AN EVALUATION OF A COMMUNITY-BASED STRESS MANAGEMENT PILOT PROGRAM

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AN EVALUATION OF A COMMUNITY-BASED STRESS MANAGEMENT PILOT PROGRAM

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ABSTRACT

The purpose of this study was to evaluate the effectiveness of a University of Missouri Extension pilot program, *Taking Care of You: Body-Mind-Spirit,* in reducing perceived stress and improving lifestyle behaviors compared to the effectiveness of a strength training program. The stress management pilot program included research-based strategies from the field of positive psychology with a strong focus on mindfulness.

Participants both programs completed surveys at baseline (time 0) (n = 477), immediately following the programs (time 1) (n = 390) and three months following the programs (time 2) (n = 299). Surveys at each timepoint assessed participants' perceived stress levels, tobacco use and health promoting lifestyle behaviors.

Too few tobacco users were identified for this outcome measure to be included in the analyses. Participants of both program groups showed significant improvements in stress levels and health promoting lifestyle behaviors from time 0 to time 1. However, improvements in health promoting lifestyle behaviors, with the exception of physical activity and social health behaviors, from time 0 to time 1 were significantly greater for the participants of the pilot program in comparison to the strength training program. In comparison to the strength training program, the stress management program showed significantly greater improvements across all three timepoints and from time 0 to time 2

in regard to perceived stress levels and health promoting lifestyle behaviors, with the exception of physical activity and social health behaviors. Overall, participants of both programs significantly maintained improvements in perceived stress levels and health promoting lifestyle behaviors made as a result their program participation.

This study adds to the limited amount research evaluating the effectiveness of stress management programs in improving health behaviors. Results of this program evaluation show that the pilot program was successful in decreasing stress levels and improving health promoting lifestyle behaviors providing grounds for support to continue to offer this program as a part of health promotion efforts.

CHAPTER 1

INTRODUCTION

Statement of the Problem

It is well-know that unhealthy lifestyle behaviors such as poor eating habits, lack of physical activity and tobacco use are a major problem in the United States due to their effect on the ever-increasing prevalence of obesity and lifestyle-related chronic diseases (e.g., McGinnis & Foege, 1993). Chronic diseases associated with lifestyle such as heart disease, hypertension, lung disease, cancer, and diabetes are the leading causes of death in the United States and account for 75 percent of the nation's medical costs (Xu, Kenneth, Murphy, & Tejada-Vera, 2007). Stress is intricately connected to chronic disease in the various pathways by which stress affects our body physiologically, psychologically and behaviorally (e.g., Larzelere & Jones, 2008; Lovallo, 1997; Ng & Jeffery, 2003). As a result, stress can have detrimental consequences on our physical health, psychological health and lifestyle behaviors (e.g., Fukuda & Morimoto, 2001a; Heslop et al, 2001; Lazelere & Jones, 2008). Beyond increasing susceptibility to chronic disease and mental health conditions, stress can exacerbate many chronic disease states and mental health conditions (Lazerle & Jones, 2008). Furthermore, actually having a chronic disease and/or mental health condition in itself can increase stress levels (Cohen, Janicki-Deverts, & Miller, 2007; Larzelere & Jones, 2008).

The concept of stress is broad, and has many different meanings depending on the area of research. Stress is often thought to occur as a result of a stimulus or response to something in the environment such as a natural disaster, illness, loss of a job, or death of a loved one. However, this conceptualization of stress does not take into account differences in how individuals evaluate a specific stressor (Lazarus & Folkman, 1984). Every individual has a slightly different response and magnitude of a response to stressors in life. The concept of psychological stress takes into account these individual differences. According to Lazarus and Folkman, it is an individual's cognitive appraisal of stress which makes a stressor stressful; psychological stress is defined as the "relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being" (p. 21). Thus, research studying the ways in which stress affects health has focused on identifying the variables which cause discrepancies in individuals' responses to stressors. Research has analyzed a variety of types of stressors such as acute laboratory stressors, real life daily minor stressors, major life events, and chronic stress.

Of particular interest in the fields of health education and psychology in the last few decades is the connection between psychological stress and health. Psychological stress occurs when environmental demands exceed an individuals' ability to cope or adapt (Lazarus & Folkman, 1984). With our current economic downturn, psychological stress levels of Americans are increasing. According to a poll conducted in the summer of 2009 by the American Psychological Association with 1,568 adults, 42 percent of

Americans state their stress levels are higher this year than last. In addition, 24 percent of Americans reported their average stress levels to be high, eight or above on a ten point scale, and 51 percent of Americans reported moderate levels of stress (scoring at a level of 4, 5, 6 or 7 on a 10 point scale) (American Psychological Association). Psychological stress causes physiological responses that are normal and usually harmless if acute in nature through biochemical mechanisms as a means to adapt to stress; however, chronic stress increases our risk of health problems (e.g., Larzelere & Jones, 2008; Lovallo, 1997). Therefore, the high levels of reported stress places Americans at risk of health consequences related to chronic stress.

The effects of psychological stress on health are thoroughly described in research. They include a wide variety of mental and physical diseases and conditions, for example, heart disease, hypertension, glycemic control in diabetes, decreasing immunity, irritable bowel syndrome, peptic ulcers, sleep problems, headaches, depression and anxiety (e.g., Cohen, et al., 2007; Larzelere & Jones, 2008; Yokoyama et al., 2009). Not surprisingly, psychological stress is associated with unhealthy lifestyle behaviors as a means of coping and/or adapting to stress such as increased frequency of drinking, smoking, overeating, eating unhealthy foods, skipping meals and decreased frequency of physical activity (American Psychological Association, 2008; American Psychological Association, 2009; Cohen, et al.; Ng & Jeffery, 2008; Roohafza et al., 2007). Secondary to the lack of skills in coping with and managing psychological stress, the immediate pleasure and/or escape provided by such unhealthy lifestyle behaviors are frequently used as a means of coping

with psychological stress. Furthermore, stress is often stated as a barrier to changing health behaviors, so it is not unexpected that research shows those reporting higher levels of stress have more difficulty making and sustaining lifestyle behavior changes such as quitting smoking, eating a healthier diet, becoming physically active, drinking within the recommend limits, or improving sleeping patterns (American Psychological Association, 2009; Rod, Grønbaek, Schnohr, Prescott, & Kristensen, 2009). As a result, psychological stress is a major contributor to the unhealthy lifestyle behaviors which lead to obesity and chronic disease resulting in the leading causes of death in the United States (Xu, et al., 2007; Fuduko & Morimoto, 2001b).

Psychological stress as an underlying cause of unhealthy lifestyle behaviors is rarely addressed in health education programs; a large majority of health education programs aim to provide information and/or change attitudes regarding the specific health behavior as a means to changing health behaviors with the understanding that health behaviors are a result of one's knowledge, reason, attitude and/or will power (Kerr, Weikunat, & Moretti, 2005). Changing knowledge by communicating risks and benefits of a particular health behavior, although necessary, is rarely sufficient enough for health behavior change (Green & Tones, 2010; Shumaker, Schron, & Ockene, 1990). Despite the connection between stress and unhealthy lifestyle behaviors, few health education programs focus on improving participants' ability to manage stress as a means of improving lifestyle behaviors (e.g., Richardson & Rothstein, 2008). Health education programs or interventions which aim to improve individuals' ability to manage or reduce

stress focus primarily on the psychological outcomes (i.e., anxiety, depressive symptoms, psychological distress), physiological outcomes, and behaviors related specifically to stress management (i.e, meditation, sleep) (Murphy, 1996; Grossman, Niemann, Schmidt, & Walach, 2004; Richardson & Rothstein, 2008). Secondary to the relationship between stress and lifestyle behaviors related to chronic disease and the lack of research evaluating the effectiveness of stress management interventions to improve lifestyle behaviors, the focus of the current study is to measure the effects of a community-based stress management program to improve participants' lifestyle behaviors.

Purpose of the Study:

The purpose of this study is to evaluate the effectiveness of a University of Missouri Extension pilot program, *Taking Care of You: Body-Mind-Spirit*, in reducing perceived stress and improving lifestyle behaviors compared to the effectiveness of an exercise program. This pilot program was an educational and experiential group program developed by University of Missouri Extension Health Education Specialists and was taught in community settings, meeting one hour weekly for eight weeks. Program participants learned and experienced a variety of strategies that aimed to improve participants' ability to manage or cope with stress. Program content was developed using positive psychology as a conceptual framework. Positive psychology is defined as "the study of the conditions and processes that contribute to the flourishing or optimal functioning of people, group, and institutions" (Gable & Haidt, 2005, p. 104), or as one

of the leading researchers in the field, Christopher Peterson, puts it simply, "the scientific study of what goes right in life" (Peterson, 2006, p. 4).

The program aim was to help participants better manage, or cope with stress in healthier ways with the ultimate goal of improving participants' quality of life, or well-being thus falling within the realm of positive psychology. The various activities of the program were aimed at increasing positive emotions, optimism, resiliency to stress, coping skills (including proactive coping), and self-care based on research from well-known positive psychology researchers such as Martin Seligman, Rick Foster, Greg Hicks, Sonya Lyubomirsky and Christopher Peterson (Foster, Hicks, & Seda, 2008; Greenglass & Fikesenbaum, 2009; Lyubomirsky, 2008; Peterson, 2006; Seligman, 2002).

Mindfulness, a technique which is known to bring about calmness, relaxation and insight into oneself, is one area of positive psychology that has received extensive attention in regard to stress management (Kabat-Zinn 1990, Lyubomirsky, 2008). The program included a strong focus on mindfulness using techniques from the evidenced-based program, mindfulness-based stress reduction, founded by Jon Kabat-Zinn (Kabat-Zinn).

This quasi-experimental community-based pilot program evaluation used a ten-week community-based strength training exercise program as a comparison group. This exercise program was chosen as a comparison group to ensure as much similarity in characteristics of the subjects in both the intervention and comparison groups as possible. Both programs were taught to adults in community-based settings by University of

Missouri Extension Health Education Specialists in various regions and types of communities throughout the state of Missouri. Program outcomes were evaluated for both the pilot program and comparison program using self-report standard measures at three time-points: before, immediately following and three months following the completion of the programs. Program outcomes included perceived levels of stress and current lifestyle behaviors using the following standard measures: The Perceived Stress Scale (10-item) by Cohen & Williamson (1988), the Health Promoting Lifestyle Profile II by Walker, Sechrist and Pender (1987), and a question set from the 2009 Behavioral Risk Factor Surveillance System (BRFSS) in the BRFSS topic area of tobacco use (Centers for Disease Control, 2009a).

The author proposed a three month follow-up in order to measure intermediate-term changes as a result of the intervention. However, it is recognized that additional follow-up at later points in time are necessary to measure the long-term effects of the intervention. Therefore, a 12-month follow-up measure will be conducted outside the scope of this research.

Research Questions and Hypotheses

Research shows that stress management programs are successful at decreasing levels of stress both in the short and long-term (e.g., Grossman, et al., 2004; Murphy, 1996; Praissman, 2008; Richardson & Rothstein, 2008). An exercise program, which primarily involves strength training with small amounts of light stretching, was used as a

comparison group. It is acknowledged that research indicates exercise decreases levels of stress, and is a viable stress management strategy; however, the majority of exercise programs shown to reduce stress are aerobic exercise programs (e.g., Rostad & Long, 1996). Few strength training programs have been evaluated for their ability to reduce stress. Results of these few studies are inconclusive in their ability to decrease stress levels; some studies show greater benefit from aerobic exercise compared to strength training and others show beneficial effects of strength training (Atlantis, Chow, Kirby, & Singh, 2004; Long & van-Stavel, 1995; Rostad & Long; Roskies et al., 1986).

As a result, it is acknowledged that using a strength training program as a comparison may result in a failure to detect reduced levels of stress in the intervention group, participants of the stress management program, immediately following the program. However, if strength training is not continued after the completion of the program, the stress reducing effects of the strength training may dissipate over time. There is currently no research on how the strength training program, used for comparison in this study, affects stress levels.

The strong relationship between stress and lifestyle behaviors is cited in this document, and despite this relationship, few stress management programs have assessed an effect on lifestyle behaviors (Grossman et al., 2004; Murphy 1996; Richardson & Rothstein, 2008). However, abundant stress management program evaluations have shown improvements in individuals' level of perceived stress using methods such as practicing mindfulness, muscle relaxation, cognitive behavioral techniques, exercise and

journaling (e.g., Carmody & Baer, 2008; Murphy 1996; Richardson & Rothstein, 2008). With higher stress levels being associated with less healthy lifestyle behaviors, results of such program evaluations indicate the likelihood of stress management programs having a positive effect on lifestyle behaviors following the completion of the program.

It is acknowledged that physical activity levels will likely be increased as a result of a strength training program and thus post-program physical activity measures will most likely be increased in the comparison group. While there is a lack of research on the effects of strength training programs on other lifestyle behaviors, there is a possibility that the comparison group may also improve other health promoting lifestyle behaviors as a result of voluntarily participating in an exercise program (Dutta & Bodie, 2006).

The primary aim of this study is to assess whether the stress management pilot program, *Taking Care of You: Body, Mind, Spirit*, decreases perceived levels of stress and lifestyle behaviors of participants as compared to those participants of a strength training exercise program. This was assessed by three primary research questions with an additional 12 secondary research questions which were used for further in-depth exploration of the data. Secondary to the history of the strength training program within University of Missouri Extension, it was conceived prior to this study that the possibility existed that the stress management pilot program may appeal more to adults of slightly younger age as compared to participants that take part in the strength training program. Therefore, the below research questions and hypotheses took this possibility into account by including age as a variable to control for in the analyses.

It was proposed to assess perceived stress levels, tobacco use and health promoting lifestyle behaviors as outcome measures. The health promoting lifestyle behavior survey used in this study measures health promoting lifestyle behaviors as one construct as well as six separate health behaviors as subscales of the survey. The subscales of this survey include health responsibility, nutrition, physical activity, stress management, spiritual and interpersonal relations (see Chapter 3). The primary and secondary research questions and hypotheses listed below were to be assessed for each of the following outcome measures: (1) perceived stress levels, (2) tobacco use, (3) health promoting lifestyle behaviors, (4) health responsibility behaviors, (5) nutrition behaviors, (6) physical activity behaviors, (7) stress management behaviors, (8) spiritual health thoughts and behaviors and (8) interpersonal relation behaviors. Baseline, or before the program, was defined as time 0, immediately following the program was defined as time 1 and three months following the program was defined as time 2.

The first primary research question/hypothesis compared the participants of the stress management program to the participants of the strength training program over all three timepoints (before, immediately following, and three months following the programs) while controlling for age differences between the two program groups. The next two primary research questions/hypotheses compared the two program groups at (1) immediately following the program controlling for age difference and differences at baseline and (2) three months following controlling for age differences and differences at baseline.

Primary Research Questions

1) For each of the outcome measures, do differences exist between participants of the stress management program and participants of the strength training program across all three timepoints (time 0, time 1 and time 3) when controlling for age differences between the participants of the two programs?
2) For each of the outcome measures, do differences exist for all outcome measures between participants of the stress management program and participants of the strength training program immediately following the program (time 1) when controlling for baseline (time 0) differences and age differences between the participants of the two programs?
3) For each of the outcome measures, do differences exist for all outcome measures between participants of the stress management program and participants of the strength training program three months following the program (time 1) when controlling for baseline (time 0) differences and age differences between the participants of the two programs?

Primary Hypotheses:

1) It was hypothesized that participants of the stress management program and participants of the strength training program would be significantly different across all three timepoints (time 0, time 1, and time 2) for each of the outcome

measures when controlling for age differences between the participants of the two programs.

2) It was hypothesized that the participants of the stress management program and participants of the strength training program would be significantly different at time 1 for each of the outcome measures except for physical activity behaviors when controlling for time 0 and age differences between the participants of the two programs.
3) It was hypothesized that the participants of the stress management program and participants of the strength training program would be significantly different at time 2 for each of the outcome measures when controlling for time 0 and age differences between the participants of the two programs.

The first set of three secondary research questions/hypotheses compared differences between the two program groups at each timepoint separately while controlling for age. The fourth secondary research/hypothesis question compared differences between the two program groups regardless of which timepoint while controlling for age differences. The rest of the secondary research questions/hypotheses assessed differences over time within each group separately; research questions/hypotheses five through eight evaluated participants within the stress management program and nine through twelve evaluated participants within the strength training program.

Secondary Research Questions

1) For each of the outcome measures, do differences exist between participants of the stress management program and participants of the strength training program at baseline (time 0) when controlling for age differences between the participants of the two programs?
2) For each of the outcome measures, do differences exist between participants of the stress management program and participants of the strength training program immediately following the program (time 1) when controlling for age differences between the participants of the two programs?
3) For each of the outcome measures, do differences exist between participants of the stress management program and participants of the strength training program three months following the end of the program (time 2) when controlling for age differences between the participants of the two programs?
4) For each of the outcome measures, do differences exist between the participants of the stress management program and participants of the strength training program regardless of which time point (time 0, time 1 or time 2) when controlling for age differences between the participants of the two programs?
5) For each of the outcome measures, do differences exist across all three timpoints (time 0, time 1, and time 2) within participants of the stress management program?

6) For each of the outcome measures, do differences exist within the participants of the stress management program from baseline (time 0) to immediately following the program (time 1)?
7) For each of the outcome measures, do differences exist within the participants of the stress management program from baseline (time 0) to three months following the program (time 2)?
8) For each of the outcome measures, do differences exist within the participants of the stress management program from immediately following the program (time 1) to three months following the program (time 2)?
9) For each of the outcome measures, do differences exist across all three timpoints (time 0, time 1, and time 2) within participants of the strength training program?
10) For each of the outcome measures, do differences exist within the participants of the strength training program from baseline (time 0) to immediately following the program (time 1)?
11) For each of the outcome measures, do differences exist within the participants of the strength training program from baseline (time 0) to three months following the program (time 2)?
12) For each of the outcome measures, do differences exist within the participants of the strength training program from immediately following the program (time 1) to three months following the program (time 2)?

Secondary Hypotheses:

1) It was hypothesized that the participants of the stress management program and participants of the strength training program would not be significantly different at time 0 for each of the outcome measures when controlling for age differences between the participants of the two programs.
2) It was hypothesized that the participants of the stress management program and participants of the strength training program would be significantly different at time 1 for each of the outcome measures except for physical activity behaviors when controlling for age differences between the participants of the two programs.
3) It was hypothesized that the participants of the stress management program and participants of the strength training program would be significantly different at time 2 for each of the outcome measures when controlling for age differences between the participants of the two programs.
4) It was hypothesized that the participants of the stress management program and participants of the strength training program would be significantly different regardless of which time point (time 0, time 1 or time 2) for each of the outcome measures when controlling for age differences between the participants of the two programs.

5) It was hypothesized that participants of the stress management program would be significantly different across all three timepoints (time 0, time 1 and time 2) for each of the outcome measures.
6) It was hypothesized that the participants of the stress management program would be significantly different from time 0 compared to time 1 for each of the outcome measures except for physical activity behaviors.
7) It was hypothesized that the participants of the stress management program would be significantly different from time 0 compared to time 2 for each of the outcome measures.
8) It was hypothesized that the participants of the stress management program would be significantly different from time 1 compared to time 2 for each of the outcome measures.
9) It was hypothesized that participants of the strength training program would not be significantly different across all three timepoints (time 0, time 1 and time 2) for each of the outcome measures.
10) It was hypothesized that the participants of the strength training program would not be significantly different from time 0 compared to time 1 for each of the outcome measures except physical activity behaviors.
11) It was hypothesized that the participants of the strength training program would not be significantly different from time 0 compared to time 2 for each of the outcome measures.

12) It was hypothesized that the participants of the strength training program would not be significantly different from time 1 compared to time 2 for each of the outcome measures.

Delimitations

The participants who took part in this current study were limited to community-dwelling adults of any age in a variety of communities throughout Missouri. Participants may or may not have had prior experience with stress management training. Both groups, subjects of the stress management program and the comparison program, were individuals who self-selected to participate in the program.

The current study evaluated a stress management program which utilized mindfulness-based techniques and other techniques based in positive psychology. Both programs were facilitated by Regional University of Missouri Extension Specialists, university employees who specialize in delivering health education programming in community settings. All employees have obtained a master's degree in nutrition or in another health-related field.

To limit the variability in program delivery among the eight facilitators of the stress management program, all facilitators were involved in the development of the program curriculum, read background literature, and underwent experiential training on the specifics of delivering the program. The training involved reviewing the program content, experiencing program activities, answering facilitators' questions, and having the

Extension Specialists role-play as facilitators and program participants while practicing teaching the program curriculum. Similarly, all 11 program facilitators of the comparison program participated in extensive hands-on training to teach the program as a means to limit the variability that exists among how the Extension Specialists deliver each program.

The stress management program was taught in groups of about 15 persons meeting for an hour weekly for eight weeks. The strength training program was organized similarly; it was taught in groups of about 15 and met for an hour weekly for ten weeks. Data wer collected from both programs over a period of ten months spanning from the early fall 2009 to late spring 2010.

Limitations

A major limitation of this research is that the design does not include a control group, but utilizes another University of Missouri program as a comparison group. As a result, this program evaluation is comparing effects of the stress management program to the comparison program, a strength training program. Additionally, it utilizes a quasi-experimental design since the participants will not be randomized to the intervention or comparison program. As with other community-based programs, persons voluntarily registered for the programs, and therefore were likely to be motivated to take part in the program and may exhibit higher levels of motivation to make changes in their behaviors.

Since programming was conducted throughout the state of Missouri, actual locations of the intervention and comparison programs varied, and the many of the comparison programs were implemented in different communities than the intervention programs. While care was taken to allow for both the intervention and comparison programs to be taught during similar timeframes over a period of nine months, exact timing was not possible. Furthermore, trained facilitators were all highly educated Caucasian females which may have caused biases in how participants respond to the facilitators. Several of the Regional Extension Specialists who facilitated the stress management program also facilitated the strength training program to different participants. This is a result of position expectations for Extension Specialists; they were expected by their respective supervisors to deliver the strength training program. Additionally, despite the fact that all program facilitators were trained to teach their respective program in a standard fashion, some amount of variability in program delivery still occurred.

As a community-based program, it was unreasonable to expect all participants to attend all of the programs' sessions, but a set minimum attendance level was necessary to maintain integrity of the data. Only participants who attended a minimum of 75% of program's sessions for both the intervention and the comparison programs were included in the data analysis.

An age difference between the participants of the two program groups was expected due to the nature of the programs. In the past the participants who choose to

take part in the strength training program used as a comparison program in this study have been primarily middle-aged and older adults. It was expected that participants choosing to take part in the stress management program would likely include mostly middle-aged adults with a small percentage of older adults.

As with any self-report measure there is a possibility of recall bias and/or dishonesty. Additionally, with conducting community-based research with free-living adults, measured changes could be due to factors influencing participants outside of the program and not due to the intervention itself.

In conclusion, the slight weaknesses of this research design and the limitations of conducting community-based research described above should be noted when interpreting and generalizing results of this study.

Strengths of the Study

This study evaluates the effects of a pilot-program across a wide variety of community-dwelling persons throughout the state of Missouri. Most stress management program evaluations are conducted in one location, often in a university setting. The current study was implemented in a various geographic locations (i.e., rural, urban, suburban) throughout the state as well as in an assortment of community-based settings (i.e., schools, churches, community centers, University of Missouri County Extension offices, workplaces) providing the advantage of the results being more generalizable than if the program had been conducted in one specific location. Program participants were

persons who voluntarily choose to take part in one of the two Extension programs. As a result, program participants are similar to other people who freely take part in health education or self-improvement programs making the results of this research translatable to not only other state Extension programs, but other organizations that provide community-based health education programming to people who voluntarily take part. In addition, all program facilitators were well educated; they all had completed at least a master's degree, and they all had minimally two years of experience in providing health education programs in community settings through University of Missouri Extension.

This program evaluation is innovative in that it is one of the first stress management program evaluations to measure effects on health behaviors as a main outcome. The overwhelming majority of stress management program evaluations measure psychological well-being and physiological outcomes (Murphy, 1996; Grossman et al., 2004; Richardson & Rothstein, 2008).

Significance of the Study

It is clear that stress is associated with poor physical health. However, the relationship between psychological stress and lifestyle behaviors is complex in nature and not well understood due to the many factors involved. This program evaluation adds to the body of research investigating whether a stress management program, which directly aims to improve participants' ability to manage stress, has an indirect effect on improving participants' lifestyle behaviors.

Using a strength training program as a comparison group, this research also adds to the slim body of research analyzing the effects of muscular strength training on perceived psychological stress. Additionally, the research adds to what little research exists comparing the effectiveness of exercise programs to stress management programs in decreasing stress levels. This research used strength training as the exercise intervention whereas the majority of studies comparing exercise interventions to stress management interventions use aerobic physical activity. Therefore, this study is of particular importance in adding to the limited body of research comparing the effectiveness of exercise interventions to stress management interventions in reducing stress levels. Furthermore, this study adds to the limited research assessing the lasting effect of the changes in perceived stress levels after the completion of an exercise program compared to a stress management program.

Research shows changing one health behavior may lead to improvements in other health behaviors secondary to an underlying sense orientation towards health promotion (Dutta & Bodie, 2006; Dutta-Bergman, 2005). Therefore, the exercise program may lead to improvements in other health behaviors as a result of increased frequency of physical activity. Thus, this research will assess which type of program is more effective in improving other lifestyle behaviors, besides physical activity, immediately after and three months following each program.

Importantly, this program evaluation research adds to the repertoire of research-based Extension health programming. As a result, it will be taught as a University of

Missouri Extension health education program and, if shared nationally with other university extensions, it could be taught within other states as part of their Extension programming.

Finally, this research adds to the field of positive psychology since the evaluated stress management program applied a variety of strategies based on positive psychology research. Currently, with the exception of a few studies looking at the effect of mindfulness interventions on health behaviors, the field of positive psychology is limited in research evaluating the effects of positive psychology interventions on coping with stress or the impact of such interventions on their ability to improve lifestyle behaviors (Greenglass & Fiksenbaum, 2009; Howard, 2008; Richardson & Rothstein, 2008).

Operational Definition of Terms

Coping – " a dynamic process between a person and his/her environment, whereby the individual who has a set of resources, commitments, and values interacts with his/her environment" (Rowe, 2006, p. 603). As defined by Lazarus & Folkman (1984): "constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person," (p. 141).

Health-promoting lifestyle - "multidimensional pattern of self-initiated actions and perceptions that serve to maintain or enhance the level of wellness, self-actualization and fulfillment on the individual" (Walker et al., 1987, p. 77).

Mindfulness - "is paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally," (Kabat-Zinn, 1994, p. 4).

Positive psychology – "is an umbrella term for the study of positive emotions, positive character traits, and enabling institutions" (Seligman, Steen, Park, & Peterson, 2005, p. 410); "the scientific study of what goes right in life" (Peterson, 2006, p. 4); "the study of the conditions and processes that contribute to the flourishing or optimal functioning of people, groups and institutions" (Gable & Haidt, 2005, p. 104).

Proactive coping- “consists of efforts undertaken in advance of a potentially stressful event to prevent it or modify its form before it occurs” (Aspinwall & Taylor, 1997, p. 417).

Psychological Stress- “the relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being” (Lazarus & Folkman, 1984, p. 21).

CHAPTER 2: REVIEW OF THE LITERATURE

Introduction

The concept of stress was originally identified as affecting only the body through the "general adaptation syndrome," and therefore, was previously defined as the "non-specific response of the body to any demand" (Selye, 1956, p.1). Hans Selye was one of the first persons to report the harmful effects of stress on physiological health through observations of rats under stress displaying enlargements of the adrenal cortex, atrophy of the spleen, thymus, lymph nodes and other lymph structures, and bleeding ulcers of the stomach (Selye). This was the origin of the field of research that studied the effects of stress on health and the mind-body connection. Researchers agree that the consequences of stress are not limited to the body. Stress also impairs our psychological health, often resulting in unhealthy coping behaviors that further compound the deleterious effects of stress.

Chronic stress directly harms the body's physiology through changing hormonal, immune, and other biochemical responses in the body, thus increasing the risk of a multitude of psychological and physical health conditions (e.g., Lazelere & Jones, 2008; Lovallo, 1997). Chronic diseases such as coronary heart disease, atherosclerosis, hypertension, diabetes, cancer, autoimmune disorders, other physical conditions such as ulcers, headaches, sleep problems are associated with, and/or have a known causal

relationship with, stress (e.g, Cohen et al., 2007; Hellerstedt & Jeffery, 1997; Lazelere & Jones; Yokoyama et al., 2009).

Beyond the direct physiological consequences of stress on health, stress causes detrimental effects on health indirectly through unhealthy lifestyle behaviors related to coping with stress such as smoking, drinking alcohol, decreased physical activity, poorer food choices and eating habits (Cohen et al., 2007; Fuduko & Morimoto, 2001b; Heslop et al., 2001; Roohafza et al., 2007; Steptoe, Wardle, Pollard, Canaan, & Davies, 1996). In concurrence with research, a poll conducted by the American Psychological Association (2008) showed that stress increased the frequency of alcohol consumption, smoking, overeating, eating unhealthy foods, and skipping meals, and decreased quality of sleep and frequency of physical activity.

This program evaluation assessed whether an intervention aimed at improving individuals' ability to manage stress through improving coping skills and building participants' psychosocial resources (i.e., resiliency, optimism, sense of personal control, positive mood) influenced their ability to make and sustain health-related lifestyle behaviors. Taylor, Kemeny, Reed, Bower, and Gruenewald (2000) have shown that psychosocial resources like a positive self-worth, optimism, and having a sense of personal control and meaning in life are protective against the negative appraisal of a situation and are psychologically and physiologically protective. Since stress is defined as an "individual's cognitive appraisal of stress which makes a stressor stressful" (Lazarus

& Folkman, 1984), perceiving a stressful situation more positively lessens how stressful the stressor is appraised as by an individual.

Research shows that the type of coping strategy used is predicative of one's stress level and health-promoting lifestyle behaviors; an active coping style such as problem-solving and positive reappraisal are related to healthier lifestyle behaviors as compared to a passive or avoidance coping style such as disengagement and escape (Bellizzi & Blank, 2006; Park, Edmondson, Fenster, & Blank, 2008; Reardon & Aydin, 1993; Tucker, Butler, Loyuk, Desmond, & Surrency, 2009). Psychosocial resources such as optimism, self-esteem, and sense of personal control have been shown to be closely tied to active coping (Aspinwall & Taylor, 1997). Coping has been was viewed as an adaptive reaction to a stressor. However, a newer form of coping, known as proactive coping, involves preparing for a stressor before it has occurred. Proactive coping can be conceptualized as accumulation of internal and external resources and skills in preparation for a future stressor in order to avert, prevent or lessen the impending stressful event (Aspinwall & Taylor; Greenglass & Fiksenbaum, 2009). Proactive coping involves having resources for self-improvement, goal setting, and self-efficacious beliefs leading to taking on life demands as challenges versus threats. Once a stressor has occurred, proactive coping leads to strategies which are active in nature such as problem solving (Aspinwall & Taylor). Proactive coping has been shown to be positively associated with health promoting behaviors and well-being (Greenglass, Fiksenbaum, & Eaton, 2006; Greenglass, Marques, deRidder, & Behl, 2005). The program evaluated in this study

aimed to improve participants' health behaviors by instilling proactive coping and building participants' psychosocial resources in effort to lessen how stressful a participant appraises a situation. The program also sought to increase participants' active coping skills as a means to deal with potentially stressful situations.

Although it is acknowledged that numerous unhealthy lifestyle behaviors are associated with stress, this literature review will focus on the most influential lifestyle behaviors related to chronic disease. Due to the strong causal relationship among dietary intake, physical activity and tobacco use and the chronic diseases which are the major causes of morbidity and mortality in the United States, including heart disease, stroke, cancer, lung disease, and diabetes, these three lifestyle behaviors are the outcomes of interest for this program evaluation (American Psychological Association, 2008; Xu et al., 2007). The research supporting the relationship between stress and dietary intake, physical activity and tobacco use behaviors is reported in this literature review. Additionally, this literature review summarizes research analyzing the effectiveness of various types of stress management programs including the physical, psychological and behavioral outcomes. Finally, this chapter explores available literature comparing the effectiveness of exercise programs to stress management programs given that this research studies a program evaluation which compared a stress management program to an exercise program.

Dietary Intake and Stress

Dietary intake, including the type and amount of food consumed, as well as physical activity behaviors are key factors in the causing of obesity, and obesity is often an underlying cause of many chronic diseases. Therefore, understanding the relationship between stress and dietary intake is critical in preventing certain chronic diseases.

Much research has been conducted on the negative effects of stress on eating behaviors and/or dietary intake leading to obesity and chronic diseases such as hypertension, diabetes, heart disease and cancer. Data concerning exactly how stress affects dietary intake are mixed; some research shows increased likelihood of poorer dietary intake and higher caloric intake through increased snacking, reduced consumption of vegetables, and increased consumption of high sugar and high fat foods as a result of stress (O'Conner, Jones, Conner, McMillan, & Ferguson, 2008; Wardle, Steptoe, Oliver, & Lipsey, 2000), while other research shows no affect and even a decrease in intake secondary to stress (Grunberg & Straub, 1992; Oliver, Wardle, & Gibson, 2000).

Research shows that how stress influences dietary intake is dependent on behavioral, psychological and/or physiological characteristics of the individual such as whether the individual is practicing dietary restraint, an individuals' level of cortisol in reaction to stress, symptoms of depression, current mood state, and whether the person has a recent history of emotional eating, binge eating or other unhealthy dietary practices (Dove, 2007; Epel, Lapidus, McEwen, & Brownell, 2001; Greeno & Wing, 1994; Haynes, Lee, & Yeomans, 2003; Oliver et al., 2000; Wardle et al., 2000). The effect of

stress on eating behaviors of obese persons is of interest due to the connection between cortisol, a steroid hormone released by the adrenal cortex, levels and obesity and the positive relationship between stress and cortisol (Fukuda & Morimoto, 2001a). According to a review by Greeno and Wing, the theory predicting that obese individuals eat more than non-obese individuals when under stress has been tested thoroughly. The results indicate that both non-obese and obese persons respond differently, indicating that individual characteristics are more predicative of eating in response to stress than is weight alone. Research by Epel et al. studied the effects of cortisol levels and stress and showed persons who react to stress with the production of high levels of cortisol, had a greater intake of calories and ate more sweets and high fat foods increasing their risk of obesity. In addition, this research demonstrated that negative mood was related to food intake after exposure to stress. This research shows both a physiological and psychological relationship between stress and eating. However, research by Dove showed a stronger relationship of the psychological response compared to the physiological response to stress, concluding a negative mood state to be more predictive of due to stress than cortisol levels.

In addition to cortisol levels, a person's history of dietary restraint is another individual factor that has shown to be more predictive of eating behaviors in relation to stress. Much research has focused on individuals' history of eating behaviors and their reaction to stress in regard to dietary intake. A review of the research showed that people who practice dietary restraint or diet are particularly vulnerable to stress-induced eating,

especially women (Greeno & Wing, 1994). Dietary restraint and stress-induced eating are indicated in laboratory settings as well as real-life settings (Wardle et al., 2000). According to research conducted by Oliver et al. (2000), restrained eaters were significantly more likely to be emotional eaters, and emotional eaters were significantly more likely to eat more sweet, high fat, and energy dense meals than non-emotional eaters. It is suggested that restrained eaters are temporarily disinhibited by strong emotional reactions caused by stress, causing the restrained eater to eat greater amounts of high calorie or palatable food than normal while under stress (Haynes et al., 2003). When looking at disinhibition separately from restraint, research showed that disinhibition caused by stress may be more of a factor in consumption of sweets and overall food intake than restraint alone (Haynes et al.). This research is suggesting that the level of disinhibition, or likelihood to act impulsively, is more predictive of dietary intake when an individual is under stress than whether an individual is dieting or not.

Beyond typical dietary restraint of food intake, unhealthy weight control practices such as using laxatives, water pills, vomiting and fasting for at least 24 hours as well as binge eating were also found to be associated with psychological stress (Cohen, Kristal, Neumark-Sztainer, Rock, & Neuhouser, 2002). Such unhealthy weight control practices either can be defined as, or lead to, a clinical eating disorder.

In summary a clear relationship between stress and dietary intake exists. However, this relationship between stress and dietary intake is mediated by individual

factors such as current dietary restraint or other weight control practices, gender, history of emotional eating, and likelihood to act impulsively.

Tobacco Use and Stress

Tobacco use is the leading cause of preventable death in the United States and the single most negative influential factor concerning health. Cigarette smoking costs the United States more than 440,000 preventable deaths and $157 billion annually in direct health care expenditures and indirectly through loss of productivity (U.S. Department of Health & Human Services, 2004). The causal relationship between tobacco use and chronic disease in the United States is well-established. According to the 2004 Surgeon General's Report, smoking is known to cause multiple types of cancers in addition to lung cancer, such as bladder, kidney, cervical, esophageal, pancreatic, stomach and leukemia (U.S. Department of Health & Human Services). Beyond cancers, research has also established that tobacco use causes cardiovascular disease and respiratory disease as well as other conditions such cataracts, diminished health status, hip fractures, and peptic ulcer disease (U.S. Department of Health & Human Services). Despite these well-known consequences of cigarette smoking, 19.8% of the United States population smokes (Centers for Disease Control, 2009b). The state of Missouri exhibits higher levels of smoking rate than the national average with prevalence rate of 24.6% (Centers for Disease Control). Stress is the primary explanation reported for smoking and the primary reason stated for not being able to quit smoking (Cohen & Lichtenstein, 1990).

Smoking is reported by smokers as a means of stress relief. In an early review by Parrott (1999), research by Ikert, Green and Horn conducted in 1969 found that 80% of smokers agree that with statements such as "smoking relaxes me when I am upset or nervous," and that "smoking calms me down." Paradoxically, nicotine is a stimulant; it has an opposite effect of relaxation on the body's nervous system. As a result of this conflicting report of stress-relieving versus relaxing effects of smoking and the physiological evidence of nicotine stimulation, research was conducted in attempt to understand this paradox, named Nesbitt's Paradox (Parrott, 1998).

Research by Parrot (1998) analyzed Nesbitt's paradox, the assertion that nicotine is both stimulating and relaxing, and found that nicotine is needed by smokers as a means to normalize mood; the negative mood felt by smokers between cigarettes is elevated to normal levels by nicotine use, and the supposed "relaxing" and "distressing" effects of smoking are in actuality just relieving the smoker of their negative moods between cigarettes. Moreover, Parrott's research also found that smoking actually causes the negative mood, such as feelings of stress or irritability, felt in smokers between cigarettes. Therefore, the result is a self-perpetuating cycle of propagating negative mood, relieving the negative mood with tobacco use to feel normal temporarily and then quickly resuming the negative mood. Additional research by Parrott and Garnham (1998) supports these findings in a study comparing deprived smokers to non-smokers and non-deprived smokers. These authors found that compared to non-smokers and non-deprived

smokers, deprived smokers reported significantly greater feelings of stress, irritability, depression, poor concentration and low pleasure.

Other research supports Parrott's findings. Stein et al. (2008) studied the effects of smoking among members of the U.S. Armed forces, a group of people which frequently endure high-stress occupations. Researchers found that among military smokers and non-smokers, smokers reported higher levels of stress, and those who used both smokeless tobacco and cigarettes were found to have even higher levels of stress. Nicotine users were found to have other deleterious behaviors as a means to coping with stress such as alcohol use, and they were less likely to use positive coping strategies such as problem solving. In agreement with other research, Stein et al. found that tobacco use perpetuates stress in tobacco users, and that tobacco is needed to feel normal between each use.

Research by Steptoe et al. (1996) found similar results using academic exams as a stressor. This stressor increased smoking frequency by 54% in female University students with low social support as well as alcohol intake (18.5%).

Research by Aronson, Almeida, Stawski, Klein, and Kozlowski (2008) supports previous research by finding increased negative affect, or feelings of tension, anxiety, and/or anger, associated with smoking more than usual on days when the subjects reported experiencing stressors. However, smoking more than usual did not change subjects' negative affect on days that no stressors were reported. These results indicate that while smoking may decrease negative affect on non-stressful days, it actually may increase negative affect on stressful days. As a result, smoking more than usual in

response to stress may actually make one feel worse providing evidence that smoking is a detrimental way to cope with stress.

Cohen and Lichtenstein (1990) researched changes of stress levels within changes in smoking status. Results of this research support others research by demonstrating a higher level of stress in smokers and decreasing levels of stress with increasing duration of time of abstinence. Furthermore, relapse was associated with an increase in stress level.

Research on anxiety, which is closely related to feelings of stress, showed no evidence of increased anxiety following smoking cessation, but instead found that anxiety levels decreased as a result of cessation (West & Hajeck, 1997). Research by Carey, Kalra, Carey, Halperin and Richards (1993) found similar results with subjects who quit smoking; they perceived less stress. In addition, this research found for those who quit smoking, they had increased self-efficacy, increased use of active coping skills including problem solving and cognitive restructuring. Thus, quitting smoking may not only decrease perceived stress levels and other negative feelings, but also improve the likelihood of using healthy ways of coping with or managing stress.

In addition to smoking increasing stress levels, not surprisingly, smoking may be related to the use of other negative health behavior as a means of coping with stress compounding the health effects of stress and smoking. Research shows that persons who smoke are less physically active and consume more alcohol (Bergen & Caporaso, 1999; Macky, McKinney, & Tavakoli, 2008). Such findings are supported by other research. In

a review by Kaczynski, Manske, Mannell and Grewal (2008) the majority of studies reviewed found a negative association between physical activity and smoking, particularly for adults. The reasons for this association may be physiological in that smoking impedes lung function making exercise more difficult (Kaczynski et al.). Psychological factors may also play a part in the negative association between physical activity and smoking (Kaczynski et al.). For example, research shows that smokers report feelings of depression more than non-smokers and smoking is positively related to depression (Kaczynski et al.; Parrott & Garnham, 1998).

As a result of smoking impeding one's ability to be physically active through impaired lung function, recently research has been conducted exploring the effects of using exercise as a means to improving the abstinence from smoking. It has been hypothesized that if smoking makes exercise difficult, one will be less likely to smoke in order to engage in exercise. Supporting this hypothesis, in a randomized trial by Prochaska et al. (2008) it was found that increased moderate-to-vigorous physical activity predicted sustained abstinence at six months and physical activity decreased the perceived difficulty of abstaining from smoking. Although more research is needed, future health education efforts should utilize physical activity as a possible means to sustaining smoking abstinence due to the possible positive effects of physical activity on sustaining abstinence as well as the stress relieving effects of exercise described below.

In summary, research shows that the supposed diminishing effects of stress resulting from smoking are not reality despite what smokers report. Unfortunately, the

message to the public about tobacco use being an actual cause of stress and negative mood is not clear. Smokers continue to believe that smoking is an effective means of coping with stress in spite of the known lethal health effects caused by smoking and the negative health behaviors associated with smoking. Health education efforts are desperately needed to disprove the infamous stress-relieving effects of smoking and help persons learn healthy means to more effectively cope with stress.

Physical Activity and Stress

It is well-known that physical activity, or exercise, provides a multitude of physical and psychological health benefits such as preventing chronic disease and decreasing risk of mortality as well as reducing the deleterious physical and psychological effects of stress (U.S. Department of Health & Human Services, 1996). A large body of research shows that physical activity is associated with reported lower perceived stress levels and psychological wellbeing (Aldana, Sutton, Jacabson, & Quirk, 1996; Atlantis et al., 2004; Rostad & Long, 1996; Schnohr, Kristensen, Prescott, & Scharling, 2005; Steptoe, Kimbell, & Basford, 1998). Additionally, physical activity improves the body's ability to recover after a stressful event (Chafin, Christenfeld, & Gerin, 2008).

Much of the research on physical activity and stress has focused on the physiological response of the body to an acute stressor following a bout of exercise. It is clear that exercise benefits the body in adapting to stress through various physiological

mechanisms, and research also suggests that exercise may help one cope with perceived levels of stress through a psychological mechanism (Chafin et al., 2008; Lovallo, 1997; Rostad & Long, 1996).

Rostad and Long (1996) suggest that exercise is beneficial in coping with stress through an emotional-function by inducing relaxation, providing a distraction via a time out from other daily hassles, and/or enhancing mood. However, this research also suggests that exercise may also serve as a problem-solving function for some people through the relaxation. The authors suggest exercise may provide time for one to work through a life problem while exercising and that exercise may improve one's personal resources for solving problems via increasing self-esteem, self-efficacy and/or energy levels. Recent research by Chafin et al. (2008) conducted with undergraduate students suggests that exercise may help with dampening the emotional nature of negative thoughts resulting from stress thereby acting as a psychological coping mechanism.

The majority of research on physical activity and stress has focused primarily on how the stress response is affected when physical activity is performed prior to the stressor. However, in real-life, one often cannot predict when a stressor will occur making it impractical to utilize exercise prior to a stressful event as coping mechanism to deal with stress. A few studies described below have researched how coping with stress is affected when exercise is used following a stressor.

A study by Chafin et al. (2008) found a physiological benefit of exercise using a three-minute bout of walking following an acute laboratory stressor. Subjects' blood

pressure significantly decreased compared to the control group following the short bout of physical activity, indicating even exercise of low intensity and for a short duration may provide physiological benefits in response to stress. However, persons under chronic stress may have different outcomes; a longer, and/or more intense bout of physical activity may be necessary to provide similar physiological benefits.

A naturalistic study, conducted with young adults assessed how exercise affected subjects' ability to cope psychologically with stress from daily stressors, acute and chronic in nature (Steptoe et al., 1998). Results indicated for regular exercisers on days they exercised, they perceived fewer stressful events and the stressful events which they did observe were perceived as less stressful compared to days which they did not exercise. Such results indicate that for active adults, exercise affects people's perception of the amount of stress they endure and the severity of stressors. Additionally, this research found positive moods as rated higher and depression lower on days which subjects exercised. In spite of the lack of control group, this naturalistic study provides knowledge not gained through controlled laboratory studies of how day-to-day real life stressors are affected by the frequency of physical activity. Results of this research concur with the original definition of psychological stress by Lazarus and Folkman (1984), which explains that an individuals' cognitive appraisal of a stressor is key to the level of stress one endures. Therefore, according to the research results of Steptoe et al., physical activity may positively affect an individual's cognitive appraisal of a stressor.

The type of exercise, such as aerobic, anaerobic, stretching or muscular strength training, may make a difference in the effects of exercise on stress. The majority of existing research has used aerobic exercise when studying the relationships between exercise and stress (Rostad & Long, 1996). This present research study utilizes an exercise program as the comparison group which primarily involves strength training with some light stretching. Therefore, this study will add to the slim body of research analyzing the effects of muscular strength training on perceived psychological stress. The limited research that exists on other forms of exercise besides aerobic exercise and stress is inconclusive (Atlantis et al., 2004; Long & van-Stavel, 1995; Roskies et al., 1986; Rostad & Long).

Research by Atlantis et al. (2004) utilized a combination of moderate to high intensity aerobic training combined with weight training in a 24-week exercise training intervention. Results of this research indicated that the combined aerobic and weight training intervention was as effective as aerobic exercise alone in improving stress outcomes as well as depression and quality of life outcomes. The Montreal Type A Intervention Project by Roskies et al. (1986) compared the effects of aerobic exercise, weight training, and stress management interventions and found the stress management intervention to be most effective compared to the two exercise interventions in improving behavioral reactivity to stress in men with type A personalities. While both types of exercise, aerobic and weight training, yielded improvements in behavioral reactivity to stress, neither type of exercise was found to be superior to the other. A meta-analysis of

studies examining the effects of exercise training as a method of stress management found aerobic, but not non-aerobic which included strength training, to be associated with decreases in anxiety (Long & van-Stavel, 1995).

Despite the research and awareness indicating that exercise is an effective and healthy means of coping with stress, only half of Americans regularly exercise (Centers for Disease Control, 2007; Rostad & Long, 1996). Additionally, among persons who regularly exercise, exercise frequency decreases as levels of perceived stress increase, indicating that stress may pose a barrier to exercise (Stetson, Rahn, Dubbert, Wilner, & Mercury, 1997). Steptoe et al. (1996) found exam stress in University students caused a decrease in physical activity level. Johnson-Kozlow, Sallis and Calfas (2004) found similar results; when studying adherence to exercise regimens during the maintenance phase of a physically active lifestyle; physical activity frequency was found to be negatively affected by major life stressors. Such results suggest that persons who endure higher levels of chronic stress are particularly vulnerable to being unable or unwilling to maintain, or adhere to, a regular exercise regimen.

The research explained above provides grounds for stress as major public health concern in maintaining a physically active lifestyle. Due to the countless physiological and psychological benefits of physical activity as a means of coping with and reducing the negative physiological effect of stress, research investigating types of interventions which will improve adherence to a physically activity lifestyle for persons enduring high levels of chronic stress is warranted. Since research shows that stress is one of the major

underlying causes of a non-adherence to a physically activity lifestyle, improving one's ability to manage stress may result in improved maintenance of a physically active lifestyle. As such, this present study will evaluate a stress management's program ability to influence participants' level of physical activity. Outcomes of other stress management programs are reviewed hereafter.

Stress Management Interventions and Programs

As described above chronic stress is a major problem due to the negative mental and physical health effects it causes and the unhealthy coping behaviors people often use as a means of dealing with stress. While it is not possible to eliminate stressors from people's lives, people can learn to reduce their levels of stress by improving their ability to manage or cope with their stressors in effort decrease the risk of the deleterious physical and mental health problems that result from high levels of chronic stress.

As stated previously, it is not the stressor itself which causes stress in an individual; rather, it is how individual perceives the stressor as stressful and their response to the stressor which causes stress (Lazarus & Folkman, 1984). Therefore, stress management programs do not focus on reducing the stressors in people's lives, but instead help people change how they perceive their stressors and help cultivated healthier responses to, or means of coping with, stressors.

Due to the lack of consensus of the most effective stress management intervention, a variety of different types of stress management interventions exist

(Richardson & Rothstein, 2008). This is partially due to the research providing evidence of a variety of beneficial outcomes for the different types of interventions (Murphy, 1996; Richardson & Rothstein). For example interventions' outcomes range from improved physical health (i.e., decreased heart rate, blood pressure and glycemic control), improved psychological health (i.e., decreased anxiety and depression), improvements in biochemical levels (i.e, levels of adrenaline, cortisol, cholesterol), decreased somatic symptoms (i.e., headache, fatigue, back pain), improved work-related performance outcomes (i.e., decreased absenteeism, increased productivity) and positive behavioral outcomes (improved coping skills, decreased dietary intake and binge eating) making it difficult to identify a program or intervention which is most beneficial (Katzer et al., 2008; Landsman-Dijkstra, van Wijck, & Groothoff, 2006; Murphy, 1996; Richardson & Rothstein).

In a review of stress management programs by Murphy (1996), five different types of interventions were identified including (1) progressive muscle relaxation, (2) meditation, (3) biofeedback, (4) cognitive-behavioral skills training, (5) programs using combinations of techniques and (6) a category of "other" techniques which were techniques that did not fall into one of these categories. Health outcomes varied greatly depending on the type of interventions used and such outcomes were classified as either physical health, psychological health, or somatic symptoms (i.e., fatigue, pain). Results of this review showed that programs using cognitive–behavioral interventions were the most common type of single-technique program and produced the most consistent beneficial

effects on psychological health outcomes, particularly in reducing anxiety. Physical health outcomes for cognitive–behavioral interventions were found to produce mediocre effects. Using a combination of techniques was found to be most common in this review with the combination of cognitive–behavioral and progressive muscle relaxation techniques as the most frequently used and they were most efficacious in that improvements were shown for all three outcome measures: physical health, psychological health and somatic symptoms. The authors propose that the combination of techniques are most efficacious because such programs provide benefits of each technique such as the physical health and somatic symptom benefits frequently found in progressive relaxation interventions and the psychological benefits shown in cognitive-behavioral interventions. Surprisingly, this review of stress management programs did not show any of the programs measuring lifestyle behavior, or health behaviors as an outcome measure. Measuring such behavior changes may have shown to mediate outcomes, for example, physical health and somatic symptom changes may have been secondary to health behavior changes made as a result of improved means of coping with stress.

In a recent review of occupational stress management interventions by Richardson and Rothstein (2008), similar types of interventions were identified; however, a few new interventions were identified. The authors classified interventions into six categories including the following: (1) cognitive-behavioral interventions; (2) meditation, relaxation and deep breathing interventions; (3) exercise programs; (4) journaling interventions; (5) time management and goal setting interventions; and (6) electromyogram (EMG)

biofeedback training. Outcomes were classified as psychological, physical, or organizational (i.e., absenteeism, productivity) in nature, with psychological outcomes being as the most common type of outcome measured (35 of the 36 studies reviewed). Stress and anxiety were the most common types of psychological measures. Similarly to results of the review by Murphy (1996), this review found cognitive-behavioral interventions as the most effective in improving psychological outcomes particularly with reducing anxiety. Conversely, this review found programs using a single intervention more effective than programs using a combination of interventions. As shown in Murphy's review, this review found that programs using a combination of cognitive-behavioral and meditation/relaxation interventions were most common, however, this review found the combination less effective than cognitive-behavioral interventions alone. Notably, this review did not asses cognitive-behavioral interventions' affect on physiological health due to the lack of interventions assessing such types of outcomes since this is not the primary intent of this intervention. In effect, the combination of cognitive-behavioral interventions with relaxation/meditation may be more effective in improving a variety of outcomes than a program using solely a cognitive-behavioral intervention. Similar to the review by Murphy, none of the programs reviewed assessed lifestyle behaviors as an outcome measure.

Despite the results of the reviews above, a small number of stress management programs have measured changes lifestyle behaviors as an outcome. A community-based stress management program was evaluated by Timmerman, Emmelkamp and Sanderman

(1998) the program utilized a variety of stress management techniques with one of those techniques focused on changing unhealthy lifestyle behaviors. The other techniques of the program included training focused on relaxation, problem solving, and social skills. Subjects selected to participate were at high risk of developing a mental health conditions, but did not yet display symptoms of psychopathology (n = 229). Unhealthy lifestyle behaviors were addressed in this program by having program participants track behaviors and set goals for changing behaviors. Compared to the control group, the experimental group significantly reduced levels of distress, anxiety, and daily hassles and significantly improved assertiveness and satisfaction with social support, however, no significant changes in lifestyle behaviors were found. Lack of significant changes in lifestyle behaviors could be due to a lack of readiness to change. Since subjects were only included if they met criteria for being at high risk of developing a mental health condition, this factor may have had a detrimental effect on their readiness to change lifestyle behaviors.

Katzer et al. (2008) evaluated the effectiveness of a ten-week "non-dieting" program, using overweight female adults, which primarily used a relaxation-based stress management strategy (techniques to elicit a relaxation response). The study compared such stress management "non-dieting" program (n= 60) to two "non-dieting" programs which did not include a stress management component; the two comparison programs focused on healthy eating and physical activity with one meeting face-to-face (n = 61) and the other being a self-guided, mailed delivered program. Outcomes measured

included lifestyle behaviors, body mass index, blood pressure and psychological measures. Between the start of the program and one year following the program, all three interventions showed significant improvements in psychological distress, anxiety, and interpersonal sensitivity scores. Depression scores significantly improved with the exception of the self-guided mail-delivered program. At twelve months following the program, the "non-diet" intervention with the relaxation-based stress management component resulted in the most significant improvements in stress management behaviors and medical symptom discomfort, and it was the only intervention to show significant improvements in self-efficacy for low-fat eating. Most notably, the relaxation-based stress management program which did not focus on nutrition or physical activity had the greatest improvements in nutrition and physical activity behaviors at one year following the program. As hypothesized in research study at hand, addressing the underlying issues preventing individuals from making lifestyle behaviors changes, such as psychological distress and stress management behaviors, may be more effective in changing health behaviors than directly addressing the behavior itself. Similarly, improvements in self-efficacy for low-fat eating resulting from the relaxation-based stress management "non-dieting" program may have been mediated by the improvements in the psychological measures and/or stress management behaviors.

A stress management program evaluated by Landsman-Dijkstra et al. (2006), using a pre-post design without a control group, involved an intensive three-day body awareness intervention (n =122). Changes in lifestyle behaviors were evaluated as

outcome measures. The program was developed to help persons with chronic aspecific psychosomatic symptoms (CAPS) better balance their daily workloads and improve their capacity to deal with their work load. The body awareness techniques used in the program were defined as "paying attention or having thought about the body and how it feels in stressful and non-stressful situations" (p. 126). Results indicated at two and twelve months following the three-day program, balance between work and recovery improved with increased self-management in coping with stress and psychosomatic symptoms as well and increased physical activity and social activity. While this study lacked a control group, this study is a start to assessing stress management programs' ability to improve lifestyle behaviors.

A randomized clinical trial of a mail-delivered stress management intervention based on the transtheoretical model's stages of change was conducted with national sample of adults (n = 1,085) (Evers & Prochaska, 2006). Results showed a significant improvement from pre-action to action and/or maintenance phase of the stages of behavior change. Additionally, 60% of the subjects in the intervention group started practicing effective stress management skills at six and 18 months following the study resulting in significantly reduced stress and depression levels. It should be noted that this study analyzed health behaviors and found that, compared to the control group, the intervention group engaged in significantly less unhealthy behaviors such as eating sweet snacks and being sedentary; this improvement remained significant at six months following the intervention. Other stress management behaviors significantly improved as

well, including: seeking help from others, planning, and seeking professional help. The results of study are particularly encouraging since 80% of the subjects were not prepared to adopt stress management behaviors according the results of the baseline measure of the stages of change and because the intervention was conducted via mail. This study is one of the few stress management intervention evaluations that analyzed its effect on health behaviors.

Mindfulness-Based Stress-Management Interventions:

Not specifically included as a separate type of stress management program in the review of the literature above are programs using mindfulness-based techniques. A mindfulness-based approach has recently become a popular technique used in stress-management programs, and such programs are currently receiving a lot of attention in the area of stress management research. Since this pilot program evaluation analyzed a stress management program which was based heavily on mindfulness-based techniques, the effectiveness of interventions using mindfulness-base techniques are reviewed hereafter.

Many types of stress-management interventions have incorporated mindfulness techniques as part of interventions, and they have been used in treating a variety of type of psychological conditions such as depression, anxiety, eating disorders, and borderline personality disorder (Baer, 2006). Mindfulness-based stress reduction and mindfulness-based cognitive therapy are two interventions based solely on mindfulness training (Baer).

Mindfulness is defined as "is paying attention in a particular way: on purpose, in the present moment, nonjudgmentally" (Kabat-Zinn, 1994, p. 4). Another way of conceptualizing mindfulness is moment-to-moment awareness of thoughts, physical sensations, perceptions, and emotions, and it can be developed through the practice of meditation (Kabat-Zinn, 1990).

According to Kabat-Zinn (1990) "cultivating mindfulness can lead to the discovery of the realms of relaxation, calmness, and insight within yourself," (p. 12). It is suggested that mindfulness may lead to changes in one's thought patterns or attitudes about one's thoughts by nonjudgmental awareness of thoughts just as "thoughts" and not a reflection of reality. This process prevents further negative thoughts and dampens one's physiological reaction and/or passive coping behaviors to such negative thoughts (Baer, 2006; Kabat-Zinn). In addition, mindfulness allows for awareness of one's emotions, body sensations and reactions to stress. As a result, mindfulness may help individuals self-mange, or cope in healthier ways with stress instead of behaving impulsively to stress (Baer; Kabat-Zinn). Furthermore, meditation strategies used in the program are known to induce a relaxation response which may help in reducing the hyperarousal response that stress causes thereby having similar effects as other relaxation techniques typically used in stress management programs (Kabat-Zinn).

The mindfulness-based stress reduction (MBSR) program was founded by Jon Kabat-Zinn at the University of Massachusetts, where it was formally known as the Stress Reduction and Relaxation Program (Kabat-Zinn, 1990). The MBSR was developed

primarily for behavioral medicine in clinical settings for people suffering from chronic pain and other specific medical problems such as heart disease, cancer, sleep disorders, digestive problems, psychiatric disorders, and chronic headaches (Kabat-Zinn). The program has been expanded to variety of settings and populations as a form of treatment and prevention; however, it is still mainly used in clinical medical and psychiatric settings. MBSR programs have shown success among clinical population in the fields of medicine and psychology as well as with non-clinical populations including college students, health care professionals, work-sites and community groups in college-based communities (Barker, 2005; Baer, 2006; Cohen-Katz, Wiley, Capuano, Baker, & Shapiro, 2004; Grossman et al., 2004; Nyklicek &Kuijpers, 2008; Praissman, 2008; Shapiro, Astin, Bishop, & Cordova, 2005; Smith et al., 2008; Williams, Kolar, Reger, & Pearson, 2001).

The MBSR program is a structured, non-religious group program founded by the Buddhist tradition of Asia which utilizes mindfulness meditation to help prevent and/or alleviate suffering from a variety of psychological and physical conditions. The program is time-demanding, requiring eight, 2½ hour sessions and a six to eight hour retreat usually held on a weekend. Program sessions involve group discussions and experiential activities such as body scans, sitting meditation and Hatha yoga. In order to help participants incorporate mindfulness into their daily lives, program participants are expected to carry out daily 45-mintute homework assignments involving meditation practice and mindful yoga (Baer, 2006; Grossman et al., 2004; Praissman, 2008).

MBSR has shown success in the clinical populations within the medical and psychological fields with reducing physical and psychological symptoms (i.e. pain, anxiety, depression, blood pressure) and in a broad range of chronic disorders (Grossman et al., 2004; Praissman, 2008). Research of a clinical sample of adults (n= 174) with a wide range of medical and psychological symptoms who underwent the mindfulness-based stress reduction program was conducted by Carmody and Baer (2008). Results of this research indicated that the program significantly improved psychological well-being, decreased levels of stress and psychological and medical symptoms, and significantly increased levels of mindfulness. Results from this study should be interpreted with caution since a control group was not utilized; however, other studies support the results of this study.

In an evaluation by Shapiro, Schwartz and Bonner (1998) of the MBSR program with medical and premedical students using a wait-list control group resulted in decreases in anxiety, depression, psychological distress and increases in empathy and spiritual experiences (n= 78) thus improving participants' psychological well-being and professional effectiveness. Furthermore, in a small study conducted by Rosenzweig et al. (2007) with type 2 diabetes patients using a mindfulness-based stress reduction program had similar findings; research outcomes showed decreases in depression, anxiety and psychological distress in the 14 patients of this study. Moreover, the study by Rozenweig et al. indicated physiological benefits as a result of the MBSR program; at one month following the program this study showed significant improvements in patients' glycemic

control and blood pressure. It should be noted that these physiological results were not due to changes in patients' lifestyles; therefore, it is possible that these effects are a direct result of the program itself.

In non-clinical populations MBSR has been implemented with health professionals, college students, in work-sites and with volunteers of college/university communities. These programs have shown success in reducing stress and reducing physical and psychological symptoms in a broad range of chronic conditions (Baer, 2006; Grossman et al., 2004; Nyklicek & Kuijpers, 2008; Shapiro et al., 2005; Smith et al., 2008; Williams et al., 2001). Using a community sample, Smith et al. compared a MBSR program (n= 36) to a cognitive-behavioral stress reduction program (n= 14), and results demonstrated success of both programs in reducing perceived stress and depression, but the MBSR program resulted in better outcomes for mindfulness, energy, reducing pain and a trend of binge eating. Due to the lack of a control group and the small sample sizes generalization of the results of this research is limited. Nyklicek & Kuijpers used a community sample (n= 60) to evaluate the effectiveness of the MBSR program on psychological well-being compared to a wait-list control group and found that, compared to the control group, the MBSR program produced significantly greater reductions in perceived stress and exhaustion and significantly greater improvements in positive affect, quality of life and mindfulness. Williams et al. conducted a randomized control trial to evaluate the effectiveness of a wellness-based mindfulness stress reduction intervention with a community sample of adults (n=103). Compared to the control group, the

intervention group reported significantly less daily hassles (24%), psychological distress (44%), and medical symptoms (46%); such results were maintained at the three-month follow-up assessment.

As a result of research strongly supporting the effectiveness of stress management programs using a mindfulness-based approach in various settings, this research examines a program in which mindfulness-based strategies and techniques are the core of the program. Most studies conducted using MBSR programs in community-based settings are located in communities with a college or university (Nyklicek & Kuijpers, 2008; Smith et al, 2008; Williams et al., 2008). There are no known evaluations of community-based MBSR or other mindfulness based interventions in communities without a large higher education institution. The stress management program of this study was conducted in various regions of Missouri, including communities which did not contain a higher education institution. Therefore, the current research study adds to the body research in regard to the effectiveness of mindfulness-based stress management interventions focusing on in community settings. Additionally, evaluations of MBSR interventions have primarily focused on changes in psychological (i.e., perceived stress, depression, anxiety, quality of life) and physical (i.e., pain, blood pressure, glycemic control) effects (e.g., Baer, 2006; Grossman et al., 2004; Nyklicek & Kuijpers, 2008; Shapiro et al., 2005; Smith et al., 2008; William et al., 2001). Research evaluating the effects of MBSR on lifestyle behaviors is limited; therefore, the current stress management program

evaluation provides insight to the possible positive health behavior influences of using mindfulness-based techniques in community settings (Rosenzweig et al. (2007).

Comparison of the Effectiveness of Stress Management and Exercise Programs

As explained above, research shows physical activity reduces stress levels, an idea which has initiated interest in comparing the effectiveness of exercise programs to stress management programs. Since this stress-management pilot program evaluation utilized an exercise program as a comparison group, similar evaluation studies are reviewed below. Some of the research has compared stress management programs to exercise programs (some with and some without a control group), while others have compared combined stress management and exercise programs to a stress management program and/or control. Such research comparing exercise interventions to stress management interventions is limited; therefore, this pilot program evaluation adds to this small body of research.

A study conducted by Roskies et al. (1986) was one of the first studies to compare the effects of an exercise intervention to a stress management intervention. Using a sample of men with "type A" personalities, two different exercise interventions, a ten week aerobic training (primarily jogging) and weight training, were compared to a 10-week cognitive behavioral stress management program (n = 170). The stress management program aimed to increase subjects' coping strategies and flexibility in using such strategies. Results indicated the stress management intervention had the greatest changes

in behavioral reactivity, or negative behaviors in reaction to stress, compared to the exercise interventions. No differences were found between the two exercise interventions, and no other significant physiological reactivity changes which included, for example, cardiovascular and endocrine changes resulted.

Using a randomized controlled trial in a clinical setting of patients with heart disease, Blumenthal et al (2005) compared an aerobic exercise program to a stress management intervention with a routine medical care group as a control (n = 134). Interventions were matched similarly for time invested with exercise involving 35 minutes three times per week for 16 weeks (stationary bike and jogging), and the stress management intervention met once per week for one and half hours for 16 weeks. The stress management program used a cognitive-social learning model of behavior which attempted to enhance subjects' awareness of the effects of their social environment and personality on their responses to situations. Following the interventions, results showed that both the exercise and stress management programs were effective in significantly reducing depression and distress, and improved cardiovascular risk outcomes compared to usual medical care.

Three studies showed that interventions using a combination of exercise and stress management faired best when compared to exercise or stress management alone (Bruning & Frew, 1987; Bundy, Carroll, Wallace, & Nagle, 1998; Emery, Schein, Hauck, & MacIntyre, 1998). In a worksite setting with a control group, Bruning and Frew (1987) compared an aerobic exercise intervention to two stress management interventions which

included a skills management training and meditation (n =86). Only physical health measures were assessed, and results indicated all three interventions significantly reduced blood pressure and pulse rate compared to the control group.

In the research by Bundy, Carroll, Wallace and Nagle (1998) patients diagnosed with chronic stable angina were assigned one of the three seven-week interventions: a weekly one and a half hour stress management program; a bi-weekly 45 minutes exercise training program; or a combination of the two interventions. A wait-list control was used, and outcome measures were related to physical health and medication use. The stress management intervention involved cognitive control, anger inoculation and control, relaxation training, lifestyle assessment, and lifestyle change and maintenance. The exercise training was non-aerobic, involving repetitive stretching, flexing, moving and lifting sequences. Subjects (n = 120) were assessed before, immediately following and eight weeks after the intervention. Results indicated that those patients who undertook the combined stress management and exercise program improved the most on the exercise tolerance test immediately after and eight weeks following the program compared to the other groups. The combined intervention significantly decreased the number of reported angina episodes compared to the exercise alone and control group. Most notably, the stress management intervention, either alone or in combination with the exercise program, significantly reduced reported medication use, and this group maintained reduced reliance on medication at follow up.

Emery, Schein, Hauck and MacIntyre (1998) used a similar design with patients diagnosed with chronic obstructive pulmonary disease (COPD). A combined teen-week exercise, stress management and education intervention (n =29) was compared to a ten-week intervention of stress management and education (n =25) in a randomized control trial with a wait-list control (n =25). The stress management training used a cognitive behavior format and met in groups weekly for one hour. The educational training included four, hour-long, educational lectures on topics related to COPD. The exercise training involved 45 minutes of mainly aerobic exercise and weight training. Outcomes measured were related to physical and psychological health as well as a cognitive assessment which included attention, motor speed, mental and verbal skills. Results indicated that the intervention using the combination of the three trainings (exercise, stress management and education) was most effective compared to the other two groups by significantly improving endurance, verbal fluency and reducing anxiety.

A major limitation to research comparing the effectiveness of exercise interventions to stress management interventions is the variety of the types of stress management interventions used to compare to exercise interventions. As elucidated above, the type of stress management intervention has a strong effect on the outcomes. Furthermore, the type, intensity and duration of the exercise interventions varied as well, though most of the studies used aerobic exercise. As such, definitive conclusions should not be drawn from this review of the literature.

Summary

In summary, as a result of the strong associations, and even causal relationships, which exist between stress and dietary intake, stress and tobacco use, and stress and physical activity, it is astonishing that very few stress management programs measure their effect on improving lifestyle behaviors. This research will add to the knowledge base of whether a stress management program, based on mindfulness techniques, can be utilized as a means to improving lifestyle behaviors, thus preventing chronic disease. Additionally, this study will add to the sparse research measuring the effects of strength training program to improve stress levels. Finally, this program evaluation will add to the slim body of research comparing the effectiveness of a stress management program to an exercise program with regard to lowering stress levels and improving lifestyle behaviors.

CHAPTER 3: METHODS

Overview

The following chapter will provide details of the research design, setting, participants, instruments, stress management pilot program, strength training program, procedures and statistical analyses of this pilot program evaluation.

Design

The study was a pilot program evaluation which used a quasi-experimental design to evaluate the effectiveness of a community-based eight-week stress management program. The goal of the program was to decrease participants' perceived stress levels and improve lifestyle behaviors in comparison to participants of a ten-week community-based strength training program. Subjects for this research were recruited from program participants who have already registered to take part in the stress management (intervention), program and the strength training (comparison) program. Both programs were taught to adults throughout the state of Missouri at multiple timepoints over a nine month period. At the start of each program, all participants were informed about the study and invited to participate. An informed consent was obtained for those participants interested in taking part in the evaluation. Program participants who chose not to take part in evaluation were treated the same as program participants who opted to complete evaluation in regard to program content and attention from program facilitators. All

research procedures were approved by the University of Missouri Institutional Review Board. Intervention and comparison program participants' baseline measures were obtained at the start of each program and post-program measures were obtained at the end of the last program session. Follow-up measures were collected at three-months after the conclusion of each program via mail or e-mail depending on each participant's preference. Participants who opted for receiving the survey via e-mail received an e-main containing a link to the survey using the survey software, Survey Monkey (n.d.). Participants opting to receive the survey through the mail were given a pre-stamped return envelope to return the survey.

Setting

The study was conducted in various communities throughout the state of Missouri by University of Missouri Extension Regional Specialists who had expertise in the area of health education. The intervention and comparison programs were marketed by Regional Extension Specialists to adults within the communities in which they serve as Extension Specialists through brochures, flyers, and verbal and electronic networking. Since the majority of the state of Missouri's counties are rural and Extension has Regional Specialists serving all the counties throughout the state, a majority of the programming occurred in rural communities; however, urban communities were included. The Extension Specialists facilitated the programs in groups of about 10-20 participants in various types of community locations, for example, community centers,

local University of Missouri Extension county offices, local public health departments, schools, and churches. Exact locations of the various programs were decided by the Extension Specialists based on availability of a facility to hold the program and the interest of persons in the community. The program was marketed to community dwelling adults of any age, both working and non-working.

Participants

Study subjects for this pilot program evaluation were recruited from program participants, or the persons choose to take part in either the stress management or strength training programs. Program participants were invited to take part in the evaluation as long as they were of 18 years of age or older. Using the statistical software, G*Power, the sample size was calculated for a repeated measures analysis of variance (G*Power, 2009). Results indicated, using an effect size of 0.25 and to achieve a power of 80 percent, a total sample of 134 participants, 67 from the pilot program and 67 from the comparison program, was needed to obtain statistical significance of $p = .05$. It was expected from previous experience of Extension programming, that the majority of program participants would consent to participating in the evaluation research. Based on other Extension programming, a dropout rate of about 50% was expected by the three-month follow-up. Accounting for a 50% dropout rate, a minimum of 268 participants needed to be recruited to participate in this research in order achieve 134 subjects who have completed surveys at all three timepoints. With an average of 15 participants taking

part in a single multi-session program and accounting for a dropout rate of about 50 percent, Extension Specialists needed to facilitate approximately a minimum nine pilot programs and comparison programs each to obtain a total of 134 subjects.

Potential program participants were advised that taking part in the program evaluation research would in no way affect their participation in the program. Potential risks involved feeling slightly uncomfortable in answering questions about their lifestyle behaviors and/or stress levels. Additionally, potential participants were told that their participation would assist University of Missouri Extension in evaluating the effectiveness and improving Extension programming. Subjects who completed the baseline and post-program measures were compensated $20 for their time after completing the post-program survey. Those subjects who completed the three-month follow-up received an additional $20 compensation, for a total of $40 in compensation.

Instruments

Demographics

Subjects' demographic information was collected at baseline, but not at the other timepoints. Demographic information included gender, marital status, age, number of people living in their household, annual household income, employment status, county of residence, level of education completed and ethnic background.

Perceived Stress Scale (PSS)

The 10-item version of the PSS was used to measure the construct of stress (Cohen & Williamson, 1988). The PSS is a self-report questionnaire designed for community samples and measures the degree to which situations in one's life are appraised as stressful with items addressing how unpredictable, uncontrollable and overloaded respondents find their lives within the last month (Cohen, Kamarck, & Mermelstein, 1983). Additionally, the questions are general in nature in that the scale does not appraise particular situations, and it is not content specific for any particular subpopulation (Cohen & Williamson). Furthermore, the scale is not a diagnostic tool allowing it to be used in community groups, and it is frequently used to evaluate multi-session programs/interventions. Subjects' were asked to respond to items on a five-point scale ranging from zero to four, with zero being *never* and four being *very often*. See Appendix A for the questions included within the PSS. After reverse coding questions four, five, seven and eight, the scores were summed across all scale items with scores ranging from zero to 40 with lower scores indicating lower stress levels and higher scores indicating higher stress levels.

The original PSS included 14 items. Later, the 10-item scale was developed without losing any of the psychometric qualities and with even a slight gain in the total explained variance and internal reliability (Cohen & Williamson, 1988). Using a large national sample of adults, internal reliability calculations resulted in a coefficient alpha of 0.78 (Cohen & Williamson). Construct validity was assessed by relating the PSS to other stress measures such as life events, health, health service utilization, health behaviors, life

satisfaction, and help-seeking. In summary, Cohen & Williamson found that the PSS was moderately associated with life events (r = .30, $p < .001$), with the Health Services Utilization Scale (r =.21, $p < .0001$), self-reported physical health problems for serious (r = .27, $p < .0001$) and non-serious (r = .31, $p < .0001$) physical health problems. With regard to health behaviors, the PSS was negatively correlated to sleep only in persons aged 65 or older (r = -.13, $p < .008$) but not for other age groups and negatively correlated to those who ate breakfast (r = -.13, $p < .001$) indicating that people under stress ate breakfast less often. The scale showed a significant, yet small, correlation with frequency of exercise (r = -.06, $p < .003$) with less frequent exercise associated with higher levels of stress. Cigarette smoking was found to be significantly related to the scale using a one-way analysis of variance ($p < .004$) indicating smokers experienced higher level of stress than non-smokers and former smokers. Increased quantity of alcohol was found to be marginally related to the scores on this stress scales (r = .10, $p < .0001$).

Health-Promoting Lifestyle Profile (HPLP) II

This 52-item self-report scale measures health-promoting behaviors conceptualized as a multidimensional pattern of self-initiated action and perceptions that serve to maintain or enhance the levels of wellness, self actualization and fulfillment of the individual (see Appendix B) (Walker et al., 1987). The HPLP II was developed from the original HPLP to more accurately reflect current literature. This scale contains six subscales to measure behaviors in the theorized dimensions of health-promoting behaviors including, nutrition, physical activity, health responsibility, stress management,

spiritual growth and interpersonal relations (Walker & Hill-Polerecky, 1996). Respondents answer questions based on a four-point Likert scale with response choices ranging from *never* to *routinely* with low scores indicating less healthy behavior and higher scores indicating healthier behaviors. The HPLP II is scored by calculating the overall mean of the responses to the 52 items. Each of the six subscales includes eight or nine items and each subscale is scored by calculating the mean of the responses for the items included within the subscale.

Reliability and validity was assessed for the HPLP II using a sample of 712 adults with ages ranging from 18 to 92. Internal reliability results for the complete scale indicated a coefficient alpha of 0.94 with subscales ranging from 0.79 to 0.87, and the three-week test-retest analysis of the complete scale resulted in a coefficient of 0.89 (Walker & Hill-Polerecky, 1996). Criterion-related validity was assessed using a quality of life measure and perceived health status measure and results indicated significant correlations of r = .49 and r = .27 respectively.

Tobacco Use

Tobacco use was measured from the tobacco use question set from the 2009 Behavioral Risk Factor Surveillance Survey (BRFSS) (see Appendix C) (Centers for Disease Control, 2009a). The question set obtains data on four different types smoking statuses including ever, current, former, or never smoker, as well as the number of cigarettes smoked per day, length time since the respondent quit smoking, and whether smokers tried to quit smoking one or more times in the past year (Nelson, Holtzman,

Bolen, Stanwyck, & Mack, 2001). Additionally, a question on smokeless tobacco is included in the 2009 version of the question set. The scale is scored by calculating the mean for the responses to each question.

High reliability for current and ever smoking status was high with kappa (κ) values, a measure of inter-rater reliability, of 0.79 to 1.00 and 0.79 to 0.94 respectively (Nelson, Holtzman, Bolen, Stanwyck, & Mack, 2001). Reliability was slightly lower for former smokers at κ values of 0.58 to 0.86. Using self-report, the validity cigarette smoking status was found to be high as a result of 26 meta-analyses using biochemical measures with an average sensitivity and specificity of 87.5% and 89.2% respectively (Nelson et al). Number of cigarettes per day was evaluated by a few studies, and reliability was found to be high ranging from κ values of 0.76 to 0.85. Validity of the number of cigarettes was measured by household interviews and the BRFSS estimated nearly identical results for average smokers, but the scores was slightly lower for heavy smokers in the BRFSS.

Health Status

As an additional demographic measure, perceived health status was measured by one question used in the 2009 BRFSS which asks respondents to rate their current health based on five options ranging from *excellent* to *poor* (see Appendix D). Reliability of this self-reported health status question was assessed using adults aged 35 to 63 and results indicated κ values ranging from 0.42 to 0.47 (Nelson et al., 2001). A score is obtained by calculating the mean of the responses. Validity has been assessed using measures of

mortality by respondents of the National Health and Nutrition Examination Survey over a period of twelve years and results indicated for persons reporting fair/poor health, the risk of death was 2.8 times greater than those reporting excellent health (Nelson et al.).

Additional Questions

A question regarding participants' frequency of practicing strategies/skills learned within the program at home was developed specifically for this program to capture how often participants are practicing skills/strategies taught in the program outside of program sessions (post-program survey) and after the completion of the program (three-month follow-up survey). Additionally, a question regarding the use of resources provided in the program was asked. Finally, a set of standard University of Missouri Extension questions regarding participants' satisfaction with the program was collected to meet the requirements set forth by University of Missouri Extension.

Procedures

At the introduction session of both the intervention and the comparison programs, baseline survey facilitators recruited potential subjects by reading the "Recruitment Script" to all program participants and obtained written consent from those program participants who decided to participate in the research. Participants of the intervention program were provided time to complete the baseline survey and post-program survey at the end of the introductory session and last session respectively. Participants of the

comparison program were provided with the baseline surveys at the end of introductory session to take home with them to complete and bring back to the next session. Those participants who did not return their surveys at the session following the introductory session were not allowed to take part in the study. The comparison program participants were provided with the post-program surveys at the end of the 9th, or second to last program session, where they were instructed to take the survey home with them to complete and bring back to the 10th, or last program session. The last program session of the comparison program primarily includes physical assessments, and therefore, the 9th session was in essence the last program session.

The above self-report measures were administered via paper for the baseline and post-program surveys. Research participants of both programs had the option of receiving the three-month follow-up survey in paper form via mail or electronically via e-mail using the survey software Survey Monkey (n.d.). Surveys at all three timepoints took approximately fifteen to twenty minutes for the participants to complete.

Stress Management Pilot Program

The intervention program was a stress management pilot program which was developed for the University of Missouri Extension delivered in communities throughout the state of Missouri by Regional Extension Specialists with a background in health education. The program met for one hour weekly for eight consecutive weeks and was designed to be delivered to adults of any age in groups of about twenty or less. Program

sessions involved group experiential activities, self-reflection, and mini-lectures interspersed with large and small group discussions. Each week participants were provided with assignments to encourage application of the strategies learned during program sessions into their daily lives.

The program was based primarily on mindfulness concepts and activities of the Mindfulness-based Stress Reduction program developed by Jon Kabat-Zinn (1990) (see Chapter 2). However, the program was adapted to be more acceptable by community members of rural Missouri, and as a result, it integrated a variety of stress management techniques such as concepts and activities from the field of positive psychology as well as cognitive behavioral therapy. The primary aim of the program was to improve participants' stress management skills and build participants' psychosocial resources to be able to better cope and/or adapt to life's stressors resulting in reduced stress levels and improved lifestyle behaviors. In effort to achieve these program aims, program concepts included the following components: mindfulness-based strategies to increase non-judgmental awareness of one's physical sensations, emotions and cognitions; increasing awareness of one's responses to stress; cognitive restructuring strategies to assist participants in reversing detrimental thought processes; strategies to help participants' learn from and find opportunities in life's challenges; increase participants' resilience to stress through strategies which cultivate positive emotion; strategies for proactive coping and active coping; and strategies for self-care of one's mind, body and spirit.

Strength Training Program

The comparison program which was used in this research was a community-based strength training program for adults of any age who had little or no strength training background. This program was a University of Missouri Extension program offered throughout the state of Missouri and was taught by Regional Extension Specialists with background in health education. The program met weekly for an hour for ten consecutive weeks, and similarly to the intervention program, was designed for groups of twenty or less. The program's primary aims were to improve participants' strength, flexibility and balance with the outcome goals of increasing bone density, prevent frailty and osteoporosis. In past evaluations, program participants reported feeling stronger, higher energy levels, greater flexibility, and lessened joint pain as a result of the program. Post-program physical assessments have shown improved strength, balance and flexibility. Program sessions involved a warm-up and warm-down of stretching and strength exercises involving body weight and light weights. The first and last program session involved physical assessments for program evaluation purposes.

Statistical Analyses

Data were entered into a computerized spreadsheet and imported into the Statistical Package for Social Sciences 17.0 (SPSS Inc., 2009). Descriptive statistics were calculated for all measures. Normality of the interval data was assessed to check for outliers by analyzing descriptive statistics; the minimum, maximum, skew and kurtosis of

the data was assessed. Scores on all standard measures were calculated per authors' instructions. Baseline differences between the intervention and comparison groups on all demographic measures were analyzed using chi-square analyses since all demographic data was categorical.

This study included a set of primary hypotheses and secondary hypotheses. The first primary research question compared the participants of the stress management program to the participants of the strength training program over all three timepoints (before, immediately following, and three months following the programs) while controlling for age differences between the two program groups. The next two primary research questions compared the two program groups at (1) immediately following the program controlling for age difference and differences at baseline and (2) three months following controlling for age differences and differences at baseline. The first set of three secondary research questions compared differences between the two program groups at each timepoint separately while controlling for age. The fourth secondary research question compared differences between the two program groups regardless of which timepoint while controlling for age differences. The rest of the secondary research questions assessed differences over time within each group separately; research questions five through eight evaluated participants within the stress management program and nine through twelve evaluated participants within the strength training program.

The following section lists the primary and secondary hypotheses. Each hypothesis was to be investigated for each of the following outcome measures: perceived

stress levels as measured by the PSS, tobacco use as measured by the BRFSS tobacco use question set, health promoting lifestyle behaviors as measured by the HPLP II and the six subscales of the HPLP II (nutrition behaviors, physical activity behaviors, health responsibility behaviors, stress management behaviors, spiritual thoughts and behaviors and interpersonal relation behaviors). Baseline, or before the program, was defined as time 0, immediately following the program was defined as time 1 and three months following the program was defined as time 2. The primary and secondary hypotheses were analyzed using the following statistical analysis techniques:

Primary Hypotheses and Statistical Analyses

1) It was hypothesized that participants of the stress management program and participants of the strength of training program would be significantly different across all three timepoints (time 0, time 1, and time 2) for each of the outcome measures when controlling for age differences between the participants of the two programs. For each of the outcome measures, a repeated measures analysis of covariance (ANCOVA) test was used to assess if statistically significant ($p < .05$) differences existed between the two groups over the three timepoints (time 0, time 1 and time 2) using age as a covariate.
2) It was hypothesized that the participants of the stress management program and participants of the strength of training program would be significantly different at

time 1 for each of the outcome measures except for physical activity behaviors when controlling for time 0 and age differences between the participants of the two programs. For each of the outcome measures, an ANCOVA test was used to assess if significant ($p < .05$) differences existed between the two groups at time 1 with time 0 scores and age as covariates.

3) It was hypothesized that the participants of the stress management program and participants of the strength of training program would be significantly different at time 2 for each of the outcome measures when controlling for time 0 and age differences between the participants of the two programs. For each of the outcome measures, an ANCOVA test was used to assess if statistically significant ($p < .05$) differences existed between the two groups at time 2 with time 0 scores and age as covariates.

Secondary Hypotheses and Statistical Analyses:

1. It was hypothesized that the participants of the stress management program and participants of the strength of training program would not be significantly different at time 0 for each of the outcome measures when controlling for age differences between the participants of the two programs. An ANCOA test was used to assess each of the outcome measures for statistically significant (p

< .05) differences between the two program groups at time 0 using age as a covariate.

2. It was hypothesized that the participants of the stress management program and participants of the strength of training program would be significantly different at time 1 for each of the outcome measures except for physical activity behaviors when controlling for age differences between the participants of the two programs. An ANCOVA test was used to assess each of the outcome measures for statistically significant ($p < .05$) differences between the two program groups at time 1 using age as a covariate.
3. It was hypothesized that the participants of the stress management program and participants of the strength of training program would be significantly different at time 2 for each of the outcome measures when controlling for age differences between the participants of the two programs. An ACNOVA test was used to assess each of the outcome measures for significant ($p < .05$) differences between the two program groups at time 2 using age as covariate.
4. It was hypothesized that the participants of the stress management program and participants of the strength of training program would be significantly different regardless of which time point (time 0, time 1 or time 2) for each of the outcome measures when controlling for age differences between the participants of the two programs. An ANCOVA test with age, time 0 and time 1 as covariates and time 2 as the dependant variable was used to assess each

of the outcome measures for statistically significant ($p < .05$) differences between the two program groups regardless of which timepoint (time 0, time 1 or time 2).

5. It was hypothesized that participants of the stress management program would be significantly different across all three timepoints (time 0, time 1 and time 2) for each of the outcome measures. A repeated measures analysis of variance (ANOVA) was used to assess each of the outcome measures for statistically significant ($p < .05$) differences within the stress management program participants across all three timepoints (time 0, time 1 and time 2).
6. It was hypothesized that the participants of the stress management program would be significantly different from time 0 to time 1 for each of the outcome measures except for physical activity behaviors. Including only data from the stress management program, a repeated measures ANOVA was used to assess each of the outcome measures for statistically significant ($p < .05$) differences within the stress management program participants from time 0 to time 1.
7. It was hypothesized that the participants of the stress management program would be significantly different from time 0 to time 2 for each of the outcome measures. Including only data from the stress management program, a repeated measures ANOVA was used to assess each of the outcome measures for statistically significant ($p < .05$) differences within the stress management program participants from time 0 to time 2.

8. It was hypothesized that the participants of the stress management program would be significantly different from time 1 to time 2 for each of the outcome measures. Including only data from the stress management program, a repeated measures ANOVA was used to assess each of the outcome measures for statistically significant ($p < .05$) differences within the stress management program participants from time 1 to time 2.
9. It was hypothesized that participants of the strength training program would not be significantly different across all three timepoints (time 0, time 1 and time 2) for each of the outcome measures. A repeated measures ANOVA was used to assess each of the outcome measures for statistically significant ($p < .05$) differences within the strength training program participants across all three timepoints (time 0, time 1 and time 2).
10. It was hypothesized that the participants of the strength of training program would not be significantly different from time 0 to time 1 for each of the outcome measures except physical activity behaviors. Including only data from the strength training program, a repeated measures ANOVA was used to assess each of the outcome measures for statistically significant ($p < .05$) differences within the strength training program participants from time 0 to time 1.
11. It was hypothesized that the participants of the strength of training program would not be significantly different from time 0 to time 2 for each of the

outcome measures. Including only data from the strength training program, a repeated measures ANOVA was used to assess each of the outcome measures for statistically significant ($p < .05$) differences within the strength training program participants from time 0 to time 2.

12. It was hypothesized that the participants of the strength of training program would not be significantly different from time 1 to time 2 for each of the outcome measures. Including only data from the strength training program, a repeated measures ANOVA was used to assess each of the outcome measures for statistically significant ($p < .05$) differences within the strength training program participants from time 1 to time 2.

The significant level, or *p*-value resulting from the *F*-ratio of ANOVAs and ANCOVAs provides knowledge of whether to accept or reject a hypothesis. However, to assess the magnitude of the effect of the outcome measures in regard to the participants of the two program groups independent of the sample size, effect sizes should be calculated (Levene & Hullett, 2002). Therefore, a partial eta squared (η_p^2) was calculated for every ANOVA and ANCOVA used to assess each of the above primary and secondary hypotheses. The η_p^2 can be interpreted as the percent of group differences plus the associated error variance. The statistical tests of the secondary hypotheses were used

to further investigate results of the primary analyses thus were conducted in lieu of post-hoc analyses of the primary hypotheses.

CHAPTER 4: RESULTS

Overview

The results of the current study are provided in this chapter. The purpose of the study was to evaluate the effectiveness of a stress management program compared to a strength training program in regard to perceived stress levels and health behaviors. Two stages of analysis were conducted. First, the primary analysis was conducted to compare participants of the two groups with regard to perceived stress levels and health behaviors including: (1) across the three timepoints (time 0, time 1, and time 2), controlling for age differences; (2) at time 1, controlling for age differences and differences at time 0; and (3) at time 2, controlling for age differences and differences at time 0.

A set of 12 secondary analyses were conducted to further explore the data. These analyses included assessing differences between participants of the two programs at each timepoint separately while controlling for age difference between the two groups as well as regardless of which timepoint while controlling for age difference between the two groups. Additionally, the differences within the participants of each program group was assessed across all timepoints, from time 0 to time 1, from time 1 to time 2 and from time 0 to time 2.

A total of 18 stress management programs and 27 strength training programs were taught throughout the state starting in the fall of 2009 until the end of the summer of 2010 by University of Missouri Extension Regional Specialists. The programs were taught in urban, rural and suburban areas. A total of 8 Specialists taught the intervention program

and 11 Specialists taught the comparison program. The attrition rate for the stress management program and strength training program was 11.7% and 18.7% respectively.

Demographics and Descriptive Statistics

As stated in Chapter 3, Statistical Package for Social Sciences 17.0 (SPSS Inc., 2009) was used to analyze the data of this study. Descriptive statistics were calculated for all measures at all timepoints. Subjects in the stress management program who reported currently or previously taking part in the strength training program were eliminated at each timepoint. In addition, respondents who took part in the strength training program for this study and started taking the strength training program again or the stress management program prior to completing the three month follow-up survey, were eliminated from the sample at time 2. Finally, a small number of subjects at each timepoint did not complete the majority of the questions on survey including the outcome measures, therefore these subjects were deleted from the sample. As a result, the total sample sizes at each timepoint included: 477 subjects at baseline (time 0), 390 subjects immediately following the program (time 1) and 299 subjects three months following the program (time 2). Total sample sizes and sample sizes of the two program groups at each timepoint are reported in Table 1.

Table 1

Sample Sizes

Timepoint	Intervention Group	Comparison Group	Total
Time 0	206	271	477
Time 1	181	209	390
Time 2	156	142	299

Results of the descriptive statistics for the tobacco use survey indicated that only 48 participants self-identified as current tobacco users at baseline. For adequate power, this number was too small to include this measure in the analyses of the data. Therefore, tobacco use was eliminated as an outcome measure in this study.

Demographic variables assessed at baseline included gender, age, ethnicity, marital status, employment status, number of people living within one's household, household income, and general health status which was measured by the single question from the Behavioral Risk Factor Surveillance System (BRFSS) where respondents rated their current health based on five options ranging from *excellent* to *poor* (see Chapter 3 for detailed description of the general health question) (Centers for Disease Control, 2009a). Differences between the stress management program (intervention group) and the strength training program (comparison group) for all demographic measures were analyzed using chi-square goodness of fit analyses. Results of the chi-square goodness of fit analysis showed significant differences between the intervention group and the comparison group ($p < .05$) at baseline in regard to all demographic measures with the exception of gender and ethnicity.

As hypothesized, results showed a greater percentage of older adults (age 65+) in the strength training program (45.9%) compared to the stress management program (7.3%). Whereas the stress management program included a greater percentage of adults aged 25 - 44 year olds (30.2 %) than the strength training program (4.8%). The strength training program also showed a greater percentage of retired subjects, widowed subjects, and subjects who reported less number of people living in one's household than the stress management program. This is not surprising since employment status and marital status are likely to be associated with older age. According to the results, employment status and marital status along as well as education level, annual household income and number of people in one's household were significantly ($p < .01$) correlated to age thus justifying the need to control for age in the analyses. See Table 2 for a summary of the descriptive statistics of the demographic variables.

Table 2

Demographics

	Intervention Group		Comparison Group		Total	
Demographic Measure	n	%	n	%	n	%
Gender						
Male	24	11.7	48	17.7	72	15.1
Female	181	88.3	223	82.3	405	84.9
Age[a]						
18-24	6	2.9	3	1.1	9	1.9
25-44	62	30.2	13	4.8	75	15.8
45-64	122	59.5	130	48.1	252	53.1
65+	15	7.3	124	45.9	139	29.3

Note. Table 2 continued on next page.

Table 2 continued

Demographics

	Intervention Group		Comparison Group		Total	
Demographic Measure	n	%	n	%	n	%
Ethnicity						
White (non-Hispanic)	189	92.2	226	85.9	415	88.7
Black or African	8	3.9	30	11.4	38	8.1
American	3	1.5	3	1.1	6	1.3
Hispanic of Latino	1	0.5	1	0.4	2	0.4
Asian	1	0.5	3	1.1	4	0.9
Native American	0	0	0	0	0	0
Arabic						
Other	3	1.5	0	0	3	0.6
Employment Status						
Full-time[b]	151	75.5	65	24.5	216	46.5
Part-time[c]	26	13.0	40	15.1	66	14.2
Unemployed	7	3.5	12	4.5	19	4.1
Homemaker	4	2.0	26	9.8	30	6.5
Full-time student	0	0.0	1	0.4	1	0.2
Retired	12	6.0	121	45.7	133	28.6
Education						
8th grade or less	0	0 0	0 0	0 0	0 0	0 0 0
Some high school	1	1 0.5	0.5 6	6 2.2	2.27	7 1.5 1.5
High school graduate	27	27 13.4	13.4 64	64 23.9	23.91	91 19.4 19.4
Some college[d]	58	58 28.7	28.7 98	98 36.6	36.156	156 33.2 33.2
College graduate	58	58 28.7	28.7 64	64 23.9	23.922	122 26.0 26.0
Graduate degree	58	58 28.7	28.7 36	36 13.4	13.94	94 20.0 20.0

Note. Table 2 continued on next page.

Table 2 continued

Demographics

	Intervention Group		Comparison Group		Total	
Demographic Measure	n	%	n	%	n	%
Marital Status						
Never Married	21	10.3	13	4.9	34	7.3
Married	138	68.0	181	68.3	319	68.2
Living with a partner	10	4.9	3	1.1	13	2.8
Separated/Divorced	25	12.3	20	7.5	45	9.6
Widowed	9	4.4	48	18.1	57	12.2
General health						
Excellent	12	5.8	24	8.9	36	7.6
Very good	64	31.1	110	63.3	174	36.6
Good	89	43.2	112	41.6	201	42.3
Fair	33	16.0	21	7.8	54	11.4
Poor	8	3.9	2	0.7	10	2.1
Annual household income						
Less than $15,000	12	6.0	17	7.0	29	6.5
$15,001 - $24,999	18	9.0	43	17.6	61	13.7
$25,000 - $49,999	57	28.4	83	34.0	140	31.5
$50,000 - $99,000	92	45.8	83	34.0	175	39.3
$100,000+	22	10.9	18	7.4	40	9.0
Number of people in household	34	16.5	59	21.8	93	19.5
1 person	90	43.7	172	63.5	262	54.9
2 people	42	20.4	17	6.3	59	12.4
3 people	27	13.1	9	3.3	36	7.5
4 people	9	4.4	10	3.7	19	4.0
5 people						
6 or more people	4	1.9	4	1.5	8	1.7

Note. [a]No subjects were under the age of 18; [b]Includes full-time self-employed; [c]Includes part-time self-employed; [d]Includes business or technical school.

For the purpose of this study's analyses, the demographic variable of age was coded as a continuous variable; therefore, tests of normality were assessed for age

including skew, kurtosis, and through visually inspecting histograms with the normal bell curve and Quantile-Quantile (Q-Q) plots. Results of these assessments provided evidence of approximately normal distributions for each of the program groups in regard to age. A one-way analysis of variance (ANOVA) between the participants of the two program groups in regard to age resulted in statistically significant ($p < .05$) differences between the participants of the two groups, therefore justifying the need to control for age in the primary analyses.

Outcome Variables

After eliminating the tobacco use measure, the outcome variables of interest included perceived levels of stress measured by the Perceived Stress Scale (PSS), health promoting lifestyle behaviors measured by the Health Promoting Lifestyle Profile (HPLP) II and the various health behaviors measured by the six subscales of the HPLP II which included: nutrition, physical activity, health responsibility, stress management, interpersonal relations, and spiritual health. The PSS included 10 items and was scored using a sum of the responses to the individual items. If the subject provided responses to at least 9 of the 10 items then a score was provided; however, if the respondent answered fewer than 9 of the 10 items then a score was not calculated leaving a missing value for this measure. The HPLP II and the subscales were scored using an average of the responses to the individual items. If the respondent answered at least 43 of the 52 items of the HPLP II, then a score was calculated for this measure, and if they answered less than 43 of the items a score was not calculated. Each subscale of the HPLP II contained 8

or 9 items. Based on the content of each item within the six subscales, the following number of required answered items was decided upon for a score to be calculated for each subscale of the HPLP II: 8 of the 9 items on the nutrition subscale, 6 of the 8 items on the physical activity subscale, 8 of the 9 items on the health responsibility subscale, 7 of the 8 items on the stress management subscale, 8 of the 9 items on the interpersonal relations subscale, and 8 of the 9 items on the spiritual health subscale. All outcomes measures were scored as explained above for all three timepoints.

Prior to the main analyses, all outcome variables, including the PSS, the HPLP II and the six subscales of the HPLP II, at all three timepoints were examined for missing values, normality of distributions and outliers by analyzing descriptive statistics, including the minimum and maximum values, skewness values, kurtosis values, and through visually inspecting histograms with the normal bell curve and Q-Q plots. According to the minimum and maximum levels, all variables had scores within the acceptable range and all skewness and kurtosis values were less than +/- 1.0 at each of the timepoints. Visually, a few of the histograms with the normal bell curve appeared slightly skewed, and a few of the Q-Q plots displayed points at ends of the plot that we slightly distant from the other points. Therefore, in effort to further check normality of the distributions, homogeneity of variance tests were ran for all of the analyses described below to assess whether the variance between the groups were approximately equal. Levene's test was used to assess the homogeneity of variance between the groups for all the analyses that used a one-way ANOVA or an analysis of covariance test (ANCOVA). The Mauchly's Test of Sphericity was used to assess homogeneity of variance between

the groups for those analyses using a repeated measures ANOVA or repeated measures ANCOVA. Results of the homogeneity of variance tests are provided below within the description of the results of each analysis. See Table 3for a summary of the descriptive statistics for the outcome variables.

Table 3

Descriptive Statistics

	Intervention Group						Comparison Group					
Measure	X	S.D.	Min	Max	Skew	Kurtosis	X	S.D.	Min	Max	Skew	Kurtosis
PSS Time 0	20.53	5.67	9.00	34.00	0.15	-0.78	14.44	5.83	4.00	32.00	0.60	0.21
PSS Time 1	14.67	6.07	2.00	33.00	0.48	-0.07	11.20	5.83	0.00	32.00	0.62	0.52
PSS Time 2	13.54	6.90	0.00	31.00	0.43	-0.43	11.18	6.13	0.00	30.00	0.59	0.27
HPLPII Time 0	2.46	0.41	1.54	3.52	0.19	-0.38	2.76	0.42	1.40	3.67	-0.26	0.11
HPLPII Time 1	2.79	0.43	1.63	3.79	-0.06	-0.48	2.89	0.44	1.63	3.90	-0.27	0.02
HPLPII Time 2	2.81	0.45	1.73	3.87	-0.07	-0.67	2.87	0.42	1.46	3.78	-0.68	0.65
HResp Time 0	2.25	0.56	1.00	4.00	0.42	0.58	2.58	1.11	3.89	0.15	0.33	-0.55
HResp Time 1	2.54	0.66	1.11	4.00	0.06	0.59	2.66	1.33	4.00	0.30	-0.42	-0.59
HResp Time 2	2.60	0.66	1.11	4.00	-0.04	0.59	2.66	1.33	3.89	-0.12	-0.51	-0.73

Note. Table continued on next page.

Table 3 continued

Descriptive Statistics

	Intervention Group						Comparison Group					
Measure	X	S.D.	Min	Max	Skew	Kurtosis	X	S.D.	Min	Max	Skew	Kurtosis
PhysAct Time 0	2.03	0.71	1.00	3.88	0.58	-0.51	2.31	0.63	1.00	3.88	0.21	-0.44
PhysAct Time1	2.36	0.72	1.00	4.00	0.14	0.57	2.63	1.13	4.00	0.21	-0.82	-0.46
PhysAct Time 2	2.36	0.73	1.00	4.00	0.09	0.61	2.54	1.13	3.88	-0.04	-0.78	-0.19
Nutr Time 0	2.58	0.55	1.22	3.78	0.01	-0.42	2.83	0.52	1.33	4.00	-0.22	-0.30
Nutr Time 1	2.79	0.57	1.22	4.00	-0.11	-0.34	2.91	0.53	1.22	3.89	-.042	-0.19
Nutr Time 2	2.85	0.54	1.44	4.00	-0.22	-0.59	2.93	0.48	1.44	3.89	-0.29	-0.18
Stress Time 0	2.20	0.49	1.00	3.38	0.30	0.54	2.70	1.38	4.00	-0.21	-0.22	-0.34
Stress Time 1	2.68	0.51	1.50	3.75	0.01	0.55	2.83	1.38	4.00	-0.14	-0.52	-0.50
Stress Time 2	2.72	0.53	1.50	3.88	-0.01	0.54	2.86	1.25	3.88	-0.39	-0.71	-0.11

Note. Table continued on next page.

Table 3 continued

Descriptive Statistics

	Intervention Group						Comparison Group					
Measure	X	S.D.	Min	Max	Skew	Kurtosis	X	S.D.	Min	Max	Skew	Kurtosis
IRel Time 0	2.88	0.54	1.67	4.00	0.02	-0.82	3.01	0.53	1.22	4.00	-0.41	0.05
IRel Time 1	3.14	0.52	1.75	4.00	-0.43	-0.44	3.10	0.55	1.44	4.00	-0.63	0.16
IRel Time 2	3.16	0.55	1.22	4.00	-0.66	0.21	3.08	0.54	1.44	4.00	0.54	0.24
Spirit Time 0	2.74	0.59	1.33	4.00	0.10	-0.52	3.10	0.56	1.44	4.00	-0.37	-0.26
Spirit Time 1	3.16	0.53	1.88	4.00	-0.31	-0.64	3.18	0.54	1.67	4.00	-0.57	-0.18
Spirit Time 2	3.12	0.58	1.44	4.00	-0.56	-0.19	3.15	0.55	1.75	4.00	-0.56	-0.23

Note. X = mean; S.D. = Standard deviation; PSS = Perceived Stress Scale; HPLPII = Health Promoting Lifestyle Profile; PysAct = Physical Activity subscale of the HPLP II; Nutr = Nutrition subscale of the HPLP II; Stress = Stress Management subscale of the HPLP II; HResp = Health Responsibility subscale of the HPLP II; IRel = Interpersonal Relations subscale of the HPLP II; Spirit = Spiritual Health subscale of the HPLP II.

Also prior to the main analyses, reliability of the standard survey instruments including the PSS, HPLP II and the six subscales of the HPLP II were assessed using Chonbach's alpha. Results indicated alpha levels ranging from .74 to .95; acceptable alpha levels for social science research (Osborn & Waters, 2002). See Table 4 for the alpha levels of all of the outcome measures at each timepoint.

Table 4

Reliability Analyses

	Chronbach's Alpha Level		
Survey Measure	Timepoint 0	Timepoint 1	Timepoint 2
PSS[a]	0.82	0.86	0.89
HPLP II[b]	0.94	0.95	0.94
Health Responsibility subscale HPLP II	0.81	0.84	0.85
Physical Activity subscale HPLP II	0.85	0.84	0.84
Nutrition subscale HPLP II	0.74	0.77	0.76
Stress Management subscale HPLP II	0.80	0.79	0.80
Interpersonal Relations subscale HPLP II	0.83	0.85	0.86
Spiritual Health subscale HPLP II	0.87	0.86	0.88

Note. [a]PSS = Perceived Stress Scale; [b]HPLP = Health Promoting Lifestyle Profile.

Results of the Primary Hypotheses

The primary analyses included analyzing three hypotheses which were conducted to address the main purpose of this study: to assess whether the stress management pilot program, *Taking Care of You: Body, Mind, Spirit*, decreased perceived levels of stress and improved lifestyle behaviors of participants as compared to participants of a strength

training program. The first primary hypothesis was of greatest interest because it compared the effectiveness of the programs in regard to changes in participants' scores on all of the outcome measures over the three timepoints while controlling for age differences between the participants of the two groups. The second primary hypothesis compared the participants of the two groups at time 1 while controlling for age differences and differences at baseline (time 0) scores. The third primary hypothesis compared the participants of the two groups at time 2 while controlling for age differences and differences in baseline (time 0) scores.

The following section will provide the results of the primary hypotheses assessed for each of the outcome measures which included the PSS, HPLP II and the six subscales of the HPLP II (nutrition behaviors, physical activity behaviors, health responsibility behaviors, stress management behaviors, spiritual thoughts and behaviors and interpersonal relation behaviors). All analyses in this study used an alpha level of .05 as the cut-off for statistical significance because the analyses used moderately robust types of statistical analyses (ANCOVA and repeated measures ANOVA). Baseline, or before the program, was defined as time 0, immediately following the program was defined as time 1 and three months following the program was defined as time 2.

Results of Primary Hypotheses 1

It was hypothesized that participants of the stress management program and participants of the strength of training program would be significantly different across all three timepoints (time 0, time 1, and time 2) for each of the outcome measures when controlling for age differences between the participants of the two programs.

This hypothesis was analyzed for each of the outcome measures using a repeated measures ANCOVA to assess if statistically significant ($p < .05$) differences existed between the two program groups over the three timepoints (time 0, time 1 and time 2) including age as a covariate. Results of the homogeneity of variance test, using Mauchly's Sphericity test, showed significant results for the HPLP II and for health responsibility, physical activity, stress management, impersonal relations and spiritual health subscales of the HPLP II. As a result, sphericity was not assumed, so the Wilk's lambda test statistic was interpreted and reported hereafter in results of the repeated measures ANOVAs for each of the outcome measures.

Results of testing this hypothesis showed statistically significant ($p < .05$) differences between the participants of the two programs across the three timepoints when controlling for age for the PSS, $F(2, 273) = 9.31$, $p = .000$; HPLP II, $F(2, 273) = 9.28$, $p = .000$; health responsibility subscale of the HPLPII, $F(2, 273) = 7.29$, $p = .001$; nutrition subscale of the HPLP II, $F(2, 273) = 7.94$, $p = .000$; stress management subscale of the HPLP II, $F(2, 273) = 13.01$, $p = .000$; and spiritual health subscale of the HPLP II, $F(2, 273) = 7.54$, $p = .001$. While the significance levels were strong for these outcome measures, the effect sizes, using partial eta squared (η_p^2), were small at $\eta_p^2 = .064$ for the PSS, $\eta_p^2 = .063$ for the HPLP II, $\eta_p^2 = .054$ for the nutrition subscale of the HPLP II, $\eta_p^2 = .088$ for the stress management subscale of the HPLP II, and $\eta_p^2 = .052$ for the spiritual health subscale of the HPLP II. Results of the physical activity and interpersonal relations subscale of the HPLP II were not statistically significant ($p < .05$). See Table 5 detailed results. The age adjusted means and standard deviations of the intervention and

comparison groups for each of the outcome measures at the three timepoints are provided in Table 6 within Appendix H.

Table 5

Results of Primary Hypothesis 1

Measure	*F*	*p*	η_p^2
PSS	9.31	.000	.064
HPLP II	9.28	.000	.063
Health Responsibility subscale HPLP II	7.29	.001	.051
Physical Activity subscale HPLP II	0.40	.67	.003
Nutrition subscale HPLP II	7.94	.000	.054
Stress Management subscale HPLP II	13.0	.000	.088
Interpersonal Relations subscale HPLP II	2.01	.14	.015
Spiritual Health subscale HPLP II	7.54	.001	.052

Note. PSS = Perceived Stress Scale; HPLP = Health Promoting Lifestyle Profile; η_p^2 = partial eta squared, the measurement for effect size.

Figures 1 through 8 (see Appendix I) provide results of the direction and magnitude of change within each program group for each of the outcome measures. These figures also provide a visual comparison of the differences in change between the two program groups over the three timepoints.

The graph of the PSS results shown in Figure 1, demonstrate that participants of the stress management program scored higher at all three timepoints compared to the participants of the strength training program indicating participants in the stress management program had higher levels of perceived stress at all three timepoints. Within both program groups scores on the PSS decreased from time 0 to time 1. However, from

time 1 to time 2 the stress management program group continued to decrease perceived stress levels while the strength training program group increased slightly.

Figure 2 shows the results of the HPLP II where an increase in scores indicates improvements in health promoting lifestyle behaviors. It appears that both program groups improved their HPLP II scores from time 0 to time 1 with the participants of the stress management program starting off (time 0) with lower HPLP II scores than participants of the strength training program. From time 1 to time 2 participants' HPLP II scores of stress management program continue to increase while those of the strength training program decrease slightly resulting in greater final HPLP II score for the participants of the stress management program compared to the participants of the strength training program at time 2.

Graphic results of the subscales of the HPLP II are provided in Figures 3 – 6 (see Appendix I). In all of these graphs it is apparent that the participants of the stress management HPLP II subscales have time 0 scores lower than participants of the strength training program. In each of the subscales, participants of both programs increased scores from time 0 to time 1; however, the rate of improvement was greater for those in the stress management program compared to the strength training program with the exception the physical activity subscale. Participants of the stress management program continued to increase scores on the health responsibility, nutrition, interpersonal relations, and stress management subscales of the HPLP II from time 1 to time 2 where as participants of the strength training program continued to increase scores from time 1 to time 2 on the nutrition and stress management subscales only. Furthermore, participants

of the stress management program improved scores across the three timepoints to surpass or become approximately equal with participants' scores of the strength training program at time 2 for following subscales of the HPLP: health responsibility, nutrition, interpersonal relations, stress management and spiritual health. Further analysis of the changes between the two program groups and within each of the two program groups in regard to the three timepoints is provided below in the results of the secondary hypotheses.

Results of Primary Hypotheses 2

It was hypothesized that the participants of the stress management program and participants of the strength of training program would be significantly different at time 1 for each of the outcome measures except for physical activity behaviors when controlling for time 0 and age differences between the participants of the two programs.

This hypothesis was analyzed for each of the outcome measures using an ANCOVA to assess if statistically significant ($p < .05$) differences existed between the two groups at time 1 with time 0 scores and age as covariates. Results of the homogeneity of variance tests, using a Levene's test, showed statistically significant ($p < .05$) for the HPLP II and the physical activity and interpersonal relations subscale of the HPLP II indicating caution should be used when interpreting the results of these outcome measures.

Results of the ANCOVAs indicated statistically significant ($p < .05$) differences between the two program groups for the HPLP II, $F(1, 385) = 8.53$, $p = .004$, $\eta_p^2 = .022$; nutrition subscale of the HPLP II, $F(1, 383) = 4.66$, $p = .031$, $\eta_p^2 = .012$; stress management subscale of the HPLP II, $F(1, 376) = 9.10$, $p = .003$ $\eta_p^2 = .024$; and spiritual

health subscale of the HPLP II, $F(1, 384) = 19.7$, $p = .000$, $\eta_p^2 = .049$ with the interpersonal relations subscale of the HPLP almost significant at $F(1,379) = 3.713$, $p = .055$, $\eta_p^2 = .010$. See Table 7 for detailed results.

Table 7

Results of Primary Hypothesis 2

Measure	*F*	*p*	η_p^2
PSS	0.34	.56	.001
HPLP II	8.53	.004	.022
Health Responsibility subscale HPLP II	1.66	.20	.004
Physical Activity subscale HPLP II	0.65	.42	.002
Nutrition subscale HPLP II	4.66	.031	.012
Stress Management subscale HPLP II	9.10	.003	.024
Interpersonal Relations subscale HPLP II	3.71	.055	.010
Spiritual Health subscale HPLP II	19.8	.000	.045

Note. PSS = Perceived Stress Scale; HPLP = Health Promoting Lifestyle Profile; η_p^2 = partial eta squared (the measurement for effect size).

The above results indicate this hypothesis was accepted for the HPLP II, the physical activity, nutrition, stress management and spiritual health subscales of the HPLP II (see Table 7). According to the adjusted means provided in Table 6 and Figures 2, 4, 6, and 8 it is evident that these significant differences indicate greater scores for participants of the stress management program compared to participants of the strength training program when controlling for differences in age and scores at time 0.

Results of Primary Hypotheses 3

It was hypothesized that the participants of the stress management program and participants of the strength of training program would be significantly different at time 2

for each of the outcome measures when controlling for time 0 and age differences between the participants of the two programs. Results of the homogeneity of variance tests, using a Levene's test, showed statistically significant ($p < .05$) results for all of the outcome measures with the exception of the health responsibility and nutrition subscale of the HPLP II. Therefore, caution should be used when interpreting the results of the all the outcome measures except for the health responsibility and nutrition subscale of the HPLP II.

This hypothesis was analyzed for each of the outcome measures using an ANCOVA to assess if statistically significant ($p < .05$) differences existed between the participants of the stress management program and participants of the strength training program at time 2 with time 0 scores and age as covariates. Results (see Table 8) indicated statistically significant differences ($p < .05$) between participants of the two programs for the PSS, $F(1, 284) = 3.96$, $p = .047$, $\eta_p^2 = .014$; HPLP II, $F(1, 288) = 9.41$, $p = .002$, $\eta_p^2 = .032$; health responsibility subscale of the HPLP, $F(1, 283) = 8.37$, $p = .004$, $\eta_p^2 = .029$; nutrition subscale of the HPLP II, $F(1, 288) = 6.04$, $p = .015$, $\eta_p^2 = .021$; stress management subscale of the HPLP II, $F(1, 283) = 8.02$, $p = .005$, $\eta_p^2 = .028$; and spiritual health subscale of the HPLP II, $F(1, 288) = 5.58$, $p = .019$, $\eta_p^2 = .019$. The interpersonal relations subscale was close to significant at $p = .056$. As a result, this hypothesis was accepted for all of the outcome measures except for the interpersonal relations and physical activity subscale of the HPLP II. See Table 8 for detailed results. According to the adjusted means in Table 6 and from visually inspecting the graphs in Figures 1, 2, 3, 5, 6 and 8 (see Appendix I), it is apparent for this hypothesis that for those outcome

measures that showed significant ($p < .05$) results, this indicates significantly lower perceived stress levels and greater health promoting lifestyle behaviors for participants of the stress management program compared to participants of the strength training program when controlling for differences in age and scores at time 0.

Table 8

Results of Primary Hypothesis 3

Measure	*F*	*p*	η_p^2
PSS	3.96	.047	.014
HPLP II	9.41	.002	.032
Health Responsibility subscale HPLP II	8.37	.004	.029
Physical Activity subscale HPLP II	0.012	.91	.000
Nutrition subscale HPLP II	6.04	.015	.021
Stress Management subscale HPLP II	8.02	.005	.028
Interpersonal Relations subscale HPLP II	3.68	.056	.013
Spiritual Health subscale HPLP II	5.58	.019	.019

Note. PSS = Perceived Stress Scale; HPLP = Health Promoting Lifestyle Profile; η_p^2 stands for partial eta squared, the measurement for effect size.

Results of the Secondary Hypotheses

The secondary analyses were conducted to further explore the data based on the results of the above primary analyses. The secondary hypotheses and analyses assessed differences between the stress management and strength training program groups at each timepoint separately (time 0, time 1 and time 2) and regardless of time. In addition, the secondary hypotheses and analyses assessed within the stress management and strength training program groups separately across all three timepoints, from time 0 to time 1,

from time 1 to time 2, and from time 0 to time 2. All secondary analyses were conducted for each of the outcome measures.

The following section provides the secondary hypotheses and an explanation of the results of the statistical analyses used to test these hypotheses with regard to the PSS, HPLP II and the six subscales of the HPLLP II (nutrition behaviors, physical activity behaviors, health responsibility behaviors, stress management behaviors, spiritual thoughts and behaviors and interpersonal relation behaviors). Results of the homogeneity of variance tests are provided for secondary hypotheses 1-4. However, since secondary hypotheses 5-12 assessed for differences overtime within each group, homogeneity of variance tests were not conducted for these analyses.

Secondary Hypothesis 1

It was hypothesized that the participants of the stress management program and participants of the strength training program would not be significantly different at time 0 when controlling for age differences between the participants of the two programs.

As shown in the Table 6 scores on the PSS, HPLP II and for all of the subscales of the HPLP II for the stress management and strength training program groups were normally distributed according to the skew and kurtosis at time 0. The homogeneity of variance statistics were statistically insignificant ($p > .05$) for all the outcome measures at time 0 indicating that the variance between the participants' of the two programs for each of the outcome variables were approximately equal.

An ANCOVA test was performed to assess the statistical significance differences between the two groups at baseline for each outcome measure when controlling for age

differences between the two program groups. Results showed statistically significant ($p < .05$) differences for all outcome measures at time 0 (PSS, HPLP II and the six subscales of the HPLP II) indicating baseline significant differences between the two groups. Therefore, this secondary hypothesis is rejected for all measures. Detailed results of these analyses, including significant levels, F-ratio values and effect size values, are provided in Table 9. Differences between the two groups at time 0 is also shown graphically in Figures 1 – 8 (see Appendix I).

Secondary Hypothesis 2

It was hypothesized that the participants of the stress management program and participants of the strength of training program would be significantly different at time 1 for each of the outcome measures except for physical activity behaviors when controlling for age differences between the participants of the two programs.

As shown in the Table 6 scores on the PSS, HPLP II and for all of the subscales of the HPLP II for the stress management program group and the strength training program group were normally distributed according to the skew and kurtosis at time 1. The homogeneity of variance statistics were not statistically significant ($p > .05$) for the PSS, the HPLP II and all subscales of the HPLP II except for the physical activity subscale at time 1. Therefore, results of the analysis for the physical activity subscale should be interpreted with caution. ANCOVA tests were performed to test for statistically significant differences between the two groups at time 1 for each measure controlling for age differences between the participants of the two program groups.

Results showed statistically significant differences ($p < .05$) between participants of the two program groups for the PSS and the physical activity subscale of the HPLP II. Differences between the two groups at time 1 for the HPLP II and the following HPLP II subscales: health responsibility, nutrition, stress management, spiritual health and interpersonal relations were statistically insignificant ($p > .05$) at $p = .23$, $p = .33$, $p = .35$, $p = .15$, $p = .62$ and $p = .58$ respectively. Detail results, including F-ratios, significance levels and effect sizes are provided in Table 9.

Table 9

Results of Secondary Hypotheses

Measure	*F*	*p*	η_p^2
Secondary Hypothesis 1			
PSS	79.9	.000	.15
HPLP II	30.5	.000	.061
Health Responsibility subscale HPLP II	14.4	.000	.030
Physical Activity subscale HPLP II	11.7	.000	.024
Nutrition subscale HPLP II	10.9	.000	.023
Spiritual Health subscale HPLP II	22.7	.000	.046
Stress Management subscale HPLP II	49.8	.000	.097
Interpersonal Relations subscale HPLP II	4.18	.041	.009
Secondary Hypothesis 2			
PSS	21.6	.000	.090
HPLP II	1.47	.23	.004
Health Responsibility subscale HPLP II	0.97	.33	.003
Physical Activity subscale HPLP II	10.2	.002	.026
Nutrition subscale HPLP II	0.91	.34	.002
Spiritual Health subscale HPLP II	0.24	.62	.001
Stress Management subscale HPLP II	2.05	.15	.005
Interpersonal Relations subscale HPLP II	0.31	.58	.001
Secondary Hypothesis 3			
PSS	4.81	.029	.017
HPLP II	0.015	.90	.000
Health Responsibility subscale HPLP II	0.70	.40	.002
Physical Activity subscale HPLP II	2.23	.14	.008
Nutrition subscale HPLP II	.004	.95	.000
Spiritual Health subscale HPLP II	.037	.85	.000
Stress Management subscale HPLP II	0.10	.75	.000
Interpersonal Relations subscale HPLP II	1.21	.27	.004

Note. Table continued on next page.

Note. Table continues on the next page.
Table 9 continued

Results of Secondary Hypotheses

Measure	*F*	*p*	η_p^2
Secondary Hypothesis 4			
PSS	7.31	.007	.026
HPLP II	4.67	.032	.017
Health Responsibility subscale HPLP II	7.39	.007	.027
Physical Activity subscale HPLP II	0.18	.67	.001
Nutrition subscale HPLP II	1.75	.19	.006
Spiritual Health subscale HPLP II	1.11	.29	.004
Stress Management subscale HPLP II	3.04	.082	.011
Interpersonal Relations subscale HPLP II	3.35	.069	.012
Secondary Hypothesis 5			
PSS	163	.000	.52
HPLP II	82.7	.000	.35
Health Responsibility subscale HPLP II	38.1	.000	.21
Physical Activity subscale HPLP II	24.8	.000	.14
Nutrition subscale HPLP II	34.2	.000	.19
Spiritual Health subscale HPLP II	55.1	.000	.38
Stress Management subscale HPLP II	91.7	.000	.16
Interpersonal Relations subscale HPLP II	29.4	.000	.27
Secondary Hypothesis 6			
PSS	192	.000	.51
HPLP II	129	.000	.42
Health Responsibility subscale HPLP II	49.5	.000	.22
Physical Activity subscale HPLP II	43.6	.000	.19
Nutrition subscale HPLP II	41.4	.000	.19
Spiritual Health subscale HPLP II	134	.000	.43
Stress Management subscale HPLP II	141	.000	.44
Interpersonal Relations subscale HPLP II	51.5	.000	.22

Note. Table continues on the next page.

Table 9 continued

Results of Secondary Hypotheses

Measure	*F*	*p*	η_p^2
Secondary Hypothesis 7			
PSS	164	.000	.52
HPLP II	109	.000	.42
Health Responsibility subscale HPLP II	62.2	.000	.30
Physical Activity subscale HPLP II	31.3	.000	.17
Nutrition subscale HPLP II	48.8	.000	.24
Spiritual Health subscale HPLP II	61.9	.000	.29
Stress Management subscale HPLP II	124	.000	.45
Interpersonal Relations subscale HPLP II	43.8	.000	.23
Secondary Hypothesis 8			
PSS	7.70	.006	.049
HPLP II	1.06	.31	.007
Health Responsibility subscale HPLP II	1.09	.30	.007
Physical Activity subscale HPLP II	0.092	.76	.001
Nutrition subscale HPLP II	1.94	.17	.013
Spiritual Health subscale HPLP II	0.87	.35	.006
Stress Management subscale HPLP II	1.74	.19	.011
Interpersonal Relations subscale HPLP II	1.23	.27	.008
Secondary Hypothesis 9			
PSS	36.1	.000	.22
HPLP II	20.4	.000	.14
Health Responsibility subscale HPLP II	4.30	.015	.033
Physical Activity subscale HPLP II	26.5	.000	.17
Nutrition subscale HPLP II	4.07	.018	.031
Spiritual Health subscale HPLP II	12.3	.002	.048
Stress Management subscale HPLP II	8.15	.000	.091
Interpersonal Relations subscale HPLP II	6.42	.000	.061

Note. Table Continues of next page.

Table 9 continued

Results of Secondary Hypotheses

Measure	*F*	*p*	η_p^2
Secondary Hypothesis 10			
PSS	89.6	.000	.31
HPLP II	33.4	.000	.14
Health Responsibility subscale HPLP II	12.4	.001	.058
Physical Activity subscale HPLP II	74.9	.000	.27
Nutrition subscale HPLP II	5.14	.024	.025
Spiritual Health subscale HPLP II	11.3	.001	.052
Stress Management subscale HPLP II	17.2	.000	.080
Interpersonal Relations subscale HPLP II	14.1	.000	.065
Secondary Hypothesis 11			
PSS	38.8	.000	.22
HPLP II	38.6	.000	.22
Health Responsibility subscale HPLP II	9.62	.002	.066
Physical Activity subscale HPLP II	37.9	.000	.22
Nutrition subscale HPLP II	9.19	.003	.063
Spiritual Health subscale HPLP II	7.69	.006	.053
Stress Management subscale HPLP II	27.1	.000	.17
Interpersonal Relations subscale HPLP II	13.8	.000	.093
Secondary Hypothesis 12			
PSS	2.56	.11	.020
HPLP II	0.15	.70	.001
Health Responsibility subscale HPLP II	0.080	.78	.001
Physical Activity subscale HPLP II	1.34	.25	.010
Nutrition subscale HPLP II	1.62	.21	.012
Spiritual Health subscale HPLP II	0.078	.78	.001
Stress Management subscale HPLP II	2.25	.14	.018
Interpersonal Relations subscale HPLP II	0.002	.97	.000

Note. PSS = Perceived Stress Scale; HPLP = Health Promoting Lifestyle Profile.

In conclusion, the secondary hypothesis 2 was accepted for the PSS, and since it was hypothesized that physical activity would not be significantly different and it was at $p = .000$, this hypothesis was rejected for the physical activity measure. In addition, this hypothesis was rejected for the HPLP II, health responsibility, nutrition, stress management, spiritual health and interpersonal relations subscales of the HPLP II.

Secondary Hypothesis 3

It was hypothesized that the participants of the stress management program and participants of the strength of training program would be significantly different at time 2 when controlling for age differences between the participants of the two programs.

As shown in Table 6, scores on the PSS, HPLP II and all of the subscales of the HPLP II for the stress management and strength training program groups were normally distributed according to the skew and kurtosis at time 2. The homogeneity of variance statistics were statistically insignificant ($p > .05$) for the PSS, the HPLP II and all subscales of the HPLP II except for the physical activity subscale at time 2. Therefore the results of the analysis for the physical activity subscale should be interpreted with caution. ANCOVA tests were performed to assess for statistically significant difference ($p < .05$) between the two groups at time 2 for each measure.

Results showed statistically significant ($p < .05$) differences between the two program groups at time 2 for the PSS, $F(1, 285) = 4.81$, $p = .029$, $\eta_p^2 = .017$, but not for any of the other measures (HPLP II $p = .90$, health responsibility subscale $p = .40$, physical activity subscale $p = .14$, nutrition subscale $p = .95$, spiritual health subscale $p = .85$, stress management subscale $p = .75$, and interpersonal relations subscale $p = .27$). In

conclusion, secondary hypothesis 3 was accepted only for the PSS measure, and it was rejected for the HPLP II and the six subscale of the HPLPII. See Table 9 for detailed results.

Secondary Hypothesis 4

It was hypothesized that the participants of the stress management program and participants of the strength of training program would be significantly different regardless of which time point (time 0, time 1 or time 2) when controlling for age differences between the participants of the two programs.

To asses this research question an ANCOVA with age, time 0 and time 1 as covariates and time 2 as the dependant variable for each measure was used. The homogenity of variance analyses using Levene's test showed significant ($p < .05$) results for the HPLP II and the health responsibility, stress management, spiritual health, and interpersonal relations subscales of the HPLP II therefore, results of these outcome measures should be assess with caution.

Results of the ANCOVAs showed statistically significant ($p < .05$) differences between the stress management program participants and the strength training program participants regardless of the timepoint for scores on the PSS, $F(1, 275) = 7.31$, $p = .007$, $\eta_p^2 = .026$, HPLP II, $F(1, 279) = 4.67$, $p = .032$, $\eta_p^2 = .017$, and health responsibility subscale of the HPLP II, $F(1, 273) = 7.39$, $p = .032$, $\eta_p^2 = .027$. Results of the above analyses for the nutrition, physical activity, stress management, spiritual growth and interpersonal relations subscales of the HPLP II were not statistically significant at $p = .19$, $p = .67$, $p = .082$, $p = .29$, and $p = .069$ respectively. See Table 9 for detailed results.

In conclusion, this hypothesis was accepted for the PSS and the health responsibility subscale of the HPLP II. It was rejected for the HPLP II and for the nutrition, physical activity, stress management, spiritual growth and interpersonal relations subscales of the HPLP II.

Secondary Hypothesis 5

It was hypothesized that participants of the stress management program would be significantly different across all three timepoints (time 0, time 1 and time 2) for each of the outcome measures. A repeated measures ANOVA was used to assess each of the outcome measures for statistically significant ($p < .05$) differences within the participants of the stress management program across all three timepoints (time 0, time 1 and time 2).

Results of the repeated measures ANOVAs indicated statistically significant differences ($p < .05$) within the participants of the stress management program for all of the outcome measures (PSS, HPLP II and the six subscales of the HPLP II) (see Table 9). Therefore, this hypothesis was accepted for each of the outcome measures. When taking the adjusted means into account (see Table 6), these results indicated participants of the stress management program significantly decreased their perceived stress levels and significantly improved health promoting lifestyle behaviors across all timepoints.

Secondary Hypothesis 6

It was hypothesized that the participants of the stress management program would be significantly different from time 0 compared to time 1 for each of the outcome measures. This hypothesis was tested for each of the outcome measures using repeated measures ANOVAs with participants of stress management group only.

Results of the repeated measures ANOVAs showed statistically significant differences ($p < .05$) within the stress management program participants from time 0 and time 1 for scores on the PSS, HPLP II, and all six subscales of the HPLP II (nutrition, physical activity, health responsibility, stress management, spiritual growth and interpersonal relations). Therefore, this hypothesis was accepted for all of the outcome measures. See Table 9 for detailed results. According to Table 6 and Figures 1- 8, the significant changes from time 0 to 1 for the PSS was a significant decrease, or improvement in perceived stress levels, and for the HPLP II and the six subscales of the HPLP the change was a significant increase, or improvement in health promoting lifestyle behaviors.

Secondary Hypothesis 7

It is hypothesized that the participants of the stress management program are significantly different from time 0 compared to time 2. Repeated measures ANOVAs with the stress management program data only was used to test this preliminary hypothesis for all the outcome measures.

Results indicated statistically significant differences ($p < .05$) within the participants of the stress management program from time 0 and time 2 for scores on the PSS, HPLP II, and all six subscales of the HPLP II (nutrition, physical activity, health responsibility, stress management, spiritual growth and interpersonal relations). Therefore, this hypothesis was accepted for all measures. See Table 9 for detailed results. According to Table 6 and Figures 1- 8, the significant changes from time 0 to 2 for the PSS was a significant decrease, or improvement, in perceived stress levels, and for the HPLP II and

the six subscales of the HPLP the change was a significant increase, or improvement in health promoting lifestyle behaviors.

Secondary Hypothesis 8

It was hypothesized that the participants of the stress management program would be significantly different time 1 to time 2 for each of the outcome measures. This hypothesis was tested for each of the outcome measures using repeated measures ANOVAs with the stress management group only.

Results of the repeated measures ANOVAs showed statistically significant differences ($p < .05$) within the stress management program participants from time 1 to time 2 for scores on the PSS. The analyses showed that the HPLP II and all six subscales of the HPLP II (nutrition, physical activity, health responsibility, stress management, spiritual growth and interpersonal relations) were not significantly different ($p > .05$). Therefore, this secondary hypothesis was accepted for the PSS and rejected for all the other measures. See Table 9 for detailed results. Adjusted means provided in Table 6 and Figures 1 – 8 show that the participants of the stress management program scores on the PSS decreased significantly from time 1 to time 2 indicating participants' perceived stress levels continued to decrease, or improve, after the completion of the program. For the other measures (HPLP and the six subscales of the HPLP), the scores did not change significantly providing indication that the changes made as a result of the program were at least maintained after the completion of the program.

Secondary Hypothesis 9

It was hypothesized that participants of the strength training program would not be significantly different across all three timepoints (time 0, time 1 and time 2) for each of the outcome measures. A repeated measures ANOVA was used to assess each of the outcome measures for statistically significant ($p < .05$) differences within the participants of the strength training program across all three timepoints (time 0, time 1 and time 2).

Results of the repeated measures ANOVAs indicated statistically significant differences ($p < .05$) within the participants of the strength training program for all of the outcome measures (PSS, HPLP II and the six subscales of the HPLP II). Therefore, this hypothesis was rejected for each of the outcome measures. See Table 9 for detailed results. When taking the adjusted means into account, these results indicate participants of the strength training program significantly improved across all timepoints for all the outcome measures.

Secondary Hypothesis 10

It was hypothesized that the participants of the strength training program would not be significantly different from time 0 compared to time 1 for each of the outcome measures except physical activity behaviors. This secondary hypothesis was tested for each of outcome measures using repeated measures ANOVAs with the strength training program group only.

Results of the repeated measures ANOVAs showed statistically significant differences ($p < .05$) within the strength training program group from time 0 and time 1 for scores on the PSS, HPLP II, and all six subscales of the HPLP II (nutrition, physical

activity, health responsibility, stress management, spiritual growth and interpersonal relations). Therefore, this hypothesis was accepted for the physical activity measure and rejected for all other measures. See Table 9 for detailed results. According to the adjusted means provided in Table 6 and Figures 1- 8, the significant changes from time 0 to 1 for the PSS was a significant decrease, or improvement in perceived stress levels, and for the HPLP II and the six subscales of the HPLP the change was a significant increase, or improvement in health promoting lifestyle behaviors.

Secondary Hypothesis 11

It was hypothesized that the participants of the strength training program would not be significantly different from time 0 compared to time 2 each of the outcome measures. This hypothesis was tested for each of the outcome measures using repeated measures ANOVAs with the strength training program group only.

Results of the repeated measures ANOVAs showed statistically significant differences ($p < .05$) within the participants of the strength training program from time 0 and time 2 for all measures, thus rejecting this hypothesis for all measures. See Table 9 for detailed results. According to the adjusted means provided in Table 6 and Figures 1-8, the significant changes from time 0 to 2 for the PSS was a significant decrease, or improvement in perceived stress levels, and for the HPLP II and the six subscales of the HPLP the change was a significant increase, or improvement in health promoting lifestyle behaviors.

Secondary Hypothesis 12

It was hypothesized that the participants of the strength training program would not be significantly different from time 1 compared to time 2 for each of the outcome measures. This hypothesis was tested for each of the outcome measures using repeated measures ANOVAs with the strength training program group only.

Results of the repeated measures ANOVAs indicated that none of the measures showed statistically significant differences ($p < .05$) within the strength training program participants from time 1 and time 2 for all measures. Therefore, this preliminary hypothesis was accepted for all measures. See Table 9 for detailed results.

In summary, the results of the secondary hypotheses show that the participants of the stress management program and the participants of the strength training program were significantly different at baseline on all measures. When looking at each group separately, both groups showed significant improvements from baseline (time 0) to immediately following the program (time 1) and from baseline (time 0) to three months following the program (time 2). Overall, the improvements made in each group from baseline (time 0) to immediately following the program (time 1) were maintained from immediately following the program (time 1) to three months following the program (time 2).

CHAPTER 5: DISCUSSION

The following chapter will provide a summary of this study, discuss the implications of the results provided in Chapter 4, discuss limitations of the study and provide recommendations for future research. In addition, this chapter will provide the final concluding remarks of this pilot program evaluation.

Summary

A substantial amount of research supports the relationship between stress and unhealthy lifestyle behaviors which was thoroughly described in Chapter 2. Despite this, few stress management programs evaluate their impact on lifestyle behaviors. As a result, the purpose of this study was to evaluate the effectiveness of a stress management pilot program, *Taking Care of You: Body-Mind-Spirit*, in reducing perceived stress levels and improving lifestyle behaviors compared to a strength training program.

The pilot and comparison programs were facilitated by University of Missouri Extension Specialists throughout the state where program participants voluntarily took part. Program participants were recruited to take part in the research which included completing a set of surveys before, immediately following and three months following the programs. A total of 477 subjects completed baseline (time 0) surveys, and of those 206 were stress management program participants and 271 were strength training program participants. Immediately following (time 1) the programs, a total of 390

subjects had completed both time 0 and time 1 surveys of which 181 were stress management program completers and 209 were strength training program completers. Finally, at three months following the programs (time 2), at total of 299 subjects had completed all three surveys with 156 of those subjects being from the stress management program and 142 of those subjects being from the strength training program (see Table 1).

Discussion

The outcome measures of this study included perceived stress levels and health promoting lifestyle behaviors. The data for tobacco use was not analyzed because too few subjects identified themselves as tobacco users for proper statistical analyses. Therefore, the outcome measures that are described below include perceived stress levels as measured by the Perceived Stress Scale (PSS), health promoting lifestyle behaviors as measured by the Health Promoting Lifestyle Profile (HPLP) II, and the following health behaviors as measure by the six subscales of the HPLP II: nutrition behaviors, physical activity behaviors, health responsibility behaviors, stress management behaviors, spiritual thoughts and behaviors and interpersonal relation behaviors. Chapter 3 provides the details of these survey instruments.

Three primary research hypotheses were used as the main assessment for evaluating the effectiveness of the stress management pilot program compared to the strength training program in regard to decreasing perceived stress levels and improving

health promoting lifestyle behaviors. The first primary hypothesis of this study compared the stress management pilot program participants to the strength training program participants across the three timepoints (time 0, time 1 and time 2) while controlling for age differences between the two program groups. This research question did not control for the baseline differences between the two program groups in regard to the outcome measures, therefore two additional primary hypotheses were necessary. These two additional primary hypotheses compared the two program groups at time 1 and time 2 separately while controlling for baseline differences of the outcome measures and age differences between the two program groups.

To more fully examine the data and have a clearer understanding of the results of these three primary hypotheses, a set of 12 secondary hypotheses were assessed. The first four of secondary hypotheses (1-4) assessed each of the outcome measures for differences between the two program groups at each of the timepoints separately and regardless of time while controlling for age differences between the two program groups. The rest of secondary hypotheses (8-12) assessed within each of the program groups separately at each of the timepoints. The implications of the results including both the primary and secondary hypotheses are provided below.

The results of the first primary hypothesis showed that compared to the strength training program, the stress management program participants significantly decreased perceived stress levels across the three timepoints, significantly improved health promoting lifestyle behaviors, and improved individual behaviors (subscales of the HPLP

II) including: health responsibility behaviors, nutrition behaviors, stress management behaviors and spiritual health thoughts and behaviors (Table 5). Social health behaviors, as measured by interpersonal relations subscale of the HPLP II, were not significantly different between the two program groups across the three timepoints; however, the participants of the stress management program did show greater improvements over the three timepoints as shown in Figure 7 (see Appendix I) and in the adjusted means of Table 6. Since the strength training program was a program in which participants took part in physical activity, it is not surprising that improvements of this behavior were shown among participants of the strength training program. Participants of the stress management program also improved their physical activity behaviors as a result of the pilot program, therefore the results for this measure were not significantly different over the three timepoints between the two program groups. The results of the analyses for the first primary research question (Table 5), along with Figures 1-5 and 6-8 and the adjusted means provided in Table 6, show that overall, the stress management program was successful in its aim to improve participants' stress levels and health promoting lifestyle behaviors compared to the strength training program immediately following the completion of the program. Furthermore, these improvements were maintained at three months following the program.

Despite these strong significant differences between the two program groups, the effect sizes were small. This provides an indication that while these differences were statistically significant, the difference the stress management program made in regard to

perceived stress levels and health behaviors was small compared to the participants of the strength training program. However, the small effect sizes resulting from the analyses of this hypothesis may have been negatively affected by the large differences between the two program groups at baseline. The significant baseline differences between the two program groups on all measures (See results of Secondary hypothesis 1 within Table 5) substantiated the need to control for differences at baseline when comparing the two program groups at the other timepoints.

Further investigation of the data, through the second primary hypotheses showed that when controlling for differences at baseline (as well as age differences), the differences between the two program groups at time 1 were still significant for the HPLP II, nutrition, stress management and spiritual health measures, but not for the PSS, health responsibility, physical activity, interpersonal relations or measures. Again, however, while significant statistically, the effect sizes for these analyses were low (see Table 7). When assessing the differences between the two program groups at time 2, while controlling for baseline differences (and age differences), the two groups were significantly different for the PSS, HPLP II, health responsibility, nutrition, and stress management measure and spiritual health measures, but were not significantly different for the physical activity or interpersonal relations measures. Nonetheless, once again the effect sizes were small for these analyses (see Table 8) giving an indication that while there were statistically significant differences between the two program groups, these differences were not making a considerable discrepancy in the scores on the measures

between the two program groups. The resulting small effect sizes of these hypotheses are likely due to the fact that the pilot program was being compared to another program which showed to also improve stress levels and health behaviors. Had a control group been used, versus an exercise program as a comparison, the effect sizes would have likely been enhanced. Additional investigation was carried out to explore the data further through the secondary hypotheses. While taking the results of primary hypotheses into account, the results of additional investigation of the data by the secondary hypotheses is discussed below.

Perceived Stress Levels

Taking into consideration the results of all three primary hypotheses, the differences between the two groups did not differ greatly in regard to decreasing perceived stress levels as a result of the programs. While the stress management program group was significantly different compared to the strength training program group across all three timepoints for scores on the PSS (Primary hypothesis 1), the effect size was quite low ($\eta_p^2 = .064$). This low effect size was likely due to the fact that both groups significantly decreased participants' stress levels from before (time 0) to immediately after the program (time 1) (see results in Table 9 of Secondary hypotheses 6 and 10). Had a control group, or comparison group that did not receive an intervention that also improved stress levels and health behaviors, been used the resulting effect sizes would have likely been greater.

Despite the use of a rigorous comparison, the stress management program continued to improve stress levels from after the program (as shown in Figure 1) while the strength training did not. This conclusion is supported by the results of the eighth and twelfth secondary hypotheses which indicated a significant decrease in perceived stress levels for participants of the stress management program from time 1 to time 2 but not for participants of the strength training program (See Table 9). In addition, while both program groups had statistically significant differences within each group across all time points (Secondary hypotheses 5 and 9 in Table 9), from time 0 and time 1 (Secondary hypotheses 6 and 10 in Table 9), and time 0 to time 2 (Secondary hypotheses 7 and 11 in Table 9), the effects sizes of the stress management program were substantially greater compared to the strength training program for each of these. In conclusion, when taking the results of both the primary and secondary hypotheses into account, the participants of the stress management program showed greater improvements in regard to perceived stress levels as a result of the pilot program compared to the participants of the strength training program.

Research shows that taking part in aerobic physical activity helps decrease stress levels; however, the research is mixed on the effects of strength training, or anerobic physical activity, on stress levels (e.g., Atlantis, et al., 2204; Long & van-Stavel, 1995; Roskies et al., 1986; Rostad & Long). The results of this study add to the limited body of research showing that strength training assists in decreasing stress levels based on the results as shown in Figure 1 and the result of the Secondary hypothesis 10 (Table 9).

Therefore, it is not surprising that both groups significantly decreased stress levels from time 0 to time 1 and that the two programs were not significantly different at time 1 as shown by the results of Primary hypothesis 2 (Table 7) and Secondary hypothesis 2 (Table 9). It should be noted that the effect size of the differences within the stress management program group from time 0 to time 1 was greater at $\eta_p^2 = .51$ compared to the strength training program group at $\eta_p^2 = .33$ (see Secondary hypotheses 6 and 10 within Table 9) indicating a greater improvement from time 0 to time 1 for the stress management program. The results of the analyses measuring differences within each program from time 1 to time 2 show that the stress management program was successful in helping participants to continue to improve stress levels after the completion of the program whereas the strength training program was not (see Secondary hypotheses 8 and 12 within Table 9).

The large significant differences at baseline between the two program groups on the PSS as shown in the results of the Secondary hypothesis 1 (Table 9) is an indication that the stress management program attracted persons who felt the need to take part in a program that would help them better deal with their stress. This is not surprising since this program was marketed as a program to help people better deal with their stress. Additionally, it is reassuring that the stress management program reached those in greater need of assistance in dealing with their stress levels.

In summary, taking into account the results for the PSS of all of the hypotheses, both programs were successful in lowering participants perceived stress levels

immediately following the programs. However, the results indicate that the participants of the stress management program continued to apply stress management strategies learned in the pilot program to their lives following the completion of the program thereby helping them to improve stress levels even more so after the program. On the other hand, the results showed that the stress levels of the strength training program participants' did not continue to improve after the completion of the program, although they were maintained. This could be an indication that (1) participants of the strength training program are continuing to do the exercises learned through the strength training program, but that there may a plateau in the influence that the exercises of this program have on stress levels, (2) there is a ceiling effect based on the measurement limitations of the PSS (3) the participants of the strength training program are continuing to do the exercise somewhat but not at the same level as they were while in the program. A discussion of the physical activity results provided below explores these possible indications in greater detail.

Health Promoting Lifestyle Behaviors

The HPLP II and the six subscales of this survey instrument were holistic in nature by assessing lifestyle behaviors in the physical, mental and spiritual realm of health. Considering the stress management pilot program of this study took a holistic approach to teaching participants how to better manage their stress levels, the HPLP II and the individual subscales were appropriate for assessing the program's influence on each of these dimensions of health.

The results of the three primary hypotheses provide mixed results for health promoting lifestyle behaviors between the two programs. Taking health promoting lifestyle behaviors as single construct, by assessing the HPLP II, the results for the stress management program were stronger with this measure being statistically significant for all three primary hypotheses with greater scores for the participants of the stress management program compared to those of the strength training program. Results of the secondary hypotheses showed that the participants of the stress management program started with lower scores on the HPLP II at time 0 compared participants of the strength training program and that both groups showed significant improvements from time 0 to time 1. While effect sizes were low for all three of the primary hypotheses (see Tables 5, 6 and 7), this is a consequence of using a comparison program which also improved participants' health promoting lifestyle behaviors. Consistent with the research, the strength training program participants' showed that engaging one healthy lifestyle behavior, in this case physical activity, is often associated with improvements in other lifestyle behaviors (Dutta & Bodie, 2006; Jayanti & Burns, 1998). Despite this, the stress management program still showed significant improvements in comparison to the strength training program indicating that the stress management program had a stronger influence on health behaviors than did the strength training program.

While both groups made improvements from time 0 to time 1, the stress management program group made larger improvements and continued to improve from time 1 to 2 whereas the strength training program group stayed about the same from time

1 to time 2 (see Figure 2, and Secondary hypotheses 8 and 12 within Table 9). These results indicate that once the strength training program was over, the positive effects of the program on participants' health promoting lifestyle behaviors leveled off (see Figure 2), but did not decrease significantly (see Secondary Hypothesis 12, Table 9). In addition, these results suggest that the strength training program participants may be continuing to do the exercises in the program, or these results could be due a ceiling effect of measurement limitations of the HPLP II. On the other hand, the results of the stress management program from time 1 to time 2 (described above) suggest that these participants' continued to apply the strategies learned in the program to their lives after the completion of the program.

When assessing differences within each of the two program groups across all three timepoints (Secondary hypotheses 5 and 9) and from time 0 to 2 (Secondary hypotheses 7 and 11) both groups were significantly different, but the effect sizes for the stress management program were higher compared to the effect sizes of the strength training program for these analyses (see Table 9). Taken together, the results of all of the hypotheses imply that overall the stress management program was more successful at improving participants' health promoting lifestyle behaviors in comparison to the strength training program. The results of this study add to the limited research that exists supporting the effectiveness of stress management interventions to positively influencing health behaviors (Evers & Prochaska, 2006; Katzer et al., 2008; Landsman-Dijkstra et al., 2006; Timmerman et al., 1998).

Since taking part in physical activity was the main focus of the strength training program, it is not surprising that the results of the physical activity behavior subscale of the HPLP II were not significant when comparing the two program groups as shown in the results of the three primary hypotheses and Secondary hypothesis 4 (See Tables 5, 6, 7 & 8). Assessing the programs individually showed that both program groups significantly improved participants' physical activity behaviors from across the three timepoints (Secondary hypotheses 5 and 9), from before to immediately after the program (Secondary hypotheses 6 and 10) and from before to three months after the program (Secondary hypotheses 7 and 11) See Table 9 for detailed results.

It is important to be aware that the stress management program did not have participants engage in any type of physical activity during the program nor did the program instruct participants to take part in physical activity. The program did, however, teach participants that physical activity is one healthy way of coping with stress. Therefore, it is noteworthy that the stress management program participants made improvements in physical activity behaviors as a result of taking part in the program. This finding has a couple of possible implications: (1) participants of the stress management program were more physically active because they were using physical activity as a means to coping with stress; (2) because research shows that higher stress levels are associated with sedentary lifestyles (e.g., Aldana et al., 1996; American Psychological Association, 2009).

The results of this study showed similar trends for the other subscales of the HPLP II including, health responsibility, nutrition, stress management, interpersonal relations (social health) and spiritual health, in that for each of these measures, the stress management program participants had significantly lower scores at baseline compared to the strength training program (see Secondary hypothesis 1 in Table 9). This provides evidence that people who choose to take part in the strength training program were already displaying healthier lifestyle behaviors than those who choose to take part in a stress management program. Again, this finding supports the research showing that persons engaging in one healthy lifestyle behavior are likely to be engaging in other healthy lifestyle behaviors (e.g., Dutta & Bodie, 2006; Jayanti & Burns, 1998).

Both program groups significantly improved their scores from baseline to immediately following the program, however, Figures 3, 5, 6, 7, and 8 as well as the effects sizes show that improvements were greater within the stress management program from time 0 to 1 compared to the strength training program (see Secondary hypotheses 6 and 10 in Table 9). So much, that the differences between the program groups immediately following the program were no longer significant for these measures (see Secondary hypothesis 2 in Table 9). These results provide an indication that the stress management program may have had a greater influence on improving participants' health responsibility, nutrition, stress management, interpersonal relations (social health) and spiritual health behaviors compared to the strength training program immediately following the program. However, there is the possibility of a 'ceiling effect' for the

strength training participants; since they already were displaying healthier behaviors at baseline they may have had less room for improvement before reaching a limitation based on the survey measurement used.

Anytime health behavior changes are made as a result of an intervention, maintenance of such behavioral changes after the intervention is often the greatest challenge. Therefore, it is critical to assess maintenance of behavior changes when evaluating programs. The results of Secondary hypotheses 8 and 12 (see Table 9) for health responsibility, nutrition, stress management, interpersonal relations and spiritual health subscales of the HPLP II provided evidence that neither program significantly improved or significantly declined from time 1 to time 2 thus providing an indication that participants of both programs were maintaining health behaviors changes made as a result of taking part in either program. However, while not statistically significant, participants of the stress management program did show a trend of continuing improvements after the program (from time 1 to time 2) for health responsibility, nutrition, stress management and interpersonal relations (social health) behaviors (see Figures 3, 5, 6, and 7). Conversely, participants of the strength training program show a trend of continuing to improve, although not significant, after the completion of the program for nutrition and stress management behaviors, and showed a slight decline (not significant) in scores of the health responsibility and interpersonal relations measures (see Figures 3, 5, 6 and 7).

In summary, these results indicate that the stress management program proved to be slightly better at maintaining certain health promoting lifestyle behaviors in

comparison to the strength training program. Nonetheless, overall both programs demonstrated that they were able to maintain health promoting lifestyle behavior improvements made as a result of taking part in either program. Taking all of the analyses of the outcome measures into account, the results of this study demonstrate that the stress management program was more effective in reducing perceived stress levels and improving health promoting lifestyle behaviors, with the exception of physical activity, in comparison to the strength training program.

Limitations

The limitations of this study's research design are explained in the Chapter 1. After analyzing the data and evaluating the results, a few limitations of the data should be noted. First, the two program groups differed significantly for the majority of the demographic measures. Such demographic differences hinder the ability of the stress management program to be properly compared to strength training program. Second, both program groups were made up mainly of Caucasian (88.7%) females (84.9%) with at least some college education (79.2%) (see table 2). Consequently, this limits the generalizibility of the results of this study to those with similar demographic characteristics. Third, too few participants were identified as tobacco users, preventing this study from being able to analyze tobacco use behaviors as one of the outcome measures.

Recommendations for Future Research

Results of this program evaluation lead to several recommendations for future research. First, much of the research evaluating mindfulness-bases stress management programs have been conducted in clinical settings (e.g., Grossman et al., 2004). The few studies that have been conducted evaluating mindfulness-based stress management programs in community-based settings were carried out within a university or college setting (Nylicek & Kuijpers, 2008; Smith et al., 2008; Williams et al., 2008). Participants of such programs are often quite different demographically than persons who would take part in a program in community setting not associated with a higher education institution particularly in rural areas. This study was one of the first program evaluations of a mindfulness-based stress management program conducted outside of a university/college settings as well as one of the first to be done in both rural and urban areas. Additional research evaluating the effectiveness of mindfulness-based stress management programs conducted in community-based settings, within rural areas outside and/or outside of a university/college setting is needed.

Second, the number of program participants who identified themselves as tobacco users was too small to analyze for statistical significance. Since tobacco use is a health behavior that is strongly associated with stress levels (e.g., American Psychological Association, 2008; Cohen & Lichtenstein, 1990), and because tobacco used has such a deleterious effect on one's physical health (U.S. Department of Health & Human Services, 2004), future evaluations of stress management programs should specifically

recruit tobacco users to take part in stress management program evaluations in order to assess the effectiveness of such programs on participants' use of tobacco.

Third, evaluations of stress management programs often have notably flawed research designs particularly those programs conducted in community-based settings where participants voluntarily take part (e.g., Grossman et al., 2004; Smith et al., 2008). Many of the community-based stress management program evaluations' research designs lack rigor due to the inherent challenges community-based program evaluation research presents, such as (1) finding participants to take part in control group (2) identifying a comparison group with subjects that are similar in demographics and have similar motivations as the intervention group (i.e., the motivation to take part in a stress management program to decrease their stress levels); and (3) carrying out long-term follow-up analyses after the completion of the program. A need exists for more community-based stress management program evaluations with methodologically rigorous research designs and long-term follow-up to confirm the effectiveness of such programs.

Finally, due to the increasing popularity of stress management programs in the field of health promotion, it is surprising that so few of these programs evaluate their influence on health behaviors. Additional research on the effectiveness of stress management programs to improve health behaviors is warranted in effort to prove that stress management programs not only help participants with their mental/emotional health, but that they also enhance participants' physical health through improving health

behaviors. Such evidence would assist in obtaining support for stress management programs by substantiating the need for such programs as part of public health or employee-based health promotion efforts. Furthermore, by proving that stress management programs can improve health behaviors, this provides evidence of general public value for these programs; healthier employees tend to lower absenteeism, greater productivity and lower health care costs which leads to savings in tax dollars.

Conclusion

A substantial amount of stress management program evaluations exist. However, despite the strong association between stress and health behaviors, few measure their effectiveness to improve health behaviors. Therefore, this program evaluation was developed to assess the effectiveness of a stress management pilot program in improving perceived stress levels and health behaviors using a strength training program as a comparison group. Since decreased stress levels is a proven physiological benefit of exercise, the design of this study provided the benefit of assessing whether the stress management program (which taught participants cognitive and behavioral strategies to better manage their stress) was more successful in decreasing perceived stress levels and improving health behaviors in comparison to an exercise program. In addition, using an exercise program was a more rigorous design than using a control group in that both programs were likely to improve stress levels.

Participants of both programs had lower perceived stress levels both immediately after and three months following the programs thus supporting the research that both stress management programs and exercise improves stress levels. However, this study demonstrated that, in comparison to an exercise program, the stress management program resulted in greater improvements in perceived stress levels.

Results of this study also confirmed that both programs improved health promoting lifestyle behaviors. In regard to the strength training program, these results support the research that shows engaging in one health promoting lifestyle behavior often leads to improving other health behaviors. Consequently, using a strength training program as a comparison program was a more rigorous comparison than using a control group. These results also support the small number of stress management program evaluations that have assessed their program's effectiveness to positively influence health behaviors. Overall, participants of the stress management program showed greater improvements in health behaviors as a result of taking part in the program compared to the strength training program. Additional similar stress management program evaluations are needed to confirm these results.

The connection between stress and health, including the influence stress has on health behaviors, is becoming more well-known. Because of this, health promotion efforts have responded by providing more programming on this topic, and the popularity of stress management programs has increased dramatically in the last decade. As a result, it is critical that such programs evaluate their ability to not only improve health behaviors

but also maintain health behavior improvements over time. This stress management program evaluation showed that the program improved participants' health behaviors, and more importantly, proved that participants' were able to maintain health behaviors improvements over time. These results provide solid support of this program and hopefully encourage other stress management program evaluations to assess health behaviors as useful and viable outcomes of their programs.

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APPENDIX A

Perceived Stress Scale

The questions below ask you about your feelings and thoughts **during the last month**. In each question, circle the answer that best describes *how often* you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer fairly quickly.

For each question choose one answer from the following choices:

0 = Never
1 = Almost Never
2 = Sometimes
3 = Fairly Often
4 = Very Often

1.	In the last month, how often have you been upset because of something that happened unexpectedly?	0	1	2	3	4
2.	In the last month, how often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
3.	In the last month, how often have you felt nervous and "stressed"?	0	1	2	3	4
4.	In the last month, how often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
5.	In the last month, how often have you felt that things were going your way?	0	1	2	3	4
6.	In the last month, how often have you found that you could not cope with all the things that you had to do?	0	1	2	3	4
7.	In the last month, how often have you been able to control irritations in your life?	0	1	2	3	4
8.	In the last month, how often have you felt that you were on top of things?	0	1	2	3	4
9.	In the last month, how often have you been angered because of things that were outside of your control?	0	1	2	3	4
10.	In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

APPENDIX B

Health-Promoting Lifestyle Questionnaire II

DIRECTIONS: This questionnaire contains statements about your *present* way of life or personal habits. Please respond to each item as accurately as possible, and try not to skip any item. Indicate the frequency with which you engage in each behavior by checking one of the following:

	Never	**Some-times**	**Often**	**Routinely**
1. Discuss my problems and concerns with people close to me.				
2. Choose a diet low in fat, saturated fat, and cholesterol.				
3. Report any unusual signs or symptoms to a physician or other health professional.				
4. Follow a planned exercise program.				
5. Get enough sleep.				
6. Feel I am growing and changing in positive ways.				
7. Praise other people easily for their achievements.				
8. Limit use of sugars and food containing sugar (sweets).				
9. Read or watch TV programs about improving health.				
10. Exercise vigorously 20 or more minutes at least 3 times a week (such as brisk walking, bicycling, aerobic dancing, using a stair climber).				

	Never	**Some-times**	**Often**	**Routinely**
11. Take some time for relaxation each day.				
12. Believe that my life has purpose.				
13. Maintain meaningful and fulfilling relationships with others.				
14. Eat 6-11 servings of bread, cereal, rice and pasta each day.				
15. Question health professionals in order to understand their instructions.				
16. Take part in light to moderate physical activity (such as sustained walking 30-45 minutes 5 or more times a week).				
17. Accept those things I my life which I cannot change.				
18. Look forward to the future.				
19. Spend time with close friends.				
20. Eat 2-4 servings of fruit each day.				
21. Get a second opinion when I question my health care provider's advice.				
22. Take part in leisure-time (recreational) physical activities (such as swimming, dancing, bicycling).				
23. Concentrate on pleasant thoughts at bedtime.				
24. Feel content and at peace with myself.				
25. Find it easy to show concern, love and warmth to others.				

	Never	**Some-times**	**Often**	**Routinely**
26. Eat 3-5 servings of vegetables each day.				
27. Discuss my health concerns with health professionals.				
28. Do stretching exercises at least 3 times per week.				
29. Use specific methods to control my stress.				
30. Work toward long-term goals in my life.				
31. Touch and am touched by people I care about.				
32. Eat 2-3 servings of milk, yogurt, or cheese each day.				
33. Inspect my body at least monthly for physical changes/danger signs.				
34. Get exercise during usual daily activities (such as walking during lunch, using stairs instead of elevators, parking car away from destination and walking).				
35. Balance time between work and play.				
36. Find each day interesting and challenging.				
37. Find ways to meet my needs for intimacy.				
38. Eat only 2-3 servings from the meat, poultry, fish, dried beans, eggs, and nuts group each day.				
39. Ask for information from health professionals about how to take good care of myself.				

	Never	**Some-times**	**Often**	**Routinely**
40. Check my pulse rate when exercising.				
41. Practice relaxation or meditation for 15-20 minutes daily.				
42. Am aware of what is important to me in life.				
43. Get support from a network of caring people.				
44. Read labels to identify nutrients, fats, and sodium content in packaged food.				
45. Attend educational programs on personal health care.				
46. Reach my target heart rate when exercising.				
47. Pace myself to prevent tiredness.				
48. Feel connected with some force greater than myself.				
49. Settle conflicts with others through discussion and compromise.				
50. Eat breakfast.				
51. Seek guidance or counseling when necessary.				
52. Expose myself to new experiences and challenges.				

APPENDIX C

Tobacco Use Questions (from the BRFSS)

Check one answer for the following questions.

1. Have you smoked at least 100 cigarettes in your entire life?
   - ☐ Yes
   - ☐ No
   - ☐ Don't know/Not sure

If you answered "No" to question#2, please skip to question # 6.

2. Do you now smoke cigarettes every day, some days, or not at all?
   - ☐ Every day
   - ☐ Some days
   - ☐ Not at all
   - ☐ Don't know/Not sure

If you answered "Not at All" to question#3, please skip to question # 5.

3. During the past 12 months, have you stopped smoking for one day or longer because you were trying to quit smoking?
   - ☐ Yes
   - ☐ No
   - ☐ Don't know/Not sure

If you answered "No" to the question#3, please skip to question # 6.

4. How long has it been since you last smoked cigarettes regularly?
   - ☐ Within the past month (less than 1 month ago)
   - ☐ Within the past 3 months (1 month but less than 3 months ago)
   - ☐ Within the past 6 months (3 months but less than 6 months ago)
   - ☐ Within the past year (6 months but less than 1 year ago)
   - ☐ Within the past 5 years (1 year but less than 5 years ago)
   - ☐ Within the past 10 years (5 years but less than 10 years ago)
   - ☐ Never smoked regularly
   - ☐ Don't know/Not sure

5. Do you currently use chewing tobacco, snuff, or snus every day, some days, or not at all? **Note:** "Snus" is a moist smokeless tobacco sold in pouches that are place under the lip against the gum.
   - ☐ Every day
   - ☐ Some days
   - ☐ Not at all
   - ☐ Don't know/Not sure

APPENDIX D

Health Status Question (from the BRFSS)

Check one answer for the following questions.

1. Would you say that in general you health is: (check one):
   - ☐ Excellent
   - ☐ Very good
   - ☐ Good
   - ☐ Fair
   - ☐ Poor

APPENDIX E

Additional Questions

1. How often are you using skills or strategies from this program? (Check one)
   - ☐ Several times per day
   - ☐ Daily
   - ☐ A few times per week
   - ☐ A few times per month
   - ☐ Less than once per month
   - ☐ Never

2. Which skills or strategies did you find most beneficial from this program?

3. Are you using any of the resources recommended from this program such as books, web-resources, etc…? (Circle one answer.)
   Yes No Unsure

4. Would you recommend this program to anyone else? (Circle one answer.)
   Yes No Unsure

5. Before you participated in the program, you knowledge, skills, or understanding was (circle one answer):
   Not at all A Little Some A lot A great deal

6. As a result of the program, your knowledge, skills, and understanding is (circle one answer):
   Not at all A Little Some A lot A great deal

7. Did this program meet your needs? (Circle one answer.)
   Not at all A Little Some A lot A great deal

8. Please share two (2) ways this program has improved your life.

9. What would you change about the program to improve it?

10. Is there anything else you want to tell us about this class?

APPENDIX F

Recruitment Script

Evaluation of a University of Missouri Extension

Stress Management Pilot Program: Procedures and Recruitment Script

At the initial session either of the program, subjects will be recruited for research evaluating the effectiveness of a University of Missouri Extension pilot stress-management program. A comparison group will be recruited from the University of Missouri Extension exercise program, Stay Strong Stay Healthy at the initial program session as well.

Pilot program participants of the pilot stress-management program will be told:

Near the end of the first program session, all participants will receive a consent form and the University of Missouri Extension program facilitator will proceed with the following script.

"I have provided you all with a form that I will explain to you now, and then I will give you time to read it over and ask questions before agreeing to participate by signing the form."

"As a participant of this stress management program you have the option of also taking part in an evaluation study University of Missouri Extension is doing in effort to evaluate the effectiveness of this pilot program. This is the first time University of Missouri Extension has offered this program, so your participation in this evaluation study will help provide information of how this program is beneficial and what changes may be necessary to make this program better. You are not required to take part in this study as a participant of this program. Your participation is voluntary. You may withdraw from the study at any point in time, and this will have no effect on your participation in this program."

"This evaluation study involves filling out a set of surveys at three points in time: (1) today; (2) at end of the 8th, or last program session; and (3) three months following the completion of the program. The surveys ask questions about your stress level and

lifestyle behaviors as well as demographic questions. The second and third survey will also include questions about your satisfaction with the program. Risks include the possibility of making you feel uncomfortable in answering question about your own health behaviors. You do not have to answer any questions you do not wish to answer."

"Your answers will be kept confidential. A code number which we assign to you is used on the survey forms, so that your name will not be on the forms with your survey answers. The name associated with the code number will kept separate from survey answers."

"Completing the set of surveys should take you approximately 25 minutes. For the first two sets of surveys, conducted today and at the last program session, I will provide this time as part of the program session. The third survey packet will be mailed or emailed to you, whatever you prefer. If you prefer the third survey pack to be mailed to you, a stamped return envelope will be provided."

"We appreciate your participation in this evaluation, as it will help us improve our program. To compensate you for your time, you will receive a $20 check after completing the first two survey packets, and another $20 check for completing the three month follow-up survey, or third survey packet, for a total of $40. However, you must have attended at least 6 of the 8 sessions to be eligible to receive the second and third survey packets to complete and to receive the reimbursement money. In other words you will not be provided a second survey packet at the last program session unless you have attended at least 6 of the program sessions. If you do not complete the second survey packet you will not receive the $20 reimbursement. Also, you must have completed the second survey packet to receive the three month follow-up survey packet, and you must complete the three month follow-up survey packet to receive the additional $20 reimbursement, or $40 total reimbursement".

"Do you have any questions or concerns?" (Provide time for any questions/concerns).

"Read over the form and if you have any questions feel free to raise your hand I will discuss your question with you individually. If you would like to participate in the study after reading over the form complete the bottom half of the form including your signature. After you have done so, raise your hand and I will provide you with the survey packet for you to complete here today. I will be providing you with a copy of the consent form as well. If you are not interested in participating feel free to leave, and I look forward to see you next week's session."

Program participants of the exercise program, Stay Strong Stay Healthy, will be told:

"Hi, as a participant of this program you have the option of also taking part in a evaluation study University of Missouri Extension is doing in effort to evaluate the effectiveness Extension programming. Your participation in this evaluation study will help provide information of how Extension programs are beneficial and what changes may be necessary improve our programming. You are not required to take part in this study as a participant of this program. Your participation is voluntary. You may withdraw from the study at any point in time, and this will have no effect on your participation in this program."

"This evaluation study involves filling out a set of surveys at three points in time: (1) today; (2) at end the program; and (3) three months following the completion of the program. The surveys ask questions about your stress level and lifestyle behaviors as well as demographic questions. The second and third survey will also include questions about your satisfaction with the program. Completing the set of surveys should take you approximately 25 minutes which you will need to do outside of the program's sessions. Risks include the possibility of making you feel uncomfortable in answering question about your own health behaviors. You do not have to answer any questions you do not wish to answer."

"Your answers will be kept confidential. A code number which we assign to you is used on the survey forms, so that your name will not be on the forms with your survey answers. The name associated with the code number will kept separate from survey answers. "

"If you choose to participate in this evaluation study, the first survey packet will be provided to you today for you compete at home and bring back to next week's session. The second survey packet will handed out at the 9th session for you to complete at home and bring back at the last session (10th session). The third survey packet will be mailed or emailed to you, whatever your preference. If you prefer the third survey pack to be mailed to you, a stamped return envelope will be provided."

"We appreciate your participation in this evaluation study, as it will help us in improving Extension programming. To compensate you for your time, you will receive a $20 check after completing the first two survey packets, and another $20 check for completing the three month follow-up survey, or third survey packet, for a total of $40. However, you must have attended at least 7 of this program's session to be eligible to receive the second and third survey packets to complete and to receive the reimbursement

money. In other words you will not be provided a second survey packet at the 9th program session unless you have attended at least 7 of the program sessions. If you do not complete the second survey packet you will not receive the $20 reimbursement. Also, you must have completed the second survey packet to receive the three month follow-up survey packet, and you must complete the three month follow-up survey packet to receive the additional $20 reimbursement, or $40 total reimbursement".

"Do you have any questions or concerns?" (Provide time for any questions/concerns).

"Read over the form and if you have any questions feel free to raise your hand I will discuss your question with you individually. If you would like to participate in the study after reading over the form, complete the bottom half of the form including your signature. After you have done so, raise your hand and I will provide you with the survey packet for you to complete here today. I will be providing you with a copy of the consent form as well. If you are not interested in participating feel free to leave, and I look forward to see you next week's session."

APPENDIX G

Consent Form

Evaluation of University of Missouri Extension Programming:

Consent Form

This form may contain words that you do not understand. Please ask the investigator to explain any words or information that you do not clearly understand.

- I would like to ask you to participate in research that involves evaluating University of Missouri Extension health programs in effort to provide the most effective programming possible.
- Your participation in this research study is voluntary. You are not required to take part in this study as a participant of this program. You may withdraw from the study at any point in time, and this will have no effect on your participation in this program.
- Your participation in the research involves completing a set of surveys at 3points in time: (1) today; (2) at end the program; and (3) 3months following the completion of the program.
- The surveys ask questions about your stress level and lifestyle behaviors as well as demographic questions. The second and third survey will also include questions about your satisfaction with the program.
- Completing the set of surveys should take you approximately 25 minutes for you to complete.
- Risks include the possibility of making you feel uncomfortable in answering question about your own health behaviors. You do not have to answer any questions you do not wish to answer.
- Your participation in this research study is confidential. A code number which we assign to you is used on the survey forms. Completed surveys will be stored in the one of the research personnel's file identifiable by the code number. The code number connecting your name to survey answer will be kept in separate, secure location only accessible to the investigators of this study. Please do not put any personal identifying information on the surveys (i.e., name).
- To compensate you for your time, you will receive a $20 check <u>after completing the first two survey packets</u>. After completing the third survey packet you will receive another $20 check, for a total of $40. You must attend the majority of the sessions specified by you instructor (either 6 or 8 or 7 or 10) to be eligible to receive the second and third survey packets to complete. You will not be provided a second survey packet if you have not attended the specified minimum program sessions. If

you do not complete the second survey packet you will not receive the $20 reimbursement. Also, you must have completed the second survey packet to receive the three month follow-up survey packet After completing the three month follow-up survey packet you will receive the additional $20 reimbursement, or $40 total reimbursement. After providing you with a reimbursement check, the following information will need to be obtained from you for University accounting records: Full name, permanent address, social security number, and signature documenting the receipt of the payment.

Your complete honesty is appreciated for the integrity of the research.

If you have any questions, concerns, or emotional difficulties that arise while completing the surveys, please contact **Molly Vetter-Smith at 573-882-4107 or email at vettersmithm@missouri.edu**. If you have any questions regarding human subject research, contact the **University of Missouri Campus IRB Office at 573-882-9585**.

After you have consented to this study, you will be given a copy of this consent form for your personal records. Thank you for your participation.

Please sign your name below if you understand and agree with the statements made above and have all of your questions answered regarding this study. **Your signature gives us permission to include your survey packet in our Evaluation of University of Missouri Extension Programming research study.**

_____

_____

Signature of Subject **Date**

Name (please print clearly):

_____

Contact Information (please print clearly):

Address:_____

City:_____ State: _____ Zip Code:_____

Email address: _____ Phone Number: _____

May we contact you at a later date after the completion of this study for additional follow-up surveys? (Circle one) YES NO

APPENDIX H

Table 6

Age Adjusted Means and Standard Deviations

	Intervention Group		Comparison Group	
Measure	$\overline{X}$	S.D.	$\overline{X}$	S.D.
PSS at Time 0	20.27	5.56	13.93	4.94
PSS at Time 1	14.71	5.83	10.44	5.29
PSS at Time 2	13.56	6.92	11.11	5.96
HPLP II at Time 0	2.49	.42	2.75	.40
HPLP II at Time 1	2.79	.43	2.87	.42
HPLP II at Time 2	2.82	.45	2.88	.42
Health Responsibility Time 0	2.28	.58	2.55	.55
Health Responsibility Time 1	2.57	.67	2.64	.56
Health Responsibility Time 2	2.62	.65	2.65	.59
Physical Activity Time 0	2.07	.73	2.32	.55
Physical Activity Time 0	2.35	.71	2.58	.55
Physical Activity Time 2	2.36	.72	2.53	.61
Nutrition at Time 0	2.59	.54	2.84	.48
Nutrition at Time 1	2.81	.56	2.89	.51
Nutrition at Time 2	2.85	.55	2.93	.47
Stress Management Time 0	2.23	.49	2.71	.52
Stress Management Time 1	2.68	.51	2.82	.52
Stress Management Time 2	2.72	.53	2.87	.54

Note. Table continued on next page.

Table 6 continued

Age Adjusted Means and Standard Deviations

	Intervention Group		Comparison Group	
Measure	$\overline{X}$	S.D.	$\overline{X}$	S.D.
Interpersonal Relations Time 0	2.92	.55	2.98	.56
Interpersonal Relations Time 1	3.13	.51	3.09	.55
Interpersonal Relation Time 2	3.18	.53	3.09	.54
Spiritual Health Time 0	2.79	.61	3.07	.52
Spiritual Health Time 1	3.16	.54	3.17	.53
Spiritual Health Time 2	3.13	.57	3.16	.55

Note. $\overline{X}$ = Adjusted mean; S.D. = Standard deviation; PSS = Perceived Stress Scale; HPLP = Health Promoting Lifestyle Profile. Health Responsibility, Physical Activity, Nutrition, Stress Management, Interpersonal Relations and Spiritual Health are subscale of the HPLP II.

APPENDIX I

Figures 1 -8

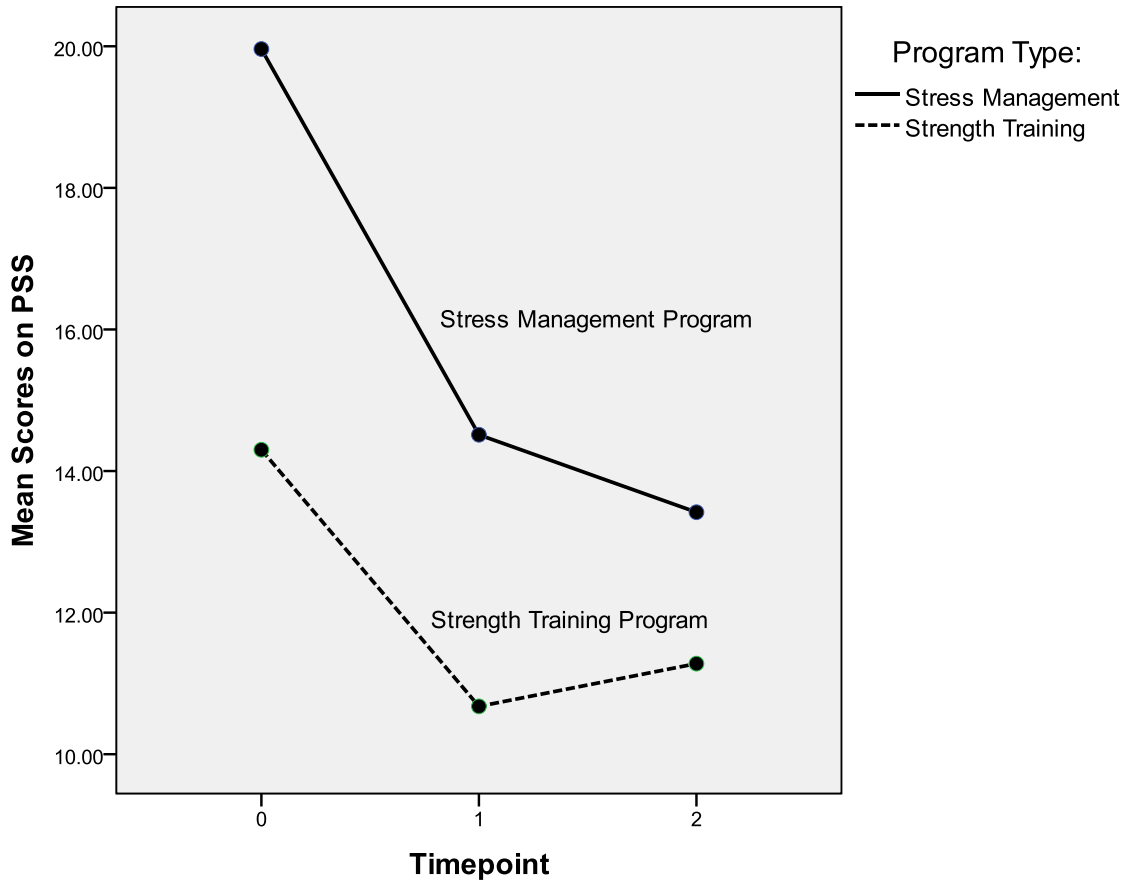

Figure 1. Adjusted mean PSS scores across the three timepoints controlling for age differences between program groups. Significant differences ($p < .05$) were found between the stress management program and strength training program at across the three timpoints, at time 0, time 1 and time 2.

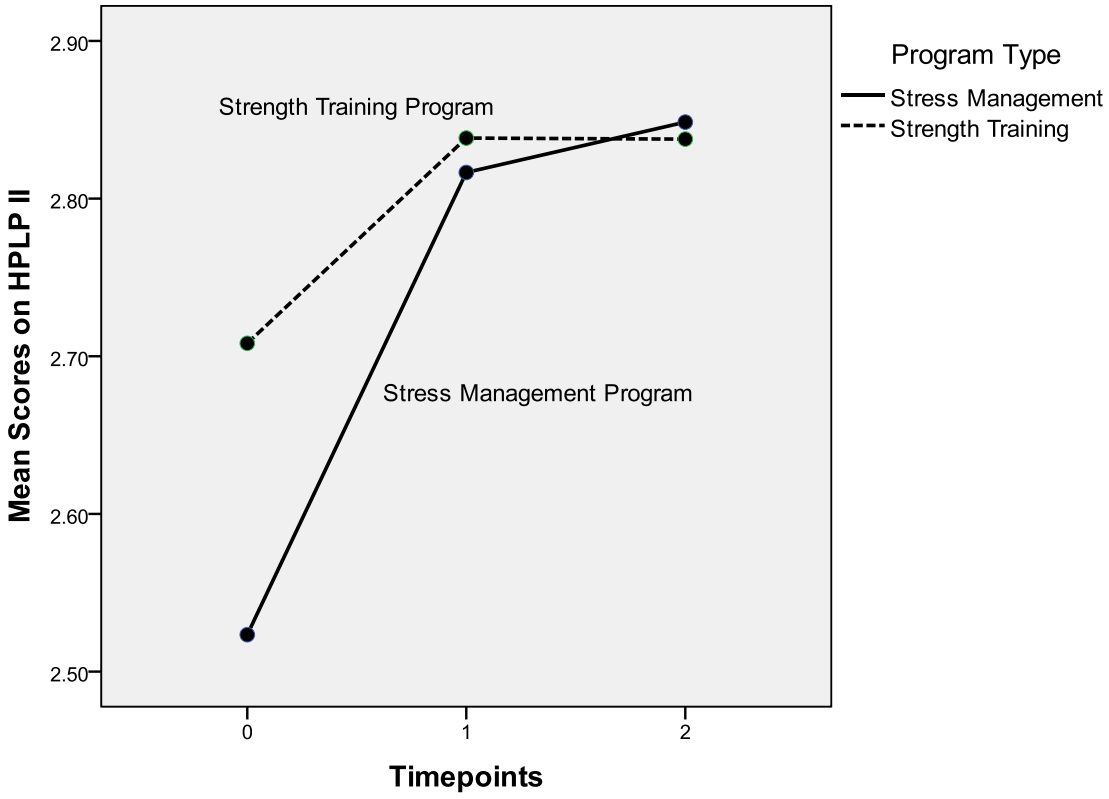

Figure 2. Adjusted mean scores on the HPLP II across the three timepoints controlling for age differences between the two program groups. Significant differences ($p < .05$) were found between the stress management program and strength training program at across the three timpoints and at time 0. No significant differences ($p < .05$) were found between the two program groups at time 1 or time 2.

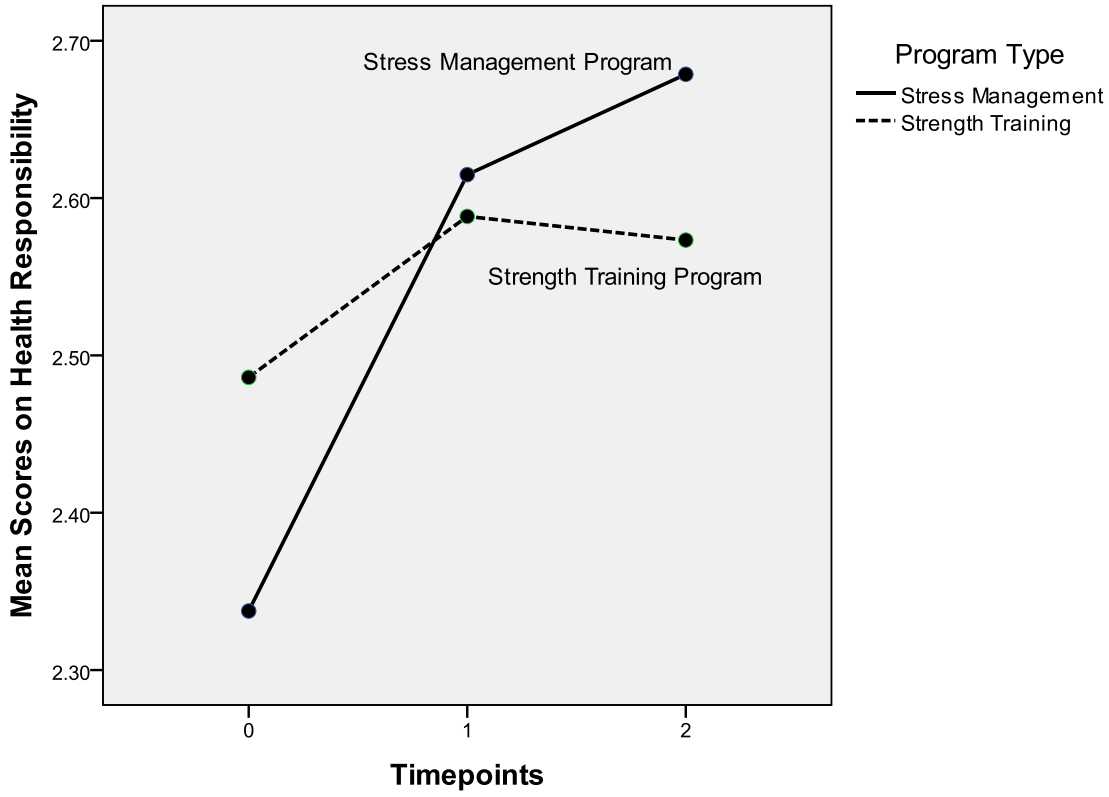

Figure 3. Adjusted mean scores on the Health Responsibility subscale of the HPLP II across the three timepoints controlling for age differences between the two program groups. Significant differences ($p < .05$) were found between the stress management program and strength training program at across the three timpoints and at time 0. No significant differences ($p < .05$) were found between the two program groups at time 1 or time 2.

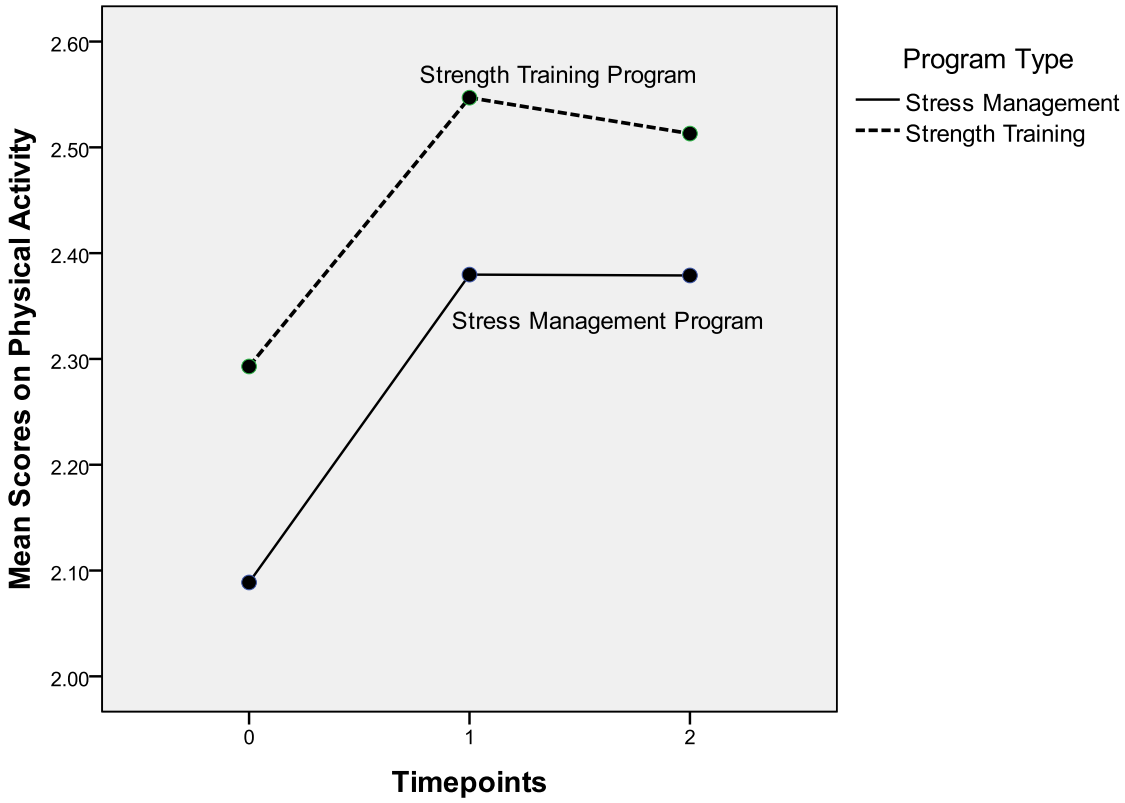

Figure 4. Adjusted mean scores on the Physical Activity subscale of the HPLP II across the three timepoints controlling for age differences between the two program groups. Significant differences ($p < .05$) were found between the stress management program and strength training program at time 0 and time time 1. No significant differences ($p < .05$) were found between the two program groups across the three timepoints or at time 2.

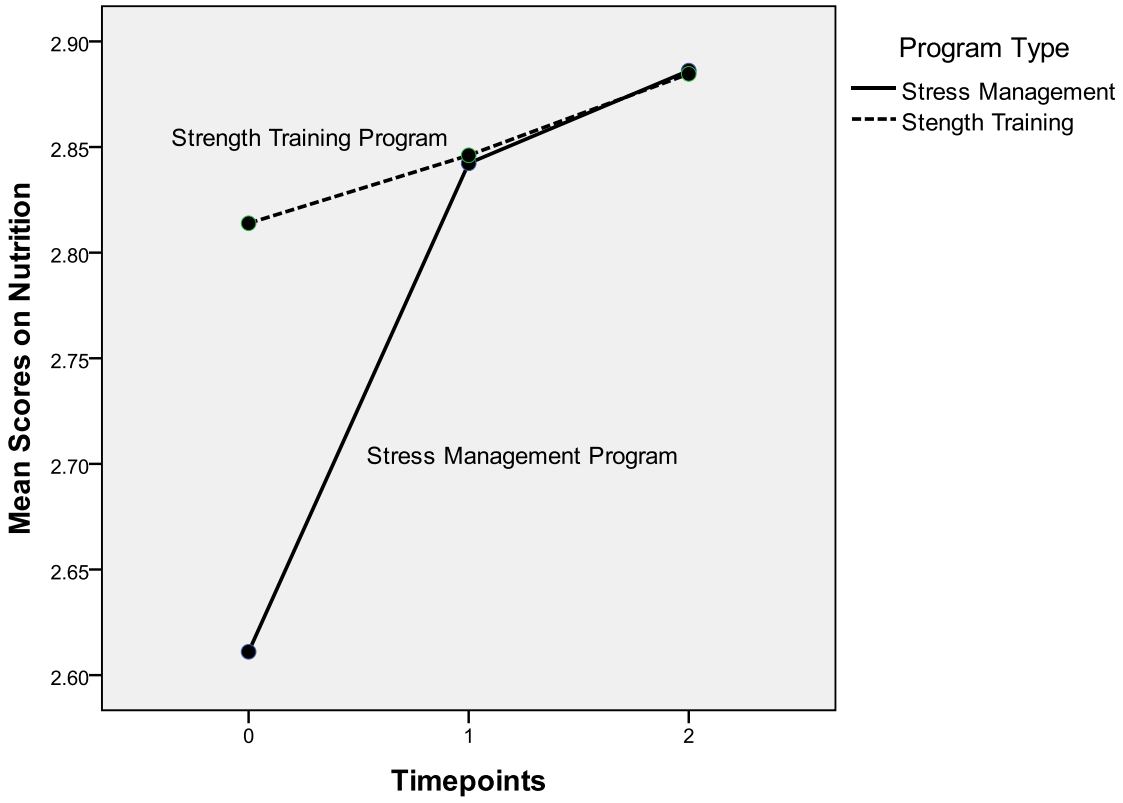

Figure 5. Adjusted mean scores on the Nutrition subscale of the HPLP II across the three timepoints controlling for age differences between the two program groups. Significant differences ($p < .05$) were found between the stress management program and strength training program across the three timepoints and at time 0. No significant differences ($p < .05$) were found between the two program groups at time 1 or time 2.

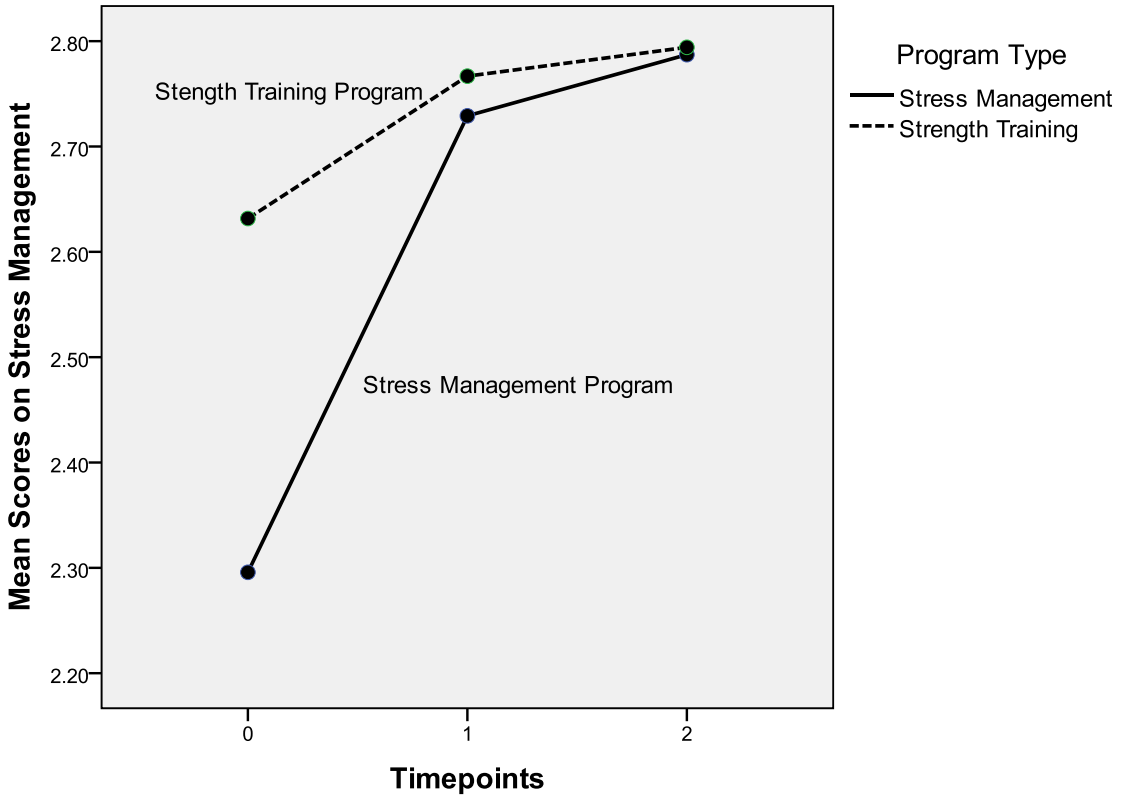

Figure 6. Adjusted mean scores on the Stress Management subscale of the HPLP II across the three timepoints controlling for age differences between the two program groups. Significant differences ($p < .05$) were found between the stress management program and strength training program across the three timepoints and at time 0. No significant differences ($p < .05$) were found between the two program groups at time 1 or time 2.

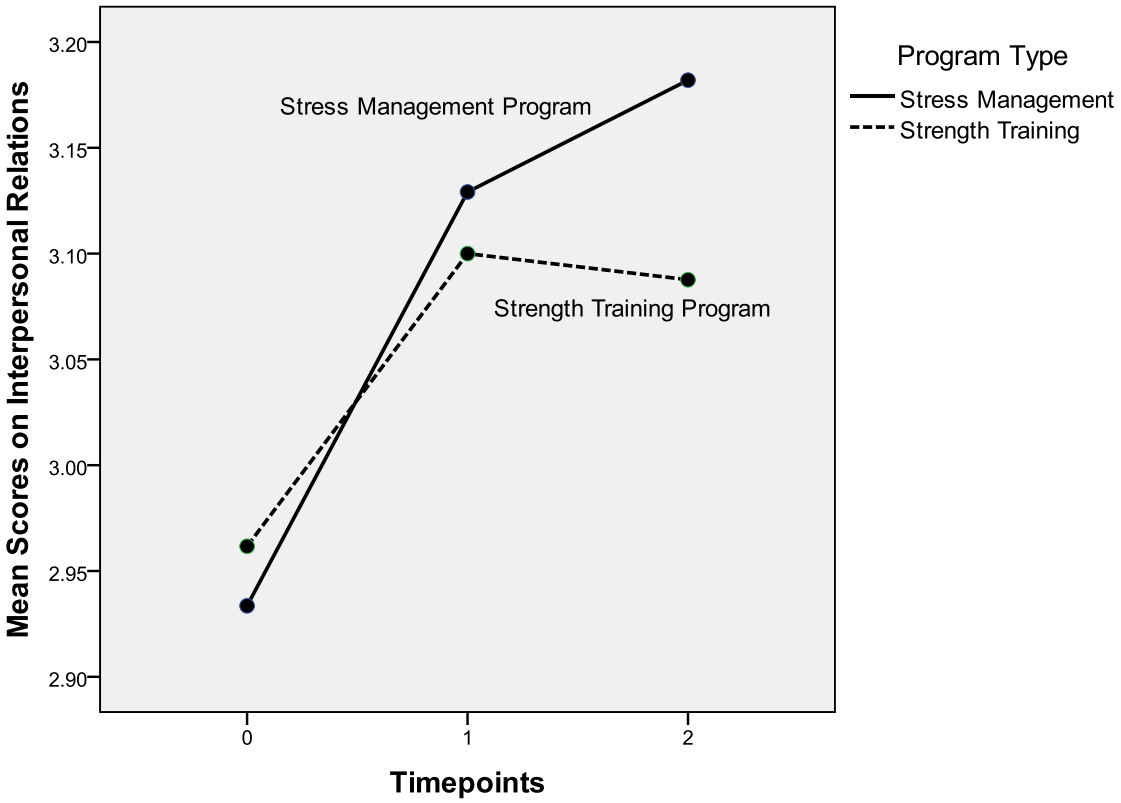

Figure 7. Adjusted mean scores on the Interpersonal Relations subscale of the HPLP II across the three timepoints controlling for age differences between the two program groups. Significant differences ($p < .05$) were found between the stress management program and strength training program at time 0. No significant differences ($p < .05$) were found between the two program groups across timepoints, at time 1 or at time 2.

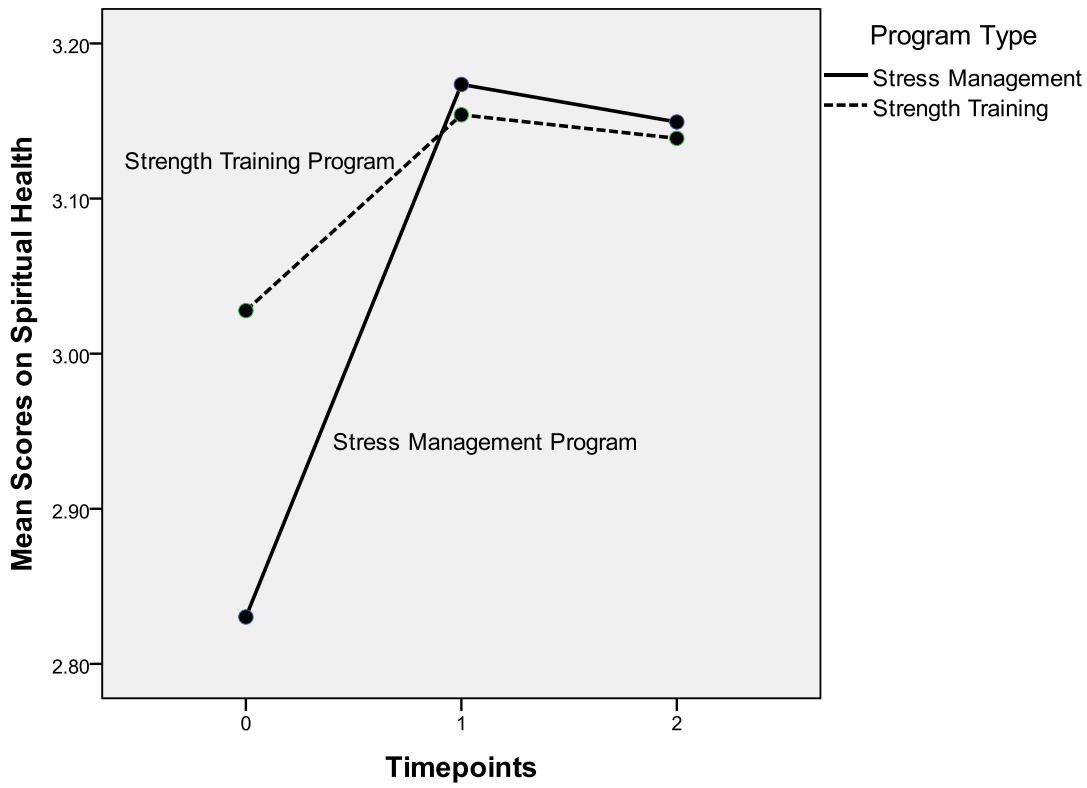

Figure 8. Adjusted mean scores on the Spiritual Health subscale of the HPLP II across the three timepoints controlling for age differences between the two program groups. Significant differences ($p < .05$) were found between the stress management program and strength training program across the three timepoints and at time 0. No significant differences ($p < .05$) were found between the two program groups at time 1 or time 2.

VITA

Molly Vetter-Smith was born October 3rd 1979 in Bloomington, Illinois. She received her Bachelor of Science (2004) in Nutritional Sciences and Medical Dietetics from the University of Missouri. Additionally, she completed her Master's of Education (2006) in Health Education and Health Promotion and Master's of Public Health (2009) from the University of Missouri. In May of 2011 she received her Doctorate of Philosophy degree in Health Education and Health Promotion from the Department of Educational, School and Counseling Psychology of the University of Missouri.

She resides in Columbia, Missouri with her husband Tracy and daughter Summer. Currently, she is employed by the University of Missouri Extension as the State Specialist of Health Education/Assistant Extension Professor.