression prevention, compared with 23% of controls. These differences, however, were not statistically significant.

Table 23

*Little Interest in Doing Things in 2 Weeks Prior to Survey (n=169) (in Percentages)*

<table>
<thead>
<tr>
<th></th>
<th>Participants Pre</th>
<th>Participants Post</th>
<th>Control Pre</th>
<th>Control Post</th>
<th>Fit for Life Pre</th>
<th>Fit for Life Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>60</td>
<td>56</td>
<td>54</td>
<td>50</td>
<td>66</td>
<td>62</td>
</tr>
<tr>
<td>Several Days</td>
<td>33</td>
<td>34</td>
<td>40</td>
<td>40</td>
<td>26</td>
<td>29</td>
</tr>
<tr>
<td>More than Half the Days</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Every Day</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

*Note.* Percentages that do not add up to 100% are due to rounding.

Table 24

*Feeling Down, Depressed, Hopeless in 2 Weeks Prior to Survey (n=169) (in Percentages)*

<table>
<thead>
<tr>
<th></th>
<th>Participants Pre</th>
<th>Participants Post</th>
<th>Control Pre</th>
<th>Control Post</th>
<th>Fit for Life Pre</th>
<th>Fit for Life Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td>64</td>
<td>59</td>
<td>68</td>
<td>60</td>
<td>60</td>
<td>59</td>
</tr>
<tr>
<td>Several Days</td>
<td>31</td>
<td>35</td>
<td>26</td>
<td>35</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>More than Half the Days</td>
<td>5</td>
<td>4</td>
<td>6</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Every Day</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

*Note.* Percentages that do not add up to 100% are due to rounding.
Table 25

Status of Practicing Depression Prevention or Never Being Depressed (n=169) (in Percentages)

<table>
<thead>
<tr>
<th>Practicing Depression Prevention?</th>
<th>Participants</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Pre 29 Post 24</td>
<td>Pre 27 Post 17</td>
<td>Pre 35 Post 20</td>
<td>Pre 31 Post 18</td>
<td>27 31</td>
</tr>
<tr>
<td>Yes</td>
<td>Pre 71 Post 76</td>
<td>Pre 73 Post 83</td>
<td>Pre 65 Post 80</td>
<td>Pre 69 Post 82</td>
<td>73 69</td>
</tr>
</tbody>
</table>

*Note.* Information is missing from one control in the posttest.

Table 26

Stages of Change for Practicing Depression Prevention (n=169) (in Percentages)

<table>
<thead>
<tr>
<th>Stages of Change</th>
<th>Participants</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precontemplation</td>
<td>Pre 13 Post 12</td>
<td>Pre 7 Post 7</td>
<td>Pre 20 Post 17</td>
<td>Pre 14 Post 13</td>
<td>13 12</td>
</tr>
<tr>
<td>Contemplation</td>
<td>Pre 7 Post 2</td>
<td>Pre 5 Post 0</td>
<td>Pre 4 Post 0</td>
<td>Pre 5 Post 0</td>
<td>9 5</td>
</tr>
<tr>
<td>Preparation</td>
<td>Pre 10 Post 10</td>
<td>Pre 15 Post 10</td>
<td>Pre 11 Post 2</td>
<td>Pre 13 Post 6</td>
<td>6 14</td>
</tr>
<tr>
<td>Action</td>
<td>Pre 12 Post 16</td>
<td>Pre 5 Post 10</td>
<td>Pre 20 Post 22</td>
<td>Pre 13 Post 16</td>
<td>11 15</td>
</tr>
<tr>
<td>Maintenance</td>
<td>Pre 29 Post 31</td>
<td>Pre 41 Post 34</td>
<td>Pre 17 Post 35</td>
<td>Pre 29 Post 34</td>
<td>30 27</td>
</tr>
<tr>
<td>Never Depressed</td>
<td>Pre 29 Post 29</td>
<td>Pre 27 Post 39</td>
<td>Pre 28 Post 24</td>
<td>Pre 28 Post 31</td>
<td>31 27</td>
</tr>
</tbody>
</table>

*Note.* Percentages that do not add up to 100% are due to rounding; information is missing from two controls in the pretest and one control in the posttest.

Practicing Stress Management

The eighth healthy behavior was stress management. Stress management is defined as using relaxation, physical activity, talking with others, or making time for social activities (Pro-Change Behavior Systems, Inc., 1999). Among the participants, 75% said they either had no stress, or were practicing stress management at pretest (Table 28). Interestingly, there was a significant difference between Teacher A’s students and Teacher B’s students at pretest ($\chi^2 (1) = 13.254$), but not at posttest. There was, however, a statistically significant difference between Fit for Life students and controls at
posttest ($\chi^2(1) = 4.205$), with 84% of all Fit for Life students reporting either no stress or use of stress management techniques compared with 71% of controls.

Table 27

*Changes of Stage for Practicing Depression Prevention (n = 166) (in Percentages)*

<table>
<thead>
<tr>
<th>Changes of Stage</th>
<th>Participants</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total - Change</td>
<td>21</td>
<td>12</td>
<td>26</td>
<td>20</td>
<td>23</td>
</tr>
<tr>
<td>-5</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>-4</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>-3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>-2</td>
<td>5</td>
<td>5</td>
<td>11</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>-1</td>
<td>10</td>
<td>7</td>
<td>11</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>No Change</td>
<td>51</td>
<td>51</td>
<td>44</td>
<td>47</td>
<td>54</td>
</tr>
<tr>
<td>+1</td>
<td>16</td>
<td>27</td>
<td>13</td>
<td>20</td>
<td>11</td>
</tr>
<tr>
<td>+2</td>
<td>4</td>
<td>7</td>
<td>0</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>+3</td>
<td>4</td>
<td>2</td>
<td>7</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>+4</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>+5</td>
<td>3</td>
<td>0</td>
<td>9</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Total + Change</td>
<td>28</td>
<td>37</td>
<td>30</td>
<td>33</td>
<td>23</td>
</tr>
</tbody>
</table>

*Note.* Percentages that do not add up to 100% are due to rounding.

Table 28

*Status of Practicing Stress Management or Having No Stress (n=169) (in Percentages)*

<table>
<thead>
<tr>
<th>Practicing Stress Management?</th>
<th>Participants</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>No</td>
<td>25</td>
<td>22</td>
<td>7**</td>
<td>22</td>
<td>41**</td>
</tr>
<tr>
<td>Yes</td>
<td>75</td>
<td>78</td>
<td>93**</td>
<td>78</td>
<td>59**</td>
</tr>
</tbody>
</table>

*$p < .05$. **$p < .01$. 
Table 29 shows the distribution of students in the stages of change for stress management. Only 8% of participants were in precontemplation, meaning that they had no intention of practicing stress management in the next 6 months. There were no significant differences in stages between Fit for Life students and controls.

Table 29

<table>
<thead>
<tr>
<th>Stages of Change</th>
<th>Participants</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>Precontemplation</td>
<td>8</td>
<td>8</td>
<td>2</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Contemplation</td>
<td>6</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Preparation</td>
<td>11</td>
<td>11</td>
<td>5</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Action</td>
<td>15</td>
<td>24</td>
<td>22</td>
<td>17</td>
<td>15</td>
</tr>
<tr>
<td>Maintenance</td>
<td>50</td>
<td>47</td>
<td>61</td>
<td>56</td>
<td>35</td>
</tr>
<tr>
<td>No Stress</td>
<td>10</td>
<td>6</td>
<td>10</td>
<td>5</td>
<td>9</td>
</tr>
</tbody>
</table>

*Note.* Percentages that do not add up to 100% are due to rounding.

Table 30 shows changes of stage that occurred between pretest and posttest for stress management. Among Fit for Life students, 31% showed forward movement through the stages, compared with 18% for controls. However, these differences were not statistically significant. There were significant differences between teacher groups \( \chi^2(2) = 8.834 \). Among Teacher A’s students, 20% moved forward through the stages and 42% regressed from pretest to posttest, whereas, among Teacher B’s students, 41% moved forward and only 15% regressed.
Table 30

*Changes of Stage for Practicing Stress Management (n = 169) (in Percentages)*

<table>
<thead>
<tr>
<th>Changes of Stage</th>
<th>Participants</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total - Change</td>
<td>27</td>
<td>42*</td>
<td>15*</td>
<td>28</td>
<td>27</td>
</tr>
<tr>
<td>-5</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>-4</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>-3</td>
<td>4</td>
<td>7</td>
<td>0</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>-2</td>
<td>9</td>
<td>12</td>
<td>7</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>-1</td>
<td>13</td>
<td>22</td>
<td>9</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td>No Change</td>
<td>48</td>
<td>39*</td>
<td>44*</td>
<td>41</td>
<td>55</td>
</tr>
<tr>
<td>+1</td>
<td>14</td>
<td>15</td>
<td>22</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>+2</td>
<td>5</td>
<td>2</td>
<td>11</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>+3</td>
<td>4</td>
<td>0</td>
<td>7</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>+4</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>+5</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total + Change</td>
<td>25</td>
<td>20*</td>
<td>41*</td>
<td>31</td>
<td>18</td>
</tr>
</tbody>
</table>

*Note.* Percentages that do not add up to 100% are due to rounding.

*p < .05.

Getting Optimal Sleep

The final healthy behavior was getting optimal sleep. Optimal sleep is defined as getting enough sleep to awake feeling refreshed (Pro-Change Behavior Systems, Inc., 1999). Table 31 shows the percentage of students who reported getting optimal sleep on most nights. Among Fit for Life students, 34% reported optimal sleep at both pretest and posttest, compared with 45% at pretest and 25% at posttest, respectively, for controls. These differences, however, were not statistically significant.
Table 31

*Status of Getting Optimal Sleep (n=169) (in Percentages)*

<table>
<thead>
<tr>
<th>Getting Optimal Sleep?</th>
<th>Participants</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre Post</td>
<td>Pre Post</td>
<td>Pre Post</td>
<td>Pre Post</td>
<td>Pre Post</td>
</tr>
<tr>
<td>No</td>
<td>60 70</td>
<td>73 68</td>
<td>59 63</td>
<td>66 66</td>
<td>55 75</td>
</tr>
<tr>
<td>Yes</td>
<td>40 30</td>
<td>27 32</td>
<td>41 37</td>
<td>34 34</td>
<td>45 25</td>
</tr>
</tbody>
</table>

*Note.* Information is missing from one control in the posttest.

Since college students are in a transition period between adolescence and adulthood and recommended sleep times are different for these two age groups, I was interested in determining how much sleep students in my study felt was optimal. To do this, I compared the mean reported hours of sleep for students saying they got optimal sleep with those who said they did not. At pretest, the mean for optimal sleep was 7.3 hours, and the mean for those not getting optimal sleep was 6.9 hours. Interestingly, posttest means were slightly lower. The posttest mean for optimal sleep was 7.0 hours, while the mean for those not getting optimal sleep was 6.1 hours. Bar graphs of optimal versus non-optimal sleep times, rounded to the nearest hour, are shown for pretest and posttest in Figure 4.
Figure 4. A comparison of optimal versus non-optimal sleep times at pretest and posttest, rounded to the nearest hour.
To compare the actual hours of sleep reported by Fit for Life students and controls, two different procedures were performed. From independent $t$ tests, the mean number of sleep hours at pretest was 7.1 for controls and 7.0 for Fit for Life students. At posttest, the means were 6.3 for controls and 6.4 for Fit for Life students. These figures were not significantly different from each other. The average hours of sleep that students reported for the week prior to each survey were then categorized and compared using Chi-Square, and are shown in Table 32. Among the participants, 38% got an average of 7.5 hours of sleep or more per night at pretest. This figure approximates the 40% reporting optimal sleep at pretest in Table 31. At posttest, however, which was the week before final exams, only 18% reported getting 7.5 hours or more. At the end of the semester, there was a significant difference between Fit for Life students and students in the control group ($\chi^2(2) = 7.495$). At posttest, only 16% of Fit for Life students reported 5 hours or less of sleep, compared to 30% of controls. Sleep times for each group, rounded to the nearest hour, are shown in the bar graphs in Figure 5. The majority of students in both groups got 6, 7, or 8 hours of sleep at pretest. At posttest, while both groups got less sleep, the controls had a greater shift to the left.

Table 32

*Average Nightly Hours of Sleep (n=169) (in Percentages)*

<table>
<thead>
<tr>
<th>Hours of Sleep</th>
<th>Participants</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre Post Pre Post Pre Post Pre Post Pre Post Pre Post Pre Post</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 or less</td>
<td>7 23 12 22 4 11 8 16* 5 30*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between 5 &amp; 7.5</td>
<td>55 59 42 61 63 76 53 69* 57 49*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.5 or more</td>
<td>38 18 46 17 33 13 39 15* 38 21*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Information is missing from two controls in the pretest. *$p < .05$. 

106
Figure 5. A comparison of Fit for Life and control group sleep times at pretest and posttest, rounded to the nearest hour.
The distribution of students in the stages of change for getting enough sleep, and the changes of stage between pretest and posttest are shown in Tables 3 and 3, respectively. There was a significant difference in the amount of stage change that occurred between Fit for Life students and controls ($\chi^2(2) = 16.256$) (Table 3). Among Fit for Life students, 40% showed forward movement through the stages and 22% regressed, while among the control group, 14% showed forward movement and 41% regressed. There were also significant differences between teacher groups ($\chi^2(2) = 6.890$). Among Teacher A’s students, 44% showed forward movement through the stages at posttest, and 10% regressed, while 37% of Teacher B’s students showed forward movement and 33% showed regression.

Table 33

<table>
<thead>
<tr>
<th>Stages of Change</th>
<th>Participants Pre</th>
<th>Post</th>
<th>Teacher A Pre</th>
<th>Post</th>
<th>Teacher B Pre</th>
<th>Post</th>
<th>Total FFL Pre</th>
<th>Post</th>
<th>Control Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precontemplation</td>
<td>9</td>
<td>9</td>
<td>10</td>
<td>2</td>
<td>11</td>
<td>6</td>
<td>10</td>
<td>5</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>Contemplation</td>
<td>17</td>
<td>13</td>
<td>27</td>
<td>5</td>
<td>17</td>
<td>13</td>
<td>22</td>
<td>9</td>
<td>11</td>
<td>16</td>
</tr>
<tr>
<td>Preparation</td>
<td>35</td>
<td>48</td>
<td>37</td>
<td>61</td>
<td>30</td>
<td>44</td>
<td>33</td>
<td>52</td>
<td>37</td>
<td>45</td>
</tr>
<tr>
<td>Action</td>
<td>13</td>
<td>11</td>
<td>7</td>
<td>5</td>
<td>13</td>
<td>24</td>
<td>10</td>
<td>15</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td>Maintenance</td>
<td>26</td>
<td>19</td>
<td>19</td>
<td>27</td>
<td>28</td>
<td>13</td>
<td>24</td>
<td>19</td>
<td>28</td>
<td>19</td>
</tr>
</tbody>
</table>

Note. Percentages that do not add up to 100% are due to rounding; information is missing from two controls in the posttest.

Total Number of Health Behaviors Practiced

To get a more comprehensive picture of what behavior changes occurred, it was useful to see the degree to which students in the study practiced healthy behaviors overall. To do this, individuals were given one point for each of the nine health behaviors...
they reported practicing at the time of the pretest and posttest. These were then added
together to give a cumulative score from 0 to 9 for each testing time. The distribution of
the number of healthy behaviors practiced by students is shown in Table 35. At pretest,
the greatest percentage of students reported practicing six of the healthy behaviors. At
posttest, there appeared to be a shift toward the practice of more healthy behaviors among
Fit for Life students. To compare Fit for Life students with controls, independent $t$ tests
were done on the total number of health behaviors at pretest and posttest. The mean
number of health behaviors for Fit for Life students and controls at pretest were not
significantly different from each other, at 5.46 and 5.63, respectively. There was a
significant difference at posttest, however, with Fit for Life students reporting a mean of
6.15 behaviors and controls reporting a mean of 5.51 ($t(167) = 2.582, p = .011$). To look
for changes from the beginning of the course to the end, paired $t$ tests were done. For
controls, the mean number of health behaviors at posttest (5.51) was not significantly
different from the mean number of health behaviors at pretest (5.63). For Fit for Life students, however, the mean number of health behaviors at posttest (6.15) was significantly higher than the mean number of health behaviors at pretest (5.46, \( t(86) = 4.414, p < .001 \)).

Table 35

*Number of Healthy Behaviors at Pretest and Posttest (n=169) (in Percentages)*

<table>
<thead>
<tr>
<th>Number</th>
<th>Participants</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
<td>6</td>
<td>7</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>14</td>
<td>13</td>
<td>20</td>
<td>15</td>
<td>9</td>
</tr>
<tr>
<td>5</td>
<td>17</td>
<td>23</td>
<td>10</td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td>6</td>
<td>28</td>
<td>20</td>
<td>39</td>
<td>24</td>
<td>26</td>
</tr>
<tr>
<td>7</td>
<td>21</td>
<td>18</td>
<td>12</td>
<td>29</td>
<td>22</td>
</tr>
<tr>
<td>8</td>
<td>5</td>
<td>14</td>
<td>7</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

*Note.* Percentages that do not add up to 100% are due to rounding.

Within the Fit for Life group of students, there was evidence of positive movement through the stages of change for several different health behaviors. It is also important, however, to assess change on the individual level. The hypothesis was that individual Fit for Life students would show forward movement through the stages of change for one or more health behaviors by the end of the course. To check for individual changes, a tabulation was made of the number of behaviors for which students made forward or backward movement through the stages of change. Table 36 summarizes the percentage of students making forward progress through the stages of change for one or more healthy behaviors. Only 7% of Fit for Life students made no forward movement
through the stages of change for any of the nine health behaviors, compared with 16% of controls. Fit for Life students progressed through the stages of change for a greater number of health behaviors than did controls, with 30% progressing in four or more health behaviors, compared with only 8% of controls.

Table 36

*Number of Behaviors for Which Students Progressed Through the Stages (n=169) (in percentages)*

<table>
<thead>
<tr>
<th>Number of Behaviors</th>
<th>Participants</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>11</td>
<td>5</td>
<td>9</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td>1</td>
<td>23</td>
<td>22</td>
<td>9</td>
<td>15</td>
<td>32</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
<td>27</td>
<td>33</td>
<td>30</td>
<td>29</td>
</tr>
<tr>
<td>3</td>
<td>17</td>
<td>24</td>
<td>13</td>
<td>18</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>15</td>
<td>17</td>
<td>28</td>
<td>23</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

*Note.* Percentages that do not add up to 100% are due to rounding.

Conversely, Fit for Life students regressed through the stages of change in fewer behaviors than did controls. While the percentage of students who regressed for just one health behavior was approximately 35% for both groups (Table 37), 25% of Fit for Life students had no regression in any behavior, compared with only 10% of controls.

Independent *t* tests were done on the number of behaviors for which students moved forward or backward through the stages of change. Fit for Life students progressed through the stages of change for significantly more health behaviors (mean of 2.59) compared with controls, *(1.70, t(167) = 4.420, p < .001)*, and regressed for
significantly fewer behaviors (mean of 1.51) compared with controls (1.91, \( t(167) = -2.015, p = .045 \)).

Table 37

*Number of Behaviors for Which Students Regressed Through the Stages (n=169) (in percentages)*

<table>
<thead>
<tr>
<th>Number of Behaviors</th>
<th>Participants</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>18</td>
<td>22</td>
<td>28</td>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>1</td>
<td>35</td>
<td>39</td>
<td>33</td>
<td>36</td>
<td>34</td>
</tr>
<tr>
<td>2</td>
<td>21</td>
<td>20</td>
<td>13</td>
<td>16</td>
<td>27</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
<td>17</td>
<td>11</td>
<td>14</td>
<td>17</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>2</td>
<td>6</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>0</td>
<td>9</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>

*Note.* Percentages that do not add up to 100% are due to rounding.

**Research Subquestions**

There were two subquestions considered in the analysis. The first was, “What influence, if any, do gender, ethnic background, class standing, or previous exposure to health education have on students’ stages of change?” The second was, “What changes in health behavior are attributable to the course?” Both subquestions were answered through the use of the structural equation modeling program, AMOS. The second subquestion was also answered through students’ answers to the open-ended questions on the survey and through the interviews. The results of these procedures are provided in this section.

To answer the research subquestions using SEM, the complete complement of parameters shown in the model (see Figure 3 in chapter 3) needed to be tested. Missing cases were dropped listwise in order to analyze all of the parameters on the same data,
leaving 157 cases rather than 169. I initially tested each of the four major ethnic groups, White, Black, Hispanic, and Asian, with the pretest results to determine if ethnicity had any effect on students’ health behaviors. Other ethnicities were not included in this analysis because there were too few (11) in this category. The modification indices recommended covariances between ethnic groups, which I accepted based on the theoretical assumption that there are commonalities among people of all ethnicities. Modification indices also recommended covariances between errors for alcohol and smoking, alcohol and caffeine, stress and depression, healthy diet and fruit and vegetable eating, and caffeine and sleep (modification indices above 8). These covariances were accepted based on theoretical backing in the field of public health. Adding them markedly improved the Chi-Square and model fit. When examining the regression coefficients for the different ethnic groups on each of the health behaviors, Hispanics scored significantly lower on the stages of change for exercise ($R = -.150$), and Asians scored significantly lower on the stages of change for not drinking alcohol ($R = -.209$), preventing depression ($R = -.199$), and managing stress ($R = -.214$). All other parameters were non-significant, and were thus removed from the model.

Next, each of the variables of gender, class standing, and prior health instruction were also tested with each of the health behaviors, and non-significant parameters were removed. Gender had a significant effect on the stages of change for getting regular exercise ($R = -.276$), in that females scored lower than males. None of the other parameters between gender, class standing, or prior health course and the health behaviors at pretest were significant. Therefore, they were removed from the model.
Lastly, the posttest variables and the variable of enrollment in Fit for Life were added and tested. Modification indices again recommended adding a covariance between the errors for posttest depression prevention and stress management, which was accepted. All of the pretest results were significantly correlated with posttest results \( p < .001 \), which was to be expected since the posttest questions were the same as the pretest. Enrollment in the Fit for Life course had a significant positive effect on the stages of change for fruit and vegetable consumption \( R = .145 \) and getting optimal sleep \( R = .200 \).

For the final model, Chi-Square was 253.688, with 208 degrees of freedom, \( p = .017 \). The CFI was .926, and \( RMSEA = .038 \ [0.017 - 0.053, 90\% CI] \), and \( PCLOSE = .908 \), indicating good model fit. The fit indicator, \( RMSEA \), was chosen because of its consideration of sample size, and because the sample model is not assumed to fit perfectly with the population (Kline, 2005). The final model is shown in Figure 6, and standardized and unstandardized regression weights are shown in Table 38.

For subquestion 1, the significant relationships seen in SEM between personal characteristics and health behaviors were examined further by looking at frequencies for each group at pretest, using the same 157 that were used for the SEM analysis. For exercise, the gender difference was clear, with only 35% of females reporting being in action or maintenance for getting regular exercise, compared with 63% of males (Table 39). Between ethnicities, Hispanics were lower in stage than other groups. Only 37% of Hispanics reported being in action or maintenance for getting regular exercise, compared with 47% of Blacks, 51% of Whites, and 62% of Asians (Table 40).
Figure 6. The structural equation model (SEM) of significant correlations in the study, using standardized regression weights. After deleting missing cases listwise, there were 157 cases for analysis.
### Table 38

Regression Weights, Standardized and Unstandardized (n = 157)

<table>
<thead>
<tr>
<th>Direct Effects:</th>
<th>Standardized</th>
<th>Unstandardized</th>
<th>SE</th>
<th>Critical Ratio</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender → Exercise 1</td>
<td>-0.276</td>
<td>-0.654</td>
<td>0.180</td>
<td>-3.635</td>
<td>0.000</td>
</tr>
<tr>
<td>Hispanic → Exercise 1</td>
<td>-0.150</td>
<td>-0.469</td>
<td>0.238</td>
<td>-1.970</td>
<td>0.049</td>
</tr>
<tr>
<td>Asian → No Alcohol 1</td>
<td>-0.209</td>
<td>-0.674</td>
<td>0.222</td>
<td>-3.039</td>
<td>0.002</td>
</tr>
<tr>
<td>Asian → Depr. Prev. 1</td>
<td>-0.199</td>
<td>-0.944</td>
<td>0.373</td>
<td>-2.531</td>
<td>0.011</td>
</tr>
<tr>
<td>Asian → Stress Man. 1</td>
<td>-0.214</td>
<td>-0.827</td>
<td>0.302</td>
<td>-2.739</td>
<td>0.006</td>
</tr>
<tr>
<td>Enrollment → Fruit/Veges 2</td>
<td>0.145</td>
<td>0.355</td>
<td>0.177</td>
<td>2.002</td>
<td>0.045</td>
</tr>
<tr>
<td>Enrollment → Sleep 2</td>
<td>0.200</td>
<td>0.466</td>
<td>0.155</td>
<td>2.996</td>
<td>0.003</td>
</tr>
<tr>
<td>Exercise 1 → Exercise 2</td>
<td>0.455</td>
<td>0.411</td>
<td>0.064</td>
<td>6.382</td>
<td>0.000</td>
</tr>
<tr>
<td>Healthy Diet 1 → Healthy Diet 2</td>
<td>0.373</td>
<td>0.389</td>
<td>0.077</td>
<td>5.020</td>
<td>0.000</td>
</tr>
<tr>
<td>Fruit/Veges 1 → Fruit/Veges 2</td>
<td>0.400</td>
<td>0.377</td>
<td>0.068</td>
<td>5.526</td>
<td>0.000</td>
</tr>
<tr>
<td>Avoid Caffeine 1 → Avoid Caffeine 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Alcohol 1 → No Alcohol 2</td>
<td>0.727</td>
<td>0.812</td>
<td>0.061</td>
<td>13.241</td>
<td>0.000</td>
</tr>
<tr>
<td>No Smoking 1 → No Smoking 2</td>
<td>0.511</td>
<td>0.639</td>
<td>0.086</td>
<td>7.419</td>
<td>0.000</td>
</tr>
<tr>
<td>Depr. Prev. 1 → Depr. Prev. 2</td>
<td>0.402</td>
<td>0.374</td>
<td>0.065</td>
<td>5.703</td>
<td>0.000</td>
</tr>
<tr>
<td>Stress Man. 1 → Stress Man. 2</td>
<td>0.368</td>
<td>0.346</td>
<td>0.067</td>
<td>5.144</td>
<td>0.000</td>
</tr>
<tr>
<td>Sleep 1 → Sleep 2</td>
<td>0.513</td>
<td>0.461</td>
<td>0.060</td>
<td>7.678</td>
<td>0.000</td>
</tr>
<tr>
<td>Indirect Effects:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender → Exercise 2</td>
<td>-0.126</td>
<td>-0.269</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic → Exercise 2</td>
<td>-0.068</td>
<td>-0.193</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian → No Alcohol 2</td>
<td>-0.152</td>
<td>-0.547</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian → Depr. Prev. 2</td>
<td>-0.080</td>
<td>-0.352</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian → Stress Man. 2</td>
<td>-0.079</td>
<td>-0.286</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender → Exercise 1</td>
<td>-0.276</td>
<td>-0.654</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender → Exercise 2</td>
<td>-0.126</td>
<td>-0.269</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic → Exercise 1</td>
<td>-0.150</td>
<td>-0.469</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic → Exercise 2</td>
<td>-0.068</td>
<td>-0.193</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian → No Alcohol 1</td>
<td>-0.209</td>
<td>-0.674</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian → No Alcohol 2</td>
<td>-0.152</td>
<td>-0.547</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian → Depr. Prev. 1</td>
<td>-0.199</td>
<td>-0.944</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian → Depr. Prev. 2</td>
<td>-0.080</td>
<td>-0.352</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian → Stress Man. 1</td>
<td>-0.214</td>
<td>-0.827</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian → Stress Man. 2</td>
<td>-0.079</td>
<td>-0.286</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enrollment → Fruit/Veges 2</td>
<td>0.145</td>
<td>0.355</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enrollment → Sleep 2</td>
<td>0.200</td>
<td>0.466</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 38 – Continued.

<table>
<thead>
<tr>
<th>Total Effects Continued:</th>
<th>Standard-ized</th>
<th>Unstandard-ized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise 1 → Exercise 2</td>
<td>.455</td>
<td>.411</td>
</tr>
<tr>
<td>Healthy Diet 1 → Healthy Diet 2</td>
<td>.373</td>
<td>.389</td>
</tr>
<tr>
<td>Fruit/Veges 1 → Fruit/Veges 2</td>
<td>.400</td>
<td>.377</td>
</tr>
<tr>
<td>Avoid Caffeine 1 → Avoid Caffeine 2</td>
<td>.637</td>
<td>.582</td>
</tr>
<tr>
<td>No Alcohol 1 → No Alcohol 2</td>
<td>.727</td>
<td>.812</td>
</tr>
<tr>
<td>No Smoking 1 → No Smoking 2</td>
<td>.511</td>
<td>.639</td>
</tr>
<tr>
<td>Stress Man. 1 → Stress Man. 2</td>
<td>.368</td>
<td>.346</td>
</tr>
<tr>
<td>Sleep 1 → Sleep 2</td>
<td>.513</td>
<td>.461</td>
</tr>
</tbody>
</table>

*Note.* 1 = Pretest, 2 = posttest.

Table 39

*Stages of Change for Exercise at Pretest, by Gender (in Percentages)*

<table>
<thead>
<tr>
<th>Stage of Change</th>
<th>Male (n=74)</th>
<th>Female (n=83)</th>
<th>Total (n=157)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precontemplation</td>
<td>1</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Contemplation</td>
<td>15</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>Preparation</td>
<td>20</td>
<td>36</td>
<td>29</td>
</tr>
<tr>
<td>Action</td>
<td>20</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>Maintenance</td>
<td>43</td>
<td>18</td>
<td>30</td>
</tr>
</tbody>
</table>

*Note.* Percentages that do not add up to 100% are due to rounding.
Table 40

*Stages of Change for Exercise at Pretest, by Ethnicity (in Percentages)*

<table>
<thead>
<tr>
<th>Stage of Change</th>
<th>White (n=55)</th>
<th>Black (n=40)</th>
<th>Hispanic (n=27)</th>
<th>Asian (n=24)</th>
<th>Other (n=11)</th>
<th>Total (n=157)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precontemplation</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Contemplation</td>
<td>11</td>
<td>23</td>
<td>37</td>
<td>17</td>
<td>27</td>
<td>20</td>
</tr>
<tr>
<td>Preparation</td>
<td>35</td>
<td>30</td>
<td>22</td>
<td>17</td>
<td>36</td>
<td>29</td>
</tr>
<tr>
<td>Action</td>
<td>16</td>
<td>13</td>
<td>22</td>
<td>33</td>
<td>9</td>
<td>19</td>
</tr>
<tr>
<td>Maintenance</td>
<td>35</td>
<td>35</td>
<td>15</td>
<td>29</td>
<td>27</td>
<td>29</td>
</tr>
</tbody>
</table>

*Note.* Percentages that do not add up to 100% are due to rounding.

The significant differences seen in SEM between Asians and other ethnic groups in alcohol use, depression prevention, and stress management were also examined by Chi-Square. A greater percentage of Asians were either current drinkers (17%) or had used it previously but stopped (25%), compared with 11% and 4% of Hispanics, 4% and 7% of Whites, and 3% and 8% of Blacks, respectively (Table 41). In regard to depression, only 17% of Asians said they were never depressed, compared with 38% of Blacks, 41% of Hispanics, and 27% of Whites, and Asians had higher rates of not practicing depression prevention (41%) than the other ethnic groups (Table 42). When asked about the symptoms of depression, 54% of Asians reported having little interest in doing things on at least several days in the 2 weeks prior to the pretest, compared with 38% of Blacks, 33% of Hispanics, and 36% of Whites. In addition, 46% of Asians reported feeling down, depressed, or hopeless on at least several days in the 2 weeks prior to the pretest, compared with 28% of Blacks, 41% of Hispanics, and 36% of Whites. For stress management, very few reported no stress, but only 54% of Asians reported either being in action or maintenance for stress management, or having no stress, compared with 70% of Hispanics, 80% of Blacks, and 84% of Whites (Table 43).
Table 41

**Stages of Change for No Alcohol at Pretest, by Ethnicity (in Percentages)**

<table>
<thead>
<tr>
<th>Stage of Change</th>
<th>White (n=55)</th>
<th>Black (n=40)</th>
<th>Hispanic (n=27)</th>
<th>Asian (n=24)</th>
<th>Other (n=11)</th>
<th>Total (n=157)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precontemplation</td>
<td>4</td>
<td>0</td>
<td>7</td>
<td>13</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Contemplation</td>
<td>0</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Preparation</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Action</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>8</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Maintenance</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>17</td>
<td>27</td>
<td>8</td>
</tr>
<tr>
<td>Non-drinker</td>
<td>89</td>
<td>90</td>
<td>85</td>
<td>58</td>
<td>73</td>
<td>83</td>
</tr>
</tbody>
</table>

*Note.* Percentages that do not add up to 100% are due to rounding.

Table 42

**Stages of Change for Depression Prevention at Pretest, by Ethnicity (in Percentages)**

<table>
<thead>
<tr>
<th>Stage of Change</th>
<th>White (n=55)</th>
<th>Black (n=40)</th>
<th>Hispanic (n=27)</th>
<th>Asian (n=24)</th>
<th>Other (n=11)</th>
<th>Total (n=157)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precontemplation</td>
<td>4</td>
<td>20</td>
<td>11</td>
<td>25</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>Contemplation</td>
<td>7</td>
<td>2</td>
<td>15</td>
<td>8</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Preparation</td>
<td>9</td>
<td>8</td>
<td>4</td>
<td>8</td>
<td>18</td>
<td>8</td>
</tr>
<tr>
<td>Action</td>
<td>7</td>
<td>5</td>
<td>11</td>
<td>25</td>
<td>27</td>
<td>11</td>
</tr>
<tr>
<td>Maintenance</td>
<td>46</td>
<td>28</td>
<td>18</td>
<td>17</td>
<td>27</td>
<td>31</td>
</tr>
<tr>
<td>Never Depressed</td>
<td>27</td>
<td>38</td>
<td>41</td>
<td>17</td>
<td>18</td>
<td>30</td>
</tr>
</tbody>
</table>

*Note.* Percentages that do not add up to 100% are due to rounding.
Table 43

Stages of Change for Stress Management at Pretest, by Ethnicity (in Percentages)

<table>
<thead>
<tr>
<th>Stage of Change</th>
<th>White (n=55)</th>
<th>Black (n=40)</th>
<th>Hispanic (n=27)</th>
<th>Asian (n=24)</th>
<th>Other (n=11)</th>
<th>Total (n=157)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precontemplation</td>
<td>4</td>
<td>10</td>
<td>7</td>
<td>13</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Contemplation</td>
<td>5</td>
<td>3</td>
<td>15</td>
<td>13</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Preparation</td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>21</td>
<td>18</td>
<td>10</td>
</tr>
<tr>
<td>Action</td>
<td>13</td>
<td>13</td>
<td>7</td>
<td>21</td>
<td>27</td>
<td>14</td>
</tr>
<tr>
<td>Maintenance</td>
<td>58</td>
<td>55</td>
<td>56</td>
<td>29</td>
<td>36</td>
<td>51</td>
</tr>
<tr>
<td>No Stress</td>
<td>13</td>
<td>13</td>
<td>7</td>
<td>4</td>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

*Note.* Percentages that do not add up to 100% are due to rounding.

For subquestion 2, the results of SEM both supported the result of individual Chi-Square analyses and added to it. The individual Chi-Square analyses identified a significant association between the treatment, enrollment in the Fit for Life course, and changes of stage for the behavior of getting optimal sleep \( \chi^2(2) = 16.256 \). Structural equation modeling identified significant positive associations between enrollment in the Fit for Life course and changes of stage for the behaviors of getting optimal sleep \( R = .200 \) and eating five or more fruit and vegetables per day \( R = .145 \).

Subquestion 2 was also answered by student responses to two open-ended questions on the survey at posttest. The direct question for Fit for Life students was, “What changes have you made in your health behaviors/practices as a direct result of HLED120 Fit for Life?” The top five responses are shown in Table 44. Of the 105 Fit for Life students who took the posttest, 50% said they were getting more exercise, and 50% had improved their diet in some way, primarily through eating better and being more aware of the foods they were eating. There were some differences between students of Teacher A and students of Teacher B. In accordance with the class requirement of doing
the FITT program, 69% of Teacher B’s students said they were getting more exercise, compared with 31% of Teacher A’s students. Another major difference was that 20% of Teacher A’s students mentioned practicing stress management techniques, compared with 6% of Teacher B’s students. The complete table is shown in Appendix C.

Table 44

Reported Behavior Changes as Result of Course (n=105) (in Percentages)

<table>
<thead>
<tr>
<th></th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Getting more exercise</td>
<td>31</td>
<td>69</td>
<td>50</td>
</tr>
<tr>
<td>Improved diet in some way</td>
<td>49</td>
<td>52</td>
<td>50</td>
</tr>
<tr>
<td>Drinking more water</td>
<td>16</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>More or better sleep/rest</td>
<td>14</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Practicing stress management</td>
<td>20</td>
<td>6</td>
<td>12</td>
</tr>
</tbody>
</table>

A separate question was added to the posttest to determine what other activities or events throughout the semester affected students’ health behaviors, either positively or negatively. The question for Fit for Life students was, “Other than this course, what other events have affected your health behaviors/practices this semester?” The wording was slightly different for controls, “What events of this semester (films, health day, fitness club membership, etc.) have caused you to change your health behaviors/practices or your attitudes about them? Please explain.” The top six responses are shown in Table 45. The primary response of the controls (35%) was involvement in PE classes, sports, or gym membership. The primary response from Fit for Life students (23%) was the stress and busy schedule of school and classes. Among controls, 18% also cited this as a contributing factor. Other important factors were individuals’ personal attention to or
interest in health and the influence of friends and family. The complete table is shown in Appendix C.

Table 45

*Other Factors Affecting Health Behavior (n=201) (in Percentages)*

<table>
<thead>
<tr>
<th>Factor</th>
<th>Teacher A</th>
<th>Teacher B</th>
<th>Total FFL</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress, school/class schedule</td>
<td>22</td>
<td>24</td>
<td>23</td>
<td>18</td>
</tr>
<tr>
<td>More exercise due to PE, sports, health club membership, etc.</td>
<td>35</td>
<td>9</td>
<td>22</td>
<td>35</td>
</tr>
<tr>
<td>Personal attention to health</td>
<td>6</td>
<td>19</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>Friends or family</td>
<td>6</td>
<td>9</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Specific non-PE course (nutrition, etc.)</td>
<td>4</td>
<td>11</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Less sleep</td>
<td>4</td>
<td>9</td>
<td>7</td>
<td>3</td>
</tr>
</tbody>
</table>

**Qualitative Analysis of Changes Attributable to the Course**

Qualitative data were collected through interviews with five Fit for Life students. Three of the students had Teacher A and two had Teacher B. Three of the students were female. Two were White, 2 were Hispanic, and 1 was Black. Three were freshmen, 1 was a junior, and 1 was a senior. Only 2 had had a previous health course in school. However, all 5 felt they had a good understanding of health principles from their home training, personal reading, and/or counsel from family members who were in medical professions.

None of those interviewed smoked or used alcohol. All were serious about their education and gave thoughtful responses to my questions during the interviews. While academic program was not one of the questions in the pretest, and was not considered in the selection process, 2 of the interviewees were studying to be teachers. This added to their insights, in that they examined their educational experiences for their own future use
as teachers. The interview guides used for the initial and follow-up interviews are presented in Appendix B.

To understand how different students would respond to the course, the students interviewed were chosen to represent a wide range of practice for each of the health behaviors. Table 46 shows their stages of change for each behavior at pretest and posttest according to their responses on the surveys. One represents precontemplation, 2 is contemplation, 3 is preparation, 4 is action, and 5 is maintenance for each behavior. Both Students 1 and 2 were in Teacher B’s class, and Students 3, 4, and 5 were with Teacher A. From these survey results and information provided in the interviews, each of the behaviors, with the exceptions of alcohol and smoking, are discussed in the following paragraphs.

Table 46

*Students’ Stages of Change for Each Health Behavior*

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Student #1 pre</th>
<th>Student #1 post</th>
<th>Student #2 pre</th>
<th>Student #2 post</th>
<th>Student #3 pre</th>
<th>Student #3 post</th>
<th>Student #4 pre</th>
<th>Student #4 post</th>
<th>Student #5 pre</th>
<th>Student #5 post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Healthy Diet</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Fruit/Veggies</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Avoid Caffeine</td>
<td>5</td>
<td>5</td>
<td>n/a</td>
<td>n/a</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>No Alcohol</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>No Smoking</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Depression</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Prevention</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Stress Management</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>n/a</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Optimal Sleep</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

*Note.* 1 = precontemplation, 2 = contemplation, 3 = preparation, 4 = action, 5 = maintenance.
Regular Exercise

The need for regular exercise was promoted by both teachers as being part of a healthy lifestyle. Teacher B, however, also required students to set goals for exercise and record their exercise levels for the last 5 weeks of the semester. Students 1 and 2 were in the goal-setting class with Teacher B. Among the 4 students who were not exercising regularly at pretest, 3 made forward movement through the stages of change towards adopting this behavior by the end of the semester (Table 41). In response to the open-ended question on the posttest survey, Students 1, 2, and 3 included getting more exercise as a change they had made as a result of the course.

In the initial interview, Student 1 reported “wanting to get in shape” and hoped the course would hold students accountable for exercising by having to report on it, which was a reality in that class. Student 1 said that, by the end of the course, his exercise routine had “changed a lot, from not anything at all to exercising.” According to Student 1, accountability did play a partial role in the increase of exercise, but personal interest was also a big factor. When asked how the course had helped with exercising, Student 1 said that it motivated him by helping him to realize “the actual importance of exercise.” Student 2 was afraid of the exercise requirement in the course, and said in the initial interview that she “wouldn’t do it if not required.” Overall, she found it difficult to exercise every day. However, as a benefit of exercising, she said, “I did notice that afterwards, I felt energetic throughout the day.” When asked specifically about the changes she had made, Student 2 responded, “I made changes, but if I’m going to be real honest with myself, the likelihood of me following that [after the course] is not that
good.” However, in response to the open-ended question on the posttest, Student 2 did say that she now made a “more conscious effort to go outside and walk.”

Students 3, 4, and 5 were in the class that did not have an exercise requirement. Student 3 was already exercising regularly at the beginning of the course. When asked if his exercise routine had changed by the end of the semester, Student 3 responded that it was “about the same.” Student 3 said, “The more you exercise, the better you feel” and that exercise helped him to “think clearly.” Student 4’s goal at the beginning of the course was to push herself to exercise, and expected that the course would require a personal fitness plan. For her, the desired exercise requirement came instead in an activity course she was enrolled in, but she credits Fit for Life with increasing her motivation to continue after the requirement was completed. She said in the second interview, “because I know . . . how [exercise] can impact my life, my mental, physical, [and] spiritual life, that is why I kept doing it.” Student 5 mentioned wanting to exercise more during the first interview, but not having time. She was hoping that exercise would be required for the course, and commented in the final interview that “it would have been nice to have it be part of the class so I’d have to do it.” She was happy to learn from the course, though, that exercise doesn’t have to be 30 minutes to an hour of time set aside to work out, but that activity can be incorporated into everyday activities. Her comment was, “I think that the class really did give me things that I was able to fit into my schedule” and, though she initially reported walking a lot in her daily routine, she said she had increased her walking because of the course. From the interviews, then, each of the 4 who had not been in action or maintenance for exercising at pretest did increase
their exercise levels as a result of the course, though not necessarily to the same level as that defined in the survey.

Eating a Healthy Diet

For eating a healthy diet, only 1 of the students interviewed was in action at the beginning of the course. By the end of the course, each of the other 4 made some forward progress through the stages of change for healthy eating (Table 41). Student 1 expressed wanting to be held accountable for eating a healthy diet as well as for exercising, and some accountability for diet was included in the goal setting and recording requirement of the course. When asked about changes in diet from the course, Student 1 said, “It had a big effect on my diet. I pretty much purged my diet of things like chips, fries, . . . I’m not frying anything and I’m really trying to expel anything that is hydrogenated, and . . . just trying to eat unrefined and natural stuff.” He also reported “eating a lot less sugar.”

Again, Student 1 reported that, while accountability played a role in motivation for change, a lot had to do with his own interest in health. In the first interview, Student 2 said her personal health concerns were about breakfasts and portion control. She reported that her early class schedule made it difficult to eat breakfast, which was unusual for her. She also said that there was some history of obesity in her family, so she needed to be aware of how much she ate. In the final interview, she had not made any progress on eating breakfast, but said that she had been more conscious of portion size. However, she felt that this was due to her own personal goal rather than being course related. Student 3 reported already eating a healthy diet. He also reported that he was not a vegetarian, as many at the University are, but he was not interested in giving up meat. No changes occurred over the semester. Student 4 very much appreciated the class time spent in the
kitchen, learning and tasting new ideas for breakfast. She would have liked another class period for “learning new recipes that are healthy and delicious at the same time.” The “eye opening” thing she took from the course was “the amount of fiber in cereal,” and she reported applying what she learned by reading cereal labels. Student 5 mentioned in the first interview that she hoped the course would help her with food choices. In the final interview, she said she learned a lot about nutrition in the course. In response to the open-ended question on the posttest, she wrote, “I am less likely to eat greasy food, and [more likely to] have a salad or soup or legume instead.” When asked about the effect of the course on her diet, she said, “I think it has motivated me. I’ve definitely started eating better.” From the interviews, 3 of the 4 students who did not report eating a healthy diet at pretest felt the course helped them improve their diet.

**Eating Five or More Fruits and Vegetables**

The question on fruits and vegetables asked about eating at least five servings per day. From the survey results, none of the 5 students were eating five or more servings per day at pretest. At posttest, 2 of them reported eating five or more (Table 41). In the final interview, Student 1 reported eating a lot more vegetables as a result of the course. Student 2 did not report any changes in fruit or vegetable consumption. At the beginning of the course, Student 3 said he ate “lots” of fruit and vegetables, but wanted to eat more, especially raw vegetables. In the final interview he reported doing a little better. He said he’s “been juicing more, so you get a lot.” Student 3’s response to the open-ended question, however, included eating more fruit and vegetables as a result of the course. Student 4 did not report any changes in fruit and vegetable eating as a result of the course. In the first interview, Student 5 said her personal goal was to eat more fruit. In the
second interview, she said the course had motivated her, and reported “eating a lot more fruits, but vegetables not so much.” She explained the lack of vegetables as being because of not liking many of them. From the interviews, 3 of the 5 students felt that the course had influenced them to eat more fruit and vegetables.

Avoiding Caffeine

Concerning caffeine use, 2 of the 5 students reported using caffeine regularly on the survey (Table 41). Only 1 student commented on caffeine use in the interviews. Student 3 said he would like to give it up, and has done so before. However, he felt that it was helpful when studying. Neither of the caffeine users changed their caffeine use or their attitudes about it because of the course.

Depression Prevention

Common symptoms of depression include feeling little interest or pleasure in doing things and feeling down, depressed, or hopeless. Three of the 5 students interviewed reported having some symptoms of depression in the 2 weeks prior to the pretest survey. However, only 1 reported using depression prevention techniques at pretest (Table 41). Only one of the students discussed the issue of depression in the final interview. That student felt that the emphasis in the course on how one’s total environment can affect us was helpful for dealing with depression. The student also mentioned the importance of stress management for its positive effects on lessening depression. The biggest factor for dealing with depression, however, according to that student, was giving the problems to God.
Stress Management

In the pretest, all 5 of the interviewees reported practicing stress management (Table 41). In the posttest interviews, Student 1 said that the teacher and the book talked about getting “rid of that stuff that is causing you mental anxiety” and, after applying it, felt it was a useful way of dealing with stress. Student 2 said she already knew of many ways of dealing with stress, but learned in the course that exercise was also a stress reliever. She discussed how difficult it would be, however, to add exercise when life was already stressful from too much to do. Student 3 was already well aware of the benefits of exercise for dealing with stress, but mentioned learning of the importance of other ways, such as time with friends, faith in God, and drinking enough water. Student 5 mentioned learning how to use deep breathing to relax and manage stress, and that she had already found it to be useful. Student 5 also talked about the dilemma that, though exercise can relieve stress, having to add it to a full schedule didn’t seem very feasible. Though all of the students were already practicing stress management at the beginning of the course, 3 reported adding useful practices as a result of the instruction received in class.

Getting Enough Sleep

Optimal sleep was defined as “getting enough sleep so as to awake feeling refreshed” (Pro-Change Behavior Systems, Inc., 1999). Three of the 5 students interviewed reported getting optimal sleep on most nights at pretest (Table 41). Sleep times at pretest ranged from 6 to 10 hours per night. At the end of the semester, most of the students said they were getting less sleep, with times ranging from 4 to 7 hours. Only 2 of the students reported that that amount of sleep was optimal. Student 1 mentioned getting more sleep on the open-ended question. Student 3 said that the importance of rest
was covered in class, and he tried to be conscious of getting enough. Student 4 shared that she was surprised to hear in class how sleep times have decreased overall through the years. Three of the 5 students definitely thought more about sleep because of the course, though only 1 actually got more sleep.

Changes in Knowledge, Attitude, and Motivation

Knowledge and understanding of what habits contribute to health and longevity are prerequisites for changing attitudes and behavior related to health. When asked how the course increased their knowledge about health, all of the students said that they went into the course already knowing a lot about health, and that much of the information presented in class was familiar to them. Four of the students identified that they had learned more details or specific information than they had known before about several health topics. One student specifically mentioned learning more about the “whys” of practicing good health habits. Another said that the course had given “insight to the importance of certain aspects of health.” Four students said they gained knowledge in the area of exercise and fitness. Three mentioned learning more about the importance of water and fluid intake. One reported learning “a lot” about nutrition. Other areas specifically mentioned were stress management, back health, fresh air, and the environment. One of the students said that it was good that the instructor had included a section on relationships, since most college students are single and are in the process of forming important relationships. All of the students felt that, while the course was easy, it covered a good mix of topics and was appropriate for an entry-level course.

While knowledge is an important precursor to behavior change, an individual must also have a positive attitude towards the desired behavior, and be motivated to
change. The subjects of attitude and motivation were intertwined in the responses of the students interviewed, so they are presented together here. Student 1 expressed that, while always being interested in health, the course helped him to “put a higher personal priority” on healthy behaviors. He also felt that the Fit for Life course had inspired him to investigate the biblical instruction on health to meet the research requirement of another course. Through this research, he came to the conclusion that “health is really important, not just to our physical well-being, . . . but for every aspect of our lives.” When asked how he had gained from the course, Student 1 said “it gives me motivation, like when I work out now I know the benefits that I’m getting from it, and so it makes me feel better about what I just did.” Student 2 said the course reminded her about the importance of health, and made her more conscious of it. Student 2 entered the course fearing the exercise requirement. When asked about her attitude towards exercise, she agreed that, while before she didn’t want to think about exercising, it was now “more in the forefront of my mind than it was before.” Student 3 began the course with a positive attitude about health, and felt at the end that his attitude was “probably the same or a little bit better.” However, he felt that the course helped him to “think more about the things I do in life.” Student 4 expressed that having the teacher tell her the same things she had heard while growing up strengthened her beliefs in practicing good health habits. She described how, because of the specific things she learned in the Fit for Life course, she was motivated to continue an exercise routine she had begun for another course, even after the course requirements were completed. Student 5 began the course saying that she wanted to be healthy, but didn’t put a lot of energy into it. For her, health practices needed to “fit into her schedule.” When asked at the end if her attitude about health had changed any, she
said, referring to dietary change, “Maybe I’m just more willing now to do something about it.” She went on to say, “I just learned that small things aren’t that hard to do, and you feel a lot better afterwards.” From what the students told me, it seems that the biggest effect of the course was to remind students of their health and increase their personal motivation to practice healthy habits. As one student put it, “Especially as a freshman in college, health-wise, you’re not necessarily that aware of what you should do. . . . So I think it’s nice to have something, somebody to remind you weekly that you should be healthy.”

Student Recommendations for the Course

Hearing that the students interviewed were already familiar with a lot of the course content, I asked them how the course might be improved. Overall, the students interviewed felt that the course would be better if it were expanded from its current format. Of the two students with Teacher B, whose class required the creation of fitness goals and tracking of progress, one said that if the course were worth more credits, and more discussion was included, it would “probably be beneficial” and students would learn more. Yet this same student did feel that the course covered a good amount of topics for a 100-level course. Another point was that having extra classes would allow more explanations of how to do certain things, such as flexibility and strength exercises. The other student said that the course would be stronger as a two-credit course, with one credit being theory and the other being practical. Among Teacher A’s students, one said that it would be better as a two-credit course because students “would learn more,” and meeting more than once per week would prevent students from forgetting about it in between. The second student also said that it would be better as two credits and included
both content time and application. This student felt that having one credit for practical application would force students to be more active. The third student suggested having lab time for the practical application of course content, for both activity and nutrition. This student also suggested that students be required to choose one behavior to work on during the semester, and have to set goals, and work towards them.
CHAPTER V

CONCLUSION AND DISCUSSION

Many of the leading causes of death and disability in the United States are directly related to lifestyle. Behaviors such as smoking, using alcohol or drugs, eating a nutritionally poor diet, and being physically inactive are considered the leading underlying causes of death in the population (Mokdad et al., 2004). However, just as certain behaviors can negatively affect health and reduce quality of life, other behaviors can improve health and prevent disability and premature death (U.S. DHHS, 2000). Not smoking, limiting alcohol, eating a plant-based diet, including five or more fruits and vegetables per day, getting regular exercise on most days of the week, and managing stress have been shown to reduce the incidence of disease, improve quality of life, and increase life expectancy (Aiello et al., 2007; Åkesson et al., 2007; Djoussé & Gaziano, 2007; Frattaroli et al., 2008; U.S. DHHS, 2000; WCRF/AICR, 2007).

A number of health risk behaviors have been identified in the college-age group (ACHA, 2009). College young people are frequently deprived of sleep. Their diets are often high in calories and fat, and low in fruit and vegetables. Many get very little exercise. About a third of college students are overweight or obese. Alcohol consumption contributes to a greater risk of accidents. Other substance use is not uncommon. These behavioral practices may already be reducing young people’s quality of life, as well as setting the stage for chronic disease and premature death.
The focus of health education is to promote health behaviors that improve quality of life and reduce the incidence of future disease. The college years are prime years for lifelong habit formation, and colleges and universities are encouraged to include health education that emphasizes good nutrition, physical activity, mental health, avoidance of harmful substances, sanitation, and a healthy environment (U.S. DHHS, 2000). Classroom education increases students’ awareness, knowledge, and skills, and contributes to attitude formation in the area of health (McKenzie & Smeltzer, 2001). Through such education, students can become more aware of their own health risks and learn how the adoption of healthy lifestyle behaviors can improve their quality of life now and in the future.

Several studies have been done on the effectiveness of college health education in promoting behavior change. Results, however, have been mixed. Welle and Kittleson (1994) found significant increases in overall wellness scores in students who had attended lecture-based health courses. Askegaard (2000) found significant improvements in students’ behavior overall, and specifically in both nutrition and physical activity, but not in stress management. Grimm (1996) found significant differences in diet, exercise, and weight control after instruction, but not in stress management or addictive behaviors. She also found that when students were required to make behavior contracts in the areas of diet, exercise, or weight control, they achieved significantly better overall scores than those in the traditional lecture-based course. Jackson and Howton (2008) found that physical activity increased significantly when students were instructed in goal setting, and were given pedometers and required to keep a step log throughout the course. In contrast to these positive examples of behavior change, Gines (2006) found no significant
differences in the consumption of breakfast, fruit and vegetables, or fast foods, or in aerobic activity, strength training, or alcohol and drug use following health instruction. Likewise, Thomas (2006) found no change in milk consumption after instruction on calcium consumption in a women’s health course.

Health status and health practices may vary between genders, among different ethnic groups (NCHS, 2007; U.S. DHHS, 2000), and by class standing. These kinds of differences occurred in some of the studies reviewed. However, they were not consistent. There was evidence that college males exercised more than females (Askegaard, 2000; Suminski & Petosa, 2002; Williams, 2000). Females scored higher in nutrition behavior in one study (Askegaard, 2000), and were observed to eat less fast food and animal-based foods in another (Cason, 2002). Males were observed to have greater alcohol use (Gines, 2006) and to take greater risks in terms of addictive behaviors (Grimm, 1996). Males showed more stress than females (Grimm, 1996), while females scored higher in stress management knowledge (Askegaard, 2000). There were no observed differences between ethnic groups in exercise (Gines, 2006) or in dietary behaviors (Gines, 2006; Grimm, 1996). Upperclassmen exhibited higher levels of nutrition and overall health knowledge than freshmen (Askegaard, 2000).

Most of the studies on health behavior change among college students have examined changes in health knowledge, attitudes, and the behaviors themselves. The research has been based on the premise that as students gain in health knowledge, become aware of their own needs, and change their attitudes relating to health, the next step will be a change in behavior (Ewles & Simnett, 1985; Hall & Hord, 2006; McKenzie & Smeltzer, 2001). However, college health courses are relatively short, lasting 10 to 15
weeks. Behavior change, on the other hand, may take much longer, with gradual growth in knowledge and skills (Hall & Hord, 2006; Rogers, 1995). Research on the effectiveness of health instruction that looks for changes in behavior may miss those students who are just beginning the process of change.

The transtheoretical model of behavior change is a model that recognizes the process of change (Norcross & Prochaska, 2002; Prochaska et al., 1998, Prochaska et al., 1994). Based on questions regarding behavioral practice, intention to change, and time, this model can be used to identify where people are in the process of behavior change, even at beginning stages. The stages range from precontemplation, when there is no intention to change, to contemplation and preparation for change, to action, and eventually maintenance of the new behavior. The identification of stage of change can be useful for describing the practices of individuals, for targeting health education, and as an outcome measure (Bulley et al., 2007).

Despite the ability of the transtheoretical model to identify early stages of behavior change, few studies among college students have used it. When the model has been used, it has most often been used descriptively. Clement et al. (2004) used the model to assess physical exercise. Chung et al. (2006) assessed readiness to eat fruit and vegetables. Horneffer-Ginter (2008) used the model to assess a variety of behaviors, including exercise, diet, smoking, alcohol, stress management, and depression management. She noted that the distribution through the stages was different for each behavior, and emphasized the importance of understanding where students were to more effectively target health instruction. Suminski and Petosa (2002) used the stages of change to assess differences between men and women, and between different ethnic
groups for regular exercise. They found that men were more likely to be in maintenance than women, and less likely to be in contemplation. Among the women, Asians made up more of those in precontemplation, while Whites were less likely to be in contemplation and more likely to be in maintenance. Among the men, Asians made up the lowest proportion in the action stage, while Blacks made up the lowest proportion of the contemplators and the highest proportion of the maintainers. Suminski and Petosa (2002) also noted that there were misclassifications of stage when compared with self-reported activity levels.

Two studies used the transtheoretical model to analyze the effectiveness of health instruction. Cardinal and Spaziani (2007) found that when instruction was tailored to match students’ stages of change for exercise behavior, there was a significant increase in students’ exercise behavior at the end of the course. Fischer and Bryant (2008) used the stages of change to track progress as a result of personal trainer services. At follow-up, there was significantly more progress among those using the personal trainer services, and significantly more regression among controls.

**Description of this Study**

The purpose of this study was to determine the degree to which students enrolled in the college health course, Fit for Life, adopted the health behaviors promoted in the course. So as not to miss the early stages of behavior change, the transtheoretical model was chosen. This study specifically focused on the process of behavior change by looking for movement through the stages of change, as described by the transtheoretical model. Forward movement through the stages of change was considered a positive step towards the adoption of a new behavior. This study also recognized that differences in health
behaviors may exist between people of different backgrounds. The background characteristics included in this study were gender, ethnicity, class standing, and prior exposure to health education.

There were three research questions used in this study. The primary research question was, “To what extent have students moved through the stages of change by the end of the course, for each of the health behaviors promoted?” The health behaviors promoted in the course, and included in this study, were eating a healthy diet, eating fruit and vegetables, getting regular exercise, preventing depression, managing stress, not smoking, not drinking alcohol, avoiding caffeine, and getting enough sleep. The first subquestion was, “What influence, if any, do gender, ethnic background, class standing, or previous exposure to health education have on students’ stages of change?” The second subquestion was, “What changes in health behavior are attributable to the course?”

This was a descriptive evaluation study utilizing a mixed-methods approach with simultaneous quantitative and qualitative methodology. The study was also exploratory in nature, in that I sought to determine what differences in health behaviors might exist between students of different genders, ethnicities, class standing, and exposure to prior health instruction. The predominant quantitative aspect used survey methodology in a quasi-experimental, non-equivalent control group, pretest/posttest design. The questionnaire used was the Health Risk Intervention survey (Pro-Change Behavior Systems, Inc., 1999), modified to meet the needs of this study. Two open-ended questions were included on the posttest survey to provide information on the influence of the Fit for Life course and other outside events on health behaviors. The qualitative side of the study
used interviews to collect data in a multiple case study design. Students were interviewed at the beginning and end of the course using the interview guide approach. The qualitative data were used to validate and corroborate the results obtained from the quantitative.

The sample for this study consisted of students in the Fit for Life and English composition courses in Spring 2009. Participants in the study included 169 undergraduate students, ages 18 and older, who completed both pretest and posttest surveys. The treatment group included 87 students in three sections of the Fit for Life course, with two different teachers. The controls were 82 students enrolled in eight sections of the general education English composition courses, who were not concurrently enrolled in Fit for Life. For the qualitative aspect of the study, five cases were chosen from among Fit for Life students to represent the varying stages of change for the nine health behaviors, and the diversity of gender, ethnicity, class standing, prior health instruction, and teacher group.

Quantitative data obtained from the survey were analyzed descriptively and inferentially using SPSS 17.0 and AMOS 17.0 software. Chi-Square was used to analyze differences in stage of change between Fit for Life students and controls. Differences in number of behaviors at pretest and posttest, as well as number of behaviors for which students progressed or regressed through the stages of change were analyzed using $t$ tests. Structural equation modeling (SEM), via AMOS, was used to determine differences between groups by gender, ethnicity, class standing, and prior health instruction; and to determine what changes in behavior were attributable to the course. For the SEM analysis, 12 students were omitted listwise, 3 Fit for Life students and 9 controls, leaving
157 students, so that all calculations would be made on one data set. Responses to the two open-ended questions on the posttest were itemized and tabulated. Qualitative data obtained from interviews with the five case studies were transcribed and coded using Weft QDA software, and analyzed using inductive and deductive reasoning.

**Summary of Results**

**Primary Research Question**

In answer to the primary research question on the extent of forward movement through the stages of change for each health behavior, Fit for Life students showed a greater amount of forward movement than controls at posttest for eating five or more fruits and vegetables, getting regular exercise, practicing depression prevention, practicing stress management, and getting optimal sleep. However, only the observed differences in stage of change for getting optimal sleep were significant using Chi-Square ($\chi^2(2) = 16.256$). There were no differences in movement through the stages of change between Fit for Life students and controls for eating a healthy diet, quitting smoking, stopping the use of alcohol, or avoiding regular caffeine use. When the total number of behaviors for which students progressed or regressed through the stages of change were tabulated and compared using $t$ tests, Fit for Life students showed forward movement through the stages of change for significantly more health behaviors than did controls ($t(167) = 4.420$, $p < .001$), and showed backward movement for significantly fewer behaviors ($t(167) = -2.015$, $p = .045$).

While this study focused on the process of behavior change by looking at the stages of change, it also provided important information on students’ behavioral practices. Behavioral status, or practice, was calculated by including all students in the
action or maintenance stages for each behavior, as well as those who reported not
smoking or drinking, or using caffeine, and those reporting no stress or depression.
Compared with controls, higher percentages of Fit for Life students reported eating a
healthy diet, eating five or more fruits and vegetables, getting regular exercise, practicing
depression prevention, and practicing stress management at posttest. However, using Chi-
Square, only the difference in stress management practice was statistically significant
\( \chi^2 (1) = 4.205 \). Fit for Life students were not significantly different from controls in
their practice of getting optimal sleep. Interestingly though, the percentage of Fit for Life
students who reported getting optimal sleep remained unchanged from pretest to posttest,
while the percentage of controls getting optimal sleep dropped by almost half. When
looking at overall health practice, Fit for Life students reported practicing significantly
more healthy behaviors at posttest than at pretest \( t(86) = 4.414, p < .001 \), and
significantly more healthy behaviors at posttest than controls \( t(167) = 2.582, p = .011 \).

Students’ sleep behaviors were examined further by looking at the actual hours
slept. Using independent \( t \) tests there were no significant differences in sleep time means
between Fit for Life students and controls at either pretest or posttest. However, when
sleep times were categorized at 5 hours or less, between 5 and 7.5 hours, and 7.5 hours or
more, there was a significant difference at posttest using Chi-Square \( \chi^2 (2) = 7.495 \).
Students slept less in general at posttest, but it appears that there was a protective effect
from the Fit for Life course, in that the percentage of Fit for Life students getting 5 hours
of sleep or less was almost half that of controls.
First Subquestion

Through the first subquestion, this study sought to identify differences in health behavior associated with gender, ethnicity, class standing, and prior health instruction. Using SEM and an examination of frequencies in each stage of change for the nine health behaviors, this study identified several significant differences between groups. Females were less likely to exercise regularly than males ($R = -.276$) and Hispanics were less likely to exercise regularly than Whites, Blacks, or Asians ($R = -.150$). Asians were more likely to have used, or to be using, alcohol than the other ethnic groups ($R = -.209$), were less likely to be practicing depression prevention ($R = -.199$), and were less likely to be managing their stress ($R = -.214$). Asians made up 15% of all participants, so these findings are noteworthy. Besides exercise, there were no significant differences in other health behaviors by gender. Besides the effect of Hispanic ethnicity on exercise, and Asian ethnicity on alcohol use, depression prevention, and stress management, there were no significant differences for other behaviors by ethnicity. There were also no differences in health behaviors by class standing or by previous exposure to health education.

Second Subquestion

The primary purpose of health education is to promote behaviors that lead to improved health and wellness. The second subquestion sought to determine what changes in health behavior were attributable to the course. This question was answered by Chi-Square, SEM, open-ended questions on the posttest, and interviews with five Fit for Life students. The open-ended question was, “What changes have you made in your health behaviors/practices as a direct result of HLED120 Fit for Life?”
Results of the second research subquestion varied somewhat by method of analysis. Using Chi-Square, enrollment in the Fit for Life course was significantly associated with greater positive changes of stage at posttest for getting optimal sleep ($\chi^2(2) = 16.256$). Using SEM, participation in the Fit for Life course was significantly correlated with higher stages of change for getting optimal sleep ($R = .200$) and for fruit and vegetable consumption ($R = .145$).

In response to the open-ended question that was asked of the Fit for Life students only, half of the students said that they were getting more exercise and half said they had improved their diet as a result of the course. Approximately 1 of every 8 students said they were getting more or better sleep, and were practicing stress management because of the course. Another health behavior reported on, which was not analyzed in this study, was that of water consumption. Approximately 1 out of 7 students reported drinking more water because of the course.

Students in the interviews also reported changes in their health behaviors at the end of the course. All 4 of those not exercising regularly at the beginning of the semester reported increasing their exercise levels because of the course. Of the 4 who reported they were not eating a healthy diet at pretest, 3 said they had made improvements to their diets. Three of the 5 said they were eating more fruits and/or vegetables. One student said the course had been helpful for dealing with depression. All of those interviewed had already been practicing stress management, but 3 said they had added useful stress-management practices as a result of the course. Three of the 5 said they were more aware of the importance of sleep, but only 1 reported actually getting more sleep. None of the 5 students smoked or drank, and those using caffeine made no change in this behavior.
In summary, compared with controls, Fit for Life students made observable forward movement through the stages of change, and also made changes in their health practices by the end of the course. From the results of the primary research question and the second subquestion, these changes are shown in Table 47.

Table 47

*Positive Changes in Health Behaviors or Stages of Change Among FFL Students*

<table>
<thead>
<tr>
<th>Behavior:</th>
<th>Increased Stage</th>
<th>Increased Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eating a healthy diet</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Eating more fruits &amp; vegetables</td>
<td>Yes*</td>
<td>b</td>
</tr>
<tr>
<td>Exercising more</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Not smoking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not drinking alcohol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoiding caffeine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preventing depression</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Managing stress</td>
<td>Yes</td>
<td>Yes*a</td>
</tr>
<tr>
<td>Getting better sleep</td>
<td>Yes**</td>
<td>ab</td>
</tr>
<tr>
<td>Total of all behaviors</td>
<td>Yes**</td>
<td>c</td>
</tr>
</tbody>
</table>

*a* Chi-Square  
*b* SEM  
*c* t test  

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

Instructor Effect

Though looking for variations between different Fit for Life sections was not part of the purpose of this study, the fact that there were two different teachers added a variable that could not be overlooked. One of the differences noted between teacher groups was in exercise. Both groups reported increased exercise levels and an increase in the percentage of students exercising regularly at posttest. However, a significantly greater percentage of students with Teacher B were exercising regularly at posttest than
Teacher A’s students ($\chi^2(1) = 3.940$). The second statistically significant behavioral difference was in stress management. The percentage of Teacher B’s students reporting forward movement through the stages of change for practicing stress management was more than double that of Teacher A’s students ($\chi^2(2) = 8.834$). The third significant difference was in sleep ($\chi^2(2) = 6.890$). When comparing the two teacher groups, Teacher A’s students were more likely to remain at the same stage of change for getting optimal sleep or move forward through the stages, with only 10% regression, while a third of Teacher B’s students regressed through the stages of change. There were no significant differences between teacher groups for other behaviors.

**Discussion of Results**

This study focused on nine different health behaviors taught in the general education course, Fit for Life. Each of these is an important part of living a healthy lifestyle, so are an important part of health instruction. Effective instruction involves meeting students where they are and assisting them in making informed choices about their health behavior. This section contains a discussion of these health behaviors, including a look at where Andrews students are in their health behavior practices, what specific needs they have, and how well the course met its goal of promoting health among Andrews students.

In this study, the first research subquestion was explorative in nature. Because of the findings of the effect of ethnicity on exercise, use of alcohol, depression prevention, and stress management, an additional review of the literature was necessary. Information from this review is included in the discussion.
Exercise

Compared to national college figures on exercise, students in this study reported higher levels of exercise. Nationally, 45.5% of students reported getting at least 30 minutes of moderate or 20 minutes of vigorous exercise on 3 or more days per week in the spring of 2008 (ACHA, 2009). In this study, 48% of all students, including controls, reported exercising moderately at least 30 minutes per day, five to seven times per week in January, and 63% in April at the end of the semester, when the weather was conducive to being outside. Due to differences in the survey questions between the two studies, an exact comparison cannot be made. However, if the students exercising 3 to 5 days per week were added, this study’s results would likely have been higher.

The survey question on exercise used in this study may not have completely reflected the exercise levels of students. The question gave examples of exercise that were “planned” activities, such as aerobics, jogging, volleyball, etc., “performed to increase physical fitness” (Pro-Change Behavior Systems, Inc., 1999). Besides walking, the examples did not include activities that were more utilitarian. However, students who engaged in utilitarian walking may not have interpreted their walking as matching the definition. This seemed to be the case with one of the young women interviewed, who mentioned walking a lot between classes and to and from work, which is estimated as being about a 15-minute walk each way, yet she responded to this question on exercise as being in the contemplation stage. Whether there were other students for whom this was true, and how many, is unknown. Students may also have been exercising more in total time, but less often, which did not fit the definition of being on “most days.” This was
the case with one student, who indicated that he/she exercised less than five times per week, but for about an hour each time.

Females in this study were less likely than males to be exercising regularly. These findings were congruent with the previous study of Andrews students (Williams, 2000), studies at other universities (Askegaard, 2000; Suminski & Petosa, 2002), and with national results (U.S. DHHS, 2009). From my personal experience in the classroom, it seems that college young men are often interested in bodybuilding or team sports, which may partially explain their higher activity levels. Both of the males interviewed thought of exercise in that way, and as the non-exerciser began to exercise, strength training was a part of his program. In contrast, only one of the females interviewed had an active personal fitness program, begun in a physical activity course, while the other two were not motivated for such activities. For these two young women, their focus on studies made them feel that they did not have time to add a regular exercise program. One of them said she thought of exercise as setting apart a “half an hour, hour every day and work[ing] out,” which she felt she did not have time for. The other girl was not interested in exercising and admitted being afraid of what the exercise requirement of the course might be. These attitudes may be important deterrents to exercise for other young women as well. Further study would be needed to determine whether this perception of exercise requiring a major block of time is a common deterrent for females. Further study would also be needed to determine whether the promotion of exercise that is incorporated into other daily activities would be more effective than traditional exercise promotion for females.
The lower percentage of Hispanic students reporting regular physical exercise in this course is congruent with other data. Nationally, Hispanics are less physically active than other ethnic groups (U.S. DHHS, 2009). Information from two studies may be helpful in understanding this observation, and in addressing this difference in the classroom. Sherman, Ruiz, Yarbrough, Cantu, and Huff (2000) found that Hispanic college students were four times more likely to report that “maintaining good physical condition takes more effort than it is worth” (p. 129) than White students. Similarly, Ryan (2005) found that for Hispanic college students, the perceived number of weeks of exercise required for noticeable cardiovascular benefits was a significant deterrent to activity levels. In his examination of the psychosocial determinants of physical activity, he found that the perceived efficacy of performing cardiovascular exercise, the expectation that symptoms of depression and anxiety can be moderated by exercise, and students’ self-evaluative outcome expectancies were all significant positive predictors of activity levels.

To help all students to increase their exercise levels, then, it is important that they view exercise as something they can do, and something that will be of benefit to them. Activity choices like walking for relaxation, or to and from appointments, or taking the stairs may be perceived as less threatening than a workout and be more acceptable to reluctant exercisers. Small changes such as these may fit more easily into a busy schedule, and can build more activity into daily life. Providing plenty of information in class on the benefits of exercise for cardiovascular function, good mental health, and improved appearance and vigor may help to motivate students, particularly Hispanics, to seek a more active lifestyle.
While the difference in the percentage of Fit for Life students reporting regular exercise compared to controls at posttest was non-significant, the 50% of Fit for Life students who responded to the open-ended question as getting more exercise as a direct result of the course cannot be ignored. Their increases in exercise may well have included small changes like those mentioned. Incremental increases in physical activity are positive changes that can improve muscle mass and help to control body weight. Small changes in behavior that bring about an increase in activity levels are an important step in improving one’s physical fitness and promoting overall health.

Eating a Healthy Diet

Unfortunately, there may have been some response error for the four questions on healthy eating because of confusion about what was meant by the wording. Some students specifically asked about how to answer the questions on stage of change because they dealt with both choosing low fat foods and eating the appropriate calories for body weight, and these students were only doing one. Other students marked that they weren’t doing one of them, but answered the stage of change questions as if they were doing both. For the question on whether they were eating the appropriate calories for their weight, a couple of students wrote on their papers that they do not count calories, showing that they did not understand what the question was really asking. Presumably, however, the confusion was similar in both Fit for Life students and controls, affecting both equally, and for both pretest and posttest, which should not have affected any trends between them.

The definitions for the question on whether or not the students were eating the “number of calories to reach and maintain a healthy weight” (Pro-Change Behavior
Systems, Inc., 1999) may not have been appropriate for all college students. From my experience in the classroom, many college women are already concerned about their figures and weight gained after entering college, so could relate to this question. College men, however, are often involved in sports and athletics and require a lot of food. Thus, they would be unlikely to be “eating small portions,” “paying attention to serving sizes,” or “telling yourself that every calorie counts” (Pro-Change Behavior Systems, Inc., 1999) as listed in the definition. For these young men, their high caloric intake may match the needs of their activity level, but they may well answer no to the question. Again, this bias should have been the same for both Fit for Life students and controls. However, the responses may not have given an accurate picture of how well students were doing with eating a healthy diet.

Because of responses to both the interviews and the open-ended question on the posttest, I believe that Fit for Life students did indeed make positive changes in their diets that can be attributed to the course. However, these changes were either not of the magnitude of that defined in the survey questions, or they were of a different type. Students in the interviews said they were more careful in their food choices by doing such things as watching portion sizes, reading labels, eating fruit as a snack, eating more salads, juicing raw vegetables and fruits, avoiding or cutting back on greasy foods, and decreasing their consumption of sweets. Of the 50% of Fit for Life students who responded to the question on behavior changes made as a result of the course by noting that they had improved their diet, most said they were eating better. One fifth of them said they had a greater awareness of what they were eating. Awareness of what one is eating and recognizing that some food choices are healthier than others are the first steps
towards making dietary improvements. Small changes in dietary habits, such as avoiding greasy foods or eating more salads, can make a difference in one’s nutritional quality. Several small changes, made over time, can significantly affect one’s overall health and reduce the risk for chronic diseases, as well as better supplying the body’s nutritional needs.

Eating Fruits and Vegetables

The percentage of students in this study who reported eating five or more servings of fruits and vegetables per day (31%) was higher than other U.S. figures. Nationally, approximately one-quarter of adults eat five or more servings per day, while the rate for young people, ages 18 to 24, is slightly lower (Serdula et al., 2004). Among college students who took the Spring 2008 National College Health Assessment (NCHA), however, only 8.5% reported eating the recommended amounts (ACHA, 2009). The findings of this study may suggest that there is something unique about students at Andrews University, or the school’s approach to health promotion in general. More study would be needed to determine whether this finding is unique to Andrews University or whether fruit and vegetable consumption is higher at all Seventh-day Adventist colleges, in accordance with Seventh-day Adventist beliefs about the importance of healthful living. It may also be useful to determine what factors contributed to the higher consumption levels seen among students in this study.

Most public health interventions to increase fruit and vegetable consumption have involved increasing awareness and education. However, these methods have generally failed to bring about behavior change in the adult population, and only slight improvements have been seen in young people (Serdula et al., 2004). The effect of
instruction on students’ stages of change for fruit and vegetable consumption in the Fit for Life course was small but significant. With few comments specifically on fruit and vegetable consumption by the students interviewed, there is no indication of just how the course affected students on this behavior. However, perhaps there is some insight to be gained from their general comments. Students mentioned appreciating the holistic nature of the course, including the incorporation of nutrition principles into other areas of instruction, the emphasis on how everything affects the body’s health, and the use of NEWSTART principles (Weimar Center for Health & Education, 2009), in which good nutrition is part of the total plan for good health. Perhaps the holistic approach of Seventh-day Adventist health education played a role in the successful promotion of fruit and vegetable consumption. This possibility is speculative, however, and more research would be needed to determine whether the holistic nature of Seventh-day Adventist health education differs significantly from that of other universities, and whether this approach played a role in bringing about behavior change in the area of fruit and vegetable consumption.

Use of Alcohol, Tobacco, and Caffeine

I believe that the influence of Seventh-day Adventist beliefs regarding the use of harmful substances is evident in the results of this study. Seventh-day Adventists believe that alcohol and tobacco should not be used (General Conference of Seventh-day Adventists, 2007; White, 1890; 1954). According to the University’s Information Technology Services, 91% of undergraduate students identify as Seventh-day Adventists, and among students in this study, fully 95% reported never smoking and 80% reported never drinking alcohol, with only 8% being active drinkers. These figures are quite
different from those obtained in the Spring 2008 NCHA, in which 66% of college students across the nation reported never using cigarettes, and approximately 17% reported never using alcohol (ACHA, 2009). Approximately three-fourths of students in this study said they were not regular caffeine users. While the literature does not have any recommendations for the restriction of caffeine, except during pregnancy, there is widespread acknowledgment that caffeine has a stimulant effect, which is why Seventh-day Adventists discourage its use (General Conference of Seventh-day Adventists, 2007; White, 1954). With the majority of students identifying as Seventh-day Adventists, this stance on caffeine may be a factor in the low incidence of use that was observed. The underlying beliefs behind student behaviors were not part of this study, however, so further study would be needed to determine to what extent students’ religious beliefs enter into their decisions to not smoke or use alcohol or caffeine. How caffeine use among students in this study compares with that of students at other Adventist colleges or with college students across the nation is not known, and more study would be needed to explore these comparisons.

In this study, there were no significant changes in behaviors related to substance use from pretest to posttest. With the small percentage of students using any of the three substances, sample size would need to be much larger to show a significant change.

A significant and surprising finding of this study was the higher percentage of Asian students who drank alcohol, either at the time of the study or in the past, compared with the other ethnic groups. With 15% of participants in this study, and just over 14% of the Spring 2009 undergraduate student population being Asian (Susan Schwab, Information Technology Services, personal communication, October 28, 2009), this is an
important finding. Because this result was unexpected, I researched it further in the literature. Nationally, Asians, ages 18 and older, have lower rates of alcohol use, and the highest rates of lifetime abstinence (41%) compared with other ethnic groups (18% for Whites to up to 30% for Blacks) (U.S. DHHS, 2009). Reported rates of lifetime alcohol use and current alcohol use among students of primarily East Asian and Southeast Asian descent at a college campus have been as high as 94% and 78%, respectively (So & Wong, 2006). More congruent with national data, however, Huang, DeJong, Gomberg Towvim, and Schneider (2009), in a study of over 5,000 undergraduate students from 32 college campuses across the nation, reported that 40% of Asian college students abstained from drinking alcohol, compared to 42% of Blacks, 21% of Hispanics, and 16% of Whites. A larger study by Theall et al. (2009) found that, after Black students (36%), Asians had lower rates of alcohol abuse (41%) compared with other ethnic groups (54% for Whites). The rate of Asian students in this study who currently used alcohol was much lower (17%) and the rate of abstainers was higher (58%) than these figures. From this perspective, the results are good news. Nevertheless, the higher incidence of drinking among Asians compared to other students surveyed is important information for those teaching the health course and for others involved with the health of Andrews’ students. Further study would be needed to determine why Asians in this study had greater alcohol use than other ethnic groups.

A significant finding of the study by Huang et al. (2009) was that abstinence from alcohol was positively associated with involvement in community service and with religious participation. Both of these are an important part of the philosophy and offerings at Andrews University. Similar to the total undergraduate student body, the
percentage of Asian students who identified as Seventh-day Adventists in the Spring 2009 semester was just over 90%. Among the total undergraduate Asian population, however, almost 28% were attending the University on non-resident visas, and among these, only 72% identified as Seventh-day Adventists (Susan Schwab, Information Technology Services, personal communication, October 28, 2009). To what degree religious beliefs and involvement in community service play a role in the drinking behavior of Asian students at Andrews University is not known. Further research would be needed to investigate this relationship.

Depression Prevention and Stress Management

Two other important findings of this study were the higher rate of symptoms of depression and lower rate of managing stress among Asian students compared with other ethnic groups. Again, because of this surprising finding, I did an additional review of the literature. College years are stressful for students overall. As many as three-fourths of college students report moderate distress, and approximately 9% report clinically significant distress (Rosenthal & Wilson, 2008). Almost 15% of students across the nation have been diagnosed with depression at some time in their lifetime, with a third of those reporting that their diagnosis occurred in the year prior to the survey (ACHA, 2009). Unfortunately, there is not much information on depression, stress, or coping among Asian college students specifically. Studies on the mental health of college students in general have found no differences in levels of distress, anxiety, or depression by ethnicity (Hudd et al., 2000; Rosenthal & Schreiner, 2000; Rosenthal & Wilson, 2008). Again, with the high percentage of Asian students in this study, the findings of this study regarding depression and stress are important, and deserve further attention.
A recent qualitative study of a diverse group of Asian young people, ages 18 to 30, in Montgomery County, Maryland, revealed some important information regarding mental health among Asians (Lee et al., 2009). Mental health was an important issue for the immigrant and second-generation Asian young people in that study. They reported that the view among Asians is that they should be able to control their own mental health. Culturally, mental health problems are a difficult topic of discussion, since they are viewed as a source of shame. Therefore, an individual suffering from mental health problems is unlikely to seek outside help. Sources of stress for Asian young people in the United States include great pressure to succeed academically, both from parents and society, tension between their adopted American culture and the more traditional culture of their parents, obligations to take care of their parents, and discrimination or isolation because of their cultural background. Factors that deter Asian young people from seeking help for mental health issues include a cultural stigma against seeking counseling, a lack of awareness of the importance of mental health among both young Asians and their parents, a desire not to cause their parents concern, costs associated with professional help, and a lack of availability of culturally competent care. This information may be useful for health teachers as they seek ways of meeting the needs of Asian students.

Unfortunately, the findings regarding stress and depression among students in this study cannot be compared with those of other studies. This study focused on stress management and depression prevention, rather than on clinically significant distress or depression. While questions were asked on depressive symptoms, I am not qualified to make interpretations as to their clinical significance. In addition, they were not the same as questions about diagnosed depression. In order to make comparisons with students at
other colleges and universities across the nation, different survey items would need to be used.

Sleep

Getting enough sleep is an important part of academic success. Unfortunately, sleep difficulties were the third most cited impediment to academic performance among college students (ACHA, 2009), and the typical college student is not getting enough sleep. Approximately two-thirds of students in this study reported not getting optimal sleep on most nights. This figure is similar to that of the Spring NCHA, in which approximately 70% of college students reported not getting enough sleep on at least 5 of the previous 7 days (ACHA, 2009).

While this study showed that the course had a significant positive effect on students’ intentions to get more sleep, I believe that it also showed a protective effect on the sleep behaviors of Fit for Life students. The stresses at the end of the semester, with assignments due and exams forthcoming, are very high for students. Stress and class schedule were cited as factors that affected health behaviors by almost one quarter of Fit for Life students and almost one-fifth of controls. Yet, the percentage of Fit for Life students getting optimal sleep did not change at the end of the semester, compared with a drop among controls. In addition, 13% of Fit for Life students reported getting more or better quality sleep in response to the open-ended question on the posttest. So while the stressors were high, Fit for Life students were mindful of their need for sleep.

Instructor Effect

The difference in health behavior change observed between the two teacher groups was not a surprising finding, particularly for exercise. The differing approaches to
teaching and time spent on the topic of physical fitness offer a valid explanation for the observed differences in exercise behavior. Teacher A’s instruction was balanced between the various health topics, with no known emphasis on any particular aspect of health. Teacher B, on the other hand, particularly emphasized exercise and physical fitness throughout the course. Both teachers used lecture and PowerPoint presentations, but Teacher B included discussion time and a requirement that students create fitness goals and monitor themselves for their achievement of those goals. While students with both teachers were given instruction that increased awareness and knowledge about the benefits of exercise, Teacher B’s students also had opportunity for reflection and the motivation of a grade to spur them into the action stage for exercise. In harmony with the emphasis placed on exercise and the exercise requirement, a significantly greater percentage of Teacher B’s students reported regular exercise at the end of the semester compared with Teacher A’s students.

What is not known is how long the observed increase in exercise behavior will last after the exercise requirement of Teacher B’s class. The exercise requirement was in the last half of the semester, and the posttest survey was given during the last week of classes. Therefore, though students reported an increase in exercise behavior, that increase may have stopped as soon as the course was over, at least for some students. As one of the students interviewed put it, “While I was recording my fitness program, I made changes, but if I’m going to be real honest with myself, the likelihood of me following that is not that good.” The other student from that class acknowledged that “you can’t force people to exercise.” For that student, the accountability of having to monitor and record exercise was a part of the personal increase in physical activity, but interest in
fitness played a bigger role in changing behavior, which the student intended to continue.
The hope of health education, of course, is that students will see that making exercise a part of their daily routine is possible and has many benefits, so that they will be personally motivated to continue the behavior, or at least try it again.

The observed difference between teacher groups in stress management is not as clear as it appears due to some conflicting results. In support of the apparent result, the greater progress of Teacher B’s students towards the adoption of stress management behaviors may have been related to the exercise requirement for that group. Exercise is known to be an effective means of relieving stress, and was included in the definition given in the question on stress management. Thus, an increase in exercise behavior may have helped students to relieve some of their stress at the end of the semester and recognize its benefits. One of Teacher B’s students did specifically mention learning about how exercise can relieve stress. However, that same student noted that having to take time to exercise when the schedule was very hectic could be stressful in and of itself. Another possible reason for the difference was Teacher B’s emphasis that wellness is contingent on one’s whole environment, and any part of that environment might be causing stress. For one student interviewed, this perspective was key in reducing stress, through the avoidance or elimination of environmental factors contributing to stress.

The ambiguity of the apparent progress of Teacher B’s students in stress management comes from two sources. To begin with, the large majority of Teacher A’s students reported either having no stress or being in action or maintenance for stress management at the beginning the course. Thus, there was not much room for improvement. There is no information as to why this group of students began the spring
semester feeling less stressed. The second thing to consider is that greater than three times more of Teacher A’s students wrote that they were practicing stress management, compared with Teacher B’s students, in response to the open-ended question on behaviors practiced as a result of the course. Interestingly, the percentage of Teacher A’s students who made forward progress through the stages of change for stress management was the same as that reported on the open-ended question (20%). One must ask the question, Is it possible that those students who improved their stress management practices were so impressed by what they learned that they all thought to volunteer that information on the open-ended question? This seems unlikely. However, learning a specific technique that they found useful, particularly at the end of the semester, may have accounted for some of the overlap. A technique mentioned in one of the final interviews was the use of deep breathing to relieve stress. That student reported that the technique was very helpful in high stress situations. The research leading up to this study, and its results, have provided no other information on this concurrence.

There is little information to help in understanding why Teacher A’s students had less regression through the stages of change for sleep. Both teachers had a class period on rest, though Teacher B combined the topic of rest with stress. Some clues might be found from the interviews. Two of Teacher A’s students specifically mentioned learning more about the importance of sleep in the class, compared to no comments from Teacher B’s students. One possible explanation for less regression during the end of the semester is that Teacher A’s examples were more pertinent, or information provided was more dramatic, so as to raise the consciousness of students to the importance of sleep. The other possible explanation is that students had greater gains in knowledge on the
importance of sleep. Both increased awareness and increased knowledge are useful for moving people out of precontemplation and contemplation into preparation. At the posttest, 61% of Teacher A’s students were in the preparation stage, compared with 44% of Teacher B’s students. These ideas, however, are speculative and would require further investigation.

Interpreting Behavior Change

While people develop patterns of behavior, which they may follow through daily life, we cannot assume that behavioral practice remains static. In this study, there were differences in the number of health behaviors practiced at pretest and posttest by both Fit for Life students and controls. While the mean number of behaviors did not change for controls, the distribution did. There was also progression and regression through the stages of change among both Fit for Life students and controls. A person may practice a certain set of behaviors, and, when circumstances change, may alter that set dramatically. The increase in exercise in response to an exercise requirement is one example, and the termination of that behavior when the requirement is over is another. In terms of diet, students have told me that they used to eat well when they were at home. Now that they are in college, however, their diets are much different because of circumstances like a busy schedule, a dislike for cafeteria food, and tight finances. Unfortunately, fast food is a cheap option that many students turn to when money gets tight. Another example was given by several students who wrote that they changed their health practices because of their own personal health problems or because of an illness or death in their family. Such events can dramatically illustrate to an individual what might happen if one were to continue with current unhealthy practices, thus motivating a change in behavior. As one
student said in the interview, personal interest in one’s health is key to the continuation of any healthy behavior.

This study provided a picture of the health behaviors of a small group of Andrews University students, and how students might change their behaviors as a result of enrollment in the Fit for Life course. The behavior changes seen in this study might persist beyond the course, but not necessarily so. Nevertheless, even short-term positive change, followed by regression, has been shown to increase the success for future permanent change (Prochaska et al., 1994). Repeated measures of Fit for Life students several months or a year after the course would give a better picture of how well the observed behavior changes persist. However, this was not within the scope of this study.

Effectiveness of the Fit for Life Course

While those in health promotion would like to see people embrace behaviors that can improve their health outcomes, health education is successful even when it helps people change their attitudes and move from precontemplation to contemplation of behavior change. That is a necessary first step. At the beginning of this research, I chose to look at the stages of change for each of nine healthy behaviors so as not to miss the small steps of progress that students in the Fit for Life course might make. I reasoned that each student comes to class with a different set of behaviors and different needs for change. I wanted this study, then, to be sensitive enough to detect small changes in attitude and behavior that students might make for only one or two behaviors. The results of this study showed that there was significant progression through the stages of change for sleep and for fruit and vegetable eating, and there were significant positive changes in stress management practice for students in the Fit for Life course. Besides the specific
behaviors, however, there was also significant progress through the stages of change for the sum of all behaviors, and a small but significant increase in total behaviors at the end of the course.

Just as progression through the stages of change towards the adoption of a healthy behavior is desirable, so are small changes of behavior that bring people closer to a healthy lifestyle. The U.S. government devotes a website to encouraging people to make small steps towards improved health (http://www.smallstep.gov). These small steps may be in eating a healthy diet, being more active, or in other behaviors. People are more likely to feel that they can make changes that do not require much time or effort. In this study, some of the small steps mentioned by Fit for Life students were being more active and eating better by drinking less soda, eating less greasy food, choosing more salads, and eating more nuts. They also reported getting better sleep, applying stress management techniques, and drinking more water. Though these small changes in behavior did not show as significant changes of stage in the results, small changes, such as exercising more, eating less fatty foods, or drinking less alcohol, have been associated with progression through the stages of change (Pro-Change Behavior Systems, 2004). These small changes also contribute to the good health of those who do them. Therefore, though the changes mentioned by the Fit for Life students may not be considered statistically significant, they do illustrate the effect of the course in promoting health. As one of the young women interviewed said, “I think that the class really did give me things that I was able to fit into my schedule, like eating better, or walking more [or] longer . . . to get to class.”
Therefore, I would conclude that the Fit for Life course was successful in bringing about behavior change among its students. In accordance with course objectives, students did “integrate positive lifestyle principles into daily living” (Anonymous Teacher A, 2009, p. 1; Anonymous Teacher B, 2009, p. 1). In harmony with the University’s goal, they also made changes that showed they had applied “the principles of health and fitness to their own lives” (Andrews University, 2009, p. 38). Most students made progress through the stages of behavior change for one or more health behaviors. Only 7% of Fit for Life students reported no positive change compared with 16% of controls, and one-third of those were already practicing all nine behaviors. Conversely, 30% reported positive change in four or more behaviors, compared with only 8% of controls.

However, while there was success in bringing about behavior change, there is still room for improvement. The students in this study had similar rates of overweight and obesity to college students across the nation. Reported exercise rates for Fit for Life students as a whole were not significantly different from controls. The majority of students reported not eating a low-fat diet and not eating the recommended five or more fruits and vegetables per day. The majority also reported not getting optimal sleep. With just over a third of students reporting little interest in doing things, or feeling down, depressed, or hopeless in a 2-week period, more students could benefit from concrete ways to prevent depression or deal with stress. It is important that the course’s instructors continue to seek ways to make health messages relevant to students, as well as providing opportunities for students to try new behaviors.

Improving course effectiveness may necessitate a change in course format. Goal setting appeared to be an important factor for behavior change in this study. The Fit for
Life students who were required to set goals and monitor their exercise levels made significantly more progress towards the adoption of the recommended exercise behavior than did students who were not. Grimm’s research (1996) found that behavior contracts were an effective means for producing behavior change in exercise, diet, and weight management. One of the students interviewed, from Teacher B’s group, related that being held accountable for exercising was an important part of motivation for change. One of Teacher A’s students said in the interview that she wished that students had been required to choose one area of their life to work on during the course, and report on the changes they had made at the end of the semester. Goal setting and behavior monitoring, or behavioral contracting, can help students to pay attention to weak areas of their health behaviors, and motivate them to begin making changes.

Effectiveness of the Fit for Life course may be improved by the addition of hands-on instruction time. When asked how the course might be made stronger, each of the students interviewed suggested that it include an activity or lab component. One student mentioned wanting more how-to training particularly for strength and flexibility, while another expressed desire for more on healthy cooking and eating. Two said that the addition of activity time would be particularly helpful. One student said that meeting twice a week would prevent students from forgetting about the course in between class periods. While this may sound simplistic at first, application of concepts is a good way to reinforce instruction. As Jenkins said, “Logic and facts can be slow motivators” (2003, p. 264). The addition of practical application time could help students to practice and gain mastery over necessary skills, thus improving their feelings of self-efficacy and behavioral control (Maddux & DuCharme, 1997; McKenzie & Smeltzer, 2001).
With the broad range of topics included in a general health course, the one-credit designation may limit the effectiveness of the course because of lack of time to go into much depth. All of the students interviewed felt the course was easy, which they appreciated. However, as one student put it, “a lot of the stuff we did I felt that, well, I know this.” When I taught the course, I felt the tension of having to meet the needs of students who had little background, for example in nutrition, and others who had grown up hearing about good health principles. One student noted, “I think that if we had gone more in depth in specific areas . . . it would have been beneficial.” Additional teaching time would allow subjects to be covered more deeply, and allow more time for students to discuss important issues. Four of the 5 students interviewed felt that the course may benefit by being two credits. I feel that their suggestion is deserving of consideration.

**Limitations**

One of the limitations of this study was the lack of specific measures of behavioral frequency for behaviors other than sleep. The inclusion of frequency measures for exercise, fruit and vegetable consumption, other dietary behaviors, and substance use would have verified answers regarding stage of change. The additional information may have also been useful for the teachers as they plan future instruction. The use of additional frequency items, however, would have made the survey instrument much longer, which might have affected students’ willingness to participate. The additional time requirement might also have affected teachers’ willingness to give up class time, which could have dramatically affected participation rates.

Another limitation of this study is in regard to generalizability. The results of this study and the conclusions drawn from it are from observations of a particular group in a
particular time and place. As such, they are not generalizable to students or health courses in other colleges or universities. Students at Andrews University, for example, either are Seventh-day Adventists themselves or choose to attend a Seventh-day Adventist institution. As such, some of their behavioral patterns may be inherently different from those of students at other institutions. One example of this is in regard to substance use. Avoidance of alcohol and tobacco is part of Seventh-day Adventist values, and is a rule that students agree to follow when they attend Andrews University.

The results of this study might not be generalizable to Andrews’ undergraduate students as a whole because of somewhat different demographic characteristics. Because Fit for Life is a general education course, students are more likely, and are encouraged, to take it early in their education. Therefore, in this study, the percentage of freshmen was higher than that in the undergraduate population, while the percentages of juniors, and particularly seniors, were much lower.

Generalization may or may not be possible for other Fit for Life groups. Since the demographic distribution of incoming groups is expected to be similar to those of this study, the behavioral characteristics of other incoming Fit for Life groups may also be comparable. Results of instruction, too, might be similar for other Fit for Life groups, providing the teachers, approaches to teaching, and course structure and content remain the same. Just as differences were observed between the two teacher groups in this study, though, other teachers would be expected to affect students in their own unique ways. Differences in some behaviors may also occur between groups of students taking the course in the fall versus those taking it in the spring, such as frequency of exercise in cold versus warm weather. Additional research would be needed to determine if the results of
this study are indeed consistent with other groups at Andrews University in other semesters with other teachers.

Another limitation of this study was that its duration was only one semester. As stated previously, the ability to generalize between Fit for Life groups in different semesters is limited. More important, the conclusions that can be drawn regarding behavior change are also limited. After the course is over, it is quite possible that students will revert to their original patterns of behavior. Without further follow-up, there is no way to determine how students’ health behaviors are affected over the long-term.

Finally, the opinions and health practices of the students interviewed may not reflect the opinions and practices of all students in the Fit for Life course. Interviewees were chosen to represent a diversity of stage of change for each of the health behaviors, to get the perspectives of students in all stages regarding the effectiveness of the health course. They were also chosen to reflect the diversity in gender, ethnicity, class standing, and prior health education of Fit for Life students as a whole. However, just 30 of the 132 Fit for Life students (23%) volunteered to be interviewed. These students may have been more academically motivated, more interested in health, or more eager to participate for some other reason. As previously noted, two of the interviewees were planning to be teachers. They were all very interested in succeeding in their studies. None of them represented those students who do not turn in assignments or fail the course, though those are few. All of them were interested in the topic of health, which may not have been the case with all students enrolled in the course. However, given the seriousness with which they reflected on my questions, it is hoped that their opinions did provide the perspective of the majority. Particularly because of the cohesiveness of many opinions and reported
changes as a result of instruction, I believe that the information received through the
interviews does confirm and inform the results of the quantitative analysis.

**Recommendations**

After reviewing the results of this study, I have a number of recommendations.
These recommendations are in the areas of future research, teaching strategies, and
course structure. They are described in the following paragraphs.

**Recommendations for Future Study**

With the disparities in health and health behaviors that exist between genders and
between ethnic groups, there is an ongoing need for research that will help health
professionals reduce these differences. Educators particularly need to know of inherent
attitudes or issues that act as barriers to healthy behavior change, as well as discovering
which teaching methodologies are particularly useful for these groups. Since the college
years are seen as the beginning of adulthood, and as a prime time for establishing healthy
lifelong behaviors, such information has the potential to affect the health of the nation for
years to come.

In regard to exercise, there is a need for more information as to why females tend
to exercise less than males, and what the attitudes of college-age women are towards
exercise. In addition, to help young women to become more physically active, it is
important to understand what types of exercise and settings they find most appealing.
Additionally, there is a need for more research as to what types of health messages and
methods of instruction are most effective for Hispanic college students, in order to help
them to become more physically active. Research on instructional methods should
include an investigation as to whether the promotion of small doable activity changes
might be effective in evoking an increase in exercise behavior among females and Hispanics particularly.

In this study, the greater levels of stress and depression seen among Asian students are of particular importance. There is a need for more research on the mental health issues of Asian college students, in general, and how their needs can best be met. More specifically, because of the high percentage of Asians in the student population, I recommend that Andrews University be proactive in researching the mental health needs of its Asian students. This type of research could be instrumental for finding ways to offer culturally sensitive support to Asian students.

The difference in alcohol use among Asian students and students of other ethnic groups in this study is also worthy of further research. I recommend that research be conducted to determine why this is so, and whether there is a difference in drinking behavior between Asians who identify as Seventh-day Adventists and those who do not, or between Asian who are U.S. residents versus those on non-resident visas. This information could be useful for the formation of appropriate messages on alcohol use and methods of delivery for Asian students.

Recommendations for the University and the Fit for Life Course

The delivery of effective health instruction is of great importance to Fit for Life instructors, and the Department of Nutrition and Wellness. Each instructor is already involved in some type of monitoring, through exams and student evaluations, that can give information for improving the effectiveness of instruction. However, I feel that the use of a standardized instrument to measure behaviors would be helpful for that analysis. Behavioral measures would add to the information on knowledge and understanding that
is collected by quizzes and exams. I recommend that the Department and instructors of the Fit for Life course consider regular use of the Health Risk Intervention survey (Pro-Change Behavior Systems, Inc., 1999), which measures the stages of behavior change, to both determine health behavior needs at the beginning of the course and to assess behavior change. This type of monitoring would also give information as to the effectiveness of the course over time, regardless of who is teaching.

In this study, the use of goal setting and behavior monitoring appeared to be an effective strategy for increasing students’ exercise behavior. I recommend that this strategy become a regular part of the course, whether it be for exercise or for the student’s choice of behavior, as was suggested by one of the students interviewed. It does not take a large investment of time on the part of the teacher, but it does require students to examine their behavior and reflect on it, which is an important part of the behavior change process. Furthermore, as students try a new behavior, they may find that doing it is not as hard as they had perceived, and they are more likely to recognize the benefits of doing it. Increased self-efficacy, mastery of necessary skills, and a shift toward more pros than cons all increase the likelihood that a person will repeat the behavior in the future.

The difference in certain health behaviors seen between genders and different ethnic groups necessitates thoughtful and sensitive instruction. Instruction on exercise, for example, should include practical tips for including more physical activity in daily life, as well as the usual information on achieving fitness. Culturally-specific information on health risks and behavioral recommendations should be added to general instruction whenever applicable. Materials used in class should also be culturally inclusive. Particularly in the area of mental health, teachers should help students to understand that
stress and depression can affect anyone, and find ways to encourage students to seek help when they are overwhelmed.

In addition to encouraging teachers to be aware of cultural differences in health behaviors, I would like to encourage the University to seriously consider the differences found in this study, particularly in regard to Asian students. While the University offers counseling services for students for a variety of mental and social health problems, this study points out the particular need for services that are “Asian friendly.” The use of Asian counselors or the initiation of peer support groups are just two ideas that may help Asian students to be more amenable to seeking help when needed.

From the input of those students who were interviewed, I recommend that the Department of Nutrition and Wellness look carefully at the Fit for Life course format to determine whether it might be more effective as a larger course. This might be accomplished through the addition of lab time, by increasing the credit load of the course, or both. Increasing instruction time would allow teachers to go into more depth, and to help students with practical application. Greater depth and detail would help to keep the interest of students who come into the course with a strong background in health, and would increase learning opportunities for all students. Application time would help students to learn new skills, and help them to move from the contemplation and preparation stages into action.

Since the promotion of a healthy lifestyle is an important part of the philosophy of Andrews University as a whole, I feel that the University could benefit by being a member of the American College Health Association. Membership would avail the University of ACHA resources, including the National College Health Assessment, and
would give the school recognition for its work in health promotion. The regular use of the NCHA with incoming and outgoing students would help the University to assess its students’ needs and the effectiveness of the schools’ total program in promoting the adoption of a “wholesome way of life” (Andrews University, 2009, p. 10).
APPENDIX A

HEALTH BEHAVIOR SURVEY
### Variable Definitions for Health Behavior Survey

**Purpose of the Study** – The purpose of this study is to determine the degree to which students enrolled in HLED120 Fit for Life adopt the health behaviors promoted in the course. The health behaviors promoted in the course are eating a healthy diet, eating fruit and vegetables, getting regular exercise, preventing depression, managing stress, not smoking, not drinking alcohol, avoiding caffeine, and getting enough sleep. The degree to which students adopt these health behaviors can be measured by their movement through the stages of change, as described by the transtheoretical model of behavior change (Prochaska, et al., 1994). The five stages of change that will be identified in this study are precontemplation, contemplation, preparation, action, and maintenance.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Conceptual Definition</th>
<th>Instrumental Definition</th>
<th>Operational Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Classification based on sexual identity: male or female</td>
<td>This variable will be determined by students’ responses to the following item:</td>
<td>Responses will be coded nominally:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. What is your gender?</td>
<td>Male = 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. Male</td>
<td>Female = 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Female</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>Self reported age</td>
<td>This variable will be determined by students’ responses to the following item:</td>
<td>Responses will be coded on a ratio scale in years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. What is your age?</td>
<td></td>
</tr>
<tr>
<td>Class Standing</td>
<td>The student’s class standing in the University</td>
<td>This variable will be determined by students’ responses to the following item:</td>
<td>Responses will be coded on an ordinal scale</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. What is your class standing?</td>
<td>Freshman = 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. Freshman</td>
<td>Sophomore = 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Sophomore</td>
<td>Junior = 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Junior</td>
<td>Senior = 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d. Senior</td>
<td>Graduate = 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>e. Graduate student</td>
<td>Other = 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>f. Other</td>
<td></td>
</tr>
<tr>
<td>Enrollment status</td>
<td>Whether or not the student is enrolled in HLED 120</td>
<td>This variable will be determined by students’ responses to the following item:</td>
<td>Responses will be coded nominally:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Are you currently enrolled in HLED120 Fit for Life?</td>
<td>No = 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. No</td>
<td>Yes = 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Yes</td>
<td></td>
</tr>
<tr>
<td>Variable</td>
<td>Conceptual Definition</td>
<td>Instrumental Definition</td>
<td>Operational Definition</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Height</td>
<td>Self reported height in feet and inches</td>
<td>This variable will be determined by students’ responses to the following item:</td>
<td>Responses will be coded on a ratio scale in inches</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. What is your height?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>__________ ft __________ in</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>Self reported weight in pounds</td>
<td>This variable will be determined by students’ responses to the following item:</td>
<td>Responses will be coded on a ratio scale in pounds</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. What is your weight?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>______________ lbs -</td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td>Classification based on ethnic identity</td>
<td>This variable will be determined by students’ responses to the following item:</td>
<td>Responses will be coded nominally</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. What is your ethnicity?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. White</td>
<td>White = 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Black or African American</td>
<td>Black = 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Hispanic or Latino</td>
<td>Hispanic = 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d. Asian</td>
<td>Asian = 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>e. American Indian or Alaska Native</td>
<td>American Indian or Alaskan Native = 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>f. Native Hawaiian or Other Pacific Islander</td>
<td>Native Hawaiian or Pacific Islander = 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>g. Other</td>
<td>Other = 7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>For SEM analysis, each ethnicity will be coded on a dummy scale, with 1 representing a member of that ethnic group, and 0 representing all others. Responses will be coded nominally</td>
</tr>
<tr>
<td>Previous health instruction</td>
<td>Whether or not a student has had a health course prior to HLED120</td>
<td>This variable will be determined by students’ responses to the following item:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7. Prior to this semester, have you had a health or wellness course in high school or college?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. No</td>
<td>No = 0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Yes</td>
<td>Yes = 1</td>
</tr>
<tr>
<td>Variable</td>
<td>Conceptual Definition</td>
<td>Instrumental Definition</td>
<td>Operational Definition</td>
</tr>
<tr>
<td>------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Regular Exercise</td>
<td>Regular moderate exercise is defined as any planned physical activity performed to increase physical fitness. Such activity should be performed 5 – 7 times per week for at least 30 minutes per day.</td>
<td>This variable will be determined by students’ responses to the following items:</td>
<td>Responses will be coded on both a nominal and an ordinal scale:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10. Regular moderate exercise is any planned physical activity (e.g. fast walking, aerobics, jogging, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, dancing, etc.) performed to increase physical fitness. Such activities should be performed:</td>
<td>Those answering a, b, or c will be counted as those not engaging in regular moderate exercise. Those answering d or e will be counted as those engaging in regular moderate exercise.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 5 to 7 times per week</td>
<td>To determine stage of change:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• for at least 30 minutes per day.</td>
<td>a = 1 = precontemplation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Exercise should be done at a level that increases your breathing rate and causes you to break a light sweat.</td>
<td>b = 2 = contemplation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do you engage in regular moderate exercise according to the previous definition?</td>
<td>c = 3 = preparation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. No, and I do not intend to in the next 6 months.</td>
<td>d = 4 = action</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. No, but I intend to in the next 6 months.</td>
<td>e = 5 = maintenance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. No, but I intend to in the next 30 days.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>d. Yes, I have been, but for less than 6 months.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>e. Yes, I have been for more than 6 months.</td>
<td></td>
</tr>
<tr>
<td>Healthy Diet</td>
<td>A healthy diet is defined as one that supplies the amount of calories needed to reach and maintain a healthy weight and is low in fat.</td>
<td>This variable will be determined by students’ responses to the following items:</td>
<td>Responses will be coded on both a nominal and an ordinal scale:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11. Healthy eating means doing both of the following:</td>
<td>11a is not eating calories according to weight</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Eating the number of calories that allows you to reach and maintain a healthy weight</td>
<td>11b is eating calories according to weight.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Eating a diet that is low in fat.</td>
<td>12a is not eating a low fat diet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eating the number of calories that allows you to reach and maintain a healthy weight means doing things like:</td>
<td>12b is eating a low fat diet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Eating small portions</td>
<td>Furthermore:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Paying attention to serving sizes</td>
<td>• If both 11 &amp; 12 = a, then 13 is for both calories and low-fat diet.</td>
</tr>
</tbody>
</table>

178
TABLE 1.3

<table>
<thead>
<tr>
<th>Variable</th>
<th>Conceptual Definition</th>
<th>Instrumental Definition</th>
<th>Operational Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy Diet contd.</td>
<td></td>
<td>- Eating more vegetables and fruits</td>
<td>- If 11 = a, &amp; 12 = b, then 13 is for calories only.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Avoiding taking handfuls of unhealthy snacks</td>
<td>- If 11 = b, &amp; 12 = a, then 13 is for low-fat diet only.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Telling yourself that every calorie counts.</td>
<td>To determine stage of change:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>13a = 1 = precontemplation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>13b = 2 = contemplation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>13c = 3 = preparation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do you eat the number of calories that allows you to reach and maintain a healthy weight?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. No</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Yes</td>
<td></td>
</tr>
<tr>
<td>12. Eating a low-fat diet</td>
<td></td>
<td>means doing things like:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Eating chicken without the skin</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Eating low-fat cheeses and other low-fat dairy products</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Using light or fat-free salad dressing or eating salad without dressing</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Eating fruits and vegetables as snacks</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Eating bread without butter</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do you eat a diet that is low in fat?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. No</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Yes</td>
<td></td>
</tr>
<tr>
<td>13. Are you planning to change what you eat so you can answer YES to questions 10 and 11?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. No, and I do not intend to in the next 6 months. (Go to Question 14)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Yes, and I intend to in the next 6 months. (Go to Question 14)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Yes, and I intend to in the next 30 days. (Go to Question 14)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>d. I did answer yes to questions 9 and 10. (Go to Question 13)</td>
<td></td>
</tr>
<tr>
<td>14. How long have you been doing these two things?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. For less than 6 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. For more than 6 months</td>
<td></td>
</tr>
<tr>
<td>Variable</td>
<td>Conceptual Definition</td>
<td>Instrumental Definition</td>
<td>Operational Definition</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Fruit and Vegetables</td>
<td>Fruit and vegetable consumption means eating at least 5 servings per day</td>
<td>This variable will be determined by students’ responses to the following items:</td>
<td>Responses will be coded on both a nominal and an ordinal scale:&lt;br&gt;Those answering a, b, or c will be counted as those not eating at least 5 fruits and vegetables.&lt;br&gt;Those answering d or e will be counted as those eating at least 5.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15. Do you eat at least 5 servings of fruits and vegetables per day (a serving is 1/2 cup of cooked vegetables, 1 cup raw vegetables, 1 cup of salad, a piece of fruit or 3/4 cup of 100% fruit juice)?&lt;br&gt;&lt;br&gt;a. No, and I do not intend to in the next 6 months.&lt;br&gt;b. No, but I intend to in the next 6 months.&lt;br&gt;c. No, but I intend to in the next 30 days.&lt;br&gt;d. Yes, I have been, but for less than 6 months.&lt;br&gt;...&lt;br&gt;e. Yes, I have been for more than 6 months.</td>
<td>To determine stage of change:&lt;br&gt;a = 1 = precontemplation&lt;br&gt;b = 2 = contemplation&lt;br&gt;c = 3 = preparation&lt;br&gt;d = 4 = action&lt;br&gt;e = 5 = maintenance</td>
</tr>
<tr>
<td>Depression prevention</td>
<td>Depression prevention is using effective methods to keep depression from occurring, or lessening its effects.</td>
<td>This variable will be determined by students’ responses to the following items:</td>
<td>Responses to question 17 will be coded on a nominal scale as listed to indicate amount of reported signs/symptoms of depression:&lt;br&gt;Responses to question 18 will be coded on both a nominal and an ordinal scale:&lt;br&gt;Those answering “a” will be counted as having no reported depression. Those answering b, c, or d will be counted as not practicing depression prevention. Those answering e or f will be counted as practicing depression prevention.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17. Over the last two weeks, how often have you been bothered by any of the following problems?&lt;br&gt;Little interest or pleasure in doing things?&lt;br&gt;a. Not at all.&lt;br&gt;b. Several days.&lt;br&gt;c. More than half the days.&lt;br&gt;d. Nearly every day.&lt;br&gt;Feeling down, depressed, or hopeless?&lt;br&gt;a. Not at all.&lt;br&gt;b. Several days.&lt;br&gt;c. More than half the days.&lt;br&gt;d. Nearly every day.</td>
<td></td>
</tr>
<tr>
<td>Variable</td>
<td>Conceptual Definition</td>
<td>Instrumental Definition</td>
<td>Operational Definition</td>
</tr>
<tr>
<td>----------</td>
<td>------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Depression prevention, contd.</td>
<td></td>
<td>• Practicing stress management on most days &lt;br&gt;• Exercising for 30 minutes or more on most days &lt;br&gt;• Getting professional help when needed.</td>
<td>To determine stage of change: &lt;br&gt;a = 0 = no reported depression &lt;br&gt;b = 1 = precontemplation &lt;br&gt;c = 2 = contemplation &lt;br&gt;d = 3 = preparation &lt;br&gt;e = 4 = action &lt;br&gt;f = 5 = maintenance</td>
</tr>
<tr>
<td>Stress management</td>
<td>Stress management is using effective methods to lessening the effects of stress, such as relaxation, physical activity, talking with others, and/or making time for social activities.</td>
<td>Do you effectively practice depression prevention in your daily life? &lt;br&gt;a. I have never been depressed. &lt;br&gt;b. No, and I do not intend to in the next 6 months. &lt;br&gt;c. No, but I intend to in the next 6 months. &lt;br&gt;d. No, but I intend to in the next 30 days. &lt;br&gt;e. Yes, I have been, but for less than 6 months. &lt;br&gt;f. Yes, I have been for more than 6 months.</td>
<td>Responses will be coded on both a nominal and an ordinal scale: &lt;br&gt;Those answering a, b, or c will be counted as not practicing effective stress management for their stress. &lt;br&gt;Those answering d and e will be counted as practicing effective stress management. &lt;br&gt;Those answering f will be counted as reporting no stress.</td>
</tr>
</tbody>
</table>

To determine stage of change: <br>a = 1 = precontemplation <br>b = 2 = contemplation <br>c = 3 = preparation <br>d = 4 = action <br>e = 5 = maintenance <br>f = 0 = no reported stress
<table>
<thead>
<tr>
<th>Variable</th>
<th>Conceptual Definition</th>
<th>Instrumental Definition</th>
<th>Operational Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Smoking</strong></td>
<td>Smoking is defined as smoking cigarettes</td>
<td>This variable will be determined by students’ responses to the following item:</td>
<td>Responses will be coded on both a nominal and an ordinal scale:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9. Have you quit smoking cigarettes?</td>
<td>Those answering “a” will be counted as non-smokers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. I was never a cigarette smoker.</td>
<td>Those answering b, c, or d will be counted as smokers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. No, and I do not intend to quit in the next 6 months.</td>
<td>Those answering e or f will be counted as previous smokers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. No, but I intend to quit in the next 6 months.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>d. No, but I intend to quit in the next 30 days.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>e. Yes, I quit less than 6 months ago.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>f. Yes, I quit more than 6 months ago.</td>
<td></td>
</tr>
<tr>
<td><strong>Alcohol</strong></td>
<td>Alcohol use is defined as any drinking of alcohol (other than possibly trying it)</td>
<td>This variable will be determined by students’ responses to the following item:</td>
<td>Responses will be coded on both a nominal and an ordinal scale:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20. Alcohol is any alcoholic beverage such as beer, wine coolers, liquor, wine, cordials, brandy, or spirits.</td>
<td>Those answering a, b, or c will be counted as drinkers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Do you drink alcohol?</td>
<td>Those answering d or e will be counted as previous drinkers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. Yes, and I do not intend to stop in the next 6 months.</td>
<td>Those answering “f” will be counted as non-drinkers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Yes, but I intend to stop in the next 6 months.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Yes, but I intend to stop in the next 30 days.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>d. No, I stopped drinking it less than 6 months ago.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>e. No, I stopped drinking it more than 6 months ago</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>f. No, (other than possibly trying it) I have never been an alcohol drinker</td>
<td></td>
</tr>
</tbody>
</table>

182
<table>
<thead>
<tr>
<th>Variable</th>
<th>Conceptual Definition</th>
<th>Instrumental Definition</th>
<th>Operational Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caffeine</td>
<td>Regular caffeine use is defined as drinking caffeinated beverages such as tea, coffee, or cola drinks more than occasionally</td>
<td>This variable will be determined by students’ responses to the following item: 16. Regular caffeine use is drinking caffeinated beverages such as coffee, tea, energy drinks such as Red Bull, or cola drinks more often than occasionally (or more than once or twice per week).</td>
<td>Responses will be coded on both a nominal and an ordinal scale: Those answering a, b, or c will be counted as regular caffeine users. Those answering d or e will be counted as previous regular users. Those answering f will be counted as non-caffeine users.</td>
</tr>
</tbody>
</table>
|          | Do you regularly use caffeine? | | To determine stage of change: | a = 1 = precontemplation  
|          | a. Yes, and I do not intend to stop in the next 6 months. | | b = 2 = contemplation  
|          | b. Yes, but I intend to stop in the next 6 months | | c = 3 = preparation  
|          | c. Yes, but I intend to stop in the next 30 days | | d = 4 = action  
|          | d. No, I have not used it regularly for less than 6 months. | | e = 5 = maintenance  
|          | e. No, I have not used it regularly for more than 6 months | | f = 0 = reported non user  
|          | f. No, I have never used caffeine on a regular basis | | |
| Sleep    | Optimal sleep is defined as getting enough sleep on most nights, that allows the person to awake feeling refreshed | This variable will be determined by students’ responses to the following items: 21. On average, how many hours per night of sleep did you get this past week?  
|          | 21. On average, how many hours per night of sleep did you get this past week? | | Responses to question 21 will be calculated on a ratio scale by hours of sleep.  
|          | 21. On average, how many hours per night of sleep did you get this past week? | | Responses to question 22 will be interpreted using a nominal scale as follows:  
|          | 22a = not getting optimal sleep.  
|          | 22b = getting optimal sleep | | |
|          | 22. Optimal sleep is getting enough sleep so as to awake feeling refreshed. | | |
Variable | Conceptual Definition | Instrumental Definition | Operational Definition
--- | --- | --- | ---
Sleep, contd. | 23. Are you planning to change your sleep habits so you can answer YES to the previous question? | a. No, and I do not intend to in the next 6 months. | To determine stage of change, responses to questions 23 and 24 will be interpreted on an ordinal scale as follows:

23a = 1 = precontemplation
23b = 2 = contemplation
23c = 3 = preparation
24a = 4 = action
24b = 5 = maintenance

b. Yes, and I intend to in the next 6 months.
c. Yes, and I intend to in the next 30 days.

24. For how long have you been getting optimal sleep?
   a. For less than 6 months
   b. For more than 6 months
Purpose of the study: The purpose of this study is to investigate health behaviors among students at Andrews University.

Inclusion criteria: In order to participate, I recognize that I must be an Andrews University student of sound mind, 18 years of age or older, and enrolled in a general education course.

Risks and discomforts: I understand that I will be completing a written survey, and there are no physical or emotional risks to my involvement in this study.

Benefits/results: I understand that there is no remuneration for taking part in this survey, but by participating, I will help the researcher to understand health behaviors among Andrews University students.

Voluntary participation: I understand that my participation in this study is voluntary, and that I may withdraw at any time without pressure, embarrassment or negative impact on me. I also understand that my participation is confidential and no identifying information will ever be disclosed.

Contact information: In the event that I have questions or concerns about my participation in this study, I understand that I may contact the researcher, Lynn Merklin at merklin@andrews.edu, or by calling her at home at 269-815-4644. If I would like to speak with the researcher's advisor, I may contact Dr Larry Burton in Bell Hall at 471-3465. I understand that one copy of this form is mine to keep for my own records.

__________________________________________________________  _________________________
Signature of Participant                                      Date

__________________________________________________________  _________________________
Signature of Witness                                          Date
Dear Students,

I am conducting a study on the health behaviors of students at Andrews University as part of my doctoral research. This survey has been developed so that I can understand more about your health behaviors. A second survey will be given at the end of the semester.

The information you provide will be kept confidential. The surveys will be kept locked in a secure location, accessible only by me. I will not, in any way, use the information you give to identify you, and no identifying information will be disclosed. Results as a whole will be published in my doctoral dissertation, and will be presented to the Department of Nutrition and Wellness.

Completing the surveys is voluntary. Extra credit points will be given for completing them. In order to get your extra credit points, please print your name and write your signature on the informed consent form. Then turn it in with the survey. The informed consent forms will be immediately separated from the surveys so that your name will not be associated with the survey in any way.

Instructions: Please write your ID number on the top of the survey in the space provided. (Do NOT write your name on the survey). Your ID number will only be used to pair this survey with the second one, and will then be removed.

Read each question carefully, and circle your answer choice. Be sure to answer the questions based on what you really do. There are no right or wrong answers. When you are finished, hand in the survey and one copy of the informed consent form.

Thank you very much for your help.  

Lynn Merklin, PhD candidate
ID number _______________

Andrews University
Department of Teaching, Learning & Curriculum

Health Behavior Survey

1. What is your gender?
   a. Male
   b. Female

2. What is your age?

3. What is your class standing?
   a. Freshman
   b. Sophomore
   c. Junior
   d. Senior
   e. Graduate student
   f. Other

4. Are you currently enrolled in HLED120 Fit for Life?
   a. No
   b. Yes

5. What is your height?

      ft ________ in

6. What is your weight?

      lbs

7. What is your ethnicity?
   a. White
   b. Black or African American
   c. Hispanic or Latino
   d. Asian
   e. American Indian or Alaska Native
   f. Native Hawaiian or Other Pacific Islander
   g. Other

8. Prior to this semester, have you had a health or wellness course in high school or college?
   a. No
   b. Yes
9. Have you quit smoking cigarettes?
   a. I was never a cigarette smoker.
   b. No, and I do not intend to quit in the next 6 months.
   c. No, but I intend to quit in the next 6 months.
   d. No, but I intend to quit in the next 30 days.
   e. Yes, I quit less than 6 months ago.
   f. Yes, I quit more than 6 months ago.

10. Regular moderate exercise is any planned physical activity (e.g. fast walking, aerobics, 
jogging, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, dancing, 
etc.) performed to increase physical fitness. Such activities should be performed:
   • 5 to 7 times per week
   • for at least 30 minutes per day.

   Exercise should be done at a level that increases your breathing rate and causes you to 
break a light sweat.

Do you engage in regular moderate exercise according to the previous definition?
   a. No, and I do not intend to in the next 6 months.
   b. No, but I intend to in the next 6 months.
   c. No, but I intend to in the next 30 days.
   d. Yes, I have been, but for less than 6 months.
   e. Yes, I have been for more than 6 months.

11. Healthy eating means doing both of the following:
   • Eating the number of calories that allows you to reach and maintain a healthy weight
   • Eating a diet that is low in fat.

   Eating the number of calories that allows you to reach and maintain a healthy weight means 
doing things like:
   • Eating small portions
   • Paying attention to serving sizes
   • Eating more vegetables and fruits
   • Avoiding taking handfuls of unhealthy snacks
   • Telling yourself that every calorie counts.

Do you eat the number of calories that allows you to reach and maintain a healthy weight?
   a. No
   b. Yes
12. **Eating a low-fat diet** means doing things like:
   - Eating chicken without the skin
   - Eating low-fat cheeses and other low-fat dairy products
   - Using light or fat-free salad dressing or eating salad without dressing
   - Eating fruits and vegetables as snacks
   - Eating bread without butter

   **Do you eat a diet that is low in fat?**
   a. No
   b. Yes

13. **Are you planning to change what you eat so you can answer YES to questions 11 and 12?**
   a. No, and I do not intend to in the next 6 months. (Go to Question 14)
   b. Yes, and I intend to in the next 6 months. (Go to Question 14)
   c. Yes, and I intend to in the next 30 days. (Go to Question 14)
   d. I did answer yes to questions 9 and 10. (Go to Question 13)

14. **How long have you been doing these two things?**
   a. For less than 6 months
   b. For more than 6 months

15. **Do you eat at least 5 servings of fruits and vegetables per day (a serving is 1/2 cup of cooked vegetables, 1 cup raw vegetables, 1 cup of salad, a piece of fruit or 3/4 cup of 100% fruit juice)?**
   a. No, and I do not intend to in the next 6 months.
   b. No, but I intend to in the next 6 months.
   c. No, but I intend to in the next 30 days.
   d. Yes, I have been, but for less than 6 months.
   e. Yes, I have been for more than 6 months.

16. **Regular caffeine use** is drinking caffeinated beverages such as coffee, tea, energy drinks such as Red Bull™, or cola drinks more often than occasionally (or more than once or twice per week).

   **Do you regularly drink caffeinated beverages?**
   a. Yes, and I do not intend to stop in the next 6 months.
   b. Yes, but I intend to stop in the next 6 months
   c. Yes, but I intend to stop in the next 30 days
   d. No, I have not used it regularly for less than 6 months.
   e. No, I have not used it regularly for more than 6 months
   f. No, I have never used caffeine on a regular basis
17. Over the last two weeks, how often have you been bothered by any of the following problems?

**Little interest or pleasure in doing things?**
- a. Not at all.
- b. Several days.
- c. More than half the days.
- d. Nearly every day.

**Feeling down, depressed, or hopeless?**
- a. Not at all.
- b. Several days.
- c. More than half the days.
- d. Nearly every day.

18. Depression prevention means using effective methods to keep depression from occurring, or if it does occur, to keep it as mild and brief as possible. The effective methods for preventing depression are:
- Controlling negative thinking every day
- Engaging in healthy, pleasant activities on most days
- Practicing stress management on most days
- Exercising for 30 minutes or more on most days
- Getting professional help when needed.

**Do you effectively practice depression prevention in your daily life?**
- a. I have never been depressed.
- b. No, and I do not intend to in the next 6 months.
- c. No, but I intend to in the next 6 months.
- d. No, but I intend to in the next 30 days.
- e. Yes, I have been, but for less than 6 months.
- f. Yes, I have been for more than 6 months.

19. Stress management includes regular relaxation, physical activity, talking with others, and/or making time for social activities.

**Do you effectively practice stress management in your daily life?**
- a. No, and I do not intend to in the next 6 months.
- b. No, but I intend to in the next 6 months.
- c. No, but I intend to in the next 30 days.
- d. Yes, I have been, but for less than 6 months.
- e. Yes, I have been for more than 6 months.
- f. I currently do not have any stress in my life.
20. Alcohol is any alcoholic beverage such as beer, wine coolers, liquor, wine, cordials, brandy, or spirits.

Do you drink alcohol?
  a. Yes, and I do not intend to stop in the next 6 months.
  b. Yes, but I intend to stop in the next 6 months.
  c. Yes, but I intend to stop in the next 30 days.
  d. No, I stopped drinking it less than 6 months ago.
  e. No, I stopped drinking it more than 6 months ago.
  f. No, (other than possibly trying it) I have never been an alcohol drinker.

21. On average, how many hours per night of sleep did you get this past week?
   _______ hrs

22. Optimal sleep is getting enough sleep so as to awake feeling refreshed.

Do you get optimal sleep on most nights?
  a. No (Go to question 23)
  b. Yes (Go to question 24)

23. Are you planning to change your sleep habits so you can answer YES to the previous question?
   a. No, and I do not intend to in the next 6 months.
   b. Yes, and I intend to in the next 6 months.
   c. Yes, and I intend to in the next 30 days.

24. For how long have you been getting optimal sleep?
   a. For less than 6 months
   b. For more than 6 months

Thank you for your participation in this survey.

Questions adapted from the Health Risk Intervention survey. Used with permission from Pro-Change Behavior Systems, Inc.
APPENDIX B

INTERVIEWS
HEALTH BEHAVIOR RESEARCH
INTERVIEW PROCEDURES

INTERVIEW 1

Introduction:

Thank you for your willingness to assist me with my research. I am studying health behaviors among students enrolled in HLED120 Fit for Life. Information from this interview, and from interviews with other Fit for Life students, will be used to help me better understand your experience during this course.

I would like to interview you now, at the beginning of the course, and again in April, at the end of the semester. I expect that this interview will take about 45 minutes to an hour. Your participation is voluntary, and you may withdraw at any time. As a gift for completing an interview with me, I will give you a gift certificate worth $10. The gift certificate, however, is only available at the end of a completed interview.

These interviews will be kept totally confidential. I will not share your personal information with anyone. Things that you share with me may appear in my dissertation, but they will always be presented anonymously, so that no connection can be made to an individual student. Your input and your personal opinions are very important to me. In order to help me to remember everything you say, I would like to record this interview. That way I can review our conversation again and be sure that I don’t miss anything. If you are willing to be interviewed for my study, please read and sign the informed consent form, and provide me with contact information so that I can schedule our second interview at the end of the semester.

Interview Guide Protocol:

- Tell me about your background and interest in health.
- Have you had a health class of any kind before?
- What are your feelings about your own (current state of) health?
- As you know, Fit for Life is one of the required general education courses at Andrews University. How do you feel about taking this course?
- Are there any concerns you have about your health or taking this course?
- What are your expectations as you take this course?
- Do you feel the need of making any changes in your health behaviors?
- If so, what kind of changes are you planning to make?
- Do you think that this course might help you to make those changes? Why or why not?

Thank you again for your willingness to interview with me. As a token of my appreciation, I would like to give you this gift certificate. I look forward to talking with you again. Have a great semester!
INTRODUCTION:

Thank you for meeting with me again. You’ll remember that I am studying the health behaviors of students enrolled in HLED120 Fit for Life. I would like to know what changes you’ve experienced during this course.

Again, your participation is voluntary, and this interview will be kept confidential. Anything that I may include in my dissertation from this interview will be anonymous, so as to protect your identity. Your input and your personal opinions are very important to me. As in the first interview, I would like to use the tape recorder so that I can review our conversation again. If you are willing to be interviewed, please read and sign the informed consent form.

Interview Guide Protocol:

- Now that the semester is almost over, what are your feelings about the course Fit for Life?
- Were the expectations you had at the beginning of the course fulfilled?
- What about the concerns you had?
- Please share with me your interest in, and feelings about health now.
- As you look back over the semester, what changes did you make in your health behaviors?
- Did the Fit for Life course help you to make those changes? In what way?
- Are there any other changes that you are about to make because of what you learned in this course?
- Is there anything that happened during the semester, other than this course, that contributed to changes in health behavior?

Thank you so much for helping me with my research. As a token of my appreciation, I would like to give you this gift certificate. Have a great summer!
INFORMED CONSENT FORM
Title: Health Behaviors of Students Enrolled in a General Education Health Course

PURPOSE OF THE STUDY: The purpose of this study is to investigate the health behaviors of students enrolled in HLED120 Fit for Life.

INCLUSION CRITERIA: In order to participate, I recognize that I must be an Andrews University Student of sound mind, 18 years or older, and enrolled in HLED120 Fit for Life.

RISKS AND DISCOMFORTS: I have been informed of the interview procedure, and understand that there are no physical or emotional risks to my involvement in this study.

BENEFITS/RESULTS: I understand that by participating, I will help the researcher to understand the health behaviors of students enrolled in HLED120 Fit for Life. For completing the interview process, I will receive a gift certificate worth $10 for my participation.

VOLUNTARY PARTICIPATION: I understand that my participation in this interview is voluntary, and that I may withdraw at any time without pressure, embarrassment or negative impact on me. I also understand that my participation is confidential and no identifying information will ever be disclosed.

CONTACT INFORMATION: In the event that I have questions or concerns about my participation in this study, I understand that I may contact the researcher, Lynn Merklin at merklin@andrews.edu, or by calling her at home at 269-815-4644. If I would like to speak with the researcher’s advisor, I may contact Dr Larry Burton in Bell Hall at 471-3465. I am supplying my own contact information so that the researcher may contact me for a follow-up interview at the end of the semester. I understand that one copy of this form is mine to keep for my own records.

________________________________________________ ______________________________
Signature of Participant E-mail or phone number Date

________________________________________________
Signature of Researcher Date

________________________________________________
Signature of Witness Date
APPENDIX C

TABLES
Table 48

*Reported Behavior Changes as Result of Course (in percentages)*

<table>
<thead>
<tr>
<th>Behavior Change</th>
<th>Teacher A (n=51)</th>
<th>Teacher B (n=54)</th>
<th>Total FFL (n=105)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Getting more exercise</td>
<td>31</td>
<td>69</td>
<td>50</td>
</tr>
<tr>
<td>Improved diet in some way</td>
<td>49</td>
<td>52</td>
<td>50</td>
</tr>
<tr>
<td>eating better</td>
<td>25</td>
<td>31</td>
<td>29</td>
</tr>
<tr>
<td>more food awareness</td>
<td>6</td>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td>eating more fruits &amp; vegetables</td>
<td>6</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>modified fats</td>
<td>6</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>less sweets</td>
<td>2</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>reading food labels</td>
<td>4</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>count calories/control intake</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>less soda &amp; sweet drinks</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>eating more nuts</td>
<td>4</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>reduced protein</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>less caffeine</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Drinking more water</td>
<td>16</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>More or better sleep/rest</td>
<td>14</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Practicing stress management</td>
<td>20</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Getting fresh air/deep breathing</td>
<td>8</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>More positive thinking, optimistic, realistic</td>
<td>8</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>More motivated &amp; interested in health</td>
<td>4</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Stronger/more balanced exercise program</td>
<td>0</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>Planning to exercise</td>
<td>6</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Practicing healthy stretching</td>
<td>0</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Sun (skin) care</td>
<td>4</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>More social support</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Practicing depression prevention</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Getting more sunshine</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>More time for prayer &amp; worship</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Improving posture</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
### Table 49

**Other Events that Affected Health Behaviors (in percentages)**

<table>
<thead>
<tr>
<th>Event</th>
<th>Teacher A (n=51)</th>
<th>Teacher B (n=54)</th>
<th>Total FFL (n=105)</th>
<th>Control (n=96)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress, school/class schedule</td>
<td>22</td>
<td>24</td>
<td>23</td>
<td>18</td>
</tr>
<tr>
<td>More exercise due to PE, sports, health club membership</td>
<td>35</td>
<td>9</td>
<td>22</td>
<td>35</td>
</tr>
<tr>
<td>Personal attention to/interest in health</td>
<td>6</td>
<td>19</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>Friends or family</td>
<td>6</td>
<td>9</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Specific non-PE course (nutrition, etc)</td>
<td>4</td>
<td>11</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Less sleep</td>
<td>4</td>
<td>9</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Weather</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Personal or weight training</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Work</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Poor food</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Worship practice &amp; time with God</td>
<td>0</td>
<td>7</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Personal health problem</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Family member's health</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Other family issues</td>
<td>0</td>
<td>6</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Checked/changed weight</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Less exercise</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Activities that lessen stress</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Finances</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Drinking more water</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Taking vitamins</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Read book, saw film, etc</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Self evaluation</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Time in sun &amp; relaxing</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Getting professional help</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Enlisted in military</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>End of school</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>In weight loss program</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Campus health week</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Upcoming wedding</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>New bike</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
AMOS SEM OUTPUT

Notes for Model (Default model)

Computation of degrees of freedom (Default model)

Number of distinct sample moments: 275
Number of distinct parameters to be estimated: 67
Degrees of freedom (275 - 67): 208

Result (Default model)

Minimum was achieved
Chi-square = 253.688
Degrees of freedom = 208
Probability level = .017

Estimates (Group number 1 – Default model)

Scalar Estimates (Group number 1 – Default model)

Maximum Likelihood Estimates

Regression Weights (Group number 1 – Default model)

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>depprevstg1</td>
<td>-.944</td>
<td>.373</td>
<td>-2.531</td>
<td>.011</td>
<td></td>
</tr>
<tr>
<td>alcoholstg1</td>
<td>-.674</td>
<td>.222</td>
<td>-3.039</td>
<td>.002</td>
<td></td>
</tr>
<tr>
<td>exercisestg1</td>
<td>-.654</td>
<td>.180</td>
<td>-3.635</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>exercisestg1</td>
<td>-.469</td>
<td>.238</td>
<td>-1.970</td>
<td>.049</td>
<td></td>
</tr>
<tr>
<td>strprevstg1</td>
<td>-.827</td>
<td>.302</td>
<td>-2.739</td>
<td>.006</td>
<td></td>
</tr>
<tr>
<td>vegestg2</td>
<td>.355</td>
<td>.177</td>
<td>2.002</td>
<td>.045</td>
<td></td>
</tr>
<tr>
<td>sleepstg2</td>
<td>.466</td>
<td>.155</td>
<td>2.996</td>
<td>.003</td>
<td></td>
</tr>
<tr>
<td>vegestg2</td>
<td>.377</td>
<td>.068</td>
<td>5.526</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>caffnstg2</td>
<td>.582</td>
<td>.056</td>
<td>10.317</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>strprevstg2</td>
<td>.346</td>
<td>.067</td>
<td>5.144</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>depprevstg2</td>
<td>.374</td>
<td>.065</td>
<td>5.703</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>exercstg2</td>
<td>.411</td>
<td>.064</td>
<td>6.382</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>smokestg2</td>
<td>.639</td>
<td>.086</td>
<td>7.419</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>sleepstg2</td>
<td>.461</td>
<td>.060</td>
<td>7.678</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>dietstg2</td>
<td>.389</td>
<td>.077</td>
<td>5.020</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>alcoholstg2</td>
<td>.812</td>
<td>.061</td>
<td>13.241</td>
<td>***</td>
<td></td>
</tr>
</tbody>
</table>
### Standardized Regression Weights

<table>
<thead>
<tr>
<th>Label</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>depprevstg1</td>
<td>-.199</td>
</tr>
<tr>
<td>alcoholstg1</td>
<td>-.209</td>
</tr>
<tr>
<td>exercisestg1</td>
<td>-.276</td>
</tr>
<tr>
<td>exercisestg1</td>
<td>-.150</td>
</tr>
<tr>
<td>strsprevstg1</td>
<td>-.214</td>
</tr>
<tr>
<td>vegestg2</td>
<td>.145</td>
</tr>
<tr>
<td>sleepstg2</td>
<td>.200</td>
</tr>
<tr>
<td>vegestg2</td>
<td>.400</td>
</tr>
<tr>
<td>caffnstg2</td>
<td>.637</td>
</tr>
<tr>
<td>strsprevstg2</td>
<td>.368</td>
</tr>
<tr>
<td>depprevstg2</td>
<td>.402</td>
</tr>
<tr>
<td>exercstg2</td>
<td>.455</td>
</tr>
<tr>
<td>smokestg2</td>
<td>.511</td>
</tr>
<tr>
<td>sleepstg2</td>
<td>.513</td>
</tr>
<tr>
<td>dietstg2</td>
<td>.373</td>
</tr>
<tr>
<td>alcoholstg2</td>
<td>.727</td>
</tr>
</tbody>
</table>

### Means (Group number 1 – Default model)

<table>
<thead>
<tr>
<th>Label</th>
<th>Estimate</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>gender</td>
<td>.529</td>
<td>.040</td>
<td>13.228</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Latino</td>
<td>.172</td>
<td>.030</td>
<td>5.692</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>.153</td>
<td>.029</td>
<td>5.306</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>enroll</td>
<td>.535</td>
<td>.040</td>
<td>13.398</td>
<td>***</td>
<td></td>
</tr>
</tbody>
</table>

### Intercepts (Group number 1 – Default model)

<table>
<thead>
<tr>
<th>Label</th>
<th>Estimate</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>dietstg1</td>
<td>2.764</td>
<td>.109</td>
<td>25.392</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>sleepstg1</td>
<td>3.306</td>
<td>.103</td>
<td>32.003</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>strsprevstg1</td>
<td>4.368</td>
<td>.118</td>
<td>37.020</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>depprevstg1</td>
<td>4.444</td>
<td>.146</td>
<td>30.485</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>smokestg1</td>
<td>5.904</td>
<td>.040</td>
<td>146.902</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>alcoholstg1</td>
<td>5.670</td>
<td>.097</td>
<td>58.344</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>caffnstg1</td>
<td>4.357</td>
<td>.156</td>
<td>27.938</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>exercisestg1</td>
<td>3.955</td>
<td>.137</td>
<td>28.840</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>vegestg1</td>
<td>3.070</td>
<td>.104</td>
<td>29.558</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>sleepstg2</td>
<td>1.429</td>
<td>.229</td>
<td>6.243</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>strsprevstg2</td>
<td>2.712</td>
<td>.301</td>
<td>9.010</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>depprevstg2</td>
<td>2.795</td>
<td>.305</td>
<td>9.175</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>smokestg2</td>
<td>2.113</td>
<td>.510</td>
<td>4.140</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>alcoholstg2</td>
<td>.947</td>
<td>.349</td>
<td>2.717</td>
<td>.007</td>
<td></td>
</tr>
<tr>
<td>caffnstg2</td>
<td>2.007</td>
<td>.269</td>
<td>7.461</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>exercstg2</td>
<td>2.345</td>
<td>.240</td>
<td>9.782</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>vegestg2</td>
<td>1.895</td>
<td>.246</td>
<td>7.692</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>dietstg2</td>
<td>1.842</td>
<td>.239</td>
<td>7.714</td>
<td>***</td>
<td></td>
</tr>
</tbody>
</table>
### Covariances (Group number 1 – Default model)

<table>
<thead>
<tr>
<th>Estimate</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian &lt;-&gt; Latino</td>
<td>-.026</td>
<td>.011</td>
<td>-2.374</td>
<td>.018</td>
</tr>
<tr>
<td>e3 &lt;-&gt; e2</td>
<td>.437</td>
<td>.146</td>
<td>3.003</td>
<td>.003</td>
</tr>
<tr>
<td>e9 &lt;-&gt; e4</td>
<td>.581</td>
<td>.196</td>
<td>2.958</td>
<td>.003</td>
</tr>
<tr>
<td>e5 &lt;-&gt; e4</td>
<td>.648</td>
<td>.168</td>
<td>3.854</td>
<td>***</td>
</tr>
<tr>
<td>e5 &lt;-&gt; e6</td>
<td>.214</td>
<td>.047</td>
<td>4.576</td>
<td>***</td>
</tr>
<tr>
<td>e8 &lt;-&gt; e7</td>
<td>.744</td>
<td>.191</td>
<td>3.884</td>
<td>***</td>
</tr>
<tr>
<td>e16 &lt;-&gt; e17</td>
<td>.511</td>
<td>.147</td>
<td>3.479</td>
<td>***</td>
</tr>
</tbody>
</table>

### Correlations (Group number 1 – Default model)

<table>
<thead>
<tr>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian &lt;-&gt; Latino</td>
</tr>
<tr>
<td>e3 &lt;-&gt; e2</td>
</tr>
<tr>
<td>e9 &lt;-&gt; e4</td>
</tr>
<tr>
<td>e5 &lt;-&gt; e4</td>
</tr>
<tr>
<td>e5 &lt;-&gt; e6</td>
</tr>
<tr>
<td>e8 &lt;-&gt; e7</td>
</tr>
<tr>
<td>e16 &lt;-&gt; e17</td>
</tr>
</tbody>
</table>

### Variances (Group number 1 – Default model)

<table>
<thead>
<tr>
<th>Estimate</th>
<th>S.E.</th>
<th>C.R.</th>
<th>P</th>
<th>Label</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian</td>
<td>.129</td>
<td>.015</td>
<td>8.832</td>
<td>***</td>
</tr>
<tr>
<td>gender</td>
<td>.249</td>
<td>.028</td>
<td>8.832</td>
<td>***</td>
</tr>
<tr>
<td>Latino</td>
<td>.142</td>
<td>.016</td>
<td>8.832</td>
<td>***</td>
</tr>
<tr>
<td>e9</td>
<td>1.664</td>
<td>.188</td>
<td>8.832</td>
<td>***</td>
</tr>
<tr>
<td>e5</td>
<td>1.294</td>
<td>.145</td>
<td>8.947</td>
<td>***</td>
</tr>
<tr>
<td>e4</td>
<td>3.794</td>
<td>.427</td>
<td>8.879</td>
<td>***</td>
</tr>
<tr>
<td>e3</td>
<td>1.683</td>
<td>.191</td>
<td>8.832</td>
<td>***</td>
</tr>
<tr>
<td>e6</td>
<td>.252</td>
<td>.029</td>
<td>8.832</td>
<td>***</td>
</tr>
<tr>
<td>e1</td>
<td>1.260</td>
<td>.143</td>
<td>8.832</td>
<td>***</td>
</tr>
<tr>
<td>e8</td>
<td>1.840</td>
<td>.208</td>
<td>8.832</td>
<td>***</td>
</tr>
<tr>
<td>e7</td>
<td>2.808</td>
<td>.318</td>
<td>8.832</td>
<td>***</td>
</tr>
<tr>
<td>e2</td>
<td>1.849</td>
<td>.209</td>
<td>8.832</td>
<td>***</td>
</tr>
<tr>
<td>enroll</td>
<td>.249</td>
<td>.028</td>
<td>8.832</td>
<td>***</td>
</tr>
<tr>
<td>e18</td>
<td>.938</td>
<td>.106</td>
<td>8.832</td>
<td>***</td>
</tr>
<tr>
<td>e16</td>
<td>2.113</td>
<td>.239</td>
<td>8.832</td>
<td>***</td>
</tr>
<tr>
<td>e14</td>
<td>.793</td>
<td>.090</td>
<td>8.832</td>
<td>***</td>
</tr>
<tr>
<td>e13</td>
<td>1.881</td>
<td>.213</td>
<td>8.832</td>
<td>***</td>
</tr>
<tr>
<td>e10</td>
<td>.905</td>
<td>.102</td>
<td>8.832</td>
<td>***</td>
</tr>
<tr>
<td>e12</td>
<td>1.222</td>
<td>.138</td>
<td>8.832</td>
<td>***</td>
</tr>
<tr>
<td>e11</td>
<td>1.732</td>
<td>.196</td>
<td>8.832</td>
<td>***</td>
</tr>
<tr>
<td>e17</td>
<td>1.467</td>
<td>.166</td>
<td>8.832</td>
<td>***</td>
</tr>
<tr>
<td>e15</td>
<td>.292</td>
<td>.033</td>
<td>8.832</td>
<td>***</td>
</tr>
</tbody>
</table>
### Squared Multiple Correlations (Group number 1 – Default model)

<table>
<thead>
<tr>
<th>Squared Multiple Correlations (Group number 1 – Default model)</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>dietstg1</td>
<td>.000</td>
</tr>
<tr>
<td>strsprevstg1</td>
<td>.046</td>
</tr>
<tr>
<td>exercisestg1</td>
<td>.099</td>
</tr>
<tr>
<td>smokestg1</td>
<td>.000</td>
</tr>
<tr>
<td>vegestg1</td>
<td>.000</td>
</tr>
<tr>
<td>caffnstg1</td>
<td>.000</td>
</tr>
<tr>
<td>sleepstg1</td>
<td>.000</td>
</tr>
<tr>
<td>alcoholstg1</td>
<td>.044</td>
</tr>
<tr>
<td>depprevstg1</td>
<td>.039</td>
</tr>
<tr>
<td>smokestg2</td>
<td>.261</td>
</tr>
<tr>
<td>strsprevstg2</td>
<td>.136</td>
</tr>
<tr>
<td>dietstg2</td>
<td>.139</td>
</tr>
<tr>
<td>exercstg2</td>
<td>.207</td>
</tr>
<tr>
<td>caffnstg2</td>
<td>.406</td>
</tr>
<tr>
<td>alcoholstg2</td>
<td>.529</td>
</tr>
<tr>
<td>depprevstg2</td>
<td>.162</td>
</tr>
<tr>
<td>sleepstg2</td>
<td>.303</td>
</tr>
<tr>
<td>vegestg2</td>
<td>.181</td>
</tr>
</tbody>
</table>
Matrices (Group number 1 – Default model)

**Total Effects (Group number 1 – Default model)**

<table>
<thead>
<tr>
<th></th>
<th>Latino</th>
<th>gender</th>
<th>Asian</th>
<th>dietstg1</th>
<th>strsprevstg1</th>
<th>exercisestg1</th>
<th>smokestg1</th>
<th>vegestg1</th>
<th>caffnstg1</th>
<th>sleepstg1</th>
<th>alcoholstg1</th>
<th>depprevstg1</th>
<th>enroll</th>
</tr>
</thead>
<tbody>
<tr>
<td>strsprevstg1</td>
<td>.000</td>
<td>.000</td>
<td>-.827</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>exercisestg1</td>
<td>-.469</td>
<td>-.654</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>alcoholstg1</td>
<td>.000</td>
<td>.000</td>
<td>-.674</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>depprevstg1</td>
<td>.000</td>
<td>.000</td>
<td>-.944</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>smokestg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.639</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>strsprevstg2</td>
<td>.000</td>
<td>.000</td>
<td>-.286</td>
<td>.346</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>dietstg2</td>
<td>.000</td>
<td>.000</td>
<td>.389</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.941</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>exercisestg2</td>
<td>-.193</td>
<td>-.269</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>caffnstg2</td>
<td>.000</td>
<td>.000</td>
<td>-.547</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>alcoholstg2</td>
<td>.000</td>
<td>.000</td>
<td>-.352</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.582</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>depprevstg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>sleepstg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>vegestg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
</tbody>
</table>

**Standardized Total Effects (Group number 1 – Default model)**

<table>
<thead>
<tr>
<th></th>
<th>Latino</th>
<th>gender</th>
<th>Asian</th>
<th>dietstg1</th>
<th>strsprevstg1</th>
<th>exercisestg1</th>
<th>smokestg1</th>
<th>vegestg1</th>
<th>caffnstg1</th>
<th>sleepstg1</th>
<th>alcoholstg1</th>
<th>depprevstg1</th>
<th>enroll</th>
</tr>
</thead>
<tbody>
<tr>
<td>strsprevstg1</td>
<td>.000</td>
<td>.000</td>
<td>-.214</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>exercisestg1</td>
<td>-.150</td>
<td>-.276</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>alcoholstg1</td>
<td>.000</td>
<td>.000</td>
<td>-.209</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>depprevstg1</td>
<td>.000</td>
<td>.000</td>
<td>-.199</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>smokestg2</td>
<td>.000</td>
<td>.000</td>
<td>-.199</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>strsprevstg2</td>
<td>.000</td>
<td>.000</td>
<td>-.079</td>
<td>.368</td>
<td>.000</td>
<td>.000</td>
<td>.511</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>dietstg2</td>
<td>.000</td>
<td>.000</td>
<td>.373</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>exercisestg2</td>
<td>-.068</td>
<td>-.126</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.455</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>caffnstg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.637</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>alcoholstg2</td>
<td>.000</td>
<td>.000</td>
<td>-.152</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>depprevstg2</td>
<td>.000</td>
<td>.000</td>
<td>-.080</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>sleepstg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.513</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>vegestg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.400</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
</tbody>
</table>
### Direct Effects (Group number 1 – Default model)

<table>
<thead>
<tr>
<th></th>
<th>Latino</th>
<th>gender</th>
<th>Asian</th>
<th>dietstg1</th>
<th>strsprevstg1</th>
<th>exercisestg1</th>
<th>smokestg1</th>
<th>vegestg1</th>
<th>caffnstg1</th>
<th>sleepstg1</th>
<th>alcoholstg1</th>
<th>depprevstg1</th>
<th>enroll</th>
</tr>
</thead>
<tbody>
<tr>
<td>strsprevstg1</td>
<td>.000</td>
<td>.000</td>
<td>-.827</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>exercisestg1</td>
<td>-.469</td>
<td>-.654</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>alcoholstg1</td>
<td>.000</td>
<td>.000</td>
<td>-.674</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>depprevstg1</td>
<td>.000</td>
<td>.000</td>
<td>-.944</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>smokestg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>strsprevstg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.346</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>dietstg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.389</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>exercisstg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>caffnstg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>alcoholstg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>depprevstg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>sleepstg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>vegestg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
</tbody>
</table>

### Standardized Direct Effects (Group number 1 – Default model)

<table>
<thead>
<tr>
<th></th>
<th>Latino</th>
<th>gender</th>
<th>Asian</th>
<th>dietstg1</th>
<th>strsprevstg1</th>
<th>exercisestg1</th>
<th>smokestg1</th>
<th>vegestg1</th>
<th>caffnstg1</th>
<th>sleepstg1</th>
<th>alcoholstg1</th>
<th>depprevstg1</th>
<th>enroll</th>
</tr>
</thead>
<tbody>
<tr>
<td>strsprevstg1</td>
<td>.000</td>
<td>.000</td>
<td>-.214</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>exercisestg1</td>
<td>-.150</td>
<td>-.276</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>alcoholstg1</td>
<td>.000</td>
<td>.000</td>
<td>-.209</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>depprevstg1</td>
<td>.000</td>
<td>.000</td>
<td>-.199</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>smokestg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>strsprevstg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>dietstg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.368</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>exercisstg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>caffnstg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>alcoholstg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>depprevstg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>sleepstg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>vegestg2</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
</tbody>
</table>
## Indirect Effects (Group number 1 – Default model)

<table>
<thead>
<tr>
<th></th>
<th>Latino</th>
<th>gender</th>
<th>Asian</th>
<th>dietstg1</th>
<th>strsprevstg1</th>
<th>exercisestg1</th>
<th>smokestg1</th>
<th>vegestg1</th>
<th>caffnstg1</th>
<th>sleepstg1</th>
<th>alcoholstg1</th>
<th>depprevstg1</th>
<th>enroll</th>
</tr>
</thead>
<tbody>
<tr>
<td>strsprevstg1</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>exercisestg1</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>alcoholstg1</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>depprevstg1</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>smokestg2</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>strsprevstg2</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>dietstg2</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>exercistg2</td>
<td></td>
<td>.193</td>
<td>-.269</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>caffnstg2</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>alcoholstg2</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>-.547</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>depprevstg2</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>-.352</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>sleepstg2</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>vegestg2</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
</tbody>
</table>

## Standardized Indirect Effects (Group number 1 – Default model)

<table>
<thead>
<tr>
<th></th>
<th>Latino</th>
<th>gender</th>
<th>Asian</th>
<th>dietstg1</th>
<th>strsprevstg1</th>
<th>exercisestg1</th>
<th>smokestg1</th>
<th>vegestg1</th>
<th>caffnstg1</th>
<th>sleepstg1</th>
<th>alcoholstg1</th>
<th>depprevstg1</th>
<th>enroll</th>
</tr>
</thead>
<tbody>
<tr>
<td>strsprevstg1</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>exercisestg1</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>alcoholstg1</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>depprevstg1</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>smokestg2</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>strsprevstg2</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>dietstg2</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>exercistg2</td>
<td></td>
<td>-0.68</td>
<td>-0.126</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>caffnstg2</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>alcoholstg2</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>-.152</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>depprevstg2</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>-.080</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>sleepstg2</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>vegestg2</td>
<td></td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
</tbody>
</table>
Modification Indices (Group number 1 – Default model)

Covariances (Group number 1 – Default model)

<table>
<thead>
<tr>
<th>M.I.</th>
<th>Par Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>e1 &lt;--&gt; e2</td>
<td>6.304</td>
</tr>
<tr>
<td>e17 &lt;--&gt; e7</td>
<td>4.722</td>
</tr>
<tr>
<td>e11 &lt;--&gt; e6</td>
<td>5.364</td>
</tr>
<tr>
<td>e10 &lt;--&gt; e2</td>
<td>6.152</td>
</tr>
<tr>
<td>e13 &lt;--&gt; e5</td>
<td>6.091</td>
</tr>
<tr>
<td>e14 &lt;--&gt; e6</td>
<td>6.144</td>
</tr>
<tr>
<td>e16 &lt;--&gt; e9</td>
<td>4.102</td>
</tr>
<tr>
<td>e18 &lt;--&gt; e15</td>
<td>4.144</td>
</tr>
<tr>
<td>e12 &lt;--&gt; e2</td>
<td>6.409</td>
</tr>
<tr>
<td>e12 &lt;--&gt; e1</td>
<td>6.938</td>
</tr>
<tr>
<td>e12 &lt;--&gt; e5</td>
<td>4.529</td>
</tr>
<tr>
<td>e12 &lt;--&gt; e10</td>
<td>4.417</td>
</tr>
<tr>
<td>e12 &lt;--&gt; e13</td>
<td>8.407</td>
</tr>
<tr>
<td>e12 &lt;--&gt; e18</td>
<td>4.191</td>
</tr>
</tbody>
</table>

Variances (Group number 1 – Default model)

<table>
<thead>
<tr>
<th>M.I.</th>
<th>Par Change</th>
</tr>
</thead>
</table>
| Regression Weights (Group number 1 – Default model)

<table>
<thead>
<tr>
<th>M.I.</th>
<th>Par Change</th>
</tr>
</thead>
</table>
| Means (Group number 1 – Default model)

<table>
<thead>
<tr>
<th>M.I.</th>
<th>Par Change</th>
</tr>
</thead>
</table>
| Intercepts (Group number 1 – Default model)

<table>
<thead>
<tr>
<th>M.I.</th>
<th>Par Change</th>
</tr>
</thead>
</table>

Minimization History (Default model)

<table>
<thead>
<tr>
<th>Iteration</th>
<th>Negative eigenvalues</th>
<th>Condition #</th>
<th>Smallest eigenvalue</th>
<th>Diameter</th>
<th>F</th>
<th>NTries</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 e</td>
<td>1</td>
<td>-.020</td>
<td>9999.000</td>
<td>1105.855</td>
<td>0</td>
<td>9999.000</td>
<td></td>
</tr>
<tr>
<td>1 e</td>
<td>0</td>
<td>12923.607</td>
<td>.985</td>
<td>592.141</td>
<td>17</td>
<td>.733</td>
<td></td>
</tr>
<tr>
<td>2 e</td>
<td>0</td>
<td>2394.889</td>
<td>.664</td>
<td>500.003</td>
<td>5</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>3 e</td>
<td>0</td>
<td>2640.566</td>
<td>.900</td>
<td>311.530</td>
<td>2</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>4 e</td>
<td>0</td>
<td>2349.347</td>
<td>.449</td>
<td>258.709</td>
<td>1</td>
<td>1.105</td>
<td></td>
</tr>
<tr>
<td>5 e</td>
<td>0</td>
<td>2002.675</td>
<td>.119</td>
<td>254.024</td>
<td>1</td>
<td>1.139</td>
<td></td>
</tr>
<tr>
<td>6 e</td>
<td>0</td>
<td>1955.425</td>
<td>.041</td>
<td>253.692</td>
<td>1</td>
<td>1.067</td>
<td></td>
</tr>
<tr>
<td>7 e</td>
<td>0</td>
<td>1892.719</td>
<td>.005</td>
<td>253.688</td>
<td>1</td>
<td>1.009</td>
<td></td>
</tr>
<tr>
<td>8 e</td>
<td>0</td>
<td>1924.698</td>
<td>.000</td>
<td>253.688</td>
<td>1</td>
<td>1.000</td>
<td></td>
</tr>
</tbody>
</table>
### Model Fit Summary

#### CMIN

<table>
<thead>
<tr>
<th>Model</th>
<th>NPAR</th>
<th>CMIN</th>
<th>DF</th>
<th>P</th>
<th>CMIN/DF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default model</td>
<td>67</td>
<td>253.688</td>
<td>208</td>
<td>.017</td>
<td>1.220</td>
</tr>
<tr>
<td>Saturated model</td>
<td>275</td>
<td>.000</td>
<td>0</td>
<td>.000</td>
<td>0</td>
</tr>
<tr>
<td>Independence model</td>
<td>44</td>
<td>847.349</td>
<td>231</td>
<td>.000</td>
<td>3.668</td>
</tr>
</tbody>
</table>

#### Baseline Comparison

<table>
<thead>
<tr>
<th>Model</th>
<th>NFI</th>
<th>Delta1</th>
<th>RFI</th>
<th>rho1</th>
<th>IFI</th>
<th>Delta2</th>
<th>TLI</th>
<th>rho2</th>
<th>CFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default model</td>
<td>.701</td>
<td></td>
<td>.668</td>
<td></td>
<td>.929</td>
<td></td>
<td>.918</td>
<td></td>
<td>.926</td>
</tr>
<tr>
<td>Saturated model</td>
<td>1.000</td>
<td></td>
<td>1.000</td>
<td></td>
<td>1.000</td>
<td></td>
<td>1.000</td>
<td></td>
<td>1.000</td>
</tr>
<tr>
<td>Independence model</td>
<td>.000</td>
<td></td>
<td>.000</td>
<td></td>
<td>.000</td>
<td></td>
<td>.000</td>
<td></td>
<td>.000</td>
</tr>
</tbody>
</table>

#### Parsimony Adjusted Measures

<table>
<thead>
<tr>
<th>Model</th>
<th>PRATIO</th>
<th>PNFI</th>
<th>PCFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default model</td>
<td>.900</td>
<td>.631</td>
<td>.834</td>
</tr>
<tr>
<td>Saturated model</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>Independence model</td>
<td>1.000</td>
<td>.000</td>
<td>.000</td>
</tr>
</tbody>
</table>

#### NCP

<table>
<thead>
<tr>
<th>Model</th>
<th>NCP</th>
<th>LO 90</th>
<th>HI 90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default model</td>
<td>45.688</td>
<td>9.497</td>
<td>90.074</td>
</tr>
<tr>
<td>Saturated model</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>Independence model</td>
<td>616.349</td>
<td>531.101</td>
<td>709.166</td>
</tr>
</tbody>
</table>

#### FMIN

<table>
<thead>
<tr>
<th>Model</th>
<th>FMIN</th>
<th>F0</th>
<th>LO 90</th>
<th>HI 90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default model</td>
<td>1.626</td>
<td>.293</td>
<td>.061</td>
<td>.577</td>
</tr>
<tr>
<td>Saturated model</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>Independence model</td>
<td>5.432</td>
<td>3.951</td>
<td>3.404</td>
<td>4.546</td>
</tr>
</tbody>
</table>

#### RMSEA

<table>
<thead>
<tr>
<th>Model</th>
<th>RMSEA</th>
<th>LO 90</th>
<th>HI 90</th>
<th>PCLOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default model</td>
<td>.038</td>
<td>.017</td>
<td>.053</td>
<td>.908</td>
</tr>
<tr>
<td>Independence model</td>
<td>.131</td>
<td>.121</td>
<td>.140</td>
<td>.000</td>
</tr>
</tbody>
</table>

#### AIC

<table>
<thead>
<tr>
<th>Model</th>
<th>AIC</th>
<th>BCC</th>
<th>BIC</th>
<th>CAIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default model</td>
<td>387.688</td>
<td>410.861</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saturated model</td>
<td>550.000</td>
<td>645.113</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independence model</td>
<td>935.349</td>
<td>950.567</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### ECVI

<table>
<thead>
<tr>
<th>Model</th>
<th>ECVI</th>
<th>LO 90</th>
<th>HI 90</th>
<th>MECVI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Default model</td>
<td>2.485</td>
<td>2.253</td>
<td>2.770</td>
<td>2.634</td>
</tr>
<tr>
<td>Saturated model</td>
<td>3.526</td>
<td>3.526</td>
<td>3.526</td>
<td>4.135</td>
</tr>
<tr>
<td>Independence model</td>
<td>5.996</td>
<td>5.449</td>
<td>6.591</td>
<td>6.093</td>
</tr>
</tbody>
</table>

### HOELTER

<table>
<thead>
<tr>
<th>Model</th>
<th>HOELTER</th>
<th>HOELTER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.05</td>
<td>.01</td>
</tr>
<tr>
<td>Default model</td>
<td>150</td>
<td>159</td>
</tr>
<tr>
<td>Independence model</td>
<td>50</td>
<td>53</td>
</tr>
</tbody>
</table>

### Execution time summary

- Minimization: .051
- Miscellaneous: .079
- Bootstrap: .000
- Total: .130
REFERENCE LIST
REFERENCE LIST


220


CURRICULUM VITAE
Lynn M. Merklin, PhD, EdS, MPH, MT (ASCP)

Education:
PhD in Education, Curriculum & Instruction, Andrews University, Berrien Springs, MI 2010
Education Specialist, Curriculum & Instruction, Adventist International Institute of Advanced Studies, Philippines 2007
Master in Public Health, Health Promotion, Adventist International Institute of Advanced Studies, Philippines 2003
Bachelor of Science, Medical Technology, University of Wisconsin – Milwaukee, Milwaukee, WI 1980

Professional Certification:
Seventh-day Adventist Professional Teaching Certification, Biology, Chemistry, & Health, North American Division of Seventh-day Adventists 2004-2009
Seventh-day Adventist Standard Teaching Certification, Biology & Chemistry, North American Division of Seventh-day Adventists 1997-2004
Medical Technologist, American Society for Clinical Pathology 1980

Employment History:
Director of Assessment, School of Education, Andrews University, Berrien Springs, MI 2010
Contract Teacher, English Second Language, Center for Intensive English Programs, Andrews University, Berrien Springs, MI 2009
Contract Course Developer, Nutrition, Griggs University, Silver Spring, MD 2008-2009
Contract Teacher, Fit for Life & Food Science, Dept of Nutrition and Wellness, Andrews University, Berrien Springs, MI 2006-2008
Contract Teen Teacher for 3-week cross-cultural training in Nairobi, Kenya, Institute of World Mission, Andrews University, Berrien Springs, MI 2006
Practicum Advisor & Instructor, Dept. of Public Health, School of Graduate Studies, Adventist International Institute of Advanced Studies, Philippines 2004-2005
Teacher, 9th & 10th Biology, Algebra, & Health, AIIAS Jr Academy, Adventist International Institute of Advanced Studies, Philippines 2003-2004
Contract Advisor, General Conference Auditing Services, Silang, Cavite, Philippines 2001-2002
Secretary, General Conference Auditing Services, Atlantic District, Lancaster, MA 1997-2001
Registrar, Pakistan Adventist Seminary, Pakistan 1993-1996
Teacher, secondary and college science & English Second Language,  
Pakistan Adventist Seminary, Pakistan 1991-1996  
Veterinary Assistant, Willow Creek Animal Hospital, Reading, PA 1988-1990  
Medical Technologist, Blood Bank, Mount Sinai Medical Center,  
Milwaukee, WI 1980-1985  

**Professional Experiences:**  
Presentation on The Impact of Health Instruction: A Study of Behavior Change  
during a Required University Course, at 2010 SDA-HPERA Conference,  
Indianapolis, IN 2010  
Presented paper: Christian Education: A Means for a More Equitable Society, at  
Martin Luther King Symposium, Andrews University, Berrien Springs, MI 2010  
Conducted evaluation of students’ behavior change during a required general  
education health course, as part of the requirements of PhD 2008-2009  
Developed online college nutrition course for Griggs University,  
Silver Spring, MD 2008-2009  
Presentation on food safety for Niles Westside Seventh-day Adventist  
Church, Niles, MI 2008  
Member of American Evaluation Association 2008 - present  
Member of Andrews Online Course Evaluation Committee, Andrews  
University, Berrien Springs, MI 2007 - present  
Involvement in research group studying Biology and Bio-neuroscience  
programs at Andrews University, Berrien Springs, MI 2007-2008  
Presentation of Personal Philosophy and Approach to Assessment & Evaluation,  
Spring 2007 Teaching, Learning, & Curriculum (TLC) Conference,  
Andrews University, Berrien Springs, MI 2007  
Preparation of accreditation reports for Dietetics programs, Department of Nutrition  
and Wellness, Andrews University, Berrien Springs, MI 2007  
Conducted evaluation of Dietetics programs for Department of Nutrition and  
Wellness, Andrews University, Berrien Springs, MI 2006  
Presentation of research on Attitudes of Filipino Women Towards Body Weight in  
Children, Nutritionists & Dieticians Association of the Philippines Annual  
Convention, Manila, Philippines 2005  
Developed online graduate course, Mechanisms of Disease, Adventist International  
Institute of Advanced Studies, Philippines 2005  
Compiled & assisted with editing International Forum (INFO), 6(2), Journal of the  
School of Graduate Studies, Adventist International Institute of Advanced  
Studies, Philippines 2005  
Developed writing guidelines for MPH student project reports, Adventist  
International Institute of Advanced Studies, Philippines 2005  
Coordinated the Distance Learning Center program for public health students,  
Adventist International Institute of Advanced Studies, Philippines 2004-2005  
Member of Nutritionists & Dieticians Association of the Philippines,  
Cavite Chapter, Philippines 2004-2005
Prepared MPH student handbook for Department of Public Health, Adventist International Institute of Advanced Studies, Philippines 2004
Conducted qualitative research on attitudes of Filipino women towards body weight in children 2004
Developed online graduate course, Introduction to Nutrition, Adventist International Institute of Advanced Studies, Philippines 2004
Conducted public health lectures/programs on obesity, weight reduction, nutrition, & family planning in cooperation with Adventist International Institute of Advanced Studies and the government health center in Silang, Philippines 2003-2004
Presentation on Timesheets program and file organization, for auditors at annual meeting of General Conference Auditing Service – Southern Asia Pacific Division of Seventh-day Adventists, Tagaytay, Philippines 2002

Publications