AN EVALUATION OF AN EXERCISE ADHERENCE INTERVENTION USING THE SOCIAL COGNITIVE THEORY

DISSERTATION

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By

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ABSTRACT

Exercise behavior change-based interventions in the workplace have been shown to increase employee’s short-term exercise levels. The effects of these programs on long-term adherence rates, and the cognitive-behavioral changes targeted by those interventions, however, are relatively unknown. The purpose of this program was to increase insufficiently active employee’s exercise participation. A two month intervention, targeting the social cognitive theory constructs, was designed to provide participants with the skills needed for successful exercise adhere. Participants attended six educational class sessions designed to target self-regulation, self-efficacy, social support, exercise enjoyment and outcome expectations and expectancies. Exercise and construct measurement occurred at pre-test, post-test, and one and three months post-intervention.

Using the one way analysis of variance, there was a significant difference between groups for self-reported, moderate-intensity minutes at post-test, follow-up one and follow-up two (p=.001; $n^2 = .12$ to .26). There was a significant difference in moderate-intensity frequency at post-test, follow-up one and follow-up two (p=.001; $n^2 = .13$ to .25). There was also a significant difference between groups for vigorous-intensity minutes at post-test (p=.001), follow-up one (p=.001) and follow-up two (p=.002), and the small
effect sizes ranged from $n^2 = .11$ to .17. Additionally, there was a significant difference between groups for vigorous-intensity frequency at post-test, follow-up one and follow-up two ($p=.001$). Effect sizes ranged from $n^2 = .144$ to .17.

Using the one way analysis of variance to examine the social cognitive theory constructs, there was a significant difference between groups for self-regulation at post-test, follow-up one and follow-up two ($p=.001; n^2 = .18$ to .36). There was not a significant difference between groups for self-efficacy at any time period, and effect sizes were small ($n^2 = .001$ to .06). Family and friend social support group differences were non-significant at post-test and follow-up one, but there was a significant difference at follow-up two ($p=.001; n^2 = .003$ to .26), due to a decrease in the treatment group scores. Between group differences for exercise enjoyment was non-significant for post-test but significant for follow-up ($p=.003; n^2 = .04$ to .11). Outcome expectations and expectancies was non-significant for all time periods ($n^2 = .03$ to .08).

The present study was successful in increasing the short and long-term exercise rates of the participants. Self-regulation has the potential to be an important construct to include in future interventions. Participants appeared to utilize concepts from self-regulation (i.e. goal setting, time management and self-monitoring) in their exercise programs. Exercise enjoyment and self-efficacy increased throughout the study, but were non-significant between groups at post-test. Social support and outcome expectations and expectancies appeared to have been the least successful strategies learned in the intervention for exercise adherence.
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CHAPTER 1

INTRODUCTION

It has been well-documented that regular physical activity substantially reduces the risk of dying from coronary heart disease and decreases the risk of colon cancer, diabetes, and high blood pressure (Paffenbarger et al., 1975; 1978; 1988; Blair et al. 1989; Salonen et al. 1982; Froelicher & Brown, 1981). Specific diseases related to regular physical activity in prospective, observational studies include cardiovascular disease, stroke, hypertension, type II diabetes, osteoporosis, obesity, breast cancer, anxiety and depression (Kesaniemi et al., 2001). Physical activity helps to control weight, contributes to healthy bones, muscles, and joints, and helps to relieve the pain of arthritis (Centers for Disease Control and Prevention, 2004). In general, those with moderate to high levels of physical activity or cardiorespiratory fitness exhibit lower mortality and morbidity that those leading sedentary lifestyles or who have low cardiorespiratory fitness (U.S. Department of Health and Human Services, 1996). The purpose of this chapter is to 1) discuss the public health significance and importance of physical activity and exercise; 2) provide an overview of worksite, physical activity programming; 3) present the provide a brief overview of the social cognitive theory,
upon which the present study is based; and 4) discuss the limitations, delimitations and study design of the current investigation.

**Public Health Significance of Physical Activity**

There is a growing body of research quantifying physical inactivity as a serious and expensive public health problem (Garrett et al., 2004). The costs associated with physical inactivity are borne by taxpayers, employers, and individuals in the form of higher taxes to subsidize public insurance programs and increased health insurance premiums (Garrett et al., 2004). The direct medical cost associated with physical inactivity was nearly 76.6 billion dollars in 2000 (Centers for Disease Control, 2004). In a study conducted by Anderson et al. (2005), physical inactivity, overweight, and obesity in adults were associated with approximately 23% of health plan health care charges and 27% of national health care charges. Charges associated with chronic disease risk factors were highest for the oldest age bracket (ages 65 and older) and for individuals with chronic conditions.

The economic impact of cardiovascular disease on the U.S. health care system continues to grow as the population ages. Specifically, coronary heart disease is a leading cause of premature and permanent disability in the U.S. workforce (O’Donnell, 2002). The cost of heart disease and stroke in the United States is projected to be 488 billion dollars in 2008 (Centers for Disease Control, 2008). This includes health care expenditures and lost productivity from death and disability. Since over 80 million Americans (almost one-quarter of the population) live with
cardiovascular disease, and over 6 million hospitalized each year are due to cardiovascular disease, physical inactivity is a serious public health concern (Centers for Disease Control, 2008).

**Physical Activity Recommendations**

In 1995, the American College of Sports Medicine and the Centers for Disease Control and Prevention published national guidelines on Physical Activity and Public Health (ACSM, 1998). The Committee on Exercise and Cardiac Rehabilitation of the American Heart Association endorsed and supported these recommendations. More than 10 years have passed since this recommendation was issued. Recently, the committee reconvened to update and clarify the 1995 recommendations on the types and amounts of physical activity needed by adults to improve and maintain health (Haskell et al., 2007). The development of the revised recommendations were conducted by an expert panel of scientists, including physicians, epidemiologists, exercise scientists, and public health specialists. The panel reviewed advances in physiological, epidemiological and clinical scientific data, including research and review articles published since the original recommendation was issued in 1995. The newly released physical activity recommendations for the general, adult population includes participating in moderate-intensity aerobic physical activity for a minimum of 30 minutes, five days per week, or vigorous-intensity aerobic physical activity for a minimum of 20 minutes, three days per week. In addition, every adult should perform
activities that maintain or increase muscular strength and endurance a minimum of two days each week (Haskell et al., 2007).

**Current Rates of Physical Activity**

Despite the proven benefits of physical activity, more than 50% percent of American adults do not get enough physical activity to provide health benefits (Gordon-Larsen et al., 2004). Physical activity participation is low and inactivity is high among the U.S. adult population (Jones et al., 1998; Crespo et al., 1996). The latest statistics report that less than half (49.1%) of U.S. adults met the CDC/ACSM physical activity recommendations. In 2007, almost 24% percent of adults reported no leisure-time activity (BRFSS, 2007).

Evidence shows that inactivity is more common among women than men. According to the Behavioral Risk Factor Surveillance Survey (2007), men are more likely to meet physical activity recommendations (49.7%) than women (46.7%). Additionally, younger people are more active than older people. Over the lifespan, physical activity rates decline and rates of inactivity increase (Casperson, Pereira, Curran, 2000). Approximately 60% percent of young people ages 18 to 24 meet the recommendations, while only 39% ages 65 and older meet the current recommendations (BRFSS, 2005).

There are racial and ethnic differences in physical activity rates. White, non-Hispanics were most likely to meet physical activity recommendations (52.3%), whereas 42% percent of Hispanics and 45% of African-Americans were meeting the
recommendations (BRFSS, 2007). Approximately 21% of Caucasians, 33% of African Americans and 37% of Hispanics do not participate in leisure time physical activity (BRFSS, 2005). Furthermore, people with a college degree were the most likely to meet physical activity recommendations (53.2%). Physical activity rates varied by those with some college education (50.2%), a high school education (45.9%), and less than a high school education (37.8%) (BRFSS, 2005).

There is also increasing evidence that time spent in sedentary, leisure-time behaviors, such as television viewing, reading and videogame playing, may pose a health risk that is independent of leisure-time physical activity (Salmon et al., 2000; Bradley, 2000; Kautiainen et al., 2005). Spending extended periods of time in sedentary behavior may result in decreased overall energy expenditure, increased risk of overweight and obesity, and increased risk of chronic diseases that are associated with inactivity and obesity (Epstein, 1998). Technology and economic incentives tend to discourage activity by reducing the energy needs for activities of daily living, and by paying more for sedentary rather than active work.

Background of Worksite Physical Activity Health Promotion

Because a majority of adults in the U.S. are not physically active to a satisfactory degree, physical activity promotion is relevant and important. In response to the current situation, there has been a growing call for population-wide interventions aimed at improving exercise involvement and commitment (Sallis et al., 1997). The worksite has been suggested as a favorable setting for the promotion of
exercise in the sedentary population because of the established channels of communication, existing support networks and opportunities for developing corporate norms of behavior (Shepard, 1995). Most adults spend up to 50 hours a week at work; consequently the workplace has a significant environmental influence on employee health (Shepard, 1995; Wellness Councils of America, 2008).

Physical activity programs have been an integral part of health promotion and disease prevention at the worksite for three decades (O’Donnell, 2002). Worksite physical activity programs can be an efficient way to increase employees’ physical activity or fitness (Dishman et al., 1998). Although many of the first programs were perks primarily offered to company executives, they provided the foundation for current physical activity efforts (O’Donnell, 2002). Worksites allow access to employees in a controlled environment through existing channels of communication and social support networks (Katz et al., 2005). Investigators can reach a large numbers of adults and have at least short-term effectiveness in increasing the physical activity and fitness of program participants. From 1979 to 1985, the percentage of companies with over 250 employees that had a formal fitness program increased from 2.5% to 32.4% (Karch, 1988). Physical activity programs offered to worksite employees almost doubled between 1985 and 1992 (Grosch et al., 1998). As of 1999, 46% of worksites with fifty or more employees offered physical activity and/or fitness programs through their health plans (Association for Worksite Health Promotion, 1999). Today, more than 81% of American businesses with 50 or more employees have some form of health promotion program, with exercise being the most popular
(Wellness Councils of America, 2008). Research on these programs has focused on cost-effectiveness, health benefits for participants and impact on organizational level variables, such as absenteeism, turnover and morale (Grosch et al., 1998).

The cost-effectiveness of worksite programming continues to grow (O’Donnell, 2002; Dishman et al., 1998; Pelletier et al., 1996; Gebhardt & Crump, 1990). Companies use fitness and exercise programs to tackle the rises in health care costs and increased deductibles (O’Donnell, 2002). In 1985, Herzlinger and Schwartz noted that companies were using fitness programs to combat the rise in health care costs, in addition to restructuring the health care system. These programs reduced employer costs for insurance premiums, disability benefits, and medical expenses (Bell and Blanke, 1992; Bly et al., 1986; Baun et al., 1986; Pelletier et al., 1996). In an earlier study conducted by Bly et al. (1986), worksites with an 18 to 30 month exercise program had lower health care costs than employees in the non-program companies. Baun et al. (1986) demonstrated that non-hospital cost differences were significantly higher for non-exercisers than exercisers.

Conversely, cost savings cannot always be identified in terms of health care savings. There are health-related benefits for those who enroll in exercise and fitness programs. Programs consisting of exercise classes and consultations on weight loss and stress management improved participant fitness, percentage of body fat and lean body mass, positive changes in blood pressure and decreases in coronary risk factors (Blair et al., 1986; Gebhardt and Crump, 1990; Shepard, 1996). Exercise programs also impact costly employee behaviors such as absenteeism, job performance and
turnover (O’Donnell, 2002). Earlier studies have shown positive results for significant reductions in absenteeism and less turnover in exercisers than non-exercisers (Leatt et al., 1988; Tsai et al., 1987; Bernacki & Baun, 1984; Cox et al., 1981).

The workplace may be an ideal setting for exercise promotion because multiple types of programs can be created and implemented to increase employee participation and adherence. Awareness programs, life-style modification programs and environmental changes can assist individuals in sustaining a physically active lifestyle. Worksites may opt to build walking paths, have onsite exercise facilities or offer discounts to local fitness facilities. The worksite also offers unique opportunities to enhance the social health of employees and their social networks. Corporate changes have included the development of buddy systems, and program participation has been greatest in studies with group exercise classes (Cady et al., 1995). Social relationships provide modeling for healthy lifestyle behaviors and motivation in the presence of change and uncertainty. The existing support networks in the workplace help to increase initial program participation and support maintenance of behavior change long-term (Shepard et al., 1996). These exposures to mass reach approaches and behavioral interventions in the workplace can potentially be more substantial than in other community settings (Dishman, 1998).

The collective evidence from previous research, however, shows the results are less than exemplary. Dishman (1998) conducted a quantitative analysis of the literature and concluded that worksite physical activity programs have a small, insignificant, positive effect on physical activity and fitness. Effect sizes were small,
and success rates varied from 50% to 60%. In Dishman’s meta-analysis, few studies used randomized control groups, participants self-selected themselves into the programs, long-term effects were not reported, there were multiple threats to the internal validity of the study, and the generalizability of the data was limited. The lack of demonstrable effectiveness of worksite interventions is explained by poor research design and measurement. The worksite may be a good setting for delivery of interventions, but may not be an ideal situation for conducting rigorous, high quality research (Dishman, 1998).

Overview of the Social Cognitive Theory

In 1986, Bandura published a comprehensive framework for understanding human social behavior and human behavior change (Bandura, 1986). This framework was an expanded version of the social learning theory, which was adopted in community, worksite and school health education studies in the late 1970s and 1980s. Albert Bandura’s version of the social learning theory, the social cognitive theory, has been useful when applied to health behavior and behavior change. The theory addresses both the psychosocial dynamics influencing health behavior and methods for promoting behavioral change.

In the theory, Bandura references the individual’s capabilities to symbolize the meanings of behavior, their ability to foresee the outcomes of given behavior patterns, to learn by observing others, to self-regulate behavior, and to reflect and analyze experiences among the critical personal factors that help determine whether or not a
particular behavior will occur in a particular situation (Bandura, 1986). Personal change is affected by whether people even consider changing health habits, whether they can enlist the motivation and perseverance needed to succeed should they choose to do so, and how well they maintain the changes they have achieved (Bandura, 1986). The principles of the social cognitive theory postulate that there are dynamic relationships among (1) personal factors in the form of cognitive, affective and behavioral events; (2) the social and physical environment; and (3) the behavior itself (Bandura, 1986). This is referred to as reciprocal determinism (Bandura, 1986). Reciprocal determinism states that a person can be both an agent for change and a respondent to change. These action, cognition and environmental factors operate interactively to produce changes (Bandura, 1997).

The social cognitive theory encompasses a set of factors that operate as regulators and motivators of established cognitive, social and behavioral skills. The constructs that comprise the social cognitive theory as formulated by Bandura (1977, 1986) include the environment, self-regulation, self-efficacy, social situation, behavioral capability, outcome expectations, outcome expectancies, observational learning, reinforcements, and emotional coping responses. The meaning of these constructs will be detailed in chapter two. A distinctive feature of the theory is the central role it assigns to self-regulatory functions. People’s behaviors are motivated and regulated by internal standards and self-evaluative reactions to their own actions (Bandura, 1986). Self-regulation is a constant influence on health related behavior change, and is an integral part of an individual’s ability to exert control over their
internal and external environment. At any given time, the constructs work together to engage or impede behavior. The relationships between the constructs are best identified in the context in which the desired behavior occurs. Health promotion through the social cognitive theory targets undesirable behaviors that can be changed by use of theoretical constructs.

**Research Hypotheses**

The following hypotheses were developed to address the exercise intervention research questions.

**Moderate Minutes of Exercise**

H<sub>0</sub> = There is no difference between groups on moderate exercise minutes at post-test.

H<sub>0</sub> = There is no difference between groups on moderate exercise minutes at follow-up.

H<sub>A</sub> = There is a difference between groups on moderate exercise minutes at post-test.

H<sub>A</sub> = There is a difference between groups on moderate exercise minutes at follow-up.

**Moderate Days of Exercise**

H<sub>0</sub> = There is no difference between groups on moderate exercise days at post-test.

H<sub>0</sub> = There is no difference between groups on moderate exercise days at follow-up.

H<sub>A</sub> = There is a difference between groups on moderate exercise days at post-test.

H<sub>A</sub> = There is a difference between groups on moderate exercise days at follow-up.
Vigorous Minutes of Exercise

\( H_0 = \) There is no difference between groups on vigorous exercise minutes at post-test.

\( H_0 = \) There is no difference between groups on vigorous exercise minutes at follow-up.

\( H_A = \) There is a difference between groups on vigorous exercise minutes at post-test.

\( H_A = \) There is a difference between groups on vigorous exercise minutes at follow-up.

Vigorous Days of Exercise

\( H_0 = \) There is no difference between groups on vigorous exercise days at post-test.

\( H_0 = \) There is no difference between groups on vigorous exercise days at follow-up.

\( H_A = \) There is a difference between groups on vigorous exercise days at post-test.

\( H_A = \) There is a difference between groups on vigorous exercise days at follow-up.

Additionally, the following hypotheses were developed to address the social cognitive theory research questions:

Self-Regulation

\( H_0 = \) There is no difference between groups on self-regulation scores at post-test.

\( H_0 = \) There is no difference between groups on self-regulation scores at follow-up.

\( H_A = \) There is a difference between groups on self-regulation scores at post-test.

\( H_A = \) There is a difference between groups on self-regulation scores at follow-up.

Self-Efficacy

\( H_0 = \) There is no difference between groups on self-efficacy scores at post-test.

\( H_0 = \) There is no difference between groups on self-efficacy scores at follow-up.
$H_A = \text{There is a difference between groups on self-efficacy scores at post-test.}$

$H_A = \text{There is a difference between groups on self-efficacy scores at follow-up.}$

*Family Social Support*

$H_o = \text{There is no difference between groups on family social support scores at post-test.}$

$H_o = \text{There is no difference between groups on family social support scores at follow-up.}$

$H_A = \text{There is a difference between groups on family social support scores at post-test.}$

$H_A = \text{There is a difference between groups on family social support scores at follow-up.}$

*Friend Social Support*

$H_o = \text{There is no difference between groups on friend social support scores at post-test.}$

$H_o = \text{There is no difference between groups on friend social support scores at follow-up.}$

$H_A = \text{There is a difference between groups on friend social support scores at post-test.}$

$H_A = \text{There is a difference between groups on friend social support scores at follow-up.}$

*Enjoyment of Exercise*

$H_o = \text{There is no difference between groups on exercise enjoyment scores at post-test.}$
H_o = There is no difference between groups on exercise enjoyment scores at follow-up.

H_A = There is a difference between groups on exercise enjoyment scores at post-test.

H_A = There is a difference between groups on exercise enjoyment scores at follow-up.

**Outcome Expectations and Expectancies**

H_o = There is no difference between groups on outcome expectations/expectancy scores at post-test.

H_o = There is no difference between groups on outcome expectations/expectancy scores at follow-up.

H_A = There is a difference between groups on outcome expectations/expectancy scores at post-test.

H_A = There is a difference between groups on outcome expectations/expectancy scores at follow-up.

**Limitations**

The limitations for this study are listed as:

1. The study utilized a volunteer sample.

2. The study utilized self-report instruments to collect exercise and social cognitive theory data.

3. Participants were recruited via all-staff emails, all-staff flyers, newsletters, health fairs and posters. Therefore, more motivated people may have contacted the investigator.
4. Exercise was completed on the participant’s own time. Exercise was unsupervised by the investigator. Therefore, over-reporting of exercise on the questionnaire could have occurred.

5. Participants were pre-screened for their activity status during the recruitment process. Participants could only be enrolled if they were in the contemplation or preparation stages of change. Therefore, all action stage of (potential) participant’s information could not be included in the analysis.

6. The separate-samples pre-test post-test group design, utilized in the current study, has threats to internal and external validity that will be discussed in chapter three.

7. The large amount of Caucasian, educated and married people may have impacted the results of the study differently than individuals from different backgrounds.

8. The high attrition rate by follow-up two may have limited the findings by limiting the power of the statistical tests.

9. The season in which the intervention was implemented (News Years) may have worked in recruiting more participants than a study that would be conducted another time of the year.

**Delimitations**

The following delimitations were set by the investigator:
The investigation included only employees at the participating worksites, between the ages of 18 to 65, who reported a health status that was sufficient to participate in exercise. Therefore, the results may not be generalizable to other types of worksites or environments.

**Definitions and Terms**

The following terms define the characteristics of exercise, distinguish between physical activity and exercise, and differentiate between moderate and vigorous intensity exercise. The terms were included in the intervention classes and assisted participants in developing their own exercise programs.

- **Physical Activity**: bodily movement that results in energy expenditure (CDC, 1996).

- **Exercise**: structured, repetitive, planned physical activity done to enhance health/fitness (CDC, 1996).

- **Dimensions of Exercise**: frequency (days), duration (minutes), type (activity) and intensity (moderate or vigorous).

- **Moderate Exercise**: continuous movement for ten minutes or more, which mildly elevates heart rate and breathing rate. Moderate exercise is classified at 3-6 METs (CDC, 1996).

- **Vigorous Exercise**: continuous movement for 20 minutes or more, which rapidly elevates heart rate and breathing is rapid and deep. Vigorous exercise is classified over 6 METs (CDC, 1996).

- **Insufficiently Active Employees**: participants who described their pre-program activity status, according to the Stage of Change Questionnaire used during recruitment, as in the contemplation or preparation stage of change.
The intervention materials were designed to emphasize the term exercise. The investigator stressed that exercise, not physical activity, was the major component of the program. The program was designed to increase insufficiently active employee’s self-reported duration and frequency of exercise; therefore, the program stressed the importance of exercise, which is structured, repetitive, planned physical activity done to enhance health/fitness. The definition of physical activity, however, was provided to the participants, so they had an understanding of the difference between the two terms. Understanding the difference between the two terms assisted them in designing their own exercise programs.

**Study Design**

The present study used the quasi-experimental, separate-sample, pre-test-post-test design (Campbell, Stanley, 1963, p. 53). Campbell and Stanley argue “that for large populations, it may often happen that although one cannot randomly assign subjects, the investigator can still exercise full experimental control over the when and to whom of the pre-test, employing random assignment procedures” (Campbell, Stanley, 1963, p. 53). The separate-samples, pre-test-post-test design allows the investigator to implement the treatment to every participant enrolled in the study, and then randomly assign participant instrument scores to one of two groups after the treatment has been delivered. Because of company restrictions, randomly assigning participants to the experimental or comparison conditions was not permitted. This design still allowed the investigator to use random assignment procedures. By
randomly assigning participant scores to one of two groups after the treatment was
complete, random assignment was still instituted. The Campbell and Stanley separate-
sample pre-test-post-test design is presented as:

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In the design, every participant in the study receives the treatment, and then
their scores are randomly assigned to one of the two groups. To detect treatment
effects, the post-test scores of the treatment group are compared to the pre-test scores
of the comparison group. Significant differences observed in the comparison are due
to the intervention.

**Purpose of the Study**

A problem encountered by worksite exercise programs is that they tend to
attract individuals who are highly motivated or are already physically active (Marcus
et al., 1998). This provides opportunities for exercise among already fit individuals
but does not reach the vast majority of sedentary employees who may be low in
motivation to change (Marcus et al., 1998). The purpose of the current study is to
evaluate a theory-based, educational, exercise, behavior change program. The BE
ACTIVE program was designed to increase insufficiently active, adult, employee’s
self-reported duration and frequency of exercise. The program was tailored to
employees who were not regular exercisers. The program was based on the social
cognitive theory constructs self-regulation, self-efficacy, social support, exercise
enjoyment and outcome expectations/expectancies. The intervention was designed for
a classroom-based, group setting and consisted of six, one hour, class sessions. A
second purpose of the study was to evaluate the impact of the intervention on the
targeted social cognitive theory constructs: self-regulation, self-efficacy for
overcoming barriers, social support for exercise, exercise enjoyment, and outcome
expectations and expectancies. Previously validated and reliable instruments were
used to measure the constructs. The components of the program were designed to
increase the social cognitive theory construct scores over the course of the study.

The investigation attempted to identify which social cognitive theory
constructs promote adoption and maintenance of a structured exercise program. The
application of theory to physical activity interventions indicates increased compliance
with and adherence to structured programs (Seedfelt et al., 2002). The study also
helps identify which constructs had an insignificant contribution to exercise
adherence. The present study sought to identify elevated post-test and one and three
month post-program adherence rates, due to the intervention, and demonstrate the
implications of an educational, theory-based, worksite, exercise intervention targeting
sedentary adults.
CHAPTER 2

LITERATURE REVIEW

Purpose of the Study

The purpose of the current study is to evaluate a theory-based, educational, exercise, behavior change program. The BE ACTIVE program was designed to increase insufficiently active, adult, employee’s self-reported duration and frequency of exercise. The program was tailored to employees who were not regular exercisers. The program was based on the social cognitive theory constructs self-regulation, self-efficacy, social support, exercise enjoyment and outcome expectations/expectancies. The intervention was designed for a classroom-based, group setting and consisted of six, one hour, class sessions. A second purpose of the study was to evaluate the impact of the intervention on the targeted social cognitive theory constructs: self-regulation, self-efficacy for overcoming barriers, social support for exercise, exercise enjoyment, and outcome expectations and expectancies. Previously validated and reliable instruments were used to measure the constructs. The components of the program were designed to increase the social cognitive theory construct scores over the course of the study.
Chapter two will be divided into four sections. The first section will describe current, adult physical activity rates in the United States. Physical activity rates will be presented on adult cohorts such as ethnicity and age. The second section will be a critical analysis of worksite, physical activity and exercise programming. This section will include a background on theory-based, worksite, physical activity and exercise interventions. Research studies that have been published in the professional literature will be examined in detail. Each study’s purpose, methods, measurement and results will be presented. The third section will be a presentation and critical analysis of the social cognitive theory. Specifically, this section will explain each theoretical construct, discuss the contribution to exercise behavior, examine the ability of the theory to predict physical activity, and identify the contribution that the social cognitive theory has had in exercise adoption and adherence interventions in the adult population. Research studies that have been evaluated and published in the professional literature will be examined. Study methods, measurement and results will be included.

Searches for theory-based, worksite, physical activity intervention studies were conducted using PsychLit and PubMed. Other reports were cross-referenced within research articles. Searches for workplace interventions using the social cognitive theory, or constructs of the theory, were conducted through PsychLit and PubMed. All intervention studies included in this chapter consisted of sedentary or low active adult populations. The studies were conducted in the workplace, and aimed at increasing participant physical activity levels. The descriptive studies included in this
chapter, used to describe and explain rates of activity and variance, were obtained through PsychLit, PubMed and cross-referenced within articles. The literature review was conducted using the key words: sedentary, inactive, low active, adults, worksite, physical activity, exercise, theory, social cognitive theory, intervention and program.

**Adult Rates of Physical Activity**

Physical health benefits of regular physical activity include increased muscle and bone strength, decreased body fat, improved weight control and aerobic fitness (Volek, Vanhees & Forsythe, 2005). Regular physical activity also enhances a sense of well-being, reduces the risk of developing depression and anxiety and improves mood (U.S. Department of Health & Human Services, 2000). Regular physical activity has demonstrated improvement in the health status of individuals with coronary heart disease, diabetes, colon cancer, osteoarthritis, and obesity (Brunet, Plotnikoff, Raine & Courneya, 2005; Sallis & Owen, 1999). In the United States, estimates of the annual cost in lives lost have ranged from 200,000 to almost 400,000 (Mokdad et al., 2004). Medical costs due to inactivity and its consequences were approximately seventy six billion in 2000 dollars (Pratt et al., 2000; Centers for Disease Control, 2004). To reduce this large health burden, public health recommendations have evolved to emphasize a lifestyle approach to increasing activity that includes lifestyle behaviors such as brisk walking, climbing stairs, doing house and yard work, and engaging in active recreational pursuits (Pate et al. 1995).
Based on the Behavioral Risk Factor Surveillance Survey data (2007), less than half (49%) of U.S. adults engage in recommended levels of physical activity during recreational pursuits. 38% percent of U.S. adults are insufficiently inactive, and almost 61% are inactive. A separate item on the BRFSS shows that almost 24% of U.S. adults do not engage in any leisure time physical activity (Centers for Disease Control & Prevention, 2007).

Data for recommended physical activity by educational group shows slightly diverging trends. The data shows a decline of almost eight percent for persons with fewer than 12 years of education, compared with an increase of nine percent for persons with a college education. Data by race/ethnicity shows slight improvements in rates of recommended physical activity for Caucasians and African Americans, yet shows a slight decrease for Hispanic adults. Despite the improvements made over the last decade, more than 50% of American adults do not get enough physical activity to provide health benefits (Centers for Disease Control & Prevention, 2005).

Seedfelt et al. (2002) cites that one of the most common barriers to physical activity is age. A common assumption is that habitual physical activity and positive attitudes toward activity during childhood continues through adolescence into adulthood, and that these behaviors result in an active lifestyle in adults. This misperception is evident in data obtained from the 2005 BRFSS for specific age cohorts. According to the survey, more than 60% of older adults are inactive (Centers for Disease Control & Prevention, 2005). Thirty-three percent of those between the ages of 18 to 24 engage in insufficient levels of physical activity. Thirty-eight percent
of 25 to 35 year olds and 39% of 35 to 45 year olds engage in insufficient amounts of activity. Forty-one percent of 45 to 65 year olds, and 35% of those over the age of 65 engage in insufficient activity levels (Centers for Disease Control & Prevention, 2005).

Gender plays a role in physical activity participation. Men were more likely to meet recommended levels than were women (27.1% versus 25.5%). Women, especially ethnic minorities and those in the lower socio-economic strata have routinely recorded lower rates of physical activity and exercise adherence than men in activity programs. 26% of females, and 22% of males report no leisure time physical activity (Seefeldt et al., 2002).

Physical activity disparities exist across education levels. 33% of those with less than a high school degree met the recommendations. However, 46% reported no leisure time activity. Forty-three percent who graduated high school met the recommendations; however, 31% reported no leisure time activity. Fifty-two percent of college graduates met the recommendations; 13% reported no leisure time physical activity (CDC, 2005). Racial and ethnic differences exist in physical activity rates as well. One of the most commonly cited reasons for inactivity is lack of access to suitable activity programs, concerns for safety and reduced opportunities for adequate healthcare (Seefeldt et al., 2002). Thirty-three percent of African Americans and nearly 21% of Caucasians do not engage in leisure time physical activity. Thirty-seven percent of Hispanics are physically inactive (Centers for Disease Control & Prevention, 2005). For minority women living in urban areas, physical activity rates
are extremely low. Only eight percent of African American women and 11% of Hispanic American women meet the physical activity recommendations set forth by the Surgeon General. Limited evidence suggests that physical inactivity may also be a problem among Asian Americans. Thirty-nine percent of Asians met recommended levels of lifestyle physical activity and approximately 24% were inactive during their leisure time (Morbidity & Mortality Weekly Report, 2004). Additionally, one important factor for the disparity in activity among ethnic groups may be the importance a culture or ethnic group places on being physically active (Giles-Corti, 2002).

Adult occupational and leisure time physical activity rates vary across occupational categories. A majority of the research has occurred outside of the United States, and is not included in this review. However, national research indicates that blue-collar employees typically exhibit lower rates of leisure-time physical activity (Burton & Turrell, 2000). Burton and Turrell (2000) reported that individuals in blue-collar occupations were approximately 50% more likely to be classified as insufficiently active during their leisure-time. While "lack of time" and "work demands" are commonly reported barriers to activity, the extent to which time-at-work mediates the relationship between occupation and leisure-time physical activity is unclear (Burton & Turrell, 2000).
Summary

Physical activity rates vary by age, gender, education and ethnicity. Younger populations (18-24) are more active than older populations (60 and over), and older adults are less likely to engage in leisure time physical activity. Sixty percent of older adults are inactive, while 33% of younger adults are inactive. Activity levels begin to decrease shortly after adolescence, and physical activity decreases with age.

Discrepancies among gender exist. Men are more likely to meet recommended levels than are women (27.1% versus 25.5%). Females are more likely to report no leisure time physical activity. Additionally, college graduates and those with an education are more likely to meet the recommendations and report more activity in their leisure time. Thirty-three percent of those with less than a high school degree met the recommendations, while 43% of high school graduates and 52% of college graduates met the recommendations.

Racial and ethnic differences occur in physical activity participation, with Hispanics and African-Americans reporting the lowest levels of physical activity. Thirty-three percent of African Americans do not engage in leisure time physical activity, whereas 21% of Caucasians do not engage in leisure time physical activity. Furthermore, research indicates that blue-collar employees typically exhibit lower rates of physical activity. Individuals in blue-collar occupations are approximately 50% more likely to be classified as insufficiently active during their leisure-time. This may be due to their high occupational activity, lack of time, or the physical demands of their jobs.
Worksite Physical Activity Intervention Programs

Physical activity has been an integral part of health promotion and disease prevention at the worksite for three decades (O’Donnell, 2002). The worksite has been suggested as a favorable setting for the promotion of exercise in sedentary populations because of the established channels of communication, existing support networks and opportunities for developing corporate norms of behavior (Shepard, 1996). Most adults spend up to one half of their weekdays at work, and spend about eight hours a day at the workplace (Katz et al., 2005; Wellness Councils of America, 2008). The workplace can have a significant environmental influence on employee health (Shepard, 1996), and offering physical activity programs at the workplace can be an efficient way to enhance employee’s physical activity or fitness levels (Dishman et al., 1998). Although many of the first programs were perks primarily offered to company executives, they did provide the foundation for current physical activity efforts (O’Donnell, 2002). Worksites allow access to employees in a controlled environment through existing channels of communication and social support networks (Katz et al., 2005). Investigators can reach a large numbers of adults and have at least short-term effectiveness in increasing the physical activity and fitness of program participants.

From 1979 to 1985, the percentage of companies with over 250 employees that had a formal fitness program increased from 2.5% to 32.4% (Karch, 1988). Physical activity programs offered to worksite employees almost doubled between 1985 and 1992. As of 1999, 46% of worksites with 50y or more employees offered physical
activity and/or fitness programs through their health plans. Large worksites were more likely to offer physical activity programs, although there was a significant variation in prevalence by industry classification (U.S. Department of Health & Human Services 1987, 1992). In 1999, 46% of worksites with 50 or more employees offered physical activity and/or fitness programs through their health plans. Thirty-eight percent of worksites with 500 to 100 employees offered physical activity programs; 42% with 150 to 250 employees offered programs; 56% with 250 to 800 employees offered programs; and 68% with more than 800 employees offered programs (Association for Worksite Health Promotion, 1999). Today, more than 81% of American businesses with 50 or more employees have some form of health promotion program, with exercise being the most popular (Wellness Councils of America, 2008). One of the goals for Healthy People 2010 is to increase the proportion of worksites offering employer-sponsored physical activity and fitness programs to 75% (Healthy People 2010).

Companies cite many reasons for participating in fitness and physical activity programs. Among these reasons are 1) health care cost-effectiveness; 2) health benefits for participants; and 3) impact on organizational level variables, such as absenteeism, turnover and morale (Grosch et al., 1998). Each of these items has the potential to impact company profits and insurance premiums.

Organizations have long recognized that physical activity and exercise programs have the potential to reduce employer costs for insurance premiums, disability benefits, and medical expenses (Bell and Blanke, 1992; Bly et al., 1986;
companies were using fitness and exercise programs to tackle and combat the rise in health care costs. In an earlier study conducted by Bly et al. (1986), worksites with an 18 to 30 month exercise program had lower health care costs than the non-program companies. Baun et al. (1986) showed that the non-hospital cost differences were significantly higher for non-exercisers than exercisers. Although no recent studies have been published, programs targeting employee and employer health care costs can be cost-effective, as evident from past research.

Companies implement fitness and physical activity programs to improve the health of their employees. Exercise classes and consultations on weight loss and stress management have resulted in improvements in fitness, percentage of body fat and body mass, positive improvements in blood pressure and decreases in coronary risk factors (Blair et al., 1986; Gebhardt and Crump, 1990; Shepard, 1996).

The cost savings for the company cannot always be identified in terms of program costs or health benefits paid. Rather, they can be derived from other costly behaviors such as absenteeism, job performance and turnover (O’Donnell, 2002). Earlier studies demonstrated significant reductions in absenteeism and less turnover in exercisers than non-exercisers (Leatt et al., 1988; Tsai et al., 1987; Bernacki & Baun, 1984; Cox et al., 1981). Recently, positive financial effects were shown for programs focusing on energy expenditure and cardiorespiratory fitness (Proper et al., 2004). In a subsequent study performed by Proper et al. (2004), although there were no statistically significant differences between groups, the mean sick leave in the
treatment group decreased as compared to the control group. Investigating the cost-effectiveness of physical activity programs helps to rationalize the costs and savings to the companies allocating budgets for these types of programs.

The workplace can be an ideal setting for exercise promotion because multiple types of programs can be created and implemented to increase employee participation and adherence. Awareness programs, life-style modification programs and environmental changes assist individuals in sustaining physically active lifestyles. Worksites may build walking paths, have onsite exercise locations or offer discounts to local fitness facilities. The worksite also offers unique opportunities to enhance the social health of employees and their social networks, and social relationships can provide modeling and motivation for healthy lifestyle behaviors. Corporate changes have included the development of buddy systems, and participation has been greatest in studies with group exercise classes (Cady et al., 1995). Employees who use these socially supportive networks may increase initial program participation, foster greater behavioral change, and maintain behavior change long-term (Shepard et al., 1996). Organizational support may also lead to restructured corporate norms of behavior (O’Donnell, 2002).

Multiple types of physical activity and exercise programs can be used in the worksite to increase employee participation and adherence. Employees can benefit at three functional levels (O’Donnell, 2002). Level one consists of awareness programs. Individuals sign up for the program, complete a health risk assessment, and obtain educational information on the health benefits of physical activity and exercise. Level
one programs generate interest and motivation, while providing participants with information on their current health status, risk of disease, and how physical activity can impact their health. Level two programs involve life-style modification. Programs include behavior modification techniques and direct participation to achieve long-term effects. Level two programs may include motivational prompts, incentives and exercise programs. Level three programs typically facilitate participation by creating an environment that assists individuals in sustaining the behavior. Social supports, environmental changes and policy alterations can aid in behavioral choices of individuals.

Determinants of Physical Activity in the Workplace

The determinants of employee participation in physical activity have not been the focus of previous literature reviews (Kaewthummanukul and Brown, 2006). Understanding the factors related to physical activity among employees is essential to establishing effective interventions. The design of such interventions must be based on the factors that influence employee adoption of physical activity. Kaewthummanukul and Brown (2006) published a review of the determinants of employee participation in physical activity. Eleven studies were identified in the review. They examined the demographic and cognitive-psychosocial factors that related to employee participation in worksite, physical activity programs.

Five of the seven studies that examined age found that the level of physical activity among employees decreased with age (Boutelle et al., 2000; Burns et al.,
1999; Burton & Turrell, 2000; Duffy et al., 1996; Piazza et al., 2001). Individuals who did not think about adopting exercise were more likely to be older, and those who actively engaged in exercise tended to be younger (Burn et al., 1999). Two out of three studies noted that gender influenced exercise behavior, with men being slightly more active than women (Biddle et al., 1994; Burton & Turrell, 2000). Most of the studies reviewed described the ethnicity of the sample, but only one study examined the association between level of exercise and ethnicity (Boutelle et al., 2000). The study found no clear relationship between ethnicity and exercise in either men or women. One study investigated education level. Male and female employees with more education engaged in more leisure-time physical activity (Boutelle et al., 2000).

As for the cognitive-psychosocial factors, self-efficacy was positively related to physical activity participation (Biddle et al., 1994; Desmond et al., 1993; Duffy et al., 1996; Pender et al., 1990; Piazza et al., 2001; Rabinowitz et al., 1992). Across the studies, self-efficacy was defined as confidence, personal competence and judgment or belief in the ability to perform the given behavior. The explained variance in studies that included self-efficacy ranged from seven percent to 38% percent. Perceived benefits and barriers were assessed in two studies (Rabinowitz et al., 1992; Biddle et al., 1994). Both studies found that perceived benefits of exercise was the best predictor; however, perceived barriers was not significantly associated with physical activity.

In order to establish effective physical activity interventions, it is important that researchers understand the factors related to physical activity among employees.
The worksite has been suggested as a favorable setting for exercise promotion in the sedentary population because of the established channels of communication, existing support networks and opportunities for developing corporate norms of behavior (Shepard, 1996). Exposure to mass reach approaches and behavioral interventions in the workplace can potentially be more substantial than in many other community settings (Dishman, 1998).

Numerous physical activity, exercise and fitness health promotion programs have occurred in the worksite setting. Reviews conducted by Shephard (1995), Dishman (1998) and Proper (2003) found aerobic exercise to be the primary outcome in a majority of the programs. Health outcomes were physiologically-oriented, including body mass, energy expenditure, skin folds, aerobic power, as measured by VO2 max, muscle strength, flexibility and blood pressure. While participant health outcomes can be appropriate and valuable information about employee health status, and can evaluate the success of a program based upon changes in these outcomes, it does not measure exercise adoption or long-term adherence. Recently, the application of theory to physical activity interventions indicates increased compliance with and adherence to structured programs (Seedfelt et al., 2002). Worksite physical activity interventions have incorporated theory and focused on behavioral skill development to increase physical activity participation and adherence rates. Although methods, measurement and results vary across studies, the following worksite interventions are
based on a theory or incorporate theoretical skill development in order to increase participant adoption and/or maintenance of an exercise program.

Blair and colleagues (1986) conducted a quasi-experimental study to increase regular vigorous physical activity over a two year period. The exercise intervention included an annual health screen with medical encouragement to initiate or maintain regular exercise, environmental changes to support regular exercise, and availability of exercise programs. Three comparison companies were offered a health screen only. Physical activity was assessed with a “lifestyle questionnaire”, a global self-estimate of exercise, and a seven day recall (Taylor et al., 1984; Blair et al., 1985). Physical fitness was measured by VO2 max on a bicycle ergometer. The program provided information on the benefits of exercise, a range of activities, facility locations, and health education and promotion campaigns. A high attrition rate (95.2% treatment; 94.3% control) was observed at the two year assessment. Almost 20% of women and 30% of men in the treatment companies began regular vigorous exercise over the two year period compared with seven percent and 19% in the health screen only companies, respectively. The one year and two year global self-rating assessment of exercise by treatment was higher than the health screen only group (p<.0001).

Marcus and Stanton (1993) evaluated the effectiveness of two strategies designed to increase levels of exercise program attendance (n=120) among previously sedentary, female worksite employees. In the 18 week intervention, a reinforcement schedule, including an attendance lottery and incentives, a relapse prevention condition, and a control condition were employed in a true experimental design.
Assessment of program attendance was conducted at study conclusion and two month follow-up. Follow-up exercise participation assessed type, frequency and duration of exercise but the measures were not reported. There was a 72% percent attrition rate. Two planned comparisons performed on attendance during the first half demonstrated a significant difference between the relapse prevention and control group (p<.01). The comparison between reinforcement and control was non-significant (p<.13). For the second half of the program, neither the relapse prevention (p<.24) nor the reinforcement versus control was significant (p<.45). At the two month follow-up, neither the relapse prevention (p<.17) nor the reinforcement versus control was significant (p<.94). Short-term maintenance and attendance was most successful for those subjects in the relapse prevention group (30 adherers) versus the reinforcement (27) and control conditions (24).

French and colleagues (1994) conducted an eight week study to examine the influence of self-reward contracting and facility access among sedentary (n=57) women at a workplace. A two by two factorial-randomized design was used. Self-reward and facility access were both dichotomized yes/no. The treatment groups included (1) facility access and no self-reward; (2) self-reward and no facility access; (3) facility access and self-reward and (4) a control condition. Outcome measures were taken at baseline, session eight and follow-up six months after the program. They included a seven day recall questionnaire, energy expenditure from weekly physical activity logs, frequency of sports facility use and a self-reward questionnaire. Facility access and self-reward were non-significant (p>.74, .49, respectively). All
groups reported significant increases in the use of the self-reward strategy over time (p<.01). A significant time effect indicated that all groups increased their physical activity levels (p<.0001), and were maintained through the six month follow-up.

A program designed by Lombard and colleagues (1995) called NoonTime Walkers (n=135) was designed to compare a highly-structured telephone prompt using goal setting and minimal feedback to a low-structured prompt on walking for exercise adherence. The two variables included the number of participants who walked at least twenty minutes in a week and the number of participants who met the ACSM recommendations for three, twenty to thirty minute bouts of aerobic activity per week. Participants were stratified by Stage of Change, and then randomly assigned to conditions. The five conditions included (a) control; (b) high frequency/low structure; (c) high frequency/high structure prompt; (d) low frequency/low structure prompt; and (e) low frequency/high structure prompt. The twenty-four week program consisted of three data collection periods. Data was collected each week in the form of activity logs (12), a one month of data collection at one month follow-up and two weeks of data collection at the three month follow-up. Telephone prompts began in week one and lasted through week twelve. Higher exercise levels were seen for participants in the treatment conditions (p>.0001). There was a significant effect for prompting (p<.0001), with the more frequently prompted participants performing better than those with minimal prompting. There was no significant difference for the prompt structure conditions (p<.9349). Forty-six percent of the participants in the high frequency prompting conditions were still adhering to the ACSM guidelines at six
months. There was an interaction between the frequency of the prompt and content of
the prompt, with the high frequency, high structure condition outperforming the high
frequency, low structure condition during the last weeks of the program (p<.006).

Cardinal and Sachs (1995) investigated the efficacy of mail-delivered, self-
instructional exercise packets designed to motivate, encourage and support female
employees (n=113) through the stages of exercise behavior. Stage of Change was
assessed at baseline, one month and seven months. Participants were stratified by
baseline stage and then randomly assigned to receive one of three mail delivered, self-
instructional, personalized written exercise packets. A lifestyle exercise packet (LEP)
encouraged participants to integrate more activity into their day, and was accompanied
by cognitive and behavioral activities tailored to each specific stage using the process
of change (Marcus et al., 1991). A structured exercise packet (SEP) encouraged
participants to follow the ACSM recommendations for frequency, intensity and
duration. The fitness feedback packet (FFP) informed subjects of their health status,
predicted body fat percentage and VO2 max. Stage of exercise improvement across
the three time periods was observed (p<.05). However, there were no significant
differences within or between the groups across the three time periods. At one month,
100 precontemplators advanced at least one stage, 50% of contemplators advanced
one stage, 24% in preparation advanced at least one stage and 41% of those in action
improved stages (p<.05). At seven months, 100% improved stages, 89% advanced
stages, 41% advanced stages and 41% improved stages, respectively (p<.05). Study
attendance was 81% for the LEP, 71% for FFP and 63% for SEP, suggesting that the LEP was favored over the other two groups.

A six week randomized control study was performed by Peterson (1997) in a worksite (n=2000) sample. Participants were randomly selected for recruitment, and volunteered if they were interested. Participants were assigned to three groups: a stage-matched newsletter group, a generic newsletter group, and a control group, which did not receive a newsletter. Outcome measures included the stage of change questionnaire and the seven day recall (Blair et al., 1985) to assess energy expenditure. At six weeks, there were significant differences between pre- and post-test physical activity among the three groups (p>.05). The stage-based newsletter group saw energy expenditure increase thirteen percent, the generic newsletter group increased one percent, and the control group decreased by eight percent. The stage-based group was 2.1 times more likely to increase one stage than the control group (p<.0001). In the stage-based group, sixty percent remained in their current stage, 33% progressed and seven percent relapsed back a stage. The investigators noted that 93% of the treatment group read the newsletter material as opposed to 79% in the generic newsletter group.

Hallam and Petosa (1998) examined the impact of a four session worksite intervention on the social cognitive variables self-efficacy, outcome expectancy for exercise and self-regulation for exercise, which included reinforcements, social support, goal setting, self-monitoring, time management and relapse prevention. Participants (n=86) in the treatment group attended one hour education sessions. The mean change scores increased for self-monitoring (16%), goal setting (21%), social
support (10%), reinforcements (13%), time management (15%) and relapse prevention (13%). A significant increase was found for self-monitoring, goal setting, social support, reinforcements, time management, relapse prevention and outcome expectations in the treatment group (p<.0001). Outcome expectancies increased (2%) but was not significant.

A study using the stage of change was conducted by Marcus and colleagues (1998). Using a randomized controlled trial, the investigators evaluated whether individuals who received a self-help intervention tailored to their stage of exercise would be more likely to progress motivationally and/or behaviorally to exercise adoption compared to those receiving a standard self-help intervention. The promotion materials were given to participants (n=1,559) at baseline and again one month later. Stage of change was assessed at baseline and three months, as well as the seven day physical activity recall (Blair et al., 1984). Nine hundred employees completed the intervention. A chi square analysis revealed that more participants in the motivationally tailored condition demonstrated stage progression (37% versus 27%). More participants in the standard group displayed stage stability (58% versus 52%). Motivational stage of exercise was significantly correlated with baseline (r=.72, p<.001) and post-test (r=.62, p<.001) self-reported physical activity. Stage movement was significantly associated with changes in minutes of self-reported exercise per week (p<.001).

Cole and colleagues (1998) and Hammond and colleagues (2000) published articles evaluating the same physical activity program conducted at the Centers for
Disease Control and Prevention. They evaluated the short-term effects of a fifty day worksite program designed to promote regular, moderate physical activity (n=1,192). A one group pretest, posttest design was used to ascertain stage of change movement due to a process of change intervention. Assessments taken before and after the intervention included the Stage of Change questionnaire to indicate current participant levels of physical activity. There was no follow-up measure. Management support, peer leadership, a goal setting contract, social support and a multilevel incentive program were aspects of the intervention. Seventy-eight regressed one or more stages, almost 400 did not regress or progress stages, and over 400 employees progressed one or more stages during the intervention. Eight-six percent of contemplators and 64% of preparers reported forward movement, and 34% of participants in action moved into the maintenance stage.

Nichols and colleagues (2000) conducted a study evaluating the effects of a three month behavioral skills training, focusing on social support, self-efficacy, benefits and barriers to exercise and enjoyment. The participants (n=64) were randomized into a treatment or control group. The treatment condition was encouraged to participate in a twelve week exercise program at a local organization and attend behavioral skill classes. The control group received a three month membership to the same facility but did not receive the behavioral skill classes. Exercise was measured weekly using the seven day physical activity recall, and follow-up was assessed at three and nine months post-program. There was an increase in moderate (p=.008) and vigorous activity (p=.001) for both groups, but there was no
statistical significance between the two groups. Although there was no significant differences, effect sizes due to the intervention were still relatively moderate to moderately-high for moderate ($p=.23, r^2=.71$) and vigorous ($p=.41, r^2=.40$) physical activity. Social support decreased in the intervention group ($p=.05$) relative to the control group. The overall effect size resulted in an $r^2=.32$. Exercise self-efficacy was not significant ($p=.45$) and there was a small effect size ($r^2=.19$). There was a moderate effect for enjoyment of exercise ($r^2=.50$).

Proper and colleagues (2003) conducted a study to determine the effects of an individual counseling intervention on workplace physical activity and health. A randomized trial (n=299) was implemented over a nine month period. The intervention group was offered seven counseling sessions, based on the individual’s Stage of Change using the PACE (Patient Assessment and Counseling for Exercise) physical activity protocols (Patrick et al., 1994; 1996). Outcome assessments included a two week physical activity recall based on the public health recommendations and energy expenditure was calculated using the seven day recall (Taylor et al., 1984; Sallis et al., 1985; Dishman et al., 1988). Physical activity during sports, cardiorespiratory fitness, body composition and blood pressure were included in the measurement. There was no significant effect on the proportion of participants that met the recommendations of moderate physical activity (OR=1.46). In the intervention and control groups, twenty-three and nineteen percent, respectively, changed from “not active enough” to “active”. Intervention participants showed a slight increase in energy expenditure over time, although not significant ($p=.281$),
while control participants decreased their energy expenditure. Leisure time physical activity based on health recommendations was not significant (p=.244) for the intervention group. Energy expenditure for intervention effectiveness was positive (p=.003). A positive effect was found for some of the attributes of the program; however, no effects were observed for changes in moderate intensity physical activity.

White and Ransdell (2003) examined the effectiveness of a university-based worksite intervention of physical activity in which behavior change strategies were combined with various physical activities in a sample (n=30) who had been previously sedentary. The participants were recruited via email for the 12 week intervention, with meetings twice a week. Intervention sessions included benefits and barriers to exercise, goal setting, self-monitoring, outcome expectations and physical activity sessions. The Cooper Aerobics Clinic Longitudinal Physical Activity Questionnaire was used, as well as the Physical Self-Perceptions profile and the Exercise Benefits and Barriers Scale. There was no report of physical activity or exercise, although energy expenditure and physiological measures were used. There was a significant increase in the amount of physical activity performed at the end of the intervention (p=.009) compared to the amount performed prior to the intervention. Participants reported a significant decrease in the number of barriers to physical activity at the end of the program (p=.02), but benefits to exercise was non-significant.

Chan and colleagues (2004) implemented a pedometer-based physical activity program in sedentary participants (n=106) in five worksites. The pedometers were used to provide feedback to participants, as motivational devices and objective
evaluative changes in physical activity. The program was divided into two phases, an adoption phase of four weeks and an adherence phase of eight weeks. Participants also received six hours of cognitive and psychosocial learning, including goal setting and overcoming relapse and barriers. During the adherence phase, participants monitored their progress. At baseline, participants averaged a little over seven thousand steps per day. During the study, the mean change in steps per day was 3,451, resulting in an average plateau of 10,480 steps per day. The time it took for participants to reach the plateau varied from three to six weeks. A majority of the participants increased their activity and sustained it for the duration of the program.

A study conducted by Griffin-Blake & DeJoy (2006) evaluated and compared the effectiveness of an eight week, minimal-contact, stage-matched versus social-cognitive theory intervention in a worksite setting. The randomized trail (n=208) involved worksite employees from a large university. The seven day recall of physical activity was used to assess the duration and intensity of participant’s physical activity. A follow-up assessment was conducted at one month. Social cognitive outcome measures included self-efficacy, outcome expectancy and goal satisfaction. Significant main effects were found for stage movement for three psychological constructs: decisional balance, self-efficacy (p<.05) and goal satisfaction (p<.01). The two treatment conditions did not differ on self-efficacy, outcome expectations or goal satisfaction. Interpretation of the stage movements main effect for goal satisfaction was qualified by a significant stage movement by time interaction (p<.01). Perceived goal satisfaction decreased from pretest to post for those who regressed stages (p<.01)
but increased from for those who progressed stages (p<.01). The two compared
conditions produced similar overall results, as there were no systematic differences
between the two intervention groups; they were equally effective in moving
participants to higher levels of motivational readiness.

In a study conducted by Green et al. (2007), The American Cancer Society's
Active for Life worksite wellness program was implemented in a nonprofit health care
company (n=565). The intervention included goal-setting, self-monitoring, incentives,
and a team competition. Self-reported physical activity was measured using the Godin
Weekly Leisure Time Exercise Questionnaire (Godin, 1985). This questionnaire
measures frequency of strenuous, moderate or mild physical activity of at least fifteen
minutes in duration. Physical activity was also measured using METS and the Stage
of Change Questionnaire. Changes in physical activity were assessed at baseline, after
the ten week intervention, and at six months. Changes in self-monitoring and goal
setting were not measured. At ten weeks, all physical activity measures increased
significantly. At baseline, 24% percent of participants were sedentary
(precontemplation or contemplation), 23% were planning to start becoming active
(preparation), and 36% percent participated in some physical activity but less than the
recommendations. At post-test, those who were sedentary decreased from 23% to six
percent (p<.001). Those meeting the CDC guidelines increased from 34% to 48%
(p<.001). Exercise METS increased by 27%, from 35.2 to 44.7 METS units (p=.04).
The six month measures, however, were not significantly different from baseline.
Sedentary participants did decrease to 19%. The proportion meeting the guidelines
increased to 39%, and exercise METS decreased to 33.1 METS units. Although the
 ten week program increased physical activity, these changes were not sustained over
time.

Summary

Fifteen intervention studies were identified in the adult, worksite population
that attempted to increase physical activity and exercise levels. The studies were
chosen because the interventions included theoretical constructs, were experimental or
 quasi-experimental interventions, targeted sedentary and low active employees, and
aimed at increasing participant physical activity and exercise levels during leisure
time. Ten studies used random assignment, three studies were quasi-experimental
(Blair et al., 1986; White and Ransdell, 2003; Green et al., 2007) and three studies
used a one-group design (Cole et al., 1998; Hammond et al., 2000; Chan et al., 2004).
Overall, a majority of the studies reported short-term increases. However, due to the
differences among the methods and results, it is difficult to make conclusions.
Physical activity program time frames ranged from four weeks to two years. Studies
that tended to be shorter in duration (< 6 months) resulted in significant, positive
treatment effects, but varied in their methods and measurement (French et al., 1994;
Cole et al., 1998; Hallam and Petosa, 1998; Hammond et al., 2000; Nichols et al.,
2000; White and Ransdell, 2003; Chan et al., 2004; Green et al., 2007). Follow-up
assessments ranged from one month to one year; however, long-term effects in a
majority of the studies are unknown because follow-up assessments were not
conducted (Blair et al., 1986; Marcus and Stanton, 1993; Lombard et al., 1995; Peterson, 1997; Cole et al., 1998; Hammond et al., 2000; White and Ransdell, 2003; Chan et al., 2004; Griffin-Blake and DeJoy, 2006; Green et al., 2007). Results varied for those that did report post-intervention and long-term follow-up. Studies used a variety of instruments to measure activity levels. Therefore, it is difficult to compare measurement methods and the resulting outcomes. Effect sizes were not reported in any of the studies except for Nichols (2000) ($r^2=.32-.71$). Positive construct assessment tended to favor self-regulation and self-efficacy, although this did not occur in all cases. Overall, the outcome of worksite exercise programs has been less than optimal; therefore, future interventions should focus on limiting the inconsistencies across studies so that conclusive evidence exists for theoretically-based, worksite, physical activity interventions.

**Overview of the Social Cognitive Theory**

In 1986, Bandura published a comprehensive framework for understanding human social behavior and human behavior change (Petosa et al., 2003), the social cognitive theory. The social cognitive theory is used as a framework for understanding and integrating organizational and individual approaches to health behavior change (Baronowski, Perry & Parcel, 2002). The theory addresses both the psychosocial dynamics influencing health behavior and methods for promoting behavioral change. Bandura includes the individual’s capabilities to symbolize the meanings of behavior, their ability to foresee the outcomes of given behavior patterns,
to learn by observing others, to self-regulate behavior, and to reflect and analyze experiences among critical personal factors that help determine whether or not a particular behavior will occur in a particular situation (Bandura, 1986). A distinctive feature of the theory is the central role it assigns to self-regulatory functions. Self-regulation is a constant influence on health related behavior change, and is an integral part of an individual’s ability to exert control over their internal and external environment.

When evaluating the role of intention in human behavior, one must distinguish between the personal production of action for an intended outcome and the effects carrying out that course of action actually produce (Bandura, 1997). The theory distinguishes among three basic processes of personal change: the adoption of new behavior patterns, their generalized use under different circumstances, and their maintenance over time (Bandura, 1986). Personal change is affected by whether people even consider changing health habits, whether they can enlist the motivation and perseverance needed to succeed should they choose to do so, and how well they maintain the changes they have achieved (Bandura, 1986).

The principles of the social cognitive theory postulate that there are dynamic relationships among (1) personal factors in the form of cognitive, affective and behavioral events; (2) the social and physical environment; and (3) the behavior itself (Bandura, 1986). This key construct is referred to as reciprocal determinism. Action, cognition and environmental factors operate interactively to produce changes (Bandura, 1997). These interactions are a continuous and dynamic process that
influences each other simultaneously. A change in one component has implications for change in the others (Bandura, 1978, 1986). For example, if a characteristic of the person, environment or behavior changes, the situation changes, and the behavior, situation and person are re-evaluated. Figure one presents the model of reciprocal determinism that is the foundation of the social cognitive theory.

**Figure 2.1: Reciprocal Determinism as illustrated by the social cognitive theory**

Reciprocal determinism does not portray symmetry in the strength or bidirectional influences, nor is the patterning and strength of mutual influences fixed. The relative influence exerted by the three sets of interacting factors will vary for different activities, different individuals and different circumstances (Bandura, 1997).
The environmental factors included in this model are factors outside of the individual. A number of variables may compose an environment, and people create, alter and destroy their environment by their actions (Bandura, 1997). The behavioral component refers to characteristics of the behavior itself. A person must know how to perform the behavior and then decide whether it is beneficial for them to make the behavior change. The personal factors that affect initiating behavior change include age, gender, cognitive abilities, attitudes or beliefs about the behavior, and past events that occurred, for example, in childhood. Reciprocal determinism does not demand that all the interacting constituents be studied at once. However, it may be advantageous to develop programs that do not focus on behavior alone, but focus on changes in the environment and in the individual as well (Glanz et al., 2002).

The social cognitive theory encompasses a large set of factors that operate as regulators and motivators of established cognitive, social and behavioral skills. The constructs that comprise the social cognitive theory as formulated by Bandura (1977, 1986) include self-regulation, self-efficacy, social situation, behavioral capability, outcome expectations/outcome expectancies, observational learning, and reinforcements.

**Self-Regulation**

The construct self-regulation requires the development of self-regulatory skills and operates through a set of sub-functions that must be developed and mobilized for self-directed change (Bandura, 1977). Maintenance of a habit change relies heavily on
self-regulatory capabilities and the functional value of the behavior. Supports for self-regulation include personal benefits, social rewards and modeling supports. Self-regulation provides individuals with continuing personalized guidance and informative feedback that enables them to exercise considerable control over their own behavior change. Self-regulation operates through three main sub-functions: self-monitoring, goal setting, and the enlistment of self-incentives for personal change, also known as self-reward (Bandura, 1986; Kanfer & Gaelick, 1986). Self-monitoring is a skill that requires one to monitor their own behavior development if they choose to adapt and adhere to a habit change. Self-directed change requires setting goals for motivation and guiding one’s efforts. Goals may consist of sub-goals, which provide incentives, self-evaluation and guides for action, and can produce self-satisfactions that may sustain one’s effort at personal change along the way. Self-incentives are used by an individual to reward themselves for skill improvement and building competencies that improve their everyday life. One type of self-reward is encouragement, either socially or personally. Social encouragement fosters adherence to high performance standards (Brownell et al. 1977), while personal encouragement can help motivate the individual to continue the behavior.

Sallis and colleagues (1986) attempted to identify the predictors of both adoption to and maintenance of physical activity over a one year period in a community sample of adults (n=1,411). A scale was used to assess self-control of habits (self-regulation) and self-efficacy. Measures of moderate and vigorous activity were assessed at pre- and post-test. Moderate activity was defined as self-reported
“usual” participation in stair use, parking further from a destination and walking during or after meal hours. Vigorous activity was defined as regularly participating in jogging or running, strenuous play or sport, bicycling or swimming in the previous three months. Participants were rated as having moderate or vigorous self-efficacy, depending on which activities they preferred to perform. Univariate tests were used to identify variables that predicted changes in reported physical activity. Adoption of vigorous activity was predicted in men and women by attitude, self-efficacy and participation in moderate activity (p<.0001). Maintenance of vigorous activity was predicted by self-control (self-regulation), attitudes and self-efficacy, but attitude was the only variable that predicted both sexes (p<.0001). Adoption of moderate activity was predicted by health knowledge and self-efficacy. Maintenance of moderate activity was predicted by self-control and self-efficacy (p<.0001). Rated self-control predicted decreases in physical activity in women (p<.01), while self-efficacy for moderate and vigorous physical activity predicted increases in activity for men (p<.0007).

A study conducted by Rovniak and colleagues (2002) examined a model of the variables social support, self-efficacy, outcome expectations and self-regulation. In a sample of university students (n=277), outcomes were measured and used to predict physical activity eight weeks later. Within the model, self-efficacy had the greatest total effect on physical activity (B=.71, p<.001), mediated largely by self-regulation (B=.57, p<.05) which directly predicted physical activity. The complete model of the
social cognitive theory variables explained 55% of the total variance observed in physical activity.

Petosa, Suminski and Hortz (2003) tested the ability of social cognitive theory to predict vigorous physical activity in college students (n=350). The social cognitive theory constructs include social support, self-regulation, outcome expectancy value, self-efficacy, exercise role identity and positive exercise experience. Vigorous physical activity was tracked for four weeks after the constructs were measured. Correlations between self-regulation and total days of vigorous physical activity resulted in an r=.405. Self-regulation accounted for slightly over seven percent of the variance.

Annesi (2004) attempted to estimate the relationship between social support, self-management and overcoming barriers to exercise maintenance in adults (n=178). The relationship between self-management and exercise maintenance resulted in an r=.39 (p<.01). Stepwise regression enhanced the prediction of length of exercise program maintenance and together accounted for 43% of the variance.

**Self-Efficacy**

Self-efficacy, which is referred to as perceived self-efficacy, is a self-evaluative judgment about one’s abilities related to performance attainments. It occupies an important role because it acts upon the other constructs and has been a significant predictor of adherence to habit change. Bandura has expressed multiple times (1977, 1978, 1982, 1986, 1997) that self-efficacy is the most important
prerequisite for behavior change because it affects how much effort is invested in a given task and what level of performance is attained. It has been operationally defined to mean the confidence an individual has to overcome barriers to performing a behavior. Self-knowledge about one’s own self-efficacy is based upon four principle sources: performance attainments, vicarious experiences, verbal persuasion, and physiological states from which people partly judge their capableness and strength. Performance attainments, or mastery accomplishments, involve building a sense of self-efficacy through mastery experiences acquiring cognitive, behavioral and self-regulatory skills for executing effective courses of action to overcome barriers. Vicarious experiences involve the observation of the performance of another, what is referred to as social modeling. The ability to learn by social modeling provides a highly effective method for increasing human knowledge and skills (Bandura, 1994). The third principle, verbal persuasion, is referred to as social persuasion. It is widely used to try to talk people into believing they possess the capabilities that will enable them to achieve what they seek. Finally, the physiological state of the individual helps them judge their own capabilities. People read their arousal and physiological cues in situations. In physical types of activities, people are aware of the immediate outcomes of performing the activity.

Sallis and colleagues (1989) conducted a second study attempting to identify and compare the correlates of vigorous exercise and the effects of potentially modifiable correlates derived from the social cognitive theory in a sample of community adults (n=2,053). Participants were categorized into gender and age
groups (those over and under the age of fifty). Self-report vigorous exercise was assessed using a global recall of vigorous exercise by asking respondents to compare their activity level with other people of the same age and sex. Variables from the social cognitive theory included self-efficacy, modeling, family and friend support, perceived benefits and perceived barriers. Correlations between the dependent variable vigorous exercise and self-efficacy resulted in an $r=.48$. The authors then chose to omit self-efficacy from the regression model because they were interested in the variables that preceded self-efficacy. Significant variables included perceived barriers, modeling, friend support and perceived benefits. Effect sizes ranged from 25% to 34% of the variance, with 34% including self-efficacy.

The relationship between outcome expectations and self-efficacy was tested in a sample of college students ($n=254$) in a study conducted by Dzewaltowski et al. (1990). The purpose was to predict physical activity participation four weeks after initiation. The study investigated the prediction of future physical activity as well as the prediction of physical activity while controlling for past behaviors. Self-efficacy significantly predicted physical activity ($B=.23, r^2=.168$), as did self-evaluation of behavior ($B=-.21, r^2=.168$). Self-efficacy was the only significant social cognitive theory predictor for physical activity ($r^2=.168$) while controlling for past behaviors.

Sallis et al. (1992) examined the determinants of vigorous physical activity in a community sample of adults ($n=1,739$) over a 24 month period. The model included cognitive, social and environmental variables such as social support, perceived benefits, perceived barriers, neighborhood environment, self-efficacy, exercise history,
age and education. Vigorous physical activity was assessed by asking participants to recall the number of times per week they usually engaged in vigorous activity, and how many months during the two year study did they meet the weekly American College of Sports Medicine recommendations for vigorous activity. The results indicated a substantial change in vigorous physical activity over the 24 month period. Twenty-five percent of the sample reported increasing and 16% reported decreasing their vigorous exercise. At baseline, 21 variables accounted for two percent of the variance, and self-efficacy was the only significant predictor (p<.001) for exercise change. Months active showed an eight percent variance in exercise at baseline. At post-test, the significant model variables included self-efficacy (p<.001).

Rodgers and Brawley (1996) examined the influence of outcome expectancy and self-efficacy on the behavioral intentions of novice exercise (n=52). The purpose was to examine whether incentives, defined as the product of outcome expectancy and outcome value, would help to predict the behavioral intentions when coupled with self-efficacy. Self-efficacy made a significant, independent contribution to the model (B=.25, p=.03). The model of incentive, which included physical health outcomes, behavioral and self-efficacy, accounted for 32% of the variance in future exercise intentions. At post-program, the physical health outcome and self-efficacy accounted for 33% of the variance in exercise intentions for the month following.

A study conducted by Rovniak and colleagues (2002) examined a model of the variables social support, self-efficacy, outcome expectations and self-regulation. In a sample of university students (n=277), outcomes were measured and used to predict
physical activity eight weeks later. Within the model, self-efficacy had the greatest total effect on physical activity (B=.71, p<.001), mediated largely by self-regulation (B=.57, p<.05) which directly predicted physical activity. The complete model of the social cognitive variables explained 55% of the total variance observed in physical activity.

Bourdeaudhuij and Sallis (2002) attempted to identify correlates for specific age and sex groups in a study of three random samples of adults (n=2,390). The purpose was to quantify the variance accounted for in each subgroup by social influences, self-efficacy, perceived benefits and perceived barriers. The age groups consisted of randomly selected 16 to 25 year olds, 35 to 45 year olds and 50 to 65 year olds. The factors varied in importance by age and sex. Multiple regression analysis for sixteen to twenty-five year olds resulted in a full statistically significant model accounting for twenty-two percent of the variance, and a full model minus perceived barriers accounting for thirteen percent of the variance. The total models accounted for 22% of the variance for males and 13% for females. For 35 to 45 year olds, all factors were significant for men except for perceived barriers, and for females, social influences and self-efficacy were found to be statistically significant. Both models accounted for 16% of the variance for both men and women. In 50 to 65 year olds, the model accounted for 23% of the variance in men and 16% in women. For males, social influences and self-efficacy were significant contributors, while social influences, self-efficacy and perceived barriers were significant for females.

Petosa, Suminski and Hertz (2003) tested the ability of social cognitive theory
to predict vigorous physical activity in college students (n=350). The social cognitive theory constructs include social support, self-regulation, outcome expectancy value, self-efficacy, exercise role identity and positive exercise experience. Vigorous physical activity was tracked for four weeks after the constructs were measured. Correlations between self-efficacy and total days of vigorous physical activity resulted in an r=.40. The constructs in the model accounted for a little over 27% of the variance in vigorous physical activity. Self-efficacy accounted for four percent additional variance in the model.

Annesi (2004) attempted to estimate the relationship between social support, self-management and overcoming barriers to exercise maintenance in adults (n=178). Overcoming barriers related to exercise maintenance resulted in an r=.60 (p<.01). Stepwise regression enhanced the prediction of length of exercise program maintenance and together accounted for 43% of the variance.

Rhodes & Plotnikoff (2005) investigated the predictive ability of the social cognitive theory on vigorous physical activity in adults after six months while comparing the data to a cross-sectional survey reporting the same information. The study included a baseline measure, a six month follow-up and an additional follow-up six months later (n=703). There was a significant difference in vigorous physical activity across the three assessments (p<.01). None of the social cognitive variables use to predict behavior differed across the six month interval. Across the constructs used to predict six month exercise behavior, self-efficacy resulted in an r=.48. Significant correlations for stability for the six month time period in self-efficacy
resulted in $r^2 = .43$. The results supported the relative temporal stability of the social cognitive theory and physical activity and behavior.

Reinforcements

Reinforcements are the consequences of behavior. Behavior has a greater probability of occurring in the future if reinforcement is frequent and is provided soon after the desired behavior (McKenzie & Smeltzer, 1997). Positive and negative reinforcements exist, as well as internal and external reinforcements. External reinforcement is the occurrence of an event that is known to have predictable reinforcement value. Internal reinforcement is a person’s own experience or perception that an event had some value. There are three types of reinforcements: direct reinforcement, vicarious reinforcement and self-reinforcement (Baronowski et al., 2002). Direct reinforcements can be conceptualized as operant conditioning, where a behavior is controlled by its immediate consequences. Vicarious reinforcements can occur in observational learning, and observed behavior offers rewards and punishments which alter the observer’s thoughts. Self-reinforcement is the process in which individual’s enhance and maintain their own control whenever they attain self-prescribed standards (Bandura, 1977).

Outcome Expectations

Outcome expectations are the anticipated aspects of behavior that are categorized to include detrimental or beneficial physical effects, positive and negative social consequences and internalized self-incentives (Bandura, 1992). They are the
expected benefits and costs of performing a behavior (Prodaniuk et al., 2004).

Outcome expectations can take three major forms: physical effects that accompany the behavior, social effects from partaking in the said behavior, and the self-evaluative reactions to one’s own behavior. Within each form, the positive expectations serve as incentives and the negative expectations serve as discouragement. When an individual learns that certain events are likely to occur in response to the person’s behavior in a particular situation, they then expect those events to occur when the situation reoccurs.

Outcomes can be categorized as to whether they are experienced from an acute bout of activity or chronic participation. Expectations are learned in four ways: (1) from previous experience in similar situations; (2) from observing others in similar situations; (3) from hearing about these ideal situations from other people or social persuasion; and (4) from emotional or physical responses to behaviors (Glanz, Rimer & Lewis, 2002).

A study conducted by Rovniak and colleagues (2002) examined a model of the variables social support, self-efficacy, outcome expectations and self-regulation. In a sample of university students (n=277), outcomes were measured and used to predict physical activity eight weeks later. Outcome expectations had a minimal effect (B=.21, p>.05) on physical activity, and was not significant. The complete model of the social cognitive variables explained 55% of the total variance observed in physical activity.
Outcome Expectancy

Outcome expectancy is the value a person places on a particular outcome. It is a value judgment of the likely consequences such performances will produce (Bandura, 1997). Based on past experiences, individuals can expect certain outcomes to occur as a result of a particular behavior in a given situation (Bolles, W., 1972). Behavior can be predicted by the combination of outcome expectancies and the corresponding outcome value. Outcome expectancies influence behavior both negatively and positively. Outcome values moderate the effect of outcome expectancy on behavior (Williams et al., 2005). Positive outcome expectancy increases behavior and negative outcome expectancy decreases behavior.

Rodgers and Brawley (1996) examined the influence of outcome expectancy and self-efficacy on the behavioral intentions of novice exercise (n=52). The purpose was to examine whether incentives, defined as the product of outcome expectancy and outcome value, would help to predict the behavioral intentions when coupled with self-efficacy. The model of incentive, which included physical health outcomes, behavioral and self-efficacy, accounted for thirty-two percent of the variance in future exercise intentions. At post-program, the physical health outcome and self-efficacy accounted for 33% of the variance in exercise intentions for the month following.

Petosa, Suminski and Hortz (2003) tested the ability of social cognitive theory to predict vigorous physical activity in college students (n=350). The social cognitive theory constructs include social support, self-regulation, outcome expectancy value, self-efficacy, exercise role identity and positive exercise experience. Vigorous
physical activity was tracked for four weeks after the constructs were measured. Correlations between outcome expectancy and total days of vigorous physical activity resulted in an $r = .24$. Outcome expectancies explained an additional four percent of the model ($r^2 = .069$).

Social Support

A social situation is referred to as a person’s perception of their social environment. Social situation, also referred to as social support, includes family and/or social acquaintances. Many people find it easier to change a behavior if those around them provide support or are willing to be partners in the behavior change process. Social support can work as an incentive for behavior change, and can exist in the forms of support groups or buddy supports, social activities and social networks (McKenzie & Smeltzer, 1997). Social supports may also assist in the growth of personal capabilities rather than promoting dependence on the group for one’s attainments. Social support during early periods of personal change and maintenance increases long-term success (Bandura, 2004).

A study conducted by Rovniak and colleagues (2002) examined a model of the variables social support, self-efficacy, outcome expectations and self-regulation. In a sample of university students ($n = 277$), outcomes were measured and used to predict physical activity eight weeks later. Social support had a moderate effect on physical activity ($B = .28$, $p < .001$), and indirectly predicted physical activity through its effect
on self-efficacy. The complete model of the social cognitive variables explained 55% of the total variance observed in physical activity.

Petosa, Suminski and Hortz (2003) tested the ability of social cognitive theory to predict vigorous physical activity in college students (n=350). The social cognitive theory constructs include social support, self-regulation, outcome expectancy value, self-efficacy, exercise role identity and positive exercise experience. Vigorous physical activity was tracked for four weeks after the constructs were measured. Correlations between social support and total days of vigorous physical activity resulted in an r=.16 for family social support and r=.28 for friend social support. Family social support explained fewer than three percent of the variance, and friend social support explained an additional seven percent of the variance.

Annesi (2004) attempted to estimate the relationship between social support, self-management and overcoming barriers to exercise maintenance in adults (n=178). Social support in relation to self-reported exercise maintenance resulted in an r=.42 (p<.01). Stepwise regression enhanced the prediction of length of exercise program maintenance and together accounted for 43% of the variance.

Rhodes & Plotnikoff (2005) investigated the predictive ability of the social cognitive theory on vigorous physical activity in adults after six months while comparing the data to a cross-sectional survey reporting the same information. The study included a baseline measure, a six month follow-up and an additional follow-up six months later (n=703). There was a significant difference in vigorous physical activity across the three assessments (p<.01). None of the social cognitive variables
used to predict behavior differed across the six month interval. Across the constructs used to predict six month exercise behavior, social support resulted in an $r^2 = .24$. Significant correlations for stability in the six month time period for social support resulted in an $r^2 = .26$. The results supported the relative temporal stability of the social cognitive theory and physical activity behavior.

**Exercise Enjoyment**

Exercise enjoyment is not a construct of the social cognitive theory. It was included in the current study because researchers have suggested that feelings of enjoyment may play an important role in exercise adherence (Dishman, 1985; Wankel, 1985). Exercise enjoyment can be described as a positive affective state that reflects feelings such as pleasure, liking and fun (Scanlan and Simons, 1992; Wankel, 1993). Many studies in the literature have associated exercise enjoyment with youth sports and physical activity in children, but not much has been conducted in regards to adults and exercise enjoyment.

**Summary**

Ten descriptive studies were identified in the literature that examined the adoption and adherence of moderate and vigorous physical activity using the social cognitive theory. The studies were performed in adults, with the exception of two studies, which were performed in college students (Petosa et al., 2003; Rovniak et al., 2002). The social cognitive theory constructs included self-regulation, self-efficacy, outcome expectations, outcome expectancy and social support. Eight investigations
examined adherence behavior while two examined the adoption of physical activity (Sallis et al., 1992; Rodgers and Brawley, 1996). Relationships between the constructs ranged from small, $r=.09$ to high, $r=.69$. Effect sizes ranged from $r^2=.02$ (small) to $r^2=.55$ (moderate). Many studies reported effect sizes from 20% to 40%, although a few studies did not report effect sizes (Sallis et al, 1989; Sallis et al., 1992; Rodgers and Brawley, 1996).

Support for the theoretical constructs and physical activity behavior varied across samples. Subjects from diverse locations and environments, of different health status, age cohorts, and specific gender contributed to the divergent results. The large variety of physical activity measurement techniques and construct assessment yielded dissimilar outcomes. Additionally, exercise behavior is a complex set of skills that might vary over the course of a study, as people change their levels of commitment to exercise programs. When long-term investigations are conducted, such as the studies included in this section, the varying levels of exercise commitment will yield disparate results. However, based on the outcomes from the studies described in the previous section, researchers do have a better understanding of which constructs explain and predict physical activity and exercise in the adult population, and additionally, which construct (s) to target in an intervention. The constructs that explained a larger proportion of physical activity and exercise behavior, such as self-efficacy, social support, self-regulation, and perceived benefits and barriers, allows investigators to hypothesize, design and implement interventions to maximize participant behavior change.
Social Cognitive Theory Interventions

Health promotion through the social cognitive theory targets specific constructs that are used to change behavior in intervention programs. Seven intervention studies were identified in the adult, worksite population that promoted adherence to physical activity using the social cognitive theory. The studies targeted moderate and vigorous intensity activity. This section examines the purpose, methods and results of each study, and the impact the social cognitive theory had in changing exercise behavior. Comparisons among the interventions and synthesis of the data will determine consistencies and inconsistencies in the literature.

Marcus and Stanton (1993) evaluated the effectiveness of two strategies designed to increase levels of exercise program attendance (n=120) among sedentary, female worksite employees. In the intervention, a reinforcement schedule, including an attendance lottery and incentives, a relapse prevention condition and control condition were employed in a true experimental design for 18 weeks. Assessment of program attendance was conducted at study conclusion and two month follow-up. Exercise participation post-program was measured by a follow-up form that assessed type, frequency and duration of exercise, but the specifics of the measure were not reported. At the end of the program, 72% of the participants did not complete it. Two planned comparisons performed on attendance during the first half of the program were conducted. The comparison between the relapse prevention and control group was significant (p<.01), and the comparison between reinforcement and control was non-significant (p<.13). For the second half of the program, neither the relapse
prevention versus control (p<.24) nor the reinforcement versus control was significant (p<.45). At two month follow-up, again neither the relapse prevention versus control (p<.17) nor the reinforcement versus control was significant (p<.94). Although the effects were for the most part non-significant and the theoretical construct reinforcement was not measured, there was a high attrition rate that has to be considered. Short-term maintenance and attendance was most successful for those subjects in the relapse prevention group (30 adherers versus 27 and 24 in the reinforcement and control conditions).

McAuley and colleagues (1994) conducted a randomized trial to examine the effects of an efficacy-based intervention in enhancing exercise adherence. The sample (n=125) consisted of sedentary male and female participants. The 20 week program employed a low-impact exercise approach for the middle aged adult sample. The treatment condition included exercise plus the efficacy based intervention sources of mastery experience, social modeling, social persuasion and interpretation of physiological states. The exercise plus attention group engaged in a twenty week exercise program and received general health-related educational material. Measures of exercise behavior (program attendance, activity duration and activity distance) were assessed at the two, four and five month phases. Program attendance ranged from 55% to 67% for the treatment group, which was statistically significant (p<.05). The treatment effects on behavior resulted in participants exercising more frequently (p<.001), more minutes per month (p<.01) and walked more miles per week (p<.01) than did the control group. Participants walked more often and further in the
intervention group during months two through five (p<.05). The effect sizes in month one were relatively small for frequency \(r^2=.13\), miles walked \(r^2=.03\) and minutes walked \(r^2=-.10\) but by month four, effect sizes had risen for frequency \(r^2=.59\), miles walked \(r^2=.54\) and minutes walked \(r^2=.52\). Males had a higher efficacy in the first few months of the program. However, in subsequent analyses, gender predicted only initial efficacy at month one and thereafter was non-significant. This may explain why efficacy scores dropped in month five for frequency \(r^2=.54\). The effects of the treatment and pre-existing efficacy accounted for significant variance in exercise frequency \(r^2=.23, p<.0001\). Exercise frequency at four months predicted frequency at program end \(r^2=.13, p>.001\). With respect to predicting frequency at four months, the treatment, self-efficacy and previous exercise behavior accounted for 31% of the variance (p<.001). Similarly, the variables accounted for thirty-one percent of the variance in behavior at five months. The intervention was unable to show a direct mediator effect of self-efficacy on adherence. The high attrition rates, which could have impacted the power of the statistical tests, may have impacted the mediation effect that did not occur.

A six month study was performed by Dunn and colleagues (1997), randomizing sedentary participants (n=235) into a structured exercise program or a lifestyle physical activity program. Outcome measures were conducted at baseline and post-program, and included the seven day recall of physical activity, self-efficacy, exercise benefits and barriers, as well as physiological measures. Participants randomized to the structured exercise protocol received traditional exercise
prescription, and participation in the lifestyle condition were advised to accumulate at least 30 minutes of moderate intensity physical activity on most days of the week. At baseline, 85% were intending to make change but not taking action, and 13% were making small changes. At six months, 78% of the lifestyle and 85% of the structured groups were achieving the recommendations for moderate activity. For both groups, those who increased the use of self-efficacy and benefits and barriers were more likely to achieve the recommendations ($p<.05$). In both groups, self-efficacy was significant (OR 2.7 and 1.9). The difference in benefits to barriers was significant in the lifestyle group (OR 2.1). There was no follow-up assessment conducted in the study, but the investigators noted that a six month intervention may help individuals sustain long-term adherence.

Hallam and Petosa (1998) examined the impact of a four session worksite intervention on the selected social cognitive variables exercise self-efficacy, outcome expectancy for exercise and self-regulation for exercise, which included reinforcements, social support, goal setting, self-monitoring, time management and relapse prevention. Participants ($n=86$) in the treatment group attended four, one hour educational sessions. Statistically significant increases were found in changes for self-regulation ($p<.0001$) and outcome-expectancy value ($p<.0001$) for the treatment group. Self-efficacy did not improve for the treatment group. The mean change scores in the treatment group increased for self-monitoring (16%), goal setting (21%), social support (10%), reinforcements (13%), time management (15%), and relapse
prevention (13%). Outcome expectancies increased in both groups (2%) but the increase was not significant.

In the same study, Hallam and Petosa (2004) examined the impact the social cognitive variables had on exercise adherence. Outcome expectancy, exercise self-efficacy and the use of self-regulation strategies for exercise were measured at baseline, six weeks, six months and twelve months. Days of reported exercise was the dependent variable. Exercise self-efficacy ($p=.601$) and outcome expectancy ($p=.203$) were non-significant. Self-regulation ($p=.003$) was significant. Effect sizes ranged from $n^2=.06$ for self-efficacy to $n^2=.64$ for self-regulation. Sixty-seven percent of the treatment group was able to maintain exercise behavior across 12 months, whereas the comparison group declined in exercise participation from 68% to 25% across the 12 months.

Nichols and colleagues (2000) conducted a study evaluating the effects of a three month worksite behavioral skills training, focusing on the mediators enjoyment of physical activity, social support, self-efficacy, benefits and barriers to exercise and enjoyment. The participants ($n=64$) were randomized into a treatment group or control group. The treatment condition encouraged individuals to participate in a twelve week exercise program at a local organization and attend behavioral skill classes. The control group received a three month membership to the same facility but did not receive the behavioral skill classes. Exercise was measured weekly using the interview-administered seven day physical activity recall (Blair et al., 1984; Sallis et al., 1985), and follow-up was assessed at three and nine months post-program. There
was an increase in moderate (p=.008) and vigorous activity (p=.001) for both groups, but there was no statistical significance between the two groups. Although there was no significant differences, effect sizes due to the intervention were still relatively moderately-high for moderate (p=.23, r²=.71) and vigorous (p=.41, r²=.40) minutes per day. Social support decreased in the intervention group (p=.05) relative to the control group. The overall effect size resulted in an r²=.32. Exercise self-efficacy was not significant (p=.45) and there was a small effect size (r²=.19). There was a large effect for enjoyment of exercise (r²=.50). Using a framework suggested by Lock and Latham (1985), a goal setting protocol was developed for a study conducted by Annesi (2002). The goal setting techniques to be used by the participants in the study were (1) specific; (2) challenging; (3) broken down into short term or incremental goals; and (4) feedback was provided to point out progress. The purpose of this study was to test the effectiveness of the protocol on the exercise maintenance of new and returning exercisers. The participants (n=100) had been sedentary for the previous six months. They were randomly assigned to be in the control group or treatment group. Goal setting included duration, frequency, mode and improvement in physiological outcome measures. Exercise maintenance by program attendance was the main outcome. Goal setting was not measured. There were no significant differences found between men and women for either attendance or dropout (x²=2.11). The attendance ranged from 11% to 92% for the control group and 21% to 94% percent for the goal-setting group (p<.0001).
A study conducted by Griffin-Blake & DeJoy (2006) evaluated and compared the effectiveness of a stage-matched intervention versus the social-cognitive theory intervention in a worksite setting for physical activity promotion. Both interventions were designed as minimal-contact, self-help programs suitable for large-scale application. The randomized trail (n=208) involved worksite employees from a large university. The seven day recall of physical activity was used to assess the duration and intensity of participant’s physical activity. A follow-up assessment was conducted at one month. Social cognitive outcome measures included self-efficacy, outcome expectancy, benefits and barriers, and goal satisfaction. Significant main effects were found for stage movement for two constructs: self-efficacy (p<.05) and goal satisfaction (p<.01). There was a significant difference between the groups at pretest (p<.05), with the social cognitive theory program reporting higher scores than the stage approach group. The two treatment conditions were effective in increasing physical activity, and did not differ on self-efficacy, outcome expectations or goal satisfaction. Interpretation of the stage movements main effect for goal satisfaction was qualified by a significant stage movement by time interaction (p<.01). Perceived goal satisfaction decreased from pretest to posttest for those who regressed stages (p<.01) but increased from pretest to posttest for those who progressed stages (p<.01). The two compared conditions produced similar overall results, as there were no systematic differences between the two intervention groups. They were equally effective in moving participants to higher levels of motivational readiness. The study
did not contain a control group, although measures were taken from both groups to assess group differences.

**Summary**

The seven interventions tested a variety of the social cognitive theory constructs, including self-efficacy, social support, self-regulation, which included goal setting, outcome expectations, outcome expectancies, reinforcements, exercise enjoyment, and benefits and barriers to physical activity. The studies were chosen because they were experimental interventions that incorporated constructs from the social cognitive theory. The studies either included one or more constructs from the theory in the intervention but did not measure them (Annesi, 2002), or included one or more constructs in the intervention and did measure them (Marcus and Stanton, 1993; McAuley et al., 1994; Dunn et al., 1997; Hallam and Petosa, 1998; Nichols et al., 2000; Griffith-Blake & DeJoy, 2006). The studies focused on behavioral skill development for exercise adoption and adherence. The interventions targeted sedentary and low active employees, and attempted to increase participant physical activity and exercise levels during leisure time.

There were positive results in the treatment groups in a majority of the studies (McAuley et al., 1994; Dunn et al., 1994; Hallam and Petosa, 1998; Annesi, 2000; Griffith-Blake and DeJoy, 2006). Studies that tended to be shorter in duration (< 6 months) resulted in significant, positive treatment effects (McAuley et al., 1994; Dunn et al., 1997; Hallam and Petosa, 1998; Nichols et al., 2000; Griffith-Blake & DeJoy,
Follow-up assessments ranged from one month to twelve months post-intervention; however, only two studies reported positive, significant long-term adherence (McAuley et al., 1994; Hallam & Petosa, 1998). Effect sizes for physical activity and the constructs were reported in three studies, and ranged from moderate ($r^2=.32$) to large ($r^2=.71$) (McAuley, 1994; Nichols et al., 2000; Hallam and Petosa, 2004). Self-regulation appeared to be the construct that consistently resulted in positive, significant effects. A majority of the studies used the seven day recall of physical activity to measure activity levels, which allows for cross-comparisons. In the studies that did not demonstrate significant effects, it can be speculated that the program was not implemented fully, the construct targeted in the intervention failed to change the desired behavior, the time frame of the program was not appropriate or attrition rates were higher than expected. Additionally, investigators may have included a construct that was inappropriate for a particular setting, participants may not have fully understood the meaning of a construct, or it was not critical to their exercise adherence program. The differences among studies, including study design, number of constructs included in the intervention, varying effect sizes, lack of long-term follow-up, and lack of reporting changes in behavioral skill development all contributed to the inconsistent results.

*Summary of Chapter*

The contents of this chapter examined the adult rates of physical activity, provided a background on worksite intervention programming, analyzed the
theoretical, physical activity and exercise interventions conducted at the workplace, described the role the social cognitive theory has played in adoption and adherence investigations, and evaluated interventions conducted at the worksite using components from the social cognitive theory. The purposes of the intervention studies were to increase leisure-time physical activity and exercise levels in sedentary and low active employees. The studies were chosen because they were based on theoretical, behavioral skill development for exercise, attempted to increase the physical activity and exercise levels among participants, and were conducted at the worksite. Fifteen studies were identified in the worksite literature that incorporated theoretical, behavioral skill development. Seven studies were identified in the worksite literature that specifically incorporated the social cognitive theory components into the intervention.

According to the BRFSS (2005, 2007), physical activity rates vary by age, gender, education and ethnicity. Younger populations (18-24) are more active than older populations (60 and over). Sixty percent of older adults are inactive, whereas 33% of younger adults are inactive. Discrepancies among gender exist. Men are more likely to meet recommended levels than are women (27.1% versus 25.5%). Additionally, college graduates are more likely to meet the recommendations. Thirty-three percent of those with less than a high school degree met the recommendations, while 43% of high school graduates and 52% of college graduates met the recommendations. Racial and ethnic differences also occur in physical activity participation. Hispanics and African-Americans report lower levels of physical
activity than their Caucasian counterparts. Thirty-three percent of African Americans and 37% of Hispanics are physically inactive, whereas 21% of Caucasians are inactive. Furthermore, national research indicates that blue-collar employees typically exhibit lower rates of physical activity than white collar employees. Individuals in blue-collar occupations are approximately 50% more likely to be classified as insufficiently active during their leisure-time. Reasons cited are high occupational activity, lack of time, or the physical demands of their jobs.

Implementing physical activity health promotion programs at the worksite is one way to target sedentary and low active adults. Workplace physical activity and exercise programming can be an efficient way to increase employee’s physical activity or fitness (Dishman et al., 1998). The worksite has been suggested as a favorable setting for the promotion of exercise in sedentary populations because of the established channels of communication, existing support networks and opportunities for developing corporate norms of behavior (Shepard, 1996). Investigators can reach a large numbers of adults and have at least short-term effectiveness in increasing the physical activity and fitness of program participants. Worksites allow access to employees in a controlled environment through existing channels of communication and social support networks that may play an important role in participation and program maintenance (Katz et al., 2005).

Companies support physical activity programming to maintain health care cost-effectiveness, to provide health benefits for participants and to have a positive impact on organizational level variables, such as absenteeism, turnover and morale.
(Grosch et al., 1998). O’Donnell (2002) states that organizations use these programs to combat the rise in health care costs. Fitness and exercise programs have demonstrated positive impacts on reducing employer costs for insurance premiums, disability benefits, medical expenses, and helping to restructure the health care system. Providing health benefits to employees is also a benefit to organizations. Positive health changes have been observed in programs consisting of exercise classes and consultations on weight loss and stress management. Additionally, the cost-savings ratio for the company and health of the employee can be identified in absenteeism, job performance, turnover and sick leave. Continued investigations will help researchers better plan programs geared toward the organization and participant’s goals.

Exercise and physical activity interventions delivered at the worksite have produced inconsistent results. While some studies produced modest, short-term increases in physical activity behavior, other studies have produced little effects (Dishman et. al., 1998). The studies identified in the adult, worksite population used a variety of methods. Study time frames varied from one month to two years, and follow-up assessments were not conducted in all cases. Theoretical constructs were not measured in every study, and effect sizes were not reported in many of the investigations.

It has been suggested that the careful use of theory can increase the effectiveness of health promotion programs (Perry et. al., 1990). Based on the review, a few items need to be addressed for the current study. 1) Design an exercise intervention that is based up on theory of behavior change. 2) Report the practical
effects of the intervention, to demonstrate how the intervention impacted participant exercise adherence; 2) Report the follow-up results to provide evidence for post-intervention effectiveness; 3) Control study methods, such as study design, random assignment and random selection, to increase the internal and external validity of the study; 4) Report changes in the construct scores, to show how the intervention affected the theoretical constructs; 5) Design a program that is less than three months in duration. Interventions less than three months in duration tend to produce more positive treatment effects; and 6) Use valid and reliable measurement techniques that match the purpose of the study.

The current study was designed to eliminate the discrepancies, while providing positive evidence for a theory-based exercise intervention. The current investigation was quasi-experimental, but random assignment of participant scores to a treatment and comparison group was employed through the use of the separate-samples pre-test, post-test group design (Campbell & Stanley, 1963). The intervention program was two months in duration, as interventions less than three months in duration tend to produce more positive results. There was a one month and three month post-intervention exercise assessment to document whether the participants sustained their exercise levels. The seven day recall of exercise questionnaire was used to document behavior, as the items measured the purpose of the study: to increase exercise frequency, monitor intensity (moderate or vigorous), and increase time spent in the activity. A majority of previous studies documented activity using the seven day recall questionnaire; therefore, comparisons can be made across the literature. The
social cognitive theory constructs, including self-efficacy, self-regulation, outcome
expectations/expectancies, social support and enjoyment of exercise were measured
using valid and reliable instruments, and the effect sizes of exercise levels and the
constructs were reported. This indicates how the constructs impacted exercise
behavior throughout the program.
CHAPTER 3

METHODS

Introduction

Chapter three begins with a summary of the research literature supporting the need for this study. The purpose of the investigation, followed by the study research questions, will be presented. The design of the current investigation, the separate samples pre-test, post-test design, is explained in the context of experimental designs. The intervention components, lesson plans and instructional planning model are described in detail, to demonstrate how the social cognitive theory was incorporated into the present intervention. The methods related to the study, such as setting, participant characteristics and participant recruitment are presented as they were used in the study. Data collection time frames are outlined, and a thorough description of the valid and reliable measurement instruments used to collect the data is presented. The method of statistical analysis used to answer the research questions concludes the chapter.
Summary of the Literature

Chapter two provided an in-depth examination into the physical activity and exercise interventions conducted at the workplace. The purpose of these studies was to increase the physical activity and exercise levels of those participating. The studies were chosen because the interventions incorporated theoretical constructs for behavioral skill development for exercise, attempted to increase the physical activity and exercise levels among participants, and were conducted at the worksite. Fifteen studies were identified in the worksite literature that included theoretically-based, behavioral skill development interventions for exercise adoption and adherence. Seven studies were identified in the worksite literature that specifically incorporated constructs of the social cognitive theory into the intervention.

Seedfelt et al. (2002) states that theory-based research has been linked to increased physical activity and exercise adherence. In the reviewed literature, significant treatment group effects and increases in participant physical activity were detected in a majority of the theory-based investigations. Yet, many of these interventions do not document the degree of change in the theoretical constructs. In the few studies that measured theoretical implications, self-regulation consistently resulted in increased scores. Without construct measurement, it is difficult to determine the extent of the role to which the constructs play in exercise adherence.

Interventions providing evidence for positive changes in physical activity were one to three months duration. Those over three months in duration showed mixed
results, some with positive effects and others with non-significant results. Follow-up assessments, documenting post-intervention physical activity rates, were conducted in half of the reviewed studies. Follow-up assessments conducted within one to six months post-intervention resulted in significant treatment group effects and elevated rates of physical activity. Whether physical activity and exercise levels remained elevated in studies that did not document follow-up is unknown.

Ideally, future studies performed in the adult, worksite population would measure not only physical activity and exercise rates, but would also measure the changes in the theoretical constructs due to the intervention. The current study was created and designed to provide positive evidence for a theory-based, educational, exercise, behavior change intervention. The intervention program was two months in duration, and there was a one month and three month post-intervention exercise assessment. The social cognitive theory constructs with positive evidence supporting their use were incorporated in the intervention. These constructs were measured, using valid and reliable instruments. The effect sizes of exercise and the constructs were reported, which indicates how the constructs impacted exercise behavior throughout the intervention.

**Purpose of the Study**

The purpose of the current study is to evaluate a theory-based, educational, exercise, behavior change program. The BE ACTIVE program was designed to increase insufficiently active, adult, employee’s self-reported duration and frequency
of exercise. The program was tailored to employees who were not regular exercisers. The program was based on the social cognitive theory constructs self-regulation, self-efficacy, social support, exercise enjoyment and outcome expectations and expectancies. The intervention was designed for a classroom-based, group setting and consisted of six, one hour, class sessions. A second purpose of the study was to evaluate the impact of the intervention on the targeted social cognitive theory constructs: self-regulation, self-efficacy for overcoming barriers, social support for exercise, exercise enjoyment, and outcome expectations and expectancies. Previously validated and reliable instruments were used to measure the constructs. The components of the program were designed to increase the social cognitive theory construct scores over the course of the study.

**Intervention Research Questions**

The purpose of the current study was to evaluate a theory-based, educational, exercise, behavior change program. The program was designed to increase insufficiently active employee’s self-reported duration and frequency of exercise. Therefore, eight primary research questions addressed the self-reported moderate and vigorous-intensity, duration and frequency of exercise among the participants enrolled in the study. A second purpose of the study was to evaluate the impact of the intervention on the targeted social cognitive theory constructs: self-regulation, self-efficacy for overcoming barriers, social support for exercise, exercise enjoyment, and outcome expectations and expectancies. The classroom components included in the
program that addressed the social cognitive theory included self-regulation for exercise, goal setting, self-efficacy for overcoming barriers, social support for exercise, outcome expectations and expectancies and exercise enjoyment. Therefore, 12 social cognitive theory research questions addressed the constructs included in the intervention.

Exercise Research Questions

The following eight research questions relate to the first purpose of the study: to evaluate the effects of a theory-based, educational, exercise, behavior change program designed to increase insufficiently active employee’s self-reported duration and frequency of moderate and vigorous exercise.

1. Is there a difference between the treatment group and the comparison group on self-reported, moderate-intensity minutes of exercise per week at post-test?
2. Is there a difference between the treatment group and the comparison group on self-reported, moderate-intensity minutes of exercise per week at follow-up?
3. Is there a difference between the treatment group and the comparison group on self-reported, moderate-intensity exercise days per week at post-test?
4. Is there a difference between the treatment group and the comparison group on self-reported, moderate-intensity exercise days per week at follow-up?
5. Is there a difference between the treatment group and the comparison group on self-reported, vigorous-intensity minutes of exercise per week at post-test?
6. Is there a difference between the treatment group and the comparison group on self-reported, vigorous-intensity minutes of exercise per week at follow-up?

7. Is there a difference between the treatment group and the comparison group on self-reported, vigorous-intensity exercise days per week at post-test?

8. Is there a difference between the treatment group and the comparison group on self-reported, vigorous-intensity exercise days per week at follow-up?

**Social Cognitive Theory Research Questions**

The following research questions relate to the second purpose of the study: to increase the scores of the social cognitive theory constructs over the course of the study.

9. Is there a difference between the treatment group and the comparison group on self-regulation scores at post-test?

10. Is there a difference between the treatment group and the comparison group on self-regulation scores at follow-up?

11. Is there a difference between the treatment group and the comparison group on self-efficacy scores at post-test?

12. Is there a difference between the treatment group and the comparison group on self-efficacy scores at follow-up?

13. Is there a difference between the treatment group and the comparison group on family social support scores at post-test?
14. Is there a difference between the treatment group and the comparison group on family social support scores at follow-up?

15. Is there a difference between the treatment group and the comparison group on friend social support scores at post-test?

16. Is there a difference between the treatment group and the comparison group on friend social support scores at follow-up?

17. Is there a difference between the treatment group and the comparison group on enjoyment for exercise scores at post-test?

18. Is there a difference between the treatment group and the comparison group on enjoyment for exercise scores at follow-up?

19. Is there a difference between the treatment group and the comparison group on outcome expectations and expectancies at post-test?

20. Is there a difference between the treatment group and the comparison group on outcome expectations and expectancies at follow-up?

The 20 intervention research questions were each answered using a between group analysis of variance (ANOVA). After the post-test assessment was completed, participant scores were randomly assigned to group one (comparison) or group two (treatment). The statistical software SPSS package generated the random sample of two groups. Analysis between the treatment and comparison groups were conducted at pre-test, post-test and both follow-up time periods. The ANOVA analysis was completed for both moderate and vigorous-intensity duration and frequency of
exercise. An ANOVA analysis was also conducted for each social cognitive theory construct. Post-test assessment took place during the eighth week of the program. Follow-up one took place one month after the post-test (end of March), and follow-up two took place three months after the post-test (end of May).

**Study Design**

The present study used the quasi-experimental, separate-sample, pre-test-post-test design (Campbell and Stanley, 1963, p. 53). Campbell and Stanley argue “that for large populations, it may often happen that although one cannot randomly assign subjects, the investigator can still exercise full experimental control over the when and to whom of the pre-test, employing random assignment procedures” (Campbell and Stanley, 1963, p. 53). The separate-samples, pre-test-post-test design allows the investigator to implement the treatment to every participant enrolled in the study, and then randomly assign participant instrument scores to one of two groups after the treatment has been delivered. Because of company restrictions, randomly assigning participants to the experimental or comparison conditions was not permitted. This design still allowed the investigator to use random assignment procedures. By randomly assigning participant scores to one of two groups after the treatment was complete, random assignment was still instituted. The Campbell and Stanley separate-sample pre-test-post-test design is presented on the following page as:
In the current design, the between group analysis of variance (ANOVA) of the post-test scores of group two (treatment) are compared to the pre-test scores of group one (comparison). Every participant in the study received the treatment, and then their scores were randomly assigned to one of the two groups. This procedure was completed through the select cases command in SPSS.

A time frame of eight weeks (two months) took place between the pre-test and post-test assessment. As stated previously, to determine the treatment effects using the between group analysis of variance, the post-test scores of group two (treatment) were compared to the pre-test scores of group one (comparison). Additionally, the follow-up scores of group two (treatment), which occurred one and three months after the post-test assessment, were also compared to the pre-test scores of group one (comparison). The model presented on the following page is a depiction of how the design was used in the current study.
Figure 3.2: Campbell & Stanley’s Separate-Samples Pre-Test, Post-Test Group Design as used in the Be Active intervention.

Controlling for Internal Validity

Internal validity of a study is the basic minimum without which any experiment is uninterpretable (Campbell and Stanley, 1963, p. 5). It addresses the question: did in fact the experimental treatment make a difference in the specific experimental instance? If an experiment has strong internal validity, the investigator can infer that the treatment produced the outcomes, and there were no confounding or external effects that could have been mistaken for the effects of the treatment. If the same effect is repeatedly found in different settings, the likelihood of its being a product of chance becomes less likely. Relevant to internal validity are eight classes of extraneous variables that if not controlled, might produce effects confounded with the effect of the experimental stimulus (Campbell and Stanley, 1963, p. 5). In the present study, the chosen research design helped control for three threats to internal validity: testing, regression and selection. Testing, which are the effects of taking a test upon the scores of a second test, is not a threat in the current study design.
Selection is controlled for because participants were not differentially selected for the study. Regression occurs when treatment groups have been selected on the basis of their extreme scores, which is not the case in the current study. The internal validity threats to the study design that may pose an issue are: maturation, instrumentation, history and morality. In samples where improvements might take place, maturational gain may work against the interpretation that the treatment had an effect.

Instrumentation represents a hazard when used in a survey (questionnaire), although this is generally the case with interview-administered surveys. For pre-test and post-test separated by several months, mortality can be a problem. Lastly, history, or events occurring during and in addition to the treatment, are more difficult to control for. As far as the investigator knew, no major events occurred during or in addition to the intervention, so history did not affect the results.

**Controlling for External Validity**

Campbell and Stanley (1963) argue that designs, such as the separate-samples pre-test post-test design, are superior in external validity or generalizability to the “true” experimental designs. External validity results from interactions between the independent variables. In the present study design, the interactions of testing and the treatment, selection and the treatment and reactive arrangements are all controlled for. Campbell and Stanley (1963) state that this design can use representative sampling, which strengthens its generalizability (p. 54). However, in the present study, representative sampling was not possible, due to company restrictions. Therefore,
interactions might have occurred between the treatment and testing or the treatment and selection, and the results may have been mistaken for the effects of the treatment. For example, the pre-test may have increased the participants responsiveness to the experiment. Some of the instrument items may have influenced the learning potential of the participants. They may have had a better idea of what the program content consisted of, therefore, becoming more engaged, learning more, and being active participants in class and group discussion. This makes the pre-tested sample unrepresentative. Taking into account how participants are recruited, factors that may affect the outcomes of an experiment, and the ability to generalize the results of the study are of utmost importance when designing interventions. It enables investigators to identify the important issues that need to be addressed before an experiment begins, so the results can be interpreted correctly and used most efficiently and effectively.

**Worksite Demographics**

Boutelle et al. (2000) reports that the highest levels of leisure-time exercise are found among white collar professionals. White collar employees are defined as belonging to the ranks of office and professional positions whose jobs generally do not involve manual labor (Bureau of Labor and Statistics, 2007). Their positions involve professional, administrative, technical and clerical work. White collar employees in these types of job typically are Caucasian and have earned a minimum of a high school degree (Bureau of Labor and Statistics, 2007). The worksites recruited for the current study classified a majority of their employees as white collar. Three of the
four worksites shared their company demographics with the investigator. One company, however, would not. The company contact reassured the investigator that a majority of the employees at the worksite were of white collar description.

The sample demographic data collected suggests that the participants enrolled in the program were white collar, because a majority of them had obtained a minimum of a high school degree (100%) and were Caucasian (84%). Since those involved in physical labor as an occupation, typical of blue collar employees, cite the physical demands of their job as a barrier to participating in physical activity programs (Seedfeldt et al., 2005), a higher rate of recruitment may have resulted because the employees that volunteered for the study were of white collar occupation.

**Program Intervention**

The intervention educational components emphasized the social cognitive theory constructs that provided positive evidence in the literature for exercise behavior. Self-regulation, including goal setting and self-monitoring, self-efficacy, defined as overcoming barriers, social support, exercise enjoyment and outcome expectations and expectancies were the constructs included in the current intervention. These constructs were found to have positive relationships and impacts on physical activity adherence.

The investigator determined six class sessions would be an appropriate time frame for relaying all pertinent program education, and for conducting pre- and post-test assessments. This number was determined by the number of constructs included
in the intervention (5), and by studies performed by Hallam and Petosa (1998) and Nichols et al. (2000). Hallam and Petosa’s study was four weeks in duration, and Nichol’s et al. (2000) study was 12 weeks in duration. Both studies resulted in increased treatment group physical activity and exercise levels. The investigator reasoned that six classes, or an eight week program, could lead to the same positive results. There was less of a time commitment of behalf of the participants, as compared to Nichols et al. (2000), but still allowed the investigator to include an additional construct that Hallam and Petosa (1998) did not include in their intervention. At the first and last class session, the pre-test and post-test assessments were completed. The instrument assessments took half of the class time period, and the other half of the class included the introduction (class one) and the class conclusion (class six).

The first four class sessions were held once a week for the first month. The last two meetings were held bi-weekly for the second month. Classes were staggered every other week in month two because the investigator wanted the participants to begin to take full accountability for their own exercise programs. Since the intervention was designed to increase insufficiently active employee’s exercise levels, classes were held bi-weekly during month two, allowing participants to become more autonomous in their programs.

The first week of the program included the consent form, the pre-test questionnaire, a worksheet assignment and learning how to complete the weekly activity log. The following five classroom experiences covered the social cognitive
theory constructs. The first five class sessions had a corresponding worksheet and activity log. The last class of the program included the post-test survey. The following is the lesson outline of the classroom components of the program.

**Outline of Social Cognitive Theory Intervention Class Lessons**

*Class 1, Week 1 – Course Introduction & Self-Regulation*
- Introduction of FITT Principle and importance of self-regulation
- Explanation of activity logs for self-monitoring (self-regulation)
- Exercise opportunities worksheet

*Class 2, Week 2 – Self-Regulation & Goal Setting*
- Definition of adherence
- Continuation of FITT Principle and importance of self-monitoring
- Explanation and importance of goal setting
- Goal setting worksheet

*Class 3, Week 3 - Self-Efficacy*
- Introduction to mastery experiences, modeling, verbal persuasion and perception and physiological states
- Explanation of importance of overcoming barriers to exercise
- Overcoming barriers worksheet

*Class 4, Week 4 – Enjoyment of Exercise*
- Discussion of reasons to exercise
- Explanation and importance of exercise enjoyment
- Exercise preferences worksheet & benefits of exercise worksheet
**Class 5, Week 6 – Social Support**
- Importance of social support
- Explanation of tailoring exercise
- Social support worksheet

**Class 6, Week 8 - Outcome Expectations & Expectancies**
- Discussion of benefits of exercise
- Importance of reasons to exercise

The first five class sessions of the intervention consisted of weekly worksheet assignments. The worksheets were handed out during class, and helped to emphasize the concepts introduced and detailed in the program class sessions. For example, the goal setting worksheet helped participants set a short term and long term exercise goal. Goal setting is an important piece of the construct self-regulation. The participants had to complete and submit four of the worksheets in order to successfully complete the program (see Appendix M). A completed and submitted worksheet enabled each participant to receive credit for class attendance. If they did not submit a worksheet on the due date, they were counted as missed attendance. If they then submitted less than four worksheets throughout the intervention, they were considered a program drop-out (missing more that three classes). Each assignment was due the week after it was assigned. This enabled them to practice, outside of class, what they had learned in class. It also allowed participants to refer back to the worksheet, during the week between meetings, to provide them with an activity to complete on their own, to emphasize the classroom components. Additionally, the worksheets provided
subsequent classes with items to review. Participants had to submit a hard copy of the assignment in order to get credit for class attendance. The purpose of submitting a hard copy of the assignment was to decrease the possibility of participants skipping the class. To outline the program intervention, the instructional planning model is presented on the following page.
Figure 3.3 Instructional Planning Model for the Intervention
Social Cognitive Theory Intervention Content

Week One Intervention Content

Week one began with an explanation of the program and introduced the concept of self-regulation. Self-regulation operates through self-monitoring, goal setting, and self-reward (Bandura, 1986; Kanfer & Gaelick, 1986). Participants first completed the consent form and the pre-test questionnaire. The investigator discussed the purpose of the course, why it is being offered, how the program would help the participants, the goals of the program, what they should expect from the program and what they should expect from the instructor. They were also told that the first day of class was the first day of the program, and they were instructed to begin their exercise program as soon as possible. The investigator began a brief introduction of self-regulation, and introduced the American College of Sports Medicine’s physical activity recommendations. This was to help participants being to think about how they were going to set their short and long-term goals, according to the recommendations. They briefly learned how to complete an activity log, which was to be done each week of the two month intervention, and were introduced to the FITT principle (frequency, intensity, time and type) and the Borg Rate of Perceived Exertion (RPE). These items assisted participants in monitoring their behavior, an aspect of self-regulation. They were instructed to complete the Exercise Opportunities worksheet, which was due the following week in class. The Exercise Opportunities worksheet allowed participants to identify the locations in their environment where
they could be physically active or exercise. These locations could then be used by the participants.

Class One Objectives

- Introduction to the program and the first concept self-regulation.
- Completed consent form and pre-test questionnaire.
- Explained purpose, importance, goals and expectations of the course.
- Introduced American College of Sports Medicine’s recommendations, FITT Principle and Borg RPE.
- Instructed participants to begin exercise program as soon as possible.
- Explained the importance of and how to use the activity logs.
- Explained the Exercise Opportunities worksheet.

Week Two Intervention Content

Week two continued with an in-depth discussion of self-monitoring (self-regulation) and goal setting. In week one, self-monitoring was introduced through the activity logs and the FITT Principle. In week two, the participants were presented with an in-depth description of self-monitoring. They were told that it was the foundation of the program. Class lecture included the definition of self-monitoring, different ways to monitor activity and the importance of self-monitoring. The FITT Principle was discussed again, with more detail on the concepts of frequency, intensity, type and time. Participants were instructed how to check their pulse as a function of intensity, and practiced personalizing the heart rate zone equation.

Goal setting, which was the second component of the class, was an additional method participants were taught to self-monitor their behavior. Participants practiced setting several small, realistic, achievable goals to work on during the program. The
lecture discussed the definition of goal setting, the importance of setting goals, why people set goals, the four components of a goal, and behavioral goals for exercise.

Participants identified the differences between behavioral goals and health status goals (weight loss, disease risk). The lecture discussed how to reach personal goals and how to evaluate goals. The participants were required to set a goal in class, for practice, and have another participant evaluate that goal. The investigator presented example to the participants as part of group discussion, and they evaluated the level of accuracy.

Participants had to complete the Goal Setting worksheet, which was turned in the following week in class. On the worksheet, they identified several short term, behavioral goals and identified a long-term behavioral and health status goal, for which they could work on during the program or post-intervention.

Class 2 Objectives

- Review of the Opportunities WS and Class One’s introduction information.
- State the definition of Self-Monitoring and provide examples.
- Explain the importance of monitoring physical activity behavior.
- Provide information on and explain the FITT Principle in relation to physical activity and exercise in detail.
- Provide more detail on the purpose and importance of activity logs and how to use them correctly.
- State the definition of Goal Setting.
- Discuss the importance of setting goals.
- Explain the different types of goals (short and long) and how they relate to physical activity and exercise (health status, behavioral).
- Discuss the four components of a goal (who, what, how much and by when)
- Explain how to set a goal using the SMART Principle.
- Provide examples of goals, for participants to practice goal setting and to help them set goals.
- Discuss evaluating goals and reaching your goals.
- Goal Setting Worksheet
Week three targeted self-efficacy. Self-efficacy is defined as a person’s confidence in the ability to perform a given behavior. Self-efficacy is a self-evaluative judgment about one’s abilities related to performance attainment. Additionally, self-efficacy has also been defined as the person’s ability to overcome barriers to perform the given behavior. For the purposes of this study, self-efficacy was referred to as overcoming barriers. The class began with a review of self-monitoring and goal setting. Participants were required to write a short-term goal on each subsequent activity log, to help emphasize the concept of self-monitoring. The lecture discussed the importance of overcoming barriers and how to identify solutions to overcoming barriers. Overcoming barriers addressed mastery experiences, modeling, verbal persuasion and physiological states. So that self-efficacy was clear and comprehensible to the participants, the concepts were referred to as tangible experiences, observing others, using social and verbal influences and being aware of your physiological state.

Tangible experiences, or mastery accomplishments, was described as executing effective courses of action to overcome barriers. For example, developing a plan to overcome the barrier lack of time. Vicarious experiences, which was referred to as social modeling, was described as involving the observation of the performance of another. Participants could model their behavior after someone they knew who already exercised regularly. Verbal persuasion was described as a way to try to talk people into believing they possess the capabilities that will enable them to achieve
what they seek. Putting an end to negative feelings or self-talk associated with exercise, or lack of exercise, such as guilt for not meeting their goals, would help them achieve the outcomes they sought. Physiological state was described to the participants as a way to help them judge their own physical and mental capabilities. They were told to pay attention to the mental and physical affects of exercise during and after they performed a session. This would enable them to gauge their level of performance in subsequent exercise sessions. The class concluded with examples of common barriers and suggestions on how to overcome them. Participants completed the Overcoming Barriers worksheet for the lesson, which they turned in the following week in class. They had to identify potential barriers in their lives that may interrupt exercise. Participants had to identify ways in which they could overcome those barriers and continue to exercise. At the end of the third class, the participants were asked to complete the mid-program evaluation.

Class 3 Objectives

- Reviewed Goal Setting WS, self-monitoring and goal setting.
- Stated the operational definition of Self-Efficacy (overcoming barriers).
- Have the class discuss barriers among each other and then in class setting.
- Provided more examples of barriers.
- Explained the importance of overcoming barriers.
- Provided information on how participants can identify barriers.
- Explained to participants the importance of identifying barriers and then developing solutions to overcome them.
- Discussed evaluation of overcoming barriers.
- Overcoming Barriers Worksheet and optional Time Management Worksheet.
- Program Evaluation
Week Four Intervention Content

Week four began with a review of self-monitoring, and participants were reminded to set a short term, behavioral goal for the next week. The construct targeted in this lesson was enjoyment of exercise. This lesson was important for participants because it helped them identify which activities and exercise they enjoyed doing. Topics focused on choosing activities the participant enjoyed, choosing activities that made them feel good, using social support for enjoyment and choosing activities within their comfort zone. This helped them to decide which activities they are most likely to adhere to, as well as elevate boredom. In class, the class participants created a list of different exercise types as a group. Individually, they ranked their top five choices, according to their perception of enjoyment. Additionally, reasons to exercise were included in this class session. Everyone was told to identify one reason to exercise; why it was important and how that could help keep them focused on adhering to exercise. Participants were presented with multiple examples of health reasons to exercise. They discussed how what they gained from exercise could help them maintain a program. Participants completed the Exercise Preferences worksheet, which was to be turned in the next week in class. This allowed them begin to consider what their preferences were and how they could tailor their exercise program to maximize the benefits.

Class 4 Objectives

- Reviewed of the Overcoming Barriers WS and overcoming barriers.
• Have participants discuss overcoming barriers, identification, developing strategies and levels of success.
• Discussed the concept of Exercise Enjoyment.
• Called on participants to identify some activities they enjoy.
• Discussed the strategy of identifying some enjoyable activities.
• Discussed the concepts of choosing activities that make us feel mentally and physically good, put us in our comfort zones and within the right intensity, and that have social or solo components.
• Discussed the sub-strategy of Reasons to Exercise.
• Explained the importance of identifying the right reasons to be active.
• Provided examples of the reasons people exercise.
• Exercise Preference WS and optional Reasons to Exercise WS.

*Week Six Intervention Content*

Week six discussed social support and tailoring exercise. The class began with a review of exercise enjoyment. Participants were also reminded to set a short term goal for the week, as well as identify an exercise barrier and solution to overcome the barrier. Social support is a person’s perception of their social environment. The definition of social support, the types and examples of social support and the importance of social support were discussed in this class. The investigator presented examples of social support, and asked the participants to identify additional sources for group discussion. Tips on how to identify and use social support were provided to the participants, but they were required to complete the social support worksheet to apply the concept. This helped identify people they could rely on for support, and what types of support those people provided (information, emotional). The class also included a discussion on tailoring exercise, which was an extension of the previous class material. More detail was presented to the participants on tailoring their
exercise, so that they could maximize the enjoyment and benefits from participating in activity. The lecture presented concepts such as the importance and benefits of tailoring, tailoring exercise to corresponded to comfort zone and intensity, and prompted the participants to consider trying new activities as they progressed in their exercise routines.

Class 5 Objectives

- Reviewed of the Exercise Preferences WS, exercise enjoyment and reasons to exercise.
- Discussed the concept of Tailoring exercise, and how exercise enjoyment, preferences and tailoring work together in helping people maintain exercise.
- Discussed the importance of tailoring exercise and physical activity.
- Identified important considerations when tailoring exercise.
- Introduced the concept of trying new activities.
- Explained the benefits of tailoring exercise and physical activity.
- Discussed evaluating and adjusting preferences.
- Introduced Social Support and provide definition.
- Explained the importance of the use of social support in exercise programs.
- Provided examples of the types of social support.
- Discussed how to identify and evaluate social support.
- Social Support WS

Week Eight Intervention Content

Week eight, the last educational class, discussed outcome expectations and expectancies. While outcome expectations are the expected benefits and costs of performing a behavior (Prodaniuk et al., 2004), outcome expectancy is the value a person places on a particular outcome. As participants embarked on their post-intervention exercise routine, they needed to have an understanding of what to expect from an active lifestyle. Discussions focused on the importance of expected
behavioral and health outcomes, types of mental and physical outcomes, what participants should expect from life-long exercise, and how to decide which outcomes were most important to them. Although there was no worksheet associated with this class, the investigator requested that participants give the last concept consideration. The investigator suggested the participants create a list of exercise outcomes and rank them in order of importance. They could refer back to this list as a source of exercise motivation or reminder of why they wanted to commit to an exercise program. A review of all of the concepts participants learned in the program occurred, and the class members discussed the reasons why the concepts were important to exercise maintenance.

The investigator concluded the class and thanked the participants. Participants completed the post-test assessment after the lecture component. The class officially concluded after participants turned in the post-test questionnaire to the investigator.

Class 6 Objectives

- Reviewed of the Social Support WS, tailoring exercise and the use of social support.
- Introduced Outcome Expectations and Expectancies of physical activity and exercise.
- Discussed the importance of identifying each in an individual’s exercise program.
- Provided examples and types of exercise outcomes similar to most people.
- Explained that the value associated with the outcome is different for everyone.
- Discussed some of the negative outcomes of physical activity.
  - Have participants identify “not so positive” aspect of exercise in the beginning.
- Conclusion of strategies, how to use them to benefit individual exercise programs, evaluation of each, and the overall purpose of the program.
• Concluded with some basic information on maintaining an exercise program.
• Completed post-test questionnaire.

Intervention Time Frame

The intervention time frame is presented in figure 3.2.

<table>
<thead>
<tr>
<th>November</th>
<th>December</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>May</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Recruitment</td>
<td>Program Recruitment</td>
<td>Pre-Test Assessment &amp; Program Implementation</td>
<td>Program Implementation &amp; Post-Test Assessment</td>
<td>One Month Follow-up</td>
<td>Three Month Follow-up</td>
</tr>
</tbody>
</table>

Figure 3.4: Intervention Timeline

Program recruitment began at the end of November, after the Thanksgiving holiday. Study permission had been granted by the Institutional Review Board at this time. Recruitment continued through December and into the first week of January, when the program officially began. Pre-test assessment took place during the first week of the intervention. Post-test assessment took place during week eight, at the end of February. A one month follow-up assessment took place at the end of March, and the three month follow-up assessment occurred at the end of May.

Methods

The following section outlines the program planning process, including intervention setting, participant characteristics, participant recruitment, organizational information and program implementation.
**Intervention Setting**

A letter was sent to seventeen local companies in the Columbus area. The companies were chosen based on size (over 250 employees) and population (white collar). White collar companies were identified by their employees, which was located on their company website, by a customer service representative or receptionist or by the company contact. White collar employees are defined as belonging to the ranks of office and professional positions whose jobs generally do not involve manual labor (Bureau of Labor and Statistics, 2007). Company size was also located on the company’s website, by a customer service representative or receptionist or by the company contact. The letter introduced the lead investigator, described the purpose and content of the study, and stated when the study was slated to begin. All companies contacted via this letter were for the purposes of the treatment condition only. Of the 17 companies originally contacted, four were immediately interested, two were interested but needed to consider after listening to a proposal, one contacted the investigator after the four treatment companies had been determined, six sent a letter or email declining the program, and four did not respond.

Each company that was interested in the study was granted a proposal meeting. This was to ensure that appropriate personnel from each company knew and understood the specifics of the study, who was to be involved, the means of participant recruitment, what was required of the worksite, and the anticipated results from the program. The four companies that agreed to participate in the study included Ashland
Chemical, Inc., Battelle Memorial Institute, Chemical Abstracts Services and Online Computer Library Center (OCLC).

Ashland Chemical, Inc. is a large company located in Dublin, Ohio. The Dublin office employs approximately 2,220 employees. The Health Management Administrator was the main point of contact at Ashland Chemical, Inc. All program content and recruitment materials had to be approved by the Medical Management Director. The company has an outdoor walking track and an onsite fitness facility. Employees can opt for a ten dollar payroll deduction to be a member of the facility.

Battelle Memorial Institute, commonly referred to as Battelle, is headquartered in Columbus, Ohio. Battelle employs nearly 2,000 individuals at the main Columbus office complex. The Fitness and Recreation Supervisor was the main point of contact at Battelle. All program content and recruitment materials had to be approved by Battelle’s legal division and media division. The company has an onsite fitness facility, and employees can opt for a ten dollar payroll deduction to be a member of the facility.

Chemical Abstract Services is located in Columbus, Ohio. CAS employs approximately 1,500 employees. There is a two mile long walking track on-site; however, there is no onsite facility employees can join. As an incentive, CAS will pay up to three hundred dollars per year for an off-site fitness facility membership. The company Nurse was the main point of contact at CAS. All program content and recruitment materials had to be approved by the nurse and the director of Human Resources.
OCLC is located in Dublin, Ohio. OCLC has approximately 800 employees. OCLC has an on-site fitness facility, called the Wellzone. All employees are eligible for a free membership to the facility. There is also a three quarter mile long walking track on the company grounds. The fitness facility program manager and director of corporate wellness in human resources were the main points of contact. All program content and recruitment materials had to be approved by these two people.

**Participant Characteristics**

The targeted sample for the intervention was apparently healthy, full time, adult employees from the four worksites. The targeted sample was males and females, ages eighteen to sixty-five. The targeted sample was also classified as insufficiently active, or not regular exercisers. Insufficiently active employees classified themselves as in the contemplation or preparation stages of change. Individuals in the contemplation stage are currently inactive and intend to begin regular exercise within six months. Those classifying themselves in the preparation stage are irregularly active below the American College of Sports Medicine’s criterion level of three or more times per week for at least twenty minutes (Pate et al., 1995). Insufficiently active participants were specifically chosen to strengthen the study by supporting the study objectives and hypotheses. The intervention was designed to increase the insufficiently active employees’ duration and frequency of exercise.
Recruitment

At the end of November, an awareness campaign began the recruitment phase. Mass media in the forms of advertisements, flyers and posters were placed in various locations on the worksite properties to recruit volunteers to participate in the program (see Appendix N). Program advertisements were placed in monthly company newsletters and daily company news briefs. Recruitment was targeted to all insufficiently active employees. The messages were tailored to those employees who were sedentary and low active. Advertisements included messages about learning the skills necessary to establish and maintain lifetime exercise, learning how to design an exercise program to fit the participant’s needs, how to begin an exercise program, and that the program was directed to employees who were not regular exercisers or did not exercise at all. All messages stated that the program was free, the time frame of the program, and the day and time the class sessions would meet. Each advertisement had the investigator’s email and telephone number, and all potential participants were encouraged to contact the investigator through email or telephone.

At Ashland, due to company restrictions, employees were only allowed to be recruited through the poster and flyer announcements. Employee email access was not an option to recruit potential participants. At Battelle, due to company restrictions, employees could only be recruited through the Daily Bulletin and flyer announcements; however, an all-staff flyer was an later option that was utilized to recruit participants. Originally at CAS, email access was not an option to recruit potential participants; however, it was decided an all-staff email could be sent out
through the company contact’s email to recruit employees for the program. At OCLC, email access was originally not an option to recruit potential participants; however, it was decided an all-staff email could be sent out through the Wellzone program manager’s email to recruit employees for the program. Employees were also recruited through flyer announcements placed in various locations on-site.

**Organizational Specifications**

The program began during the first and second week of the New Year. All study participants contacted the investigator during the month of December and during the first week of January to enroll. Each worksite agreed on one program class per week, each a different day of the week. All educational class sessions occurred on site, in a classroom or lecture room provided by the company. Classes took place during the lunch hour, and lasted forty-five to sixty minutes. Participants were required to complete all exercise on their own time, outside of classroom time. Two companies, Battelle and Ashland, began the first week of the new year. Battelle classes were held on Wednesday and Ashland classes were held on Thursday. Chemical Abstracts and OCLC began their classes the second week of the new year. CAS classes were held on Tuesday and OCLC classes were held on Friday.

**Program Eligibility**

Potential participants had to complete the Stage of Change Questionnaire to be eligible for the intervention program. After they initially contacted the investigator, the questionnaire was sent to them through email as a Microsoft Word document.
They had to send back the completed version within twenty-four hours. Participants had to categorize themselves as in the contemplation or preparation stages of change to be eligible for the program. These categories identified those employees who were insufficiently active. Those that were eligible for the program were told they were, and those who were not eligible were told they were not the right fit for the purposes of the program. For this reason, a total of 47 potential participants were turned away. Since the messages were tailored to employees who did not exercise or were irregular exercisers, the majority of employees who contacted the investigator were inactive and eligible for the program.

**Data Collection**

Participants were required to identify their Stage of Change prior to program eligibility. Once a potential participant expressed interest and contacted the investigator, they were emailed the Stage of Change questionnaire. Those who chose the categories of contemplation or preparation stage of change were included in the study. Eligible participants were emailed the program start time and date one week prior to the first class session, and were sent another email one day prior to the start of class.

The consent form was the first item the participants completed on the first class session. Demographic information of all participants was taken at pre-test, before the educational components began. The self-administered seven day recall of exercise questionnaire (7DRE-Q) was included in the pre-test questionnaire, as well as the
construct instruments self-regulation, self-efficacy, social support, outcome expectations and expectancies and enjoyment of exercise. The questionnaire was administered additionally at post-test, which was the last class session, and again at one and three months post-intervention. Participants were given two options at follow-up. The first option was to complete an electronic version of the questionnaire, sent via email, and returned within twenty-four hours. The second option involved meeting the investigator face to face, to complete a hard copy of the questionnaire. Participants could opt for either one. At follow-up one, five out of 46 participants completed a hard copy version of the instrument (11%). At follow-up two, two participants out of 30 completed a hard copy version of the instrument (6%). Participants that failed to send the investigator the questionnaire within twenty hours were omitted from the data analysis. Figure 3.3 is a timeline for the collection of data.

<table>
<thead>
<tr>
<th>Pre-Test</th>
<th>Post-Test</th>
<th>Follow-Ups 1 and 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Regulation</td>
<td>Self-Regulation</td>
<td>Self-Regulation</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>Self-Efficacy</td>
<td>Self-Efficacy</td>
</tr>
<tr>
<td>Enjoyment of Exercise</td>
<td>Enjoyment of Exercise</td>
<td>Enjoyment of Exercise</td>
</tr>
<tr>
<td>Social Support for family &amp; friends</td>
<td>Social Support for family &amp; friends</td>
<td>Social Support for family &amp; friends</td>
</tr>
<tr>
<td>Outcome Expectations</td>
<td>Outcome Expectations</td>
<td>Outcome Expectations</td>
</tr>
<tr>
<td>7DRE-Q</td>
<td>7DRE-Q</td>
<td>7DRE-Q</td>
</tr>
</tbody>
</table>

Figure 3.5: Exercise and Social Cognitive Theory Construct Data Collection Timeline
Instruments

The purpose of the current study is to evaluate a theory-based, educational, exercise, behavior change program. The program was designed to increase insufficiently active employee’s self-reported duration and frequency of exercise. Self-reported duration and frequency of exercise was reported for the previous seven days. The program was based on the social cognitive theory constructs self-regulation, self-efficacy, social support, exercise enjoyment and outcome expectations/expectancies. There are several instruments that must be used in order to obtain information on exercise and the social cognitive theory constructs from participants. All instrument coding is located in the Appendix L.

In order to determine study eligibility, the Stage of Change for Exercise Questionnaire (Marcus et al., 1992) was used to classify participants as either in the contemplation or preparation stage of change. Potential participants who classified themselves as in the contemplation or preparation stage of change were eligible for the program. They were individuals who were inactive and intended to begin regular exercise within six months (contemplation), or individuals who were irregularly active below the recommendations of three or more bouts of physical activity per week for at least twenty minutes. Therefore, these potential participants were insufficiently active. Participant exercise levels were measured using the Seven Day Recall of Exercise Questionnaire (Petosa, 1995). The theoretical constructs, including self-regulation, self-efficacy, social support, exercise enjoyment and outcome expectations/expectancies, were measured using previously validated and reliable
instruments. Initial baseline measures included participant demographics, such as gender, height, weight, ethnicity and educational status (See Appendix A). With the exception of the demographic variables, all information was self-reported by the participants at pre-test, post-test, follow-up one and follow-up two.

Stage of Change for Exercise Questionnaire

The five-choice Stage of Change for Exercise Questionnaire (Marcus et al., 1992) was completed by all participants prior to the start of the intervention (See Appendix B). The Stage of Change for Exercise Questionnaire describes an individual’s stage of exercise readiness. In the current study, the Stage of Change (SOC-Q) was used as an inclusion criteria. It was used to help determine which potential participants were insufficiently active prior to the start of the study, during the recruitment stage. Individuals chose one of five categories that best describes their current level of exercise participation. The five exercise behavior change stages are: precontemplation (individuals are inactive and do not intend to initiate an exercise program within the next six month), contemplation (individuals are inactive and intend to begin regular exercise within six months), preparation (individuals are irregularly active below the ACSM criterion level of three or more times per week for at least 20 minutes), action (individuals have been consistently active for the past six months) and maintenance (individuals have sustained regular exercise for at least six months). On the questionnaire, participants were required to choose their current level of physical activity and exercise, and submit it to the investigator prior to the start of the
intervention. If participants selected the stages contemplation or preparation, they were eligible for the study. If they chose precontemplation, action or maintenance, they were told they were not an appropriate fit for the program. Two week test-retest reliability for the self-efficacy scale was .90 (n=20) (Marcus et al., 1992). Chronbach’s Alpha was moderate in the present investigation (.61).

Exercise

The Seven Day Recall of Exercise Questionnaire was originally developed as the Seven Day Physical Activity Recall (PAR). It was first used in the Stanford Five City Project in 1984. It has been widely used to document physical activity levels, and has been refined and modified over the years (Blair et al, 1985; Dishman et al, 1988). The Seven Day Recall of Exercise Questionnaire (7DRE-Q) used in this study is one version of the self-administered questionnaire that examines participant activity levels over the previous seven days. It was developed by Petosa (1995) to capture participant’s self-reported, planned, moderate and vigorous-intensity duration and frequency of leisure time exercise. The instrument accounts for both moderate and vigorous intensity exercise. Specifically, the instrument provides detailed information on the moderate and vigorous-intensity exercise participants performed during the previous seven days. The participant is asked to recall specific exercise activities under the appropriate intensity level for each of the previous seven days. Participants list the specific activity performed on the corresponding day of the week, the length of time their performed the activity for, and whether the exercise was
planned or unplanned (See Appendix C). Exercise, by definition (see page 74), is planned physical activity done to enhance health or fitness. By providing whether the activity was planned or unplanned, the participants were demonstrating that they were planning their activities to enhance their health or fitness. Planning activities can be associated with goal setting, tailoring exercise, reasons to exercise, exercise enjoyment and outcome expectations and expectancies, all components of the social cognitive theory. Therefore, participants were demonstrating practical application of the theoretical program components in their own exercise programs. In an unpublished thesis conducted by Wolfe and Petosa (2005), the 7DRE-Q was tested for validity by means of the Actigraph accelerometer, and resulted in moderate to high correlations. The total minutes of moderate exercise correlation was $r=.72$. Vigorous exercise resulted in a correlation of $r=.897$. Overall total moderate exercise reliability resulted in a strong $r=.99$ correlation, while vigorous exercise reliability produced the same strong results $r=.99$. Chronbach’s Alpha in the current study resulted in a moderate $\alpha=.55$ for moderate minutes, an $\alpha=.58$ for moderate days, an $\alpha=.48$ for vigorous minutes and an $\alpha=.54$ for vigorous days.

**Self-Regulation**

The self-regulation instrument contains 52 items that are thought to be related to physical activity participation. Self-regulation, as defined by Bandura (1977), requires the development of self-regulatory skills, and operates through a set of sub-functions that must be developed and mobilized for self-directed change. Self-
regulation for exercise involves developing a set of skills, such as self-monitoring, goal setting or supportive feedback to promote regular exercise (Petosa, 1986). The self-regulation instrument contains items regarding self-monitoring, goal setting, outcomes of physical activity, reinforcements and environmental aid. Participants rate their use of the techniques over the previous four weeks, from one (never) to four (often). In an unpublished dissertation, a self-regulation scale was developed for adults (Petosa, 1993). An expert panel established content validity for the self-regulation instrument. Internal consistency (α=.88) and test-retest reliability (r=.92) were found to be acceptable. Similar results were found for the present study (α=.7). (See Appendix D).

Self-Efficacy

The self-efficacy instrument is a 14 item instrument that measures an adult’s confidence that they could exercise in the face of common barriers. Self-efficacy, which is referred to as perceived self-efficacy, is a self-evaluative judgment about one’s abilities related to performance attainments. Self-efficacy has become operationalized to mean overcoming barriers to exercise. Participants rated their confidence for exercise in the face of barriers, on a scale of 0% - 100% (positively could not to positively could exercise). Garcia and King (1991) used the instrument in a study examining sedentary adults and adherence to exercise. Internal consistency for Garcia and King (1991) was tested and resulted in a high Chronbach’s (α=.9) value.
Similar results were found for the present study ($\alpha=.8$). Test-retest reliability was moderately high ($r=.67$) (see Appendix E).

**Social Support for Family and Friends**

The social support instrument assesses participant’s perception of their social support for exercise (friends and family). Hofstetter, Hovell & Sallis (1990) state that social support and modeling of active lifestyles by family members and friends contributes to perceived self-regulatory efficacy to remain physically active.

Participants rate a series of statements, from one (no support) to five (very often), about their family and friend’s support for exercise during the previous three months. Originally, Treiber et al. (1991) validated a social support scale for exercise in two studies including adult samples. The studies assessed the relationships between self-reported physical activity and social support. The scale was modified from an earlier version, consisting of 12 items that relate to different types of social support. In both studies, internal consistencies were high (.90 to .96 for family and .81 to .95 for friends). Two week test-retest reliability was $r = .79$ for both family and friend subscales. Social support was positively correlated with a one item vigorous physical activity question ($r=.35$ for group one; $r=.46$ for group two). Internal consistency was tested in the present study and resulted in a high Chronbach’s ($\alpha=.9$) value (see Appendix F).
**Enjoyment of Exercise**

Enjoyment of physical activity and exercise was measured using the PACES instrument (Kendzierski & DeCarlo, 1991). The PACES instrument was designed to rate participant’s positive or negative feelings towards performing physical activity. The instrument asks participants to respond to a series of statements about physical activity. They are to rate how they feel at that moment about the physical activity they have been doing. For each feeling, they circle a number (1-7) that best describes how they feel (positive or negative) about components of physical activity (difficulty, exertion). To validate the instrument, in the study conducted by Kendzierski & DeCarlo (1991), the PACES instrument was tested in two college samples. In one sample, participants rode exercise bicycles. Test-retest reliability was moderate for bicycling, r=.60. In the second sample, participants jogged on a mini-trampoline. Test-retest reliability was high for jogging (r=.93). The 18 item instrument was found to have strong internal consistency (Chronbach’s Alpha = .93) in Kendzierski & DeCarlo’s (1991) study, however, Chronbach’s Alpha was lower in the present study (.5) (see Appendix G).

**Outcome Expectations and Expectancies**

The outcome expectations and expectancies scale was developed by Rovniak et al. (2002). The author expanded the original instrument, Benefits of Physical Activity (Sallis et al., 1999), and combined it with the PACES instrument (Kendzierski & DeCarlo, 1991), to assess both the negative and positive outcomes of physical activity and exercise, and the value associated with each. Outcome
expectations are defined as the beliefs regarding the relationship between specific levels of exercise performance and experienced outcomes. Outcome expectancy is the interaction between a person’s estimate that a behavior will lead to an outcome and the value placed on the outcome (Williams et al, 2005). The 25 item instrument asks respondents to indicate their level of agreement with positive and negative statements regarding the possible effects of regular exercise (1 = not at all; 5 = extremely likely). Participants indicate the value of each outcome, by rating the personal importance of each of the statements, ranging from 1 (not at all important) to five (extremely important). The instrument was found to have high internal consistency in Rovniak et. al. (1991) (Chronbach’s alpha = .88 and .81, respectively) and high test-retest stability (r=.85 and .81, respectively). Similar results were seen in the present study (Chronbach’s alpha = .88; test-retest = .78) (see Appendix H).

**Analysis**

To evaluate the effectiveness of the intervention, analyses were completed for the exercise variables (frequency and duration of moderate and vigorous exercise) and the social cognitive theory constructs. Each of the research questions were answered using a between group analysis of variance (ANOVA), to analyze treatment and comparison group differences.

*Exercise Impact Evaluation*

The research questions in this section address participant’s self-reported frequency and duration of exercise. Using the statistical software package SPSS,
moderate and vigorous exercise analyses were conducted separately. A priori alpha level was \( p = .05 \). A between group analysis of variance was used to answer each of the following eight research questions. Because separate analyses were used for each exercise variable, the research questions are presented for post-test analysis and follow-up analysis.

1. Is there a difference between the treatment group and the comparison group on self-reported, moderate-intensity minutes of exercise per week at post-test?
2. Is there a difference between the treatment group and the comparison group on self-reported, moderate-intensity minutes of exercise per week at follow-up?
3. Is there a difference between the treatment group and the comparison group on self-reported, moderate-intensity exercise days per week at post-test?
4. Is there a difference between the treatment group and the comparison group on self-reported, moderate-intensity exercise days per week at follow-up?
5. Is there a difference between the treatment group and the comparison group on self-reported, vigorous-intensity minutes of exercise per week at post-test?
6. Is there a difference between the treatment group and the comparison group on self-reported, vigorous-intensity minutes of exercise per week at follow-up?
7. Is there a difference between the treatment group and the comparison group on self-reported, vigorous-intensity exercise days per week at post-test?
8. Is there a difference between the treatment group and the comparison group on self-reported, vigorous-intensity exercise days per week at follow-up?
The between group analysis was conducted at post-test and follow-up to test the following eight hypotheses:

*Moderate Minutes of Exercise*

\( H_0 \) = There is no difference between groups on moderate exercise minutes at post-test.

\( H_0 \) = There is no difference between groups on moderate exercise minutes at follow-up.

\( H_A \) = There is a difference between groups on moderate exercise minutes at post-test.

\( H_A \) = There is a difference between groups on moderate exercise minutes at follow-up.

*Moderate Days of Exercise*

\( H_0 \) = There is no difference between groups on moderate exercise days at post-test.

\( H_0 \) = There is no difference between groups on moderate exercise days at follow-up.

\( H_A \) = There is a difference between groups on moderate exercise days at post-test.

\( H_A \) = There is a difference between groups on moderate exercise days at follow-up.

*Vigorous Minutes of Exercise*

\( H_0 \) = There is no difference between groups on vigorous exercise minutes at post-test.

\( H_0 \) = There is no difference between groups on vigorous exercise minutes at follow-up.

\( H_A \) = There is a difference between groups on vigorous exercise minutes at post-test.

\( H_A \) = There is a difference between groups on vigorous exercise minutes at follow-up.

*Vigorous Days of Exercise*

\( H_0 \) = There is no difference between groups on vigorous exercise days at post-test.
$H_o = \text{There is no difference between groups on vigorous exercise days at follow-up.}$

$H_A = \text{There is a difference between groups on vigorous exercise days at post-test.}$

$H_A = \text{There is a difference between groups on vigorous exercise days at follow-up.}$

Using the statistical software package SPSS, analysis of the twelve social cognitive theory research questions was conducted using the between group analysis of variance (ANOVA). An ANOVA analysis was run for each of the following six constructs: self-regulation, self-efficacy, social support for family, social support for friends, exercise enjoyment and outcome expectations and expectancies. Alpha level was set at a priori $p = .05$. The following hypotheses were tested:

**Self-Regulation**

$H_o = \text{There is no difference between groups on self-regulation scores at post-test.}$

$H_o = \text{There is no difference between groups on self-regulation scores at follow-up.}$

$H_A = \text{There is a difference between groups on self-regulation scores at post-test.}$

$H_A = \text{There is a difference between groups on self-regulation scores at follow-up.}$

**Self-Efficacy**

$H_o = \text{There is no difference between groups on self-efficacy scores at post-test.}$

$H_o = \text{There is no difference between groups on self-efficacy scores at follow-up.}$

$H_A = \text{There is a difference between groups on self-efficacy scores at post-test.}$

$H_A = \text{There is a difference between groups on self-efficacy scores at follow-up.}$
*Family Social Support*

$H_0 =$ There is no difference between groups on family social support scores at post-test.

$H_0 =$ There is no difference between groups on family social support scores at follow-up.

$H_A =$ There is a difference between groups on family social support scores at post-test.

$H_A =$ There is a difference between groups on family social support scores at follow-up.

*Friend Social Support*

$H_0 =$ There is no difference between groups on friend social support scores at post-test.

$H_0 =$ There is no difference between groups on friend social support scores at follow-up.

$H_A =$ There is a difference between groups on friend social support scores at post-test.

$H_A =$ There is a difference between groups on friend social support scores at follow-up.

*Enjoyment of Exercise*

$H_0 =$ There is no difference between groups on exercise enjoyment scores at post-test.

$H_0 =$ There is no difference between groups on exercise enjoyment scores at follow-up.

$H_A =$ There is a difference between groups on exercise enjoyment scores at post-test.
\( H_A \) = There is a difference between groups on exercise enjoyment scores at follow-up.

**Outcome Expectations and Expectancies**

\( H_o \) = There is no difference between groups on outcome expectations/expectancy scores at post-test.

\( H_o \) = There is no difference between groups on outcome expectations/expectancy scores at follow-up.

\( H_A \) = There is a difference between groups on outcome expectations/expectancy scores at post-test.

\( H_A \) = There is a difference between groups on outcome expectations/expectancy scores at follow-up.

**Assumptions of ANOVA**

Before calculating the analysis of variance for this study, it is important to discuss the underlying assumptions of ANOVA. If any of the assumptions are violated during the experiment, then it is difficult to compare the \( F_{\text{observed}} \) to the \( F_{\text{critical}} \) value. This leads to difficulty in correctly interpreting the results of the ANOVA. The assumptions for ANOVA are random selections and assignment, interval or greater data, independent observations, homogeneity of variance and normality.

*Random Selection and Assignment:* A researcher can assure that personal characteristics of the participants are equally distributed among the groups if randomization is used. In the quasi-experimental separate-samples design, participant scores are randomly assigned to the treatment and comparison group after they...
complete the post-test. Since participants were not randomly selected to be in the study, caution must be exercised when interpreting the results, as inferences to the population cannot be made without the use of a random sample.

*Interval or Greater Data:* The data must be of at least interval level. The data must result in items such as means and variance. If the data is not of interval level, these statistics are impossible to calculate and therefore cannot be used in the statistical analysis. The dependent variable in the current study is of at least interval level, as the data results in items such as means and variance.

*Independent Observations:* Observations must be independent, and the observations cannot be related to one another. In other words, one subject must not have any effect on another subject’s performance. If non-independence of scores occurs, there is a confounding of variables in the study and inferences to the treatment effect cannot be made. Although it is unknown whether any of the observations were related to one another, we should exercise caution when interpreting the results of the ANOVA.

*Homogeneity of Variance:* The treatment group variances must be homogeneous. From the statistical model, it is assumed that the variances in the different groups of the study are identical. We can detect any violations of the homogeneity of variance using Levene’s Test of Homogeneity of Variance.

*Normal Distribution:* The group data are normally distributed. In other words, the data must not be classified as having skewness or kurtosis. Kepple and Wickens
(2004, p. 145) state that when the sample becomes large, we do not need to worry about this assumption, as the statistic is generally robust against violations of normality.

**Calculation of Sample Size**

It is important in the study design phase to determine the necessary sample size to accurately detect treatment effects. In order to determine the correct number of participants for a given study, one needs to determine the relationship between three factors: significance level, the magnitude of the treatment effects and the desired power. In this study, a priori alpha level was set at $p = .05$. This is the conventional significance level used in a majority of the adult physical activity literature. Power was selected at .80, which is recommended by Kepple (Kepple, 1991). High statistical power enables researchers to correctly reject the null hypothesis (Kepple & Wickens, 2004). The effect size, Cohen’s $d$, was calculated using the formula from Keppel & Wickens, (2004, p. 162). The effect size, Cohen’s $d$, = Variability Explained / Total Variability; otherwise expressed as Cohen’s $d$ = Mean of Group 1 – Mean of Group 2 / Pooled Standard Deviation.

Once effect size was calculated, a set of power charts (modified by Pearson and Hartley, 1951) appropriate for tests at the five percent level and studies with $df_{numerator}$ between one and six were used to calculate the noncentrality parameter (Keppel & Wickens, 2004). The noncentrality parameter measures the extent to which the experiment gives evidence for differences among the population means. The chart
(Keppel & Wickens, 2004, p.590) allows one to translate power into the noncentrality parameter, denoted as $\phi$. We can combine the value we obtained for effect size with the value from the power charts for $\phi$ to compute the sample size with the following equation:

$$n = \phi^2 \frac{(1 - \text{Effect Size})}{\text{Effect Size}}$$

The following example provides the calculations for Cohen’s d Effect Size and the calculation of sample size for the dependent variable vigorous exercise minutes:

Cohen’s $d = \frac{(\text{Mean of Group 1} - \text{Mean of Group 2})}{\text{Pooled Standard Deviation}}$

$$\frac{(19.2 - 16.8)}{(20.4 + 19.2)} = 0.06$$

Sample size $n = \phi^2 \frac{(1 - \text{Effect Size})}{\text{Effect Size}}$

$$\frac{(2.0)^2 (1-0.06)}{0.06} = 63$$

The mean and standard deviation values from Hallam and Petosa (1998) and Nichols et al. (2001) used to determine the sample size calculations for exercise and the social cognitive theory variables are found in tables 3.1 and 3.2. The values for self-regulation, self-efficacy and outcome expectations and expectancies were taken from Hallam and Petosa (1998). The values for exercise, social support and exercise enjoyment were taken from Nichols et al. (2001).
### Table 3.1: A Priori Power Calculations for Study Instruments from Nichols et al. (2001)

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Treatment Mean</th>
<th>Comparison Mean</th>
<th>Mean Difference</th>
<th>Pooled SD</th>
<th>Cohen’s d</th>
<th>Number of Subjects Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seven Day Recall of Moderate Minutes</td>
<td>62.4</td>
<td>30.6</td>
<td>31.8</td>
<td>101.8</td>
<td>.31</td>
<td>4</td>
</tr>
<tr>
<td>Seven Day Recall of Vigorous Minutes</td>
<td>19.2</td>
<td>16.8</td>
<td>2.4</td>
<td>39.6</td>
<td>.06</td>
<td>2.0</td>
</tr>
<tr>
<td>Social Support</td>
<td>52.7</td>
<td>49.2</td>
<td>3.5</td>
<td>30.2</td>
<td>.12</td>
<td>2.8</td>
</tr>
<tr>
<td>Exercise Enjoyment</td>
<td>95.6</td>
<td>96.9</td>
<td>-1.3</td>
<td>26.5</td>
<td>-.05</td>
<td>1.8</td>
</tr>
</tbody>
</table>

### Table 3.2: A Priori Power Calculations for Study Instruments from Hallam & Petosa (1998)

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Treatment Mean</th>
<th>Comparison Mean</th>
<th>Mean Difference</th>
<th>Pooled SD</th>
<th>Cohen’s d</th>
<th>Number of Subjects Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Regulation</td>
<td>118.22</td>
<td>98.57</td>
<td>19.65</td>
<td>45.11</td>
<td>.43</td>
<td>4.0</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>62.78</td>
<td>59.81</td>
<td>2.97</td>
<td>34.59</td>
<td>.09</td>
<td>2.5</td>
</tr>
<tr>
<td>Outcome Expectations/Expectancies</td>
<td>127.37</td>
<td>126.68</td>
<td>.69</td>
<td>71.94</td>
<td>.01</td>
<td>.8</td>
</tr>
</tbody>
</table>
The sample size calculation indicated that a minimum of 36 participants would be needed.

**Missing Data**

Each participant had to complete a minimum of 70% of each social cognitive theory construct instrument to be included in the analysis. This was the case for each assessment time period (pre-test, post-test, follow-up). Any participant who did not complete at least 70% of the social cognitive theory instruments was excluded from the analysis. If a participant completed at least 70% but less than 100% of any social cognitive theory instrument, mean replacement, taken from the whole sample, was used for any ordinal or interval level variable. Since not all participants could report exercise at any of the assessment time periods, there was no minimum criteria for completing the Seven Day Recall of Exercise Questionnaire. If a participant did not report any exercise on the 7DRE-Q, the missing datum was not replaced. If a demographic variable was missing, mean replacement was not used. At pre-test, eight participant’s data were more than 70% complete, but less than 100% complete. Mean replacement for the missing values was input. At post-test, five participant’s data were more than 70% complete, but less than 100% complete. Mean replacement for the missing values were input. At the first follow-up, three participant’s data were more than 70% complete, but less than 100% complete. Mean replacement for the missing values were input. At follow-up two, none of the participant’s data were incomplete. Mean replacement was not used in the analysis.
Examining Drop Outs

In an attempt to retain as many participants as possible, an email was sent out to the participants at the beginning of each work week during the two month program. The purpose of this was to remind participants to attend the class session and complete and submit the assignment worksheet. At each follow-up, participants were emailed a reminder one week prior to questionnaire completion. They were sent the questionnaire via email on the day of follow-up assessment, or could meet with the investigator face to face if so desired. This was to make completing the questionnaire easier for the participant, thus increasing retention.

Participants were considered intervention drop outs if they attended less than four of the six (67%) educational class sessions. If they submitted their assignment but failed to attend the classroom session, it was counted as missed attendance. If participants did not complete the post-test survey, they were considered drop-outs. They were not contacted for follow-up. If they did not return the first follow-up questionnaire, the participant was considered a drop-out and was not sent the second follow-up questionnaire. Participants who were considered drop outs were descriptively compared to participants who completed the program.

Participant Program Evaluation

The purpose of the program evaluation was to assess whether participants thought they were benefiting from the program, whether the program was what they thought it would be, if the instructor was providing them with realistic and
understandable information, and if changes could be made to the program delivery or information. Participant evaluations were analyzed using frequency measures, since a majority of the questions were nominal in nature. Program evaluations occurred in week three of the intervention. Attendance was also monitored at each class session, to determine level of exposure to the intervention. The process evaluation document is located in Appendix K.
CHAPTER 4

RESULTS

Purpose

The purpose of the current study is to evaluate a theory-based, educational, exercise, behavior change program. The BE ACTIVE program was designed to increase insufficiently active, adult, employee self-reported duration and frequency of exercise. The program was tailored to employees who were not regular exercisers. The program was based on the social cognitive theory constructs self-regulation, self-efficacy, social support, exercise enjoyment and outcome expectations/expectancies. The intervention was designed for a classroom-based, group setting and consisted of six, one hour, class sessions. A second purpose of the study was to evaluate the impact of the intervention on the targeted social cognitive theory constructs: self-regulation, self-efficacy for overcoming barriers, social support for exercise, exercise enjoyment, and outcome expectations and expectancies. Previously validated and reliable instruments were used to measure the constructs. The components of the program were designed to increase the social cognitive theory construct scores over the course of the study.
Subject Recruitment and Retention

The target sample for the intervention was apparently healthy, insufficiently active or sedentary, full time, adult employees from the four worksites. The sample was composed of males and females ages 18 to 65. Employee recruitment methods included all-staff emails and flyers, flyers posted around the worksites, meeting announcements, word of mouth, and attending health fairs. The recruitment message for each worksite was the same. It was targeted toward insufficiently active employees. Specific items on the flyers, such as dates and times, were tailored for each individual workplace. The recruitment methods used at each worksite are discussed below. The flyer posted at the worksite is located in Appendix N.

Ashland Chemical

A total of 40 potential participants were recruited for the study, and 33 were enrolled on the first day of the program (80%). Twenty-six (79%) of the participants were female and seven (21%) were male. Twenty-nine pre-test questionnaires were obtained from the participants during the first week of the program. Twenty-five participants were recruited from flyers (63%), six were by word of mouth (15%) and nine were from a monthly newsletter called the “Flipside” (23%).

Battelle Memorial Institute

Forty potential participants were recruited for the study, and 39 (97.5%) were enrolled in the program on the first day. Thirty-four pre-test questionnaires were collected during the first week of the program. Of those who enrolled in the program,
32 were female (82%) and six were male (18%). Thirty-nine potential participants (98%) were recruited for the program by the all-staff flyer, and one (3%) participant was recruited by the Daily Bulletin, a daily newsletter that is sent to all employees with company information.

**Chemical Abstracts Services (CAS)**

Eighty-six potential participants responded to the email and contacted the investigator. Fifty-three people were enrolled on the first day of class (62%). Forty-seven pre-test questionnaires were obtained during the first week of the program. Of the 53 participants, 39 were female (74%) and 14 were male (16%). Ten were recruited through an on-site health fair (12%), 75 were recruited through an inter-office email (87%) and one was recruited by word of mouth (1%).

**OCLC**

Twenty-nine potential participants were recruited for the program, and 23 were enrolled on the first day of class (80%). Twenty-one pre-test questionnaires were collected during the first week of the program. Eleven males (48%) and 12 (52%) females participated in the program. All 29 potential participants and all 23 participants enrolled in the study were recruited through the all-staff email.
Incentives for Participation

All recruitment materials stated there would be an incentive for participation. Each participant who completed the post-test questionnaire received a pedometer and a five dollar gift certificate to their onsite-workplace cafeteria.

Program Demographic Information

One-hundred nine females (83%) and 22 males enrolled in the study (17%). The participant’s average age was 46. The average height of participants was 66 inches and the average weight was 205 pounds. Fifty-three participants obtained a bachelor’s degree (42%), 24 obtained a post-bachelor’s degree (19%), 30 participants attended some college (23%), seven attended a technical college (5%) and 13 obtained a high school degree (10%). One hundred and one participants were married (77%), 11 were single (8%), 17 were divorced (13%), one participant selected “partner” (1%) and one participant was widowed (1%). One hundred ten participants of the study population were Caucasian (84%), 15 were African American (11%), three were Asian American (2%), one participant was Hispanic (1%) and two selected “other” for their ethnicity (1.5%). This information is presented in tables 4.1, 4.2 and 4.3.
<table>
<thead>
<tr>
<th>Level of Education Attained</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School</td>
<td>13</td>
<td>10%</td>
</tr>
<tr>
<td>Technical College</td>
<td>7</td>
<td>5%</td>
</tr>
<tr>
<td>Some College</td>
<td>30</td>
<td>23%</td>
</tr>
<tr>
<td>College Degree</td>
<td>53</td>
<td>42%</td>
</tr>
<tr>
<td>Post College Degree</td>
<td>24</td>
<td>19%</td>
</tr>
</tbody>
</table>

n=127

**Table 4.1: Program Participant Level of Education Attained.**

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>98</td>
<td>77%</td>
</tr>
<tr>
<td>Single</td>
<td>11</td>
<td>8%</td>
</tr>
<tr>
<td>Divorced</td>
<td>17</td>
<td>13%</td>
</tr>
<tr>
<td>Partner</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>1%</td>
</tr>
</tbody>
</table>

n=127

**Table 4.2: Program Participant Marital Status.**

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caucasian</td>
<td>108</td>
<td>84%</td>
</tr>
<tr>
<td>African American</td>
<td>15</td>
<td>11%</td>
</tr>
<tr>
<td>Asian American</td>
<td>3</td>
<td>2%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>1%</td>
</tr>
</tbody>
</table>

n=127

**Table 4.3: Program Participant Ethnicity.**
Eligible Participants

Eligible study participants categorized themselves in the contemplation or preparation Stages of Change. In order to be eligible for the study, participants had to complete the Stage of Change Questionnaire document. The questionnaire was sent as a Microsoft Word document to potential participants via email after they initially contacted the investigator. They had to send back the completed questionnaire within 24 hours. Table 4.4 presents the participant stage of change at pre-test.

<table>
<thead>
<tr>
<th>Stage of Change</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precontemplation</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Contemplation</td>
<td>23</td>
<td>18%</td>
</tr>
<tr>
<td>Preparation</td>
<td>103</td>
<td>81%</td>
</tr>
</tbody>
</table>

n=127

Table 4.4: Program Participant Stage of Change Classification at Pre-Test

A majority of the participants (99%) classified themselves as in the Contemplation or Preparation Stage of Change.

Attrition Rates

It can be expected that 40% to 60% percent of those initiating an exercise program will drop out within three to six months (Dishman, 1988). There was a 43% percent attrition rate among the participants from pre-test to post-test. One hundred twenty-seven questionnaires were obtained at pre-test and 72 questionnaires were
obtained at post-test. Table 4.5 presents the post-test retention rates for the four worksites.

<table>
<thead>
<tr>
<th>Worksite</th>
<th>Pre-Test Completion</th>
<th>Post-Test Completion</th>
<th>Retention Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ashland Chemical, Inc.</td>
<td>28</td>
<td>12</td>
<td>43%</td>
</tr>
<tr>
<td>Battelle Memorial Institute</td>
<td>32</td>
<td>22</td>
<td>69%</td>
</tr>
<tr>
<td>Chemical Abstracts</td>
<td>47</td>
<td>27</td>
<td>57%</td>
</tr>
<tr>
<td>OCLC</td>
<td>20</td>
<td>11</td>
<td>55%</td>
</tr>
<tr>
<td>Total</td>
<td>127</td>
<td>72</td>
<td>57%</td>
</tr>
</tbody>
</table>

\[n=127\]

Table 4.5: Program Retention Rates at the Four Worksites.

Three companies had over a 50% retention rate and one company had under a 50% retention rate. This explains the overall 57% attrition rate. At the one month follow-up assessment, 46 participants completed the questionnaire. Seven participants from Ashland completed the questionnaire (15%), 13 participants from Battelle completed the questionnaire (28%), 18 participants from CAS completed the questionnaire (39%) and eight participants from OCLC completed the questionnaire (20%). This is approximately 37% of the original sample. At the three month follow-up assessment, 30 participants completed the questionnaire. Six participants from Ashland completed the questionnaire (20%), six participants from Battelle completed
the questionnaire (20%), 12 participants from CAS completed the questionnaire (40%) and six participants from OCLC completed the questionnaire (20%).

Figure 4.1 presents the Be Active participant attrition flowchart. Information is presented on the treatment and comparison group attrition and data usage at each assessment time frame. The figure is presented on the following page.
The Be Active Intervention Flowchart

Assessed for eligibility (n=195)

Enrollment

Excluded pre-intervention for not meeting inclusion criteria or attended zero class sessions (n=47).

Excluded from data analysis for not meeting inclusion criteria (n=4).

Random Assignment

Treatment Group at Pre-Test (n=65)
Analyzed (n=0)

Treatment Group at Post-Test (n=39)
Analyzed (n=37)

Treatment Group Follow-Up One (n=26)
Analyzed (n=24)

Treatment Group Follow-Up Two (n=21)
Analyzed (n=19)

Comparison Group at Pre-Test (n=66)
Analyzed (n=62)

Comparison Group Post-Test (n=32)
Analyzed (n=0)

Comparison Group Follow-Up One (n=21)
Analyzed (n=0)

Comparison Group Follow-Up Two (n=11)
Analyzed (n=0)

Analysis

Figure 4.1: Be Active Participation Retention & Attrition Flow Chart
Table 4.6 presents the values for participant class attendance by worksite.

<table>
<thead>
<tr>
<th>Number of Class Sessions Attended</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ashland</td>
<td>0</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>5</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Battelle</td>
<td>2</td>
<td>14</td>
<td>3</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>CAS</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>OCLC</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>30</td>
<td>20</td>
<td>19</td>
<td>18</td>
<td>24</td>
<td>6</td>
</tr>
</tbody>
</table>

n=127

**Table 4.6: Participant Class Attendance by Worksite.**

A majority of participants completed four or five classes (n=50). The worksite with the largest number of attendees for four or five classes was Chemical Abstracts. OCLC had the smallest number of attendees for four or five classes.

**Examining Drop Outs**

Participants were considered drop outs if they attended less than four (67%) class sessions. If they submitted their assignment but failed to attend the classroom session, it was counted as missed attendance. If participants did not complete the post-test survey, they were considered drop-outs. They were not contacted for follow-up. If they did not return the first follow-up questionnaire, the participant was considered a drop-out and was not sent the second follow-up questionnaire.

Participants who were considered drop-outs were descriptively compared to participants who completed the study.
Descriptive Rates of Exercise Participation in Sample

The Stage of Change was used to determine participant eligibility for the program. Participants had to classify themselves as Contemplation and Preparation Stages of Change. Prior to the intervention, one participant classified themselves as Precontemplation (1%), 23 participants classified themselves as Contemplation (18%), and 103 participants classified themselves as Preparation (81%). At post-test, participants were required to complete the Stage of Change instrument again. An analysis was performed to detect if participants had improved, regressed or did not change their stage of readiness to exercise. These results are presented in Table 4.7.

<table>
<thead>
<tr>
<th>Status</th>
<th>Post-Test Stage of Change</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Precontemplation to Contemplation</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Progressed Stages</td>
<td>Contemplation to Preparation</td>
<td>6</td>
<td>8%</td>
</tr>
<tr>
<td></td>
<td>Preparation to Action</td>
<td>37</td>
<td>52%</td>
</tr>
<tr>
<td></td>
<td>Contemplation to Action</td>
<td>3</td>
<td>4%</td>
</tr>
<tr>
<td>Remained in Stage</td>
<td>Contemplation</td>
<td>16</td>
<td>22%</td>
</tr>
<tr>
<td></td>
<td>Preparation</td>
<td>8</td>
<td>11%</td>
</tr>
<tr>
<td>Regressed Stages</td>
<td>Contemplation to Precontemplation</td>
<td>1</td>
<td>1%</td>
</tr>
</tbody>
</table>

n=72

Table 4.7: Program Participant Stage of Change Progression.
Exercise Rates

As part of the questionnaire, participants had to complete the Seven Day Recall of Exercise Questionnaire (Petosa, 1995). Participants had to recall their exercise for the previous seven days. Following the separate samples pre-test, post-test group design, the comparison group’s data, including pre-test mean, maximum and minimum minutes, and frequency distribution of exercise will be presented, and the treatment group’s post-test and follow-up one and two mean, maximum and minimum minutes, and frequency distribution of exercise is presented.

<table>
<thead>
<tr>
<th>Intensity</th>
<th>Mean Minutes</th>
<th>Minimum Minutes</th>
<th>Maximum Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparison Group</td>
<td>Moderate 36.6 0 315</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vigorous 2.5 0 110</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

n=127

Table 4.8: Pre-Test Exercise Comparison Mean, Minimum and Maximum Minutes for Moderate and Vigorous Exercise.

The mean minutes of pre-test moderate exercise in the comparison group was approximately 37 (SD = 56.11) minutes. The mean minutes for vigorous exercise in the comparison group was two and a half minutes (SD = 15). The pre-test frequency distribution for days of exercise in the comparison group is presented in figure 4.2.
Figure 4.2: Frequency Distribution for Days of Moderate Intensity Exercise in the Comparison Group at Pre-Test. – the next 4 graphs were added per Dr B.

The majority of participants reported zero days of pre-test exercise (52%). Ninety-nine percent of participants in the comparison group reported zero bouts of vigorous exercise. Table 4.9 presents the treatment group’s post-test mean, maximum and minute minutes of exercise.
The mean minutes of post-test moderate exercise in the treatment group was approximately 82 (SD = 65) minutes. The mean minutes for vigorous exercise in the treatment group was approximately 30 (SD = 58) minutes. The treatment group post-test frequency distribution for moderate and vigorous exercise is presented in figure 4.3 on the following page.
Figure 4.3: Frequency Distribution for Days of Moderate and Vigorous Intensity Exercise in the Treatment Group at Post-Test.

At post-test, the majority of participants are reporting more than one bout of moderate exercise in the treatment (87%). A majority of participants in the treatment group are reporting one or less bouts (84%) of vigorous exercise. Table 4.10 presents the follow-up one treatment group mean, maximum and minimum minutes of exercise.
Table 4.10: Program Follow-Up One Exercise Treatment Group Mean, Minimum and Maximum Minutes for Moderate and Vigorous Exercise.

<table>
<thead>
<tr>
<th>Intensity</th>
<th>Mean Minutes</th>
<th>Minimum Minutes</th>
<th>Maximum Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment Group</td>
<td>Moderate</td>
<td>154</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Vigorous</td>
<td>44</td>
<td>0</td>
</tr>
</tbody>
</table>

The mean minutes of follow-up one moderate exercise in the treatment group was approximately 154 (SD = 155) minutes. The mean minutes for vigorous exercise in the treatment group was 44 (SD = 73) minutes. The first follow-up frequency distribution for moderate exercise in the treatment group is presented in table 4.4 below.
At the first follow-up, those who reported zero days of exercise decreased in the treatment group (8%). Those performing zero bouts of vigorous exercise in the treatment group was less than those who reported one bout or more of vigorous exercise (54.2%). Those performing vigorous exercise was an increase from post-test. The second follow-up treatment group mean, maximum and minimum minutes of exercise are presented in Table 4.11.
<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>Intensity</th>
<th>Mean Minutes</th>
<th>Minimum Minutes</th>
<th>Maximum Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Moderate</td>
<td>135</td>
<td>0</td>
<td>480</td>
</tr>
<tr>
<td></td>
<td>Vigorous</td>
<td>18</td>
<td>0</td>
<td>90</td>
</tr>
</tbody>
</table>

Table 4.11: Program Follow-Up Two Exercise Treatment Group Mean, Minimum and Maximum Minutes for Moderate and Vigorous Exercise.

The mean minutes of follow-up two moderate exercise in the treatment group was approximately 135 (SD = 117) minutes. The mean minutes for vigorous exercise in the treatment group was approximately 18 (SD = 43) minutes. The second follow-up frequency distribution for moderate exercise in the treatment group is presented in table 4.5 on the following page.
Figure 4.5: Frequency Distribution for Days of Moderate and Vigorous Intensity Exercise in the Treatment Group at Follow-Up Two.

At the second follow-up, a majority of participants were reporting more than one bout of moderate exercise bout (84.2%). For those reporting vigorous exercise, the number reporting zero bouts increased from follow-up one (68.4%).

Missing Data

Each participant had to complete a minimum of seventy percent of each social cognitive theory construct instrument to be included in the analysis. This was the case for each assessment time period. Any participant who did not complete at least 70% percent of the social cognitive theory instruments was excluded from the analysis. If a participant completed at least 70% but less than one hundred percent of any social
cognitive theory instrument, mean replacement, taken from the whole sample, was used for any ordinal or interval level variable. Since not all participants could report exercise at any of the assessment time periods, there was no minimum criteria for completing the Seven Day Recall of Exercise Questionnaire. If a participant did not report any exercise on the 7DRE-Q, the missing data was not replaced. If a demographic variable was missing, mean replacement was not used.

Data Analysis

In order to answer each exercise and social cognitive theory research question, the between group univariate analysis of variance (ANOVA) was used to determine treatment effects.

Pre-Test Group Differences

In order to determine whether randomization of instrument scores correctly worked after the post-test assessment was complete, pre-test group differences were analyzed. An independent samples t-test was used to compare the pre-test group means. The results are presented in Appendix O.

Descriptive Statistics of Exercise Behavior

The following four tables present the comparison group’s pre-test mean and standard deviation, and the treatment group’s post-test, follow-up one and follow-up two means and standard deviations. Table 4.12 presents the comparison group’s pre-
test mean and standard deviation, and the treatment group’s post-test and follow-up means and standard deviations, for minutes of moderate-intensity exercise.

<table>
<thead>
<tr>
<th>Data Collection Point</th>
<th>Minutes of Moderate Exercise</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Pre-Test</td>
<td>36.6</td>
<td>56</td>
</tr>
<tr>
<td>Post-Test</td>
<td>81.6</td>
<td>65</td>
</tr>
<tr>
<td>Follow-Up 1</td>
<td>153.6</td>
<td>155</td>
</tr>
<tr>
<td>Follow-Up 2</td>
<td>135</td>
<td>117</td>
</tr>
</tbody>
</table>

n=62 Comparison at Pre-Test  
n=37 Treatment at Post-Test  
n=24 Treatment at Follow-Up One  
n=19 Treatment at Follow-Up Two

Table 4.12: Treatment and Comparison Group Means and Standard Deviations for Minutes of Moderate-Intensity Exercise at Pre-Test, Post-Test, Follow-Up One and Follow-Up Two.

The mean minutes of moderate-intensity exercise in the comparison group at pre-test was 36.6 (SD = 56). The mean minutes of moderate-intensity exercise in the treatment group at post-test was 81.6 (SD = 65). The treatment group mean increased at the first follow-up (153.6; SD = 155)) and remained elevated at the second follow-up (135; SD = 117)).

Table 4.13 presents the comparison group’s pre-test mean and standard deviation, and the treatment group’s post-test and follow-up means and standard deviations, for frequency of moderate-intensity exercise.
<table>
<thead>
<tr>
<th>Data Collection Point</th>
<th>Frequency of Moderate Exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>Pre-Test</td>
<td>1.3</td>
</tr>
<tr>
<td>Post-Test</td>
<td>2.8</td>
</tr>
<tr>
<td>Follow-Up 1</td>
<td>3.7</td>
</tr>
<tr>
<td>Follow-Up 2</td>
<td>4.6</td>
</tr>
</tbody>
</table>

n=62 Comparison at Pre-Test  
n=37 Treatment at Post-Test  
n=24 Treatment at Follow-Up One  
n=19 Treatment at Follow-Up Two

Table 4.13: Treatment and Comparison Group Means and Standard Deviations for Frequency of Moderate-Intensity Exercise at Pre-Test, Post-Test, Follow-Up One and Follow-Up Two.

The mean for frequency of moderate-intensity exercise in the comparison group at pre-test was 1.3 (SD = 1.9). The mean for frequency of moderate-intensity exercise in the treatment group at post-test was 2.8 (SD = 1.9). The treatment group mean increased at both the first follow-up (3.7; SD = 2.4)) and second follow-up (4.58; SD = 11.1).

Table 4.14 presents the comparison group’s pre-test mean and standard deviation, and the treatment group’s post-test and follow-up means and standard deviations, for minutes of vigorous-intensity exercise.
### Table 4.14: Treatment and Comparison Group Means and Standard Deviations for Minutes of Vigorous-Intensity Exercise at Pre-Test, Post-Test, Follow-Up One and Follow-Up Two.

<table>
<thead>
<tr>
<th>Data Collection Point</th>
<th>Minutes of Vigorous Exercise</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Pre-Test</td>
<td>2.5</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Post-Test</td>
<td>29.5</td>
<td>58.5</td>
<td></td>
</tr>
<tr>
<td>Follow-Up 1</td>
<td>43.7</td>
<td>73.3</td>
<td></td>
</tr>
<tr>
<td>Follow-Up 2</td>
<td>18.2</td>
<td>43.2</td>
<td></td>
</tr>
</tbody>
</table>

n=62 Comparison at Pre-Test  
n=37 Treatment at Post-Test  
n=24 Treatment at Follow-Up One  
n=19 Treatment at Follow-Up Two

The mean for minutes of vigorous-intensity exercise in the comparison group at pre-test was 2.5 (SD = 15). The mean for minutes of moderate-intensity exercise in the treatment group at post-test was 29.5 (SD = 58.5). The treatment group mean increased at the first follow-up (43.70; SD = 73.3) and then decreased at the second follow-up (18.16; SD = 43.2).

Table 4.15 presents the comparison group’s pre-test mean and standard deviation, and the treatment group’s post-test and follow-up means and standard deviations, for frequency of moderate-intensity exercise.
The mean for frequency of vigorous-intensity exercise in the comparison group at pre-test was .1 (SD = .4). The mean for minutes of moderate-intensity exercise in the treatment group at post-test was .8 (SD = 1.3). The treatment group mean increased at the first follow-up (1.1; SD = 1.8)) and then decreased at the second follow-up (.7; SD = 1.3).

**Impact Evaluation**

*Analysis of the Exercise Research Questions*

The analysis of the impact of the intervention on self-reported moderate and vigorous frequency and duration of exercise was conducted using the between group univariate analysis of variance (ANOVA). A separate ANOVA was used for each of the eight research questions. The between group ANOVA was the correct statistical method to use because of the study design.
Duration (minutes) of Moderate Exercise

1. Research Question One: Is there a difference between the treatment group and the comparison group on self-reported, moderate-intensity minutes of exercise per week at post-test?

Hypothesis:

H₀ = There is no difference between groups on moderate exercise minutes at post-test.

Hₐ = There is a difference between groups on moderate exercise minutes at post-test.

Table 4.16 presents the analysis of variance results at post-test.

<table>
<thead>
<tr>
<th>Time</th>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>Eta Sq.</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-Test</td>
<td>Model</td>
<td>46974.5</td>
<td>1</td>
<td>13.2</td>
<td>.001</td>
<td>.12</td>
<td>.8</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>344075.6</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>673611</td>
<td>98</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

n=37 Treatment; n=62 Comparison; Adjusted r² = .11 p<.05

Table 4.16: ANOVA Model Results for Moderate Minute Between Group Differences at Post-Test.

There was a significant difference between groups (F₁,₉₈ = 13.243, p=.001). We can reject the null hypothesis. The effect size is n²=.12. This is considered to be a small effect size.

158
2. Research Question Two: Is there a difference between the treatment group and the comparison group on self-reported, moderate-intensity minutes of exercise per week at follow-up?

Hypothesis:

$H_0 =$ There is no difference between groups on moderate exercise minutes at follow-up.

$H_A =$ There is a difference between groups on moderate exercise minutes at follow-up.

Table 4.17 presents the follow-up ANOVA results.

<table>
<thead>
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<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>Eta Sq.</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1</td>
<td>27.1</td>
<td>.001</td>
<td>.26</td>
<td>.9</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>7290485</td>
<td>84</td>
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<tr>
<td></td>
<td>Total</td>
<td>963526.4</td>
<td>85</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Follow Up 2</td>
<td>Model</td>
<td>140824.7</td>
<td>1</td>
<td>25.4</td>
<td>.001</td>
<td>.24</td>
<td>.9</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>438183</td>
<td>79</td>
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<tr>
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<td>Total</td>
<td>579007.6</td>
<td>80</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

n=24 Treatment; n=62 Comparison; Adjusted $r^2 = .25$ at follow-up one
n=19 Treatment; n=62 Comparison; Adjusted $r^2 = .22$ at follow-up two
p<.05

Table 4.17: ANOVA Model Results for Moderate Minute Between Group Differences at Follow-Up One and Follow-Up Two.

There was a significant difference between groups at follow-up one ($F_{1,85} = 27.1, p=.001$). We can reject the null hypothesis. The effect size resulted in an $n^2 = .26$, which is a small to moderately-small effect size. At follow-up two, there was
a significant difference between groups from pre-test to follow-up one \( (F_{1,80}) = 25.4, \ p=.001 \). We can reject the null hypothesis. The effect size resulted in an \( n^2=.24 \), which is a small to moderately-small effect size.

*Frequency (bouts) of Moderate Exercise*

3. Research Question Three: Is there a difference between the treatment group and the comparison group on self-reported, moderate-intensity exercise days per week at post-test?

Hypothesis:

\( H_0 \) = There is no difference between groups on moderate exercise days at post-test.

\( H_A \) = There is a difference between groups on moderate exercise days at post-test.

Table 4.18 presents the ANOVA results at post-test.

<table>
<thead>
<tr>
<th>Time</th>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>Eta Sq.</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-Test</td>
<td>Model</td>
<td>51.7</td>
<td>1</td>
<td>14.7</td>
<td>.001</td>
<td>.13</td>
<td>.8</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>341.1</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>392.7</td>
<td>98</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

n=37 Treatment; n=62 Comparison; Adjusted \( r^2 = .12 \)

p<.05

*Table 4.18: ANOVA Model Results for Moderate Frequency Between Group Differences at Post-Test.*
There was a significant difference between groups at post-test \((F_{1,98}) = 14.7, p=.001\). We can reject the null hypothesis. The effect size is \(\eta^2 = .13\). This is considered to be a small effect size.

4. Research Question Four: Is there a difference between the treatment group and the comparison group on self-reported, moderate-intensity exercise days per week at follow-up?

Hypothesis:

\(H_0 = \) There is no difference between groups on moderate exercise days at follow-up.

\(H_A = \) There is a difference between groups on moderate exercise days at follow-up.

Table 4.19 presents the ANOVA results at follow-up.

<table>
<thead>
<tr>
<th>Time</th>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>Eta Sq</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow Up 1</td>
<td>Model</td>
<td>101.2</td>
<td>1</td>
<td>25.7</td>
<td>.001</td>
<td>.25</td>
<td>.9</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>329.7</td>
<td>84</td>
<td></td>
<td></td>
<td>.14</td>
<td>.8</td>
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<tr>
<td></td>
<td>Total</td>
<td>430.9</td>
<td>85</td>
<td>30.6</td>
<td>.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follow Up 2</td>
<td>Model</td>
<td>157.3</td>
<td>1</td>
<td>30.6</td>
<td>.001</td>
<td>.14</td>
<td>.8</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>405.4</td>
<td>79</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>562.7</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(n=24\) Treatment; \(n=62\) Comparison; Adjusted \(r^2 = .24\) at follow-up one
\(n=19\) Treatment; \(n=62\) Comparison; Adjusted \(r^2 = .13\) at follow-up two
\(p<.05\)

Table 4.19: ANOVA Model Results for Moderate Frequency Between Group Differences at Follow-Up One and Follow-Up Two.
At follow-up one, there was a significant difference between groups at follow-up one \( (F_{1,85}) = 25.7, p=.001 \). We can reject the null hypothesis. The effect size resulted in an \( n^2 = .25 \), which is considered to be a small to moderately-small effect size. At follow-up two, there was a significant difference between groups \( (F_{1,80}) = 30.6, p=.001 \). We can reject the null hypothesis. The effect size resulted in an \( n^2 = .14 \), which is a small to effect size.

*Duration (Minutes) of Vigorous Exercise*

5. Research Question Five: Is there a difference between the treatment group and the comparison group on self-reported, vigorous-intensity minutes of exercise per week at post-test?

Hypothesis:

\( H_0 = \) There is no difference between groups on vigorous exercise minutes at post-test.

\( H_A = \) There is a difference between groups on vigorous exercise minutes at post-test.

Table 4.20 presents the analysis of variance results (ANOVA) at post-test.

<table>
<thead>
<tr>
<th>Time</th>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>Eta Sq.</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-Test</td>
<td>Model</td>
<td>16943</td>
<td>1</td>
<td>12.1</td>
<td>.001</td>
<td>.11</td>
<td>.75</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>136964.7</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>153877.6</td>
<td>98</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\( n=37 \) Treatment; \( n=62 \) Comparison; Adjusted \( r^2 = .11 \) \( p<.05 \)

*Table 4.20 ANOVA Model Results for Vigorous Minutes Between Group Differences at Post-Test.*
There was a significant difference between groups from at post-test \( (F_{1,98}) = 12.1, p=.001 \). We can reject the null hypothesis. The effect size is \( n^2 = .11 \). This is considered to be a small effect size.

6. Research Question Six: Is there a difference between the treatment group and the comparison group on self-reported, vigorous-intensity minutes of exercise per week at follow-up?

Hypothesis:

\( H_0 = \) There is no difference between groups on vigorous exercise minutes at follow-up.

\( H_A = \) There is a difference between groups on vigorous exercise minutes at follow-up.

Table 4.21 presents the follow-up ANOVA results.

<table>
<thead>
<tr>
<th>Time</th>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>Eta Sq.</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow Up 1</td>
<td>Model</td>
<td>26825.4</td>
<td>1</td>
<td>16.2</td>
<td>.001</td>
<td>.17</td>
<td>.9</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>138878</td>
<td>84</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>Total</td>
<td>165703.5</td>
<td>85</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follow Up 2</td>
<td>Model</td>
<td>4061.1</td>
<td>1</td>
<td>10.3</td>
<td>.002</td>
<td>.12</td>
<td>.65</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>31050.7</td>
<td>79</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>35111.7</td>
<td>80</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

n=24 Treatment; n=62 Comparison; Adjusted \( r^2 = .16 \) at follow-up one
n=19 Treatment; n=62 Comparison; Adjusted \( r^2 = .10 \) at follow-up two

\( p<.05 \)

Table 4.21: ANOVA Model Results for Vigorous Minute Between Group Differences at Follow-Up One and Follow-Up Two.
For the first follow-up, there was a significant difference between groups follow-up one \((F_{1,85}) = 16.2, p=.001\). We can reject the null hypothesis. The effect size resulted in an \(n^2= .17\), which is considered a small effect size. At the second follow-up, there was also a significant difference between groups \((F_{1,80}) = 10.3, p = .002\). We can reject the null hypothesis. The effect size resulted in an \(n^2= .12\), which is considered a small effect size.

*Frequency (Bouts) of Vigorous Exercise*

7. Research Question Seven: Is there a difference between the treatment group and the comparison group on self-reported, vigorous-intensity exercise days per week at post-test?

Hypothesis:

\(H_0\) = There is no difference between groups on vigorous exercise days at post-test.

\(H_A\) = There is a difference between groups on vigorous exercise days at post-test.

Table 4.22 presents the analysis of variance results (ANOVA) at post-test.

<table>
<thead>
<tr>
<th>Time</th>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>Eta Sq.</th>
<th>Power</th>
</tr>
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<tbody>
<tr>
<td>Post-</td>
<td>Model</td>
<td>13.9</td>
<td>1</td>
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<td>.16</td>
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<td>Test</td>
<td>Error</td>
<td>72.8</td>
<td>97</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>86.6</td>
<td>98</td>
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<td></td>
</tr>
</tbody>
</table>

\(n=37\) Treatment; \(n=62\) Comparison; Adjusted \(r^2 = .15\)

\(p<.05\)

Table 4.22: ANOVA Model Results for Vigorous Frequency Between Group Differences at Post-Test.
There was a significant difference between groups at post-test ($F_{1,98} = 18.5$, $p=.0001$). We can reject the null hypothesis. The effect size is $n^2 = .16$. This is considered a small effect size.

8. Research Question Eight: Is there a difference between the treatment group and the comparison group on self-reported, vigorous-intensity exercise days per week at follow-up?

Hypothesis:

$H_0 =$ There is no difference between groups on vigorous exercise days at follow-up.

$H_A =$ There is a difference between groups on vigorous exercise days at follow-up.

Table 4.23 presents the follow-up ANOVA results.

<table>
<thead>
<tr>
<th>Time</th>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>Eta Sq.</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow Up 1</td>
<td>Model</td>
<td>16.5</td>
<td>1</td>
<td>15.6</td>
<td>.001</td>
<td>.17</td>
<td>.9</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>88.7</td>
<td>84</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>105.2</td>
<td>85</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follow Up 2</td>
<td>Model</td>
<td>6.6</td>
<td>1</td>
<td>13.2</td>
<td>.001</td>
<td>.14</td>
<td>.8</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>39.4</td>
<td>79</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>Total</td>
<td>46</td>
<td>80</td>
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</tbody>
</table>

n=24 Treatment; n=62 Comparison; Adjusted $r^2 = .16$ at follow-up one
n=19 Treatment; n=62 Comparison; Adjusted $r^2 = .13$ at follow-up two

$p<.05$

Table 4.23: ANOVA Model Results for Vigorous Frequency Between Group Differences at Follow-Up One and Follow-Up Two.
At follow-up one, there was a significant difference between groups at follow-up one \((F_{1,85} = 15.6, p=.001)\). We can reject the null hypothesis. The effect size resulted in an \(n^2 = .17\), which is considered to be a small effect size. At the second follow-up, there was a significant difference between groups at follow-up two \((F_{1,80} = 13.2, p=.001)\). We can reject the null hypothesis. The effect size resulted in an \(n^2 = .14\), which is considered to be a small effect size.

Descriptive Statistics of the Social Cognitive Theory Constructs

The following tables present the pre-test, post-test, follow-up one and follow-up two descriptive information of the social cognitive theory constructs. Table 4.24 presents the comparison group’s pre-test mean and standard deviation, and the treatment group’s post-test and follow-up means and standard deviations, for self-regulation.

<table>
<thead>
<tr>
<th>Data Collection Point</th>
<th>Self-Regulation</th>
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<tbody>
<tr>
<td></td>
<td>Mean</td>
</tr>
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<td>Pre-Test</td>
<td>81.7</td>
</tr>
<tr>
<td>Post-Test</td>
<td>122.7</td>
</tr>
<tr>
<td>Follow-Up 1</td>
<td>122.5</td>
</tr>
<tr>
<td>Follow-Up 2</td>
<td>108</td>
</tr>
</tbody>
</table>

\[n=62\] Comparison at Pre-Test  
\[n=37\] Treatment at Post-Test  
\[n=24\] Treatment at Follow-Up One  
\[n=19\] Treatment at Follow-Up Two

Table 4.24: Treatment and Comparison Group Mean and Standard Deviations for Self-Regulation at Pre-Test, Post-Test, Follow-Up One and Follow-Up Two.
The mean for self-regulation in the comparison group at pre-test was 81.7 (SD = 24). The mean for self-regulation in the treatment group was 122.7 (SD = 30.6) at post-test, 123 (SD = 30) at follow-up one and 108 (SD = 37.4) at follow-up two. Table 4.25 on the following page includes the comparison group’s pre-test mean and standard deviation, and the treatment group’s post-test and follow-up means and standard deviations, for self-efficacy.

<table>
<thead>
<tr>
<th>Data Collection Point</th>
<th>Self-Efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>Pre-Test</td>
<td>50.2</td>
</tr>
<tr>
<td>Post-Test</td>
<td>59.3</td>
</tr>
<tr>
<td>Follow-Up 1</td>
<td>58.8</td>
</tr>
<tr>
<td>Follow-Up 2</td>
<td>50.8</td>
</tr>
</tbody>
</table>

n=62 Comparison at Pre-Test  
n=37 Treatment at Post-Test  
n=24 Treatment at Follow-Up One  
n=19 Treatment at Follow-Up Two

Table 4.25: Treatment and Comparison Group Mean and Standard Deviations for Self-Efficacy at Pre-Test, Post-Test, Follow-Up One and Follow-Up Two.

The mean for self-efficacy in the comparison group at pre-test was 50.2 (SD = 18.5). The mean for self-efficacy in the treatment group was 59.3 (SD = 13.6) at post-test, 58.8 (SD = 15.6) at follow-up one and 50.8 (SD = 18) at follow-up two. Table 4.26 presents the comparison group’s pre-test mean and standard deviation, and the treatment group’s post-test and follow-up means and standard deviations, for family social support.
The mean for family social support in the comparison group at pre-test was 39.6 (SD = 13.3). The mean for family social support in the treatment group was 42.8 (SD = 15.2) at post-test. The treatment mean decreased slightly at follow-up one (43.1; SD = 16.9) and follow-up two (24; SD = 10.6). Table 4.27 presents the comparison group’s pre-test mean and standard deviation, and the treatment group’s post-test and follow-up means and standard deviations, for friend social support.

### Table 4.26: Treatment and Comparison Group Mean and Standard Deviations for Family Social Support at Pre-Test, Post-Test, Follow-Up One Two.

<table>
<thead>
<tr>
<th>Data Collection Point</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Test</td>
<td>39.6</td>
<td>13.3</td>
</tr>
<tr>
<td>Post-Test</td>
<td>42.8</td>
<td>15.2</td>
</tr>
<tr>
<td>Follow-Up 1</td>
<td>43.1</td>
<td>16.9</td>
</tr>
<tr>
<td>Follow-Up 2</td>
<td>24</td>
<td>10.6</td>
</tr>
</tbody>
</table>

n=62 Comparison at Pre-Test
n=37 Treatment at Post-Test
n=24 Treatment at Follow-Up One
n=19 Treatment at Follow-Up Two
Table 4.27: Treatment and Comparison Group Mean and Standard Deviations for Friend Social Support at Pre-Test, Post-Test, Follow-Up One and Follow-Up Two.

<table>
<thead>
<tr>
<th>Data Collection Point</th>
<th>Friend Social Support</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>Pre-Test</td>
<td>40</td>
</tr>
<tr>
<td>Post-Test</td>
<td>42.4</td>
</tr>
<tr>
<td>Follow-Up 1</td>
<td>42.9</td>
</tr>
<tr>
<td>Follow-Up 2</td>
<td>21.6</td>
</tr>
</tbody>
</table>

n=62 Comparison at Pre-Test  
n=37 Treatment at Post-Test  
n=24 Treatment at Follow-Up One  
n=19 Treatment at Follow-Up Two

The mean for family social support in the comparison group at pre-test was 40 (SD = 13.2). The mean for family social support in the treatment group was 42.4 (SD = 14.9) at post-test. The treatment mean decreased slightly at follow-up one (42.9; SD = 17.1) and follow-up two (21.6; SD = 13.4). Table 4.28 presents the comparison group’s pre-test mean and standard deviation, and the treatment group’s post-test and follow-up means and standard deviations, for exercise enjoyment.
### Table 4.28: Treatment and Comparison Group Mean and Standard Deviations for Exercise Enjoyment at Pre-Test, Post-Test, Follow-Up One and Follow-Up Two.

<table>
<thead>
<tr>
<th>Data Collection Point</th>
<th>Exercise Enjoyment</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Pre-Test</td>
<td>4.2</td>
<td>.96</td>
</tr>
<tr>
<td>Post-Test</td>
<td>4.6</td>
<td>1</td>
</tr>
<tr>
<td>Follow-Up 1</td>
<td>4.9</td>
<td>1</td>
</tr>
<tr>
<td>Follow-Up 2</td>
<td>5.1</td>
<td>1.2</td>
</tr>
</tbody>
</table>

n=62 Comparison at Pre-Test  
n=37 Treatment at Post-Test  
n=24 Treatment at Follow-Up One  
n=19 Treatment at Follow-Up Two

The mean for exercise enjoyment in the comparison group at pre-test was 4.2 (SD = .96). The mean for exercise enjoyment in the treatment group was 4.6 at post-test (SD = 1), 4.9 at follow-up one (SD = 1) and 5.1 (SD = 1.2) at follow-up two. There was an increase in exercise enjoyment from pre-test to follow-up two. Table 4.29 presents the comparison group’s pre-test mean and standard deviation, and the treatment group’s post-test and follow-up means and standard deviations, for outcome expectations and expectancies.
Table 4.29: Treatment and Comparison Group Mean and Standard Deviations for Outcomes Expectations & Expectancies at Pre-Test, Post-Test, Follow-Up One and Follow-Up Two.

<table>
<thead>
<tr>
<th>Data Collection Point</th>
<th>Outcome Expectations &amp; Expectancies</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Test</td>
<td></td>
<td>437</td>
<td>95.3</td>
</tr>
<tr>
<td>Post-Test</td>
<td></td>
<td>409</td>
<td>60.9</td>
</tr>
<tr>
<td>Follow-Up 1</td>
<td></td>
<td>403</td>
<td>122.9</td>
</tr>
<tr>
<td>Follow-Up 2</td>
<td></td>
<td>387</td>
<td>100.3</td>
</tr>
</tbody>
</table>

n=62 Comparison at Pre-Test
n=37 Treatment at Post-Test
n=24 Treatment at Follow-Up One
n=19 Treatment at Follow-Up Two

The mean for outcome expectations and expectancies in the comparison group at pre-test was 437 (SD = 95.3). The mean for outcome expectations and expectancies decreased at post-test (409; SD = 60.9), follow-up one (403; SD = 122.9) and follow-up two (387; SD = 100.3).

Analysis of Social Cognitive Theory Research Questions:

The analysis of the between group differences on the social cognitive theory constructs was conducted using the between group univariate analysis of variance (ANOVA). A separate ANOVA was used for each of the twelve research questions. The between group ANOVA was the correct statistical comparison method to use because of the study design.

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Self-Regulation

1. Research Question One: Is there a difference between the treatment group and the comparison group on self-regulation scores at post-test?

Hypothesis:

H₀ = There is no difference between groups on self-regulation scores at post-test.

Hₐ = There is a difference between groups on self-regulation scores at post-test.

Table 4.30 presents the post-test ANOVA results.

<table>
<thead>
<tr>
<th>Time</th>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>Eta Sq.</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-Test</td>
<td>Model</td>
<td>38969.1</td>
<td>1</td>
<td>55.1</td>
<td>.001</td>
<td>.36</td>
<td>.9</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>68625</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>107594</td>
<td>98</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

n=37 Treatment; n=62 Comparison; Adjusted r² = .36
p<.05

Table 4.30: ANOVA Model Results for Self-Regulation Between Group Differences at Post-Test.

There was a significant difference between groups at post-test (F₁,₉₈) = 55.1, p = .001). We can reject the null hypothesis. The effect size is n²=.36. This is considered to be a near moderate effect size.

2. Research Question Two: Is there a difference between the treatment group and the comparison group on self-regulation scores at follow-up?
Hypothesis:

$H_0 =$ There is no difference between groups on self-regulation scores at follow-up.

$H_A =$ There is a difference between groups on self-regulation scores at follow-up.

Table 4.31 presents the follow-up ANOVA results.

<table>
<thead>
<tr>
<th>Time</th>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>Eta Sq.</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow Up 1</td>
<td>Model</td>
<td>31828.2</td>
<td>1</td>
<td>46</td>
<td>.001</td>
<td>.35</td>
<td>.9</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>58231</td>
<td>84</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Total</td>
<td>90059.2</td>
<td>85</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follow Up 2</td>
<td>Model</td>
<td>10266.7</td>
<td>1</td>
<td>13.5</td>
<td>.001</td>
<td>.15</td>
<td>.76</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>60164.9</td>
<td>79</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>70431.6</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

n=24 Treatment; n=62 Comparison; Adjusted r² = .14 at follow-up one
n=19 Treatment; n=62 Comparison; Adjusted r² = .14 at follow-up two
p<.05

Table 4.31: ANOVA Model Results for Self-Regulation Between Group Differences at Follow-Up One and Follow-Up Two.

At follow-up one, there was a significant difference between groups ($F_{1,85} = 46, p = .001$). We can reject the null hypothesis. The effect size resulted in an $r^2=.34$, which is a near moderate effect size. There was a significant difference between groups at follow-up two ($F_{1,80} = 1.5, p=.001$). We can reject the null hypothesis. The effect size resulted in an $r^2=.15$, which is a small effect size.
Self-Efficacy

3. Research Question Three: Is there a difference between the treatment group and the comparison group on self-efficacy scores at post-test?

Hypothesis:

$H_0$ = There is no difference between groups on self-efficacy scores at post-test.

$H_A$ = There is a difference between groups on self-efficacy scores at post-test.

Table 4.32 presents the post-test ANOVA results.

<table>
<thead>
<tr>
<th>Time</th>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>Eta Sq.</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-Test</td>
<td>Model</td>
<td>1895</td>
<td>1</td>
<td>6.7</td>
<td>.011</td>
<td>.06</td>
<td>.6</td>
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<tr>
<td></td>
<td>Error</td>
<td>27536.6</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>29431.6</td>
<td>98</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

n=37 Treatment; n=62 Comparison; Adjusted $r^2 = .05$ p<.05

Table 4.32: ANOVA Model Results for Self-Efficacy Between Group Differences at Post-Test.

There was a significant difference between groups at post-test ($F_{1,98} = 6.7$, $p = .011$). We can reject the null hypothesis. The effect size is $n^2=.06$, which is a small effect size.

4. Research Question Four: Is there a difference between the treatment group and the comparison group on self-efficacy scores at follow-up?
Hypothesis:

\[ H_0 = \text{There is no difference between groups on self-efficacy scores at follow-up.} \]

\[ H_A = \text{There is a difference between groups on self-efficacy scores at follow-up.} \]

Table 4.33 presents the follow-up ANOVA results

<table>
<thead>
<tr>
<th>Time</th>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>Eta Sq.</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow Up 1</td>
<td>Model</td>
<td>1728.7</td>
<td>1</td>
<td>5.3</td>
<td>.024</td>
<td>.05</td>
<td>.2</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>27332.1</td>
<td>84</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>29431.6</td>
<td>85</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follow Up 2</td>
<td>Model</td>
<td>5.6</td>
<td>1</td>
<td>.02</td>
<td>.89</td>
<td>.001</td>
<td>.004</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>26672.1</td>
<td>79</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>26677.8</td>
<td>80</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

n=24 Treatment; n=62 Comparison; Adjusted \( r^2 = .03 \) at follow-up one
n=19 Treatment; n=62 Comparison; Adjusted \( r^2 = .00 \) at follow-up two
p<.05

Table 4.33: ANOVA Model Results for Self-Efficacy Between Group Differences at Follow-Up One and Follow-Up Two.

For the first follow-up, there was a significant difference between groups
(\( F_{1,85} = 5.3, p = .024 \)). We can reject the null hypothesis. The effect size resulted in an \( n^2= .05 \), which is a very small effect size. At follow-up two, there is not a
significant difference between groups (\( F_{1,80} = .02, p = .89 \)) We cannot reject the null hypothesis. The effect size resulted in an \( n^2= .001 \), which is no effect size.
5. Research Question Five: Is there a difference between the treatment group and the comparison group on family social support scores at post-test?

Hypothesis:

$H_0$ = There is no difference between groups on family social support scores at post-test.

$H_A$ = There is a difference between groups on family social support scores at post-test.

Table 4.34 presents the analysis of variance results (ANOVA) at post-test.

<table>
<thead>
<tr>
<th>Time</th>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>Eta Sq.</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-Test</td>
<td>Model</td>
<td>240.2</td>
<td>1</td>
<td>1.2</td>
<td>.27</td>
<td>.01</td>
<td>.04</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>19112.5</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>19352.7</td>
<td>98</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$n=37$ Treatment; $n=62$ Comparison; Adjusted $r^2 = .002$ $p>.05$

Table 4.34: ANOVA Model Results for Family Social Support Between Group Differences at Post-Test.

There was no significant difference between groups at post-test ($F_{1,98} = 1.2$, $p = .27$). We cannot reject the null hypothesis. The effect size is $n^2=.01$. This is considered to be a small effect size.
6. Research Question Six: Is there a difference between the treatment group and the comparison group on family social support scores at follow-up?

Hypothesis:

H₀ = There is no difference between groups on family social support scores at follow-up.

H₁ = There is a difference between groups on family social support scores at follow-up.

Table 4.35 presents the follow-up ANOVA results.

<table>
<thead>
<tr>
<th>Time</th>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>Eta Sq.</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow Up 1</td>
<td>Model</td>
<td>209.5</td>
<td>1</td>
<td>1.03</td>
<td>.31</td>
<td>.007</td>
<td>.02</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Total</td>
<td>17238.3</td>
<td>85</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follow Up 2</td>
<td>Model</td>
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<td>1</td>
<td>22</td>
<td>.001</td>
<td>.22</td>
<td>.9</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>12851</td>
<td>79</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>16434.9</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

n=24 Treatment; n=62 Comparison; Adjusted r² = .002 at follow-up one
n=19 Treatment; n=62 Comparison; Adjusted r² = .21 at follow-up two
p<.05

Table 4.35: ANOVA Model Results for Family Social Support Between Group Differences at Follow-Up One and Follow-Up Two.

At the first follow-up, there was not a significant difference between groups (F₁,₈₅) = 1.03, p = .31). We cannot reject the null hypothesis. The effect size resulted in an n²=.007, which is a very small effect size. At the second follow-up, there was a
significant difference between groups ($F_{1,80} = 22, p = .001$). We can reject the null hypothesis. The effect size resulted in an $n^2 = .22$, which is a small effect size.

**Friend Social Support**

7. Research Question Seven: Is there a difference between the treatment group and the comparison group on friend social support scores at post-test?

Hypothesis:

$H_0 =$ There is no difference between groups on friend social support scores at post-test.

$H_A =$ There is a difference between groups on friend social support scores at post-test.

Table 4.36 presents the analysis of variance results (ANOVA) for post-test.

<table>
<thead>
<tr>
<th>Time</th>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>Eta Sq.</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-Test</td>
<td>Model</td>
<td>133.5</td>
<td>1</td>
<td>.7</td>
<td>.41</td>
<td>.007</td>
<td>.02</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>18651</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>Total</td>
<td>18784.5</td>
<td>98</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

n=37 Treatment; n=62 Comparison; Adjusted $r^2 = .001$

*p > .05

**Table 4.36: ANOVA Model Results for Friend Social Support Between Group Differences at Post-Test.**
There was no significant difference between groups at post-test \((F_{1,98}) = .7, p = .41\). We cannot reject the null hypothesis. The effect size is \(n^2=.007\). This is considered to be a very small effect size.

8. Research Question Eight: Is there a difference between the treatment group and the comparison group on friend social support scores at follow-up?

Hypothesis:

\(H_0\) = There is no difference between groups on friend social support scores at follow-up.

\(H_A\) = There is a difference between groups on friend social support scores at follow-up.

Table 4.37 presents the follow-up ANOVA results.

<table>
<thead>
<tr>
<th>Time</th>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>Eta Sq.</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow Up 1</td>
<td>Model</td>
<td>156.7</td>
<td>1</td>
<td>.8</td>
<td>.34</td>
<td>.003</td>
<td>.01</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>16678.9</td>
<td>84</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>16835.6</td>
<td>85</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follow Up 2</td>
<td>Model</td>
<td>4924.113</td>
<td>1</td>
<td>28.1</td>
<td>.001</td>
<td>.26</td>
<td>.9</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>13866.357</td>
<td>79</td>
<td></td>
<td></td>
<td></td>
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<td>Total</td>
<td>18790.5</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(n=24\) Treatment; \(n=62\) Comparison; Adjusted \(r^2 = .00\) at follow-up one

\(n=19\) Treatment; \(n=62\) Comparison; Adjusted \(r^2 = .25\) at follow-up two

\(p<.05\)

Table 4.37: ANOVA Model Results for Friend Social Support Between Group Differences at Post-Test, Follow-Up One and Follow-Up Two.
For the first follow-up, there was not a significant difference between groups 
\((F_{1,85}) = .8, p = .34\). We cannot reject the null hypothesis. The effect size resulted in 
an \(n^2=.003\), which is a very small effect size. At the second follow-up, there was a 
significant difference between groups \((F_{1,80}) = 28.1, p = .001\). The effect size resulted 
in an \(n^2=.26\), which is a small to moderately-small effect size.

*Exercise Enjoyment*

9. Research Question Nine: Is there a difference between the treatment group 
and the comparison group on enjoyment for exercise scores at post-test?

Hypothesis:

\(H_0 = \) There is no difference between groups on exercise enjoyment scores at post-
test.

\(H_A = \) There is a difference between groups on exercise enjoyment scores at post-
test.

Table 4.38 presents the analysis of variance results (ANOVA) at post-test.

<table>
<thead>
<tr>
<th>Time</th>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>Eta Sq.</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-Test</td>
<td>Model</td>
<td>3.382</td>
<td>1</td>
<td>3.9</td>
<td>.049</td>
<td>.04</td>
<td>.2</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>93.168</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>97</td>
<td>98</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(n=37\) Treatment; \(n=62\) Comparison; Adjusted \(r^2 = .03\) 
\(p<.05\)

**Table 4.38: ANOVA Model Results for Between Group Differences for Exercise Enjoyment at Post-Test.**
There was a significant difference between groups at post-test ($F_{1,98} = 3.9, p = .049$).

We can reject the null hypothesis. The effect size is $n^2 = .04$. This is considered to be a small effect size.

10. Research Question Ten: Is there a difference between the treatment group and the comparison group on enjoyment for exercise scores at follow-up?

Hypothesis:

$H_0 =$ There is no difference between groups on exercise enjoyment scores at follow-up.

$H_A =$ There is a difference between groups on exercise enjoyment scores at follow-up.

Table 4.39 presents the follow-up ANOVA results.

Table 4.39: ANOVA Model Results for Between Group Differences for Exercise Enjoyment at Follow-Up One and Follow-Up Two.
There was a significant difference between groups at follow-up one ($F_{1,85} = 15.9, p = .001$). We can reject the null hypothesis. The effect size resulted in an $n^2 = .10$, which is a small effect size. There was a significant difference between groups at follow-up two ($F_{1,80} = 9.2, p = .003$). We can also reject the null hypothesis. The effect size resulted in an $n^2 = .11$, which is a small effect size.

**Outcome Expectations and Expectancies**

11. Research Question Eleven: Is there a difference between the treatment group and the comparison group on outcome expectations and expectancies at post-test?

Hypothesis:

$H_0 = $ There is no difference between groups on outcome expectations/expectancy scores at post-test.

$H_A = $ There is a difference between groups on outcome expectations/expectancy scores at post-test.

Table 4.40 presents the analysis of variance results (ANOVA) at post-test.
Table 4.40: ANOVA Model Results for Outcome Expectations and Expectancies Between Group Differences at Post-Test.

<table>
<thead>
<tr>
<th>Time</th>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>Eta Sq.</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-Test</td>
<td>Model</td>
<td>17540.3</td>
<td>1</td>
<td>2.5</td>
<td>.12</td>
<td>.03</td>
<td>.09</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>687606</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
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<td>Total</td>
<td>705146</td>
<td>98</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

n=37 Treatment; n=62 Comparison; Adjusted r² = .02
p>.05

There was no significant difference between groups at post-test (F₁,₉₈) = 2.5, p = .12). We cannot reject the null hypothesis. The effect size is n²=.03. This is considered to be a small effect size.

12. Research Question Twelve: Is there a difference between the treatment group and the comparison group on outcome expectations and expectancies at follow-up?

Hypothesis:

H₀ = There is no difference between groups on outcome expectations(expectancy scores at follow-up.

Hₐ = There is a difference between groups on outcome expectations/expectancy scores at follow-up.

Table 4.41 presents the follow-up ANOVA results.
Table 4.41: ANOVA Model Results for Outcome Expectations and Expectancies Between Group Differences at Follow-Up One and Follow-Up Two.

<table>
<thead>
<tr>
<th>Time</th>
<th>Source</th>
<th>Sum of Squares</th>
<th>df</th>
<th>F</th>
<th>p</th>
<th>Eta Sq.</th>
<th>Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow Up 1</td>
<td>Model</td>
<td>17484.7</td>
<td>1</td>
<td>1.7</td>
<td>.2</td>
<td>.03</td>
<td>.09</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>878723.6</td>
<td>84</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td></td>
<td>Total</td>
<td>896208.2</td>
<td>85</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follow Up 2</td>
<td>Model</td>
<td>36398.8</td>
<td>1</td>
<td>3.9</td>
<td>.05</td>
<td>.08</td>
<td>.2</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>735111.5</td>
<td>79</td>
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<td>Total</td>
<td>771510.3</td>
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</tbody>
</table>

n=24 Treatment; n=62 Comparison; Adjusted $r^2 = .02$ at follow-up one
n=19 Treatment; n=62 Comparison; Adjusted $r^2 = .04$ at follow-up two

p<.05

For the first follow-up, there was not a significant difference between groups at follow-up one ($F_{1,85} = 1.7$, $p = .2$). We cannot reject the null hypothesis. The effect size resulted in an $n^2 = .03$, which is a small effect size. At follow-up two, there was a significant difference between groups ($F_{1,80} = 3.9$, $p = .05$). We can reject the null hypothesis. The effect size was an $n^2 = .08$, which is a small effect size.

Comparison of Intervention Respondents to Drop-Outs

Multiple analyses were conducted to compare the means of the intervention responders to the means of the intervention drop-outs. The purpose of these analyses was to provide evidence for increased rates of exercise and social cognitive theory construct scores in those that remained in the intervention. This may assist in demonstrating that subjects who complete an intervention can become successful exercise adherers. Variable group means and results from the independent samples t-
test will be presented for each time frame. In table 4.20, the pre-test respondents and drop-outs means and standard deviations are presented.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
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</tr>
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<td>.79</td>
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<td></td>
<td>R</td>
<td>49.79</td>
<td>17.46</td>
</tr>
<tr>
<td></td>
<td>DO</td>
<td>49.06</td>
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<td>93.16</td>
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n=127; R=Responders; DO=Drop-Outs

Table 4.42: Pre-Test Respondent to Drop-Out Means and Standard Deviations.

At pre-test, there do not appear to be large differences for the rates of exercise or the social cognitive theory constructs between those who remained in the program and those who dropped out during the intervention. An independent samples t-test was conducted to determine if there were pre-test differences. There were no significant differences between groups for moderate minutes ($t_{125} = -.25$, $p = .81$),
moderate days ($t_{125} = -1.21, p = .23$), vigorous minutes ($t_{125} = -1.4, p = .16$) or vigorous days ($t_{125} = -1.6, p = .12$). Similarly, there were no significant group differences for self-regulation ($t_{125} = .84, p = .40$), self-efficacy ($t_{125} = .28, p = .78$), exercise enjoyment ($t_{125} = -.27, p = .78$) and outcome expectations and expectancies ($t_{125} = 1.2, p = .24$) at pre-test. There were however, significant group differences for family ($t_{125} = 2.6, p = .01$) and friend ($t_{125} = 2.6, p = .01$) social support.

In table 4.43 on the following page, the post-test means and standard deviations are presented. For the independent samples t-test, participants who completed the post-test questionnaire (responders) were compared to the pre-test scores of those who dropped out during the intervention.
At post-test, there appears to be large differences for the rates of exercise or the social cognitive theory constructs between those who remained in the program and those who dropped out during the intervention. An independent samples t-test was conducted to determine if there were post-test differences. There were significant differences between groups for moderate minutes ($t_{125} = -5.29, p = .001$), moderate days ($t_{125} = -6.0, p = .001$), vigorous minutes ($t_{125} = -3.9, p = .001$) and vigorous days ($t_{125} = -4.2, p = .001$). Similarly, there were significant group differences for self-regulation ($t_{125} = -7.4, p = .001$), self-efficacy ($t_{125} = -2.7, p = .007$), exercise

---

Table 4.43: Post-Test Respondent to Drop-Out Means and Standard Deviations.

<table>
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<tr>
<th>Variable</th>
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<th>SD</th>
</tr>
</thead>
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<td>.79</td>
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<td>DO</td>
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<td>DO</td>
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n=72 Responders; n=55 Drop-Outs
R=Responders; DO=Drop-Outs
enjoyment ($t_{125} = -3.2, p = .002$) and outcome expectations and expectancies ($t_{125} = 2.0, p = .05$) at post-test. There were not however, significant group differences for family ($t_{125} = .04, p = .98$) and friend ($t_{125} = .26, p = .8$) social support.

The follow-up one means and standard deviations are presented in table 4.44.

For the independent samples t-test, participants who completed the follow-up one questionnaire (responders) were compared to the post-test scores of those who dropped out of the study during the follow-up phase.

<table>
<thead>
<tr>
<th>Variable</th>
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<td>79.69</td>
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n=72 Responders; n=46 Drop-Outs
R=Responders; DO=Drop-Outs

Table 4.44: Follow-Up One Respondent to Drop-Out Means and Standard Deviations.
At post-test, there appears to be large differences for the rates of exercise or the social cognitive theory constructs between those who completed the first follow-up and those who dropped out during the follow-up phase. An independent samples t-test was conducted to determine if there were post-test differences. There were significant differences between groups for moderate minutes \((t_{116} = -5.3, p = .001)\), moderate days \((t_{116} = -6.1, p = .001)\), vigorous minutes \((t_{116} = -3.9, p = .001)\) and vigorous days \((t_{116} = -3.8, p = .001)\). Similarly, there were significant group differences for self-regulation \((t_{116} = -6.7, p = .001)\), self-efficacy \((t_{116} = -2.0, p = .050)\), exercise enjoyment \((t_{116} = -3.2, p = .002)\) and outcome expectations and expectancies \((t_{116} = 2.3, p = .02)\) at follow-up one. There were not however, significant group differences for family \((t_{116} = -.47, p = .64)\) and friend \((t_{116} = .77, p = .46)\) social support.

The follow-up two means and standard deviations are presented in table 4.45 on the following page. For the independent samples t-test, participants who completed the follow-up two questionnaire (responders) were compared to the follow-up one scores of those who dropped out of the study during the follow-up phase.
### Table 4.45: Follow-Up Two Respondent to Drop-Outs Means and Standard Deviations.

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<td>DO</td>
<td>396.64</td>
<td>106.62</td>
</tr>
</tbody>
</table>

n=30 Responders; n=46 Drop-Outs  
R=Responders; DO=Drop-Outs

Although there appear to be small differences in the group means, an independent samples t-test was used to determine if there were statistically significant group differences. There were no significant differences between groups for moderate minutes ($t_{74} = -.04, p = .97$), moderate days ($t_{74} = -1.6, p = .12$), vigorous minutes ($t_{74} = .43, p = .68$) and vigorous days ($t_{74} = .05, p = .96$). Similarly, there were not significant group differences for self-regulation ($t_{74} = 1.1, p = .26$), self-efficacy ($t_{74} = .42, p = .68$), exercise enjoyment ($t_{74} = -.75, p = .45$) and outcome expectations and
expectancies ($t_{74} = -.14, p = .89$) at follow-up two. There were however, significant
group differences for family ($t_{74} = 4.6, p = .001$) and friend ($t_{74} = 5.2, p = .001$) social
support.

**Summary of Respondents to Non-Respondents**

There were no significant group differences between respondents and non-
respondents on moderate or vigorous exercise frequency or duration at pre-test
($p>.05$). With the exception of family and friend social support, there were no
significant differences between respondents and non-respondents on the other social
cognitive theory constructs ($p>.05$). Equal rates of exercise and scores on the social
cognitive theory constructs was expected because no one had been exposed to the
intervention yet. At post-test, there were significant group difference between those
who completed the intervention to those who dropped out, for moderate and vigorous
exercise ($p<.05$), as well as for the social cognitive theory constructs ($p<.05$), with the
exception for family and friend social support ($p>.05$). Higher rates of exercise and
construct scores were expected at post-test for those who remained in the program. At
the first follow-up, there were significant group differences in moderate and vigorous
frequency and duration of exercise ($p<.05$) for the participants who completed the
questionnaire and those that dropped out of the study during the follow-up time frame.
There were also significant group differences between the respondents and drop-outs
at the first follow-up in the social cognitive theory constructs ($p<.05$), with the
exception for family and friend social support ($p>.05$). By the second follow-up, the
respondents and drop-out group means were closer. Therefore, there were no significant differences in moderate and vigorous exercise frequency and duration (p>.05). There were also no significant differences at follow-up two in self-regulation, self-efficacy, exercise enjoyment and outcome expectations and expectancies. There was a significant difference for family and friend social support. This was due to a decrease in the respondent’s scores. Throughout the intervention, those who remained in the study had higher group means than those who dropped out, leading to the statistically significant group differences.

**Evaluation of the Program**

The survey evaluation and a summary description of the evaluation of the program and class components results are located in Appendices L and M.

**Program Expenses**

Expenses paid by the investigator include the following materials and supplies:

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<th>Item</th>
<th>Cost</th>
</tr>
</thead>
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<td>Subway Gift Certificates</td>
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</table>

*Table 4.46: Investigator Program Expenses*
Some of the items used in the program were provided by the worksites. The program pedometers were financed by the worksites ($100), the CAS gift certificates were financed by the Human Resources Department ($225), the paper for the questionnaires, worksheets and powerpoint presentations were given to the investigator by the worksites ($100) and the ink used to print all of the printed materials was done by the worksites ($100). If the investigator had paid for these remaining items, the costs for the program would have been close to nine hundred or one-thousand dollars. Since the program was free to the worksites because it was part of a dissertation project, and the investigator was volunteering her time, potentially, the money spent on a program implementer could have been much more. Charging twenty dollars per hour, and spending a minimum of twelve hours per week, including recruitment, classroom and preparation time and datum analysis, the total costs for the investigator would be close to ten thousand dollars, and potentially higher.
CHAPTER 5

DISCUSSIONS AND CONCLUSION

Introduction

The contents of chapter five discuss and interpret the results of the current study. The purpose of the study is presented first. The behavioral impact evaluation follows, discussing and concluding the exercise research questions. The social cognitive theory intervention and the associated research questions are then discussed and concluded. Implications to research, study limitations, future recommendations, and implications to practice conclude the chapter.

Purpose of the Study

The purpose of the current study is to evaluate a theory-based, educational, exercise, behavior change program. The Be Active program was designed to increase insufficiently active, adult, employee’s self-reported duration and frequency of exercise. The program was tailored to employees who were not regular exercisers. The program was based on the social cognitive theory constructs self-regulation, self-efficacy, social support, exercise enjoyment and outcome expectations/expectancies. The intervention was designed for a classroom-based, group setting and consisted of
six, one hour, class sessions. A second purpose of the study was to evaluate the impact of the intervention on the targeted social cognitive theory constructs: self-regulation, self-efficacy for overcoming barriers, social support for exercise, exercise enjoyment, and outcome expectations and expectancies. Previously validated and reliable instruments were used to measure the constructs. The components of the program were designed to increase the social cognitive theory construct scores over the course of the study.

**Behavioral Impact Evaluation**

The purpose of the impact evaluation was to determine the behavioral changes in the Be Active participants. There were eight research questions that assessed the impact of the intervention on self-reported moderate and vigorous frequency and duration of exercise. The alpha level was set at $p = .05$.

**Moderate Intensity Exercise:**

*Research Question One: Is there a difference between the treatment group and the comparison group on self-reported, moderate-intensity minutes of exercise per week at post-test?*

*Research Question Two: Is there a difference between the treatment group and the comparison group on self-reported, moderate-intensity minutes of exercise per week at follow-up?*

The between group ANOVA model revealed that there was a significant difference between groups at post-test ($p=.001$), follow-up one ($p=.001$) and follow-up.
two (p=.001). The comparison group pre-test mean (36.6) was compared to the treatment group post-test mean (81.6), the follow-up one mean (153.6) and the follow-up two mean (135). In conclusion, the intervention worked to successfully produce significant treatment group effects and increase moderate intensity minutes of exercise per week.

**Research Question Three: Is there a difference between the treatment group and the comparison group on self-reported, moderate-intensity exercise days per week at post-test?**

**Research Question Four: Is there a difference between the treatment group and the comparison group on self-reported, moderate-intensity exercise days per week at follow-up?**

The between group ANOVA revealed a significant difference between the treatment and comparison group at post-test (p=.001), follow-up one (p=.001) and follow-up two (p=.001). Participants were reporting 1.3 days of moderate exercise at pre-test. The pre-test group mean was compared to the treatment group mean (2.8), the follow-up one group mean (3.8) and the follow-up two mean (4.6). Over time, this three to four day increase may greatly reduce chronic diseases, such as cardiovascular disease and stroke. In conclusion, the intervention worked to successfully produce significant treatment group effects and increase the number of days participants engaged in moderate intensity exercise.
Discussion of Moderate Intensity Exercise

The current study produced significant differences between the treatment and comparison groups for moderate intensity duration and frequency of exercise at post-test, follow-up one and follow-two. The results for moderate exercise are attributed to the treatment. They are less likely attributed to alternative explanations, such as mortality and maturation. Mortality did occur over the course of the investigation, which is not unusual in experimental research; however, multiple sub-class analyses were used to determine if mortality affected the results. The statistically significant group differences led to the conclusion that mortality did not largely impact moderate exercise at any time frame. Additionally, multiple sub-class analyses were conducted to address the issue of maturation. The significant results signify that maturation was not an issue, and adds credibility that the treatment caused the outcomes for moderate-intensity exercise.

The treatment effects for moderate minutes observed in the present study were similar to the positive treatment effects found in McAuley et al. (1994), Hallam and Petosa (2004), Cole et al. (1998), Hammond et al. (2000) and Nichols et al. (2000). At follow-up, the positive treatment effects were similar to the results obtained in McAuley et al. (1994), Hallam and Petosa (2004) and Nichols et al. (2000). The small, post-test effect size ($r^2 = .12$) for moderate intensity exercise is similar to McAuley et al. (1994) ($r^2 = .10$), but different from Nichols et al. (2000) ($r^2 = .71$). Nichols et al. (2000), however, included exercise frequency, duration and minutes in the measurement. The smaller effect size at post-test can possibly be explained by the
lack of variability in the treatment group data. The effect sizes at follow-up one (n²=.26) and follow-up two (n²=.24) were larger than post-test; however, they were smaller than what was reported by McAuley et al. (1994) at the four months follow-up (r² = .52). Greater variability in the follow-up data and the larger increases in moderate intensity minutes per week may have contributed to the larger effect sizes. Additionally, the large increase in moderate intensity exercise minutes was practically meaningful. The American College of Sports Medicine recommends 30 minutes of moderate exercise, and the observed increases met and exceed the recommendation, as exercise scores increased by one hundred minutes over the course of the study.

For frequency of moderate exercise, the positive treatment effects observed in the present study are similar to the results found by McAuley et al. (1994), Cole et al. (1998), Hammond et al. (2000) and Nichols et al. (2000). McAuley et al. (1994) reported significant post-test group differences and an effect size of r² = .13 for moderate exercise frequency. The effect size in the current study was n²=.13, and mirrors the results reported in McAuley et al. (1994). At post-test, frequency of moderate exercise had increased almost one and a half days. By follow-up one, the mean frequency had increased over two and half days, and by follow-up, the mean frequency had increased almost four days. It is recommended that people engage in exercise as many days per week as possible, and the positive results provide evidence that participants were close to meeting the recommendations. Additionally, there was a one standard deviation increase at follow-up one and a two standard deviation increase at follow-up two. Hallam and Petosa (1998; 2004) observed a half standard
deviation increase, with frequency increasing from 2.5 to 3 days of exercise per week. It is encouraging to see that the current study exceeds previous research. Effect sizes in the current study were lower than McAuley et al. (2000), with an $n^2=.25$ at follow-up one and an $n^2=.14$ at follow-up two. Upon further examination of the data, 67% of the treatment group was reporting three to nine bouts of moderate exercise per week at follow-up. This may impact the effect size strength, particularly since the mean was almost four days per week. A four day increase in moderate exercise frequency per week is practically significant, and the present study results surpass what has been reported in the literature.

**Vigorous Intensity Exercise:**

*Research Question Five: Is there a difference between the treatment group and the comparison group on self-reported, vigorous-intensity minutes of exercise per week at post-test?*

*Research Question Six: Is there a difference between the treatment group and the comparison group on self-reported, vigorous-intensity minutes of exercise per week at follow-up?*

The between group ANOVA revealed a significant difference between the treatment and comparison groups at post-test ($p=.001$), follow-up one ($p=.001$) and follow-up two ($p=.002$). At pre-test, the mean was well below the recommended twenty minutes of vigorous intensity exercise (2.5). The comparison pre-test group mean was compared to the treatment post-test group mean (29.5), follow-up one group
mean (43.1) and follow-up two group mean (18.1). The post-test mean increase is practically significant, as well as the follow-up one mean, which is fifteen minutes less than the recommendations. At follow-up two, however, the mean in the sample decreased substantially (18.2). In conclusion, the intervention was effective at producing significant treatment group differences and increasing vigorous intensity minutes of exercise per week through follow-up one.

Research Question Seven: Is there a difference between the treatment group and the comparison group on self-reported, vigorous-intensity exercise days per week at post-test?

Research Question Eight: Is there a difference between the treatment group and the comparison group on self-reported, vigorous-intensity exercise days per week at follow-up?

The between group ANOVA revealed a significant difference between the treatment and comparison group at post-test (p=.001), follow-up one (p=.001) and follow-up two (p=.001). The increases, however, do not suggest a practical increase in the number of bouts per week. At pre-test, the comparison group mean was .06. The pre-test mean was compared to the treatment group mean at post-test (.8), follow-up one (1.1) and follow-up two (.7). These values are all less than the recommended three days per week of vigorous exercise, which greatly reduces your risk of cardiovascular disease. In conclusion, the analyses revealed a significant treatment
Discussion of Vigorous Exercise:

The current study revealed significant differences between the treatment and comparison groups for vigorous intensity duration and frequency at post-test, follow-up one and follow-two. At post-test, the results for both minutes and days of vigorous exercise can be attributed to the intervention. At follow-up one and two, it appears that mortality played a role in the results. Although the rates of vigorous exercise increased through follow-up one, multiple sub-class paired t-tests revealed non-significant findings at follow-up one and two. This revealed that the results were not solely attributed to the treatment. Overall, mortality was a concern in the present investigation, and its affects are evident with vigorous exercise. Maturation, on the other hand, did not impact vigorous exercise. The sub-class analyses revealed that all of the participants matured together, which lends credibility that maturation did not impact the results.

In the literature, the positive treatment effects for vigorous intensity duration of exercise can be compared to Blair et al. (1986) and Nichols et al. (2000). Blair et al. (1986) reported increases in vigorous physical activity in the treatment group over time (p<.05). Nichols et al. (2000) did not report group differences, but observed an increase in vigorous exercise from nine to 20 minutes at post-test, and then a decrease to 15 minutes at follow-up. The present study exceeded those findings. The observed
effect size in the present study was small, $n^2=.11$, as compared to Nichols et al. ($n^2=.40$); however, their measure included exercise frequency, duration and minutes. Effect sizes at the first and second follow-up were also small ($n^2 = .17$ and .12). Upon further examination of the data, a majority of the participants were not reporting vigorous exercise; therefore, the data variability was limited. The effect sizes may have been influenced by this fact. Even with the small effect sizes, the positive increases in vigorous minutes came close to the recommended 20 minutes of vigorous exercise per week and exceeded previous research studies.

Similar to vigorous intensity minutes, the positive findings for vigorous-intensity frequency (days) of exercise can again be compared to Blair et al. (1986) and Nichols et al. (2000). Blair et al., (1986) reported increases in vigorous physical activity in the treatment group over time ($p<.05$). Nichols et al. (2000) reported increases in vigorous physical activity, but did not detect significant treatment group differences. Nichols et al. (2000) also reported an $n^2=.4$ for vigorous physical activity. The effect sizes reported in the current study at post-test (.16), follow-up one (.17) and follow-up two (.12) were much smaller. Upon further examination of the data, over 80% of the sample was performing zero to one days of vigorous exercise per week at post-test, follow-up one and follow-up two. There was limited variability in the data, which may lower effect sizes. Although the intervention was successful at increasing vigorous days of exercise per week, the increases were small and practically insignificant. A possible explanation for the lack of change in days of vigorous exercise could be that the intervention did not place enough emphasis on vigorous
exercise, or that vigorous exercise was more strenuous and less appealing to the participants. Therefore, participants engaged in more moderate exercise. The resulting increases are two days below the recommended three days per week of vigorous exercise. It appears that the intervention did not have a practical impact on days of vigorous exercise.

**Discussion of the Intervention on Moderate and Vigorous Exercise**

As discussed in the previous section, the results of the current study revealed that the intervention produced the significant treatment group results for moderate minutes and days of exercise, and post-test vigorous exercise. However, the intervention did not solely produce the results for follow-up vigorous exercise. The rival explanations of mortality and maturation played a role in the outcomes. The results of the current study can also be interpreted by a few additional explanations. The explanations include the type of participant who enrolled in the study, those who remained in the study through follow-up, the length of the intervention, and attributes of the intervention that helped to strengthen the study.

The type of participant who enrolled in the study influenced the results. Participants were pre-screened prior to the intervention. In order to be eligible for the study, they had to identify themselves as being insufficiently active. This method was done to strengthen the current study and support the alternative hypotheses. By choosing these types of participants, a ceiling affect would be less likely to occur. In other words, if active people had enrolled in the program, there would be little to no
room for exercise improvement. A group of sedentary participants has more room for exercise improvement.

The participants who remained in the study through follow-up consistently demonstrated higher rates of exercise than the participants who dropped-out. These responders and exercisers strengthened the results of the current study. They remained in the program, learned more skills and tools to assist them with their exercise programs, and documented more exercise. The post-test and follow-up descriptive exercise data reflects and emphasizes these participants.

The length of the current intervention (two months) helped to strengthen the current study. In the literature, interventions ranging from one to three months produced more significant treatment group effects than interventions longer than three months in duration. Therefore, a two month intervention was chosen to help increase the chances of producing positive treatment group results.

Lastly, attributes of the intervention, such as recruitment, documenting attendance and providing homework assignments, contributed to the results. The recruitment materials targeted insufficiently active employees. Messages were tailored to inactive employees, and all-staff emails and flyers aided in recruiting the desired participant. Additionally, collecting homework assignments and documenting class attendance may have helped to increase retention. Of the participants who remained in the intervention, a majority of them attended four or five class sessions. Those who remained in the program learned valuable tools and skills to help them
exercise, contributing to larger effect sizes, greater variability in the data, and statistically significant treatment group results.

The Social Cognitive Theory Intervention

The constructs used in the present investigation included self-regulation, self-efficacy, social support, exercise enjoyment and outcome expectations and expectancies. During the intervention, participants were instructed to utilize all of the constructs in order to help them begin and maintain their exercise programs. They would then choose which one(s) was most successful for exercise adherence and use it post-intervention. The purpose of the social cognitive theory evaluation was to determine the changes in the constructs due to the intervention. There were twelve research questions that assessed the impact of the intervention on the social cognitive theory constructs. The alpha level for each research question was \( p = .05 \).

Analysis of Social Cognitive Theory Research Questions:

Self-Regulation:

Research Question One: Is there a difference between the treatment group and the comparison group on self-regulation scores at post-test?

Research Question Two: Is there a difference between the treatment group and the comparison group on self-regulation scores at follow-up?

The ANOVA analyses revealed a significant difference between the treatment and comparison groups on self-regulation scores at post-test \( (p=.001) \), follow-up one \( (p=.001) \) and follow-up two \( (p=.001) \). The self-regulation post-test treatment group
mean (122.7) was compared to the comparison group pre-test mean (81.7). The pre-test comparison group mean was also compared to follow-up one (122.5) and follow-up two (108.3) treatment group means. This demonstrated that participants learned and were utilizing the concepts of self-regulation throughout the study. In conclusion, the intervention produced significant treatment effects, and self-regulation appears to have the capacity to be a successful strategy for exercise adherence.

Discussion of the Self-Regulation

The analyses revealed a significant difference between the treatment and comparison group for self-regulation at all three assessment time frames. Self-regulation increased at each time period, and remained elevated over the course of the study. The increases and significant differences in self-regulation scores were due to the treatment, rather than rival threats. Construct validation of self-regulation occurred because the scores increases were produced by the intervention. The score increases demonstrated that participants learned and were utilizing the concepts of self-regulation throughout the study. Since a total of 75 minutes were devoted to self-regulation at the first and second class session, participants had ample time to learn and utilize the construct in their exercise programs. Participants were also reminded at every subsequent class session to use the self-regulation sub-skills of goal setting and self-monitoring. This may lend to the increase in self-regulation scores over the course of the study. Many participants also cited in classroom discussions, on their
activity logs, or in their weekly worksheet that the concepts of self-regulation helped them to begin and adhere to their exercise programs.

In the context of the literature, the positive treatment results observed in the current study are similar to results reported in a social cognitive theory intervention by Hallam & Petosa (1998; 2004). Mean scores increased from 92.6 to 118.2 at post-test in Hallam and Petosa (1998; 2004). In the current study, the scores were slightly higher, with the mean scores increasing to 123 at post-test. The effect sizes observed in the current study, a $n^2=.36$ at post-test, a $n^2=.35$ at follow-up one and a $n^2=.15$ at follow-up two were smaller than Hallam and Petosa (2004), who observed a moderate group by time interaction effect of $n^2 = .64$. However, post-test and follow-up one still explain a meaningful change in exercise self-regulation. One additional study also measured exercise self-regulation, which included goal setting (Annesi, 2002). Annesi (2002) reported non-significant effects in the treatment group, but the measurement instruments were different. Additionally, at follow-up, we can compare the exercise rates to Hallam and Petosa’s (2004) study. Significant differences were observed between groups at the 12 month follow-up, which are similar to the results observed in the present study. In conclusion, self-regulation has the capacity to be a successful strategy for exercise adherence. The positive treatment and practical results in the present study reinforce the need and importance of including self-regulation in exercise interventions.
Self-Efficacy:

*Research Question Three: Is there a difference between the treatment group and the comparison group on self-efficacy scores at post-test?*

*Research Question Four: Is there a difference between the treatment group and the comparison group on self-efficacy scores at follow-up?*

The ANOVA model revealed a non-significant finding between the treatment and comparison groups for self-efficacy at post-test (p=.01), follow-up one (p=.05) and follow-up two (p=.9). The comparison group pre-test mean (50.2) was compared to the post-test (59.3), follow-up one (58.9) and follow-up two (50.8) treatment group means. In conclusion, even though the intervention did not produce significant treatment effects, the small increases in self-efficacy may have meant participants were utilizing the strategy to overcome barriers to exercise.

**Discussion of Self-Efficacy**

Self-efficacy, for the purposes of the present intervention, was defined as overcoming barriers. Participants were introduced to self-efficacy at the third class session. A total of 50 minutes was spent discussing the construct self-efficacy. Additionally, participants were reminded at the subsequent three classes to continue developing methods to overcome barriers as a way to increase exercise adherence. Because self-efficacy increased and remained stable throughout the program, it appears that participants were learning and utilizing the concepts of self-efficacy throughout the study. By the three month follow-up, however, scores had decreased...
back to baseline, suggesting that self-efficacy might be greater when there is an existing supportive environment. Construct validation for self-efficacy did not occur, because the intervention did not solely produce the results. The non-significant results may be due to mortality, the smaller sample size, the lack of group mean differences, and the low power (.37 post-test; .18 follow-up one; .004 follow-up two).

In the social cognitive theory literature, three studies reported significant treatment effects for self-efficacy at post-test (McAuley et al., 1994; Dunn et al., 1997; Griffin and Blake-DeJoy, 2006), while two did not (Hallam and Petosa, 2004; Nichols et al., 2000). McAuley et al. (1994) included and measured the efficacy-based sources of mastery experience, social modeling, social persuasion and interpretation of physiological states, so it is difficult to make comparisons. Dunn et al. (1997), Hallam & Petosa (1998), Nichols et al. (2000) and Griffin & Blake-DeJoy (2006) defined self-efficacy as overcoming barriers. This was similar to the methods used in the current study. Therefore, we can more accurately compare the present results to the latter four studies. Nichols et al. (2000) observed a decrease in the mean scores and standard deviations from pre-test to post-test, while Hallam and Petosa (2004) observed an increase of three points in the mean score. The self-efficacy score increases in the current study reflect Hallam and Petosa’s (2004) results more accurately. The effect sizes in the current study ranged from $n^2=.00$ to .06. Hallam and Petosa reported an effect size of $n^2 = .06$ at post-test, which is similar to the present study (.06). Nichols et al. (2000) reported a small post-test effect size of $r^2 = .2$. These effect sizes explain zero to about one percent or less of the variance, according to Cohen (1963). This
suggests that the practical changes in exercise self-efficacy during the intervention were not meaningful. Self-efficacy may still be an important component of exercise behavior change interventions, however, one should take into account 1) measurement of self-efficacy; and 2) the dose of self-efficacy related to the desired changes in the construct score. If more time had been spent on developing the skills to overcoming barriers, participants may have been able to better utilize the construct in their exercise programs.

**Family Social Support:**

*Research Question Five: Is there a difference between the treatment group and the comparison group on family social support scores at post-test?*

*Research Question Six: Is there a difference between the treatment group and the comparison group on family social support scores at follow-up?*

The ANOVA model revealed that there was no significant differences between the treatment and comparison groups on family social support scores at post-test (p=.27) and follow-up one (p=.47). The ANOVA model did reveal a significant difference between the treatment and comparison groups on follow-up two social support (p=.001). The comparison group pre-test mean (39.6) was compared to the treatment group post-test (42.9), follow-up one (43.1) and follow-up two (23.9) means. This substantial decrease in social support scores by follow-up two is what allowed for statistical significances to be detected. In conclusion, the intervention did not produce significant treatment effects. This result was not desired; however, it is
not necessarily a negative aspect of the intervention, and this concept will be mentioned in the discussion section.

Friend Social Support:

*Research Question Seven: Is there a difference between the treatment group and the comparison group on friend social support scores at post-test?*

*Research Question Eight: Is there a difference between the treatment group and the comparison group on friend social support scores at follow-up?*

Similar to family social support, the ANOVA model revealed that there was no significant differences between the treatment and comparison groups on friend social support scores at post-test (p=.41) and follow-up one (p=.6). The ANOVA model did reveal a significant difference between the treatment and comparison groups on follow-up two social support (p=.002). The comparison group pre-test mean (40) was compared to the treatment group post-test (42.4), follow-up one (42.9) and follow-up two (21.6) means. This substantial decrease in social support scores at follow-up two is what allowed for statistical significances to be detected. In conclusion, the intervention did not produce significant treatment effects, and this result was not desired. However, it is not necessarily a negative aspect of the intervention, and this concept will also be mentioned in the following section.

Discussion of Family and Friend Social Support

Since the family and friend social support analyses and results followed the same trend, they will be discussed in one section. The ANOVA analysis revealed that
friend and friend social support was one of the constructs that failed to increase throughout the study. Additionally, construct validation of family or friend social support did not occur. Significant treatment effects were only observed at the second follow-up, which was due to the decrease in scores. Mortality was a threat that not controlled for in the social support analyses and affected the results. A total of one class period was devoted to family and friend social support, approximately 50 minutes. Social support was introduced at the fifth class session, and participants were reminded at the last class to use the different types of social support to help them adhere to their programs. The scores for both family and friend social support increased slightly at post-test, but then decreased at both follow-ups. It appeared as though the participants utilized family and friend social support to a small extent during the program, but did not use it within the two months after the program ceased. This is not necessarily a negative aspect though, because exercise rates increased. Participants may have reached a point where they did not need social support to adhere to their programs.

In the social cognitive theory literature, social support was measured in studies by Hallam and Petosa (1998) and Nichols et al. (2000). In Hallam and Petosa (1998), social support scores increased from pre-test to post-test, but were non-significant, and decreased at follow-up one. The same results were observed in the current study. There was also only a one standard deviation increase, which is less than the three point increase observed in Hallam and Petosa (1998). Nichols et al. (2000) reported significant decreases in social support in the treatment group, although a near
moderate effect size of $r^2 = .32$ still existed. The reported effect sizes in the current study were small, and suggest that the practical meaning of the social support skills learned in the intervention for exercise adherence was minimal. The insignificant findings in the current study may have been due to the low power for family social support (.07 post-test; .02 follow-up one) and for friend social support (.02 post-test; .01 follow-up one), the small sample size, or the lack of group mean differences at the assessment time frames. These factors can contribute to the inaccurate detection of non-significance, or a Type II error. Conversely, at follow-up two, the significant group difference was due to the large decrease in the treatment group mean score. The power (.96 family social support; .99 friend social support) was able to detect group differences. With the decrease in the treatment group scores, and the lack of non-significance in the current study, family social support content either needs improvement, needs to be omitted, or more time needs to be spent by participants on learning and utilizing the construct. Social support has been shown to be a contributing factor in exercise adoption and adherence (Rovniak et al., 2002; Petosa et al., 2003; Annesi, 2004; Rhodes & Plotnikoff, 2005); however, the present study does not support the literature.

Exercise Enjoyment:

*Research Question Nine: Is there a difference between the treatment group and the comparison groups on enjoyment for exercise scores at post-test?*
Research Question Ten: Is there a difference between the treatment group and the comparison group on enjoyment for exercise scores at follow-up?

The ANOVA revealed that there was no significant differences between groups for exercise enjoyment at post-test (p=.051). The ANOVA did reveal a significant difference between the treatment and comparison groups at follow-up one (p=.007) and follow-up two (p=.003). The comparison group pre-test mean (4.2) was compared to the post-test (4.6), follow-up one (4.9) and follow-up two (5.1) treatment group means. The increase in scores, despite the non-significant post-test treatment effects, is positive, as it appears that participants were taking exercise enjoyment into account in their exercise programs.

Discussion of Exercise Enjoyment

The analysis revealed a non-significant treatment effect for exercise enjoyment at post-test. There were significant treatment group differences for exercise enjoyment at follow-up one and follow-up two. Even though there were non-significant findings at post-test, there was a small, continuous increase in the treatment group scores throughout the study. Construct validation of exercise enjoyment did not occur, however, because the follow-up results are not entirely attributed to the treatment. Mortality and maturation played a role in the outcomes.

Exercise enjoyment was introduced in the fourth class session. Participants were reminded at the last two class sessions to use this strategy for exercise adherence. The only intervention in the literature to examine exercise enjoyment was Nichols et
al. (2000), who reported significant findings and a moderate effect size of $r^2 = .5$ for exercise enjoyment. The present study and Nichols et al. (2000) have different results, although they used the same PACES scale for measuring exercise enjoyment. It may be that the lack of group mean differences, the smaller sample size, or low power at post-test (.18) impacted the analysis and led to an inaccurate detection of non-significance. At follow-up one and follow-up two, the group mean differences were large enough to produce enough power (.4, .54) to detect significant group differences. The effect size at post-test ($n^2=.04$) and follow-up one were small ($n^2=.08$), and the practical significance of the score increases were minimal. There was minimal increase in the standard deviation from pre-test to post-test and to follow-up one. The scores at post-test and follow-up are equal to a response of 4 “neutral”. At follow-up two, the power was able to detect group differences, and a slightly larger effect size, $n^2=.11$, resulted. This increase was equivalent to a 5 “I am slightly enjoying or enjoying exercise”. With the score increases throughout the study, it is evident that future investigations should continue to include exercise enjoyment, as it can be an important component to exercise adherence. Increased time should be devoted to exercise enjoyment instruction, and perhaps scores could increase even greater if more time was spent on teaching participants to utilize the construct to adhere to their exercise programs.
Outcome Expectations and Expectancies:

Research Question Eleven: Is there a difference between the treatment group and the comparison group on outcome expectations and expectancies at post-test?

Research Question Twelve: Is there a difference between the treatment group and the comparison group on outcome expectations and expectancies at follow-up?

The ANOVA model revealed that there were no significant differences between the treatment and comparison group for outcome expectations and expectancies at post-test (p=.12), follow-up one (p=.11) and follow-up two (p=.051). The highest mean score for outcomes expectations and expectancies was at pre-test in the comparison group (437.1). The pre-test comparison group mean was compared to the post-test (409.6), follow-up one (403.6) and follow-up two (387.1) treatment group means. These results were not desired, because the scores for the construct decreased throughout the study, which was not anticipated. Because outcome expectations and expectancies was discussed at the last class session, participants may have not considered the construct as important in their exercise program. In conclusion, outcome expectations and expectancies did not produce the desired treatment results, nor increases in the construct scores.

Discussion of Outcome Expectations and Expectancies

Outcome expectations and expectancies was introduced at the last class session. The analysis revealed that there was not a significant treatment group effect for post-test, follow-up one and follow-up two. Mortality and maturation impacted the
analysis, as well as the low power to detect statistical significance (.09 at post-test, .09 at follow-up one and .17 at follow-up two). Construct validation of outcome expectations and expectancies did not occur. Because this strategy was introduced at the last class, the decrease in scores over the assessment time periods might reflect this. Participants may have thought the “strategy” was not as useful, did not fully understand the construct, or did not have time to implement into their programs. A total of 20 minutes were spent discussing outcome expectations and expectancies

Hallam and Petosa (1998) observed group mean increases at post-test for outcome expectations and expectancies, from 113.4 to 127.4. The results of the current study do not mirror Hallam and Petosa (1998). Additionally, Hallam and Petosa (2004) observed a significant group by time interaction for outcome expectations and expectancies, with an effect size of $n^2 = .41$. The effect sizes at post-test (.03), follow-up one (.09) and follow-up two (.05) were small. Rovniak et al. (2002), who measured outcomes to predict physical activity eight weeks later observed a minimal effect ($B=.21, p>.05$) on physical activity, and was not significant. It is difficult to make conclusions about outcomes expectations and expectancies because there is one intervention study literature that has addressed the construct, so limited comparisons can be made. If more time was devoted to teaching participants to utilize the construct to adhere to their exercise programs, or there was a corresponding worksheet for them to complete to emphasize the construct, higher construct scores might result as a consequence.
Implications for Theory

Seven intervention studies were identified in the adult, worksite population that attempted to promote adherence to physical activity using the social cognitive theory. The current study targeted the social cognitive theory constructs self-regulation, self-efficacy, social support, exercise enjoyment and outcome expectations and outcome expectancies. Results from the study support that the intervention was effective at improving the use of self-regulation skills, and providing evidence for modest increases in self-efficacy and exercise enjoyment skills in the treatment group.

Self-regulation, as defined by Bandura (1977), requires the development of self-regulatory skills that must be developed and mobilized for self-directed change. Self-regulation operates through a set of sub-functions, including goal setting, time management, self-monitoring of behavior, and the enlistment of social rewards and modeling supports (Bandura, 1986; Kanfer & Gaelick, 1986). One of the main goals for the current study was to have participants develop those self-regulatory skills for exercise. This is why self-regulation was introduced at the first class session and the most amount of classroom time was spent on developing the self-regulation skills. Participants learned about self-monitoring through the use of activity logs and learned how to develop and evaluate short and long-term exercise goals. Participants were reminded at every class session to utilize those self-regulatory skills to help them adhere to exercise. Participants were given weekly activity logs to monitor their daily exercise, and they had to complete a weekly short-term goal every week of the intervention. Consequently, the constructs scores increased and remained elevated at
each time period. These data demonstrate that participants learned and were utilizing the concepts of self-regulation throughout the study. Treatment effects were still significant, even with high rates of mortality. The effect sizes were slightly different from Hallam and Petosa (1998; 2004), who reported larger practical effects; however, the effect sizes in the current study still explained a meaningful change in exercise self-regulation. The intervention had an impact on self-regulation, and thus it appears self-regulation has the capacity to be a successful strategy for exercise adherence and should be included in future exercise adherence interventions.

Self-efficacy was the second construct targeted in the current investigation. Self-efficacy is referred to as perceived self-efficacy, which is the self-evaluative judgment about one’s abilities related to performance attainments. Bandura has expressed multiple times (1977, 1978, 1982, 1986, 1997) that self-efficacy is the most important prerequisite for behavior change because it affects how much effort is invested in a given task and what level of performance is attained. For the purposes of the present intervention, self-efficacy was defined as overcoming barriers; it has been operationally defined to mean the confidence an individual has to overcome barriers to performing a behavior. One’s own self-efficacy is based upon 1) performance attainments; 2) vicarious experiences; 3) verbal persuasion; and 4) and physiological states, from which people judge their capableness and strength. In the current intervention, these items and their definitions were presented to the participants, but the main focus was to have participants develop plans to overcome their barriers to exercise. A whole class was spent on self-efficacy; however, significant treatment
group effects for self-efficacy were not achieved. In the social cognitive theory literature, the hypothesis was not supported in three studies, who reported significant treatment effects for self-efficacy (McAuley et al., 1994; Dunn et al., 1997; Griffin and Blake-DeJoy, 2006). It was supported by Hallam and Petosa (2004) and Nichols et al. (2000), who reported non-significant treatment group results. Based on the small, scores increases in the current study, self-efficacy has the potential to be an important component in exercise adoption and adherence.

Family and friend social support was the third construct targeted in the current investigation. Social support includes one’s family and/or social acquaintances, and many people find it easier to change a behavior if those around them provide support in the behavior change process. It can work as an incentive for behavior change, and can exist in the forms of support groups, buddy supports, social activities and social networks (McKenzie & Smeltzer, 1997). Bandura (2004) explains that social support during early periods of personal change and maintenance increases long-term success. This may be the case in the current investigation. The scores increased at post-test, although there was a lack of significant treatment group differences. By follow-up one, the scores had decreased, and they continued to decrease substantially by the three month post-intervention point. The hypothesis was supported by the literature, as Hallam and Petosa (1998) and Nichols et al. (2000) reported non-significant findings, and decreased scores by follow-up in both studies. Although the results are supported by the literature, lack of significant effects are not necessarily a negative aspect. Exercise rates still continued to increase, and participants may have reached a
point where they did not need social support to adhere to their programs. Since social support has been shown to be a contributing factor in exercise adoption and adherence (Rovniak et al., 2002; Petosa et al., 2003; Annesi, 2004; Rhodes & Plotnikoff, 2005), it may be an important program component, however, maybe only during an intervention and not as much afterward.

Exercise enjoyment was the fourth construct targeted in the intervention. Exercise enjoyment can be described as a positive affective state that reflects feelings such as pleasure, liking and fun (Scanlan and Simons, 1992; Wankel, 1993). Exercise enjoyment was introduced in the fourth class session. Participants were reminded at the last two class sessions to use this strategy for exercise adherence. The increase in the group scores indicated that participants were considering activities and exercises they enjoyed doing. The results from the current study support the hypothesis for follow-up, but do not support the hypothesis and do support the literature for post-test. Nichols et al. (2000) reported significant findings at post-test and follow-up and a moderate effect size of $r^2 = .50$ for exercise enjoyment. The present study and Nichols et al. (2000) have different treatment and effect size results, although they used the same PACES scale for measuring exercise enjoyment. With the score increases throughout the study, it is evident that future investigations should continue to include and exercise enjoyment, because participants appeared to respond to the concept.

Outcome expectations and expectancies was the last construct targeted in the current study. Outcome expectations are the anticipated aspects of behavior that are categorized to include detrimental or beneficial physical effects, positive and negative
social consequences and internalized self-incentives (Bandura, 1992). Outcome expectancy is a value judgment of the likely consequences such performances will produce (Bandura, 1997). Outcome expectations and expectancies was introduced at the last class session, and 20 minutes were spent discussing outcome expectations and expectancies. Consequently, the decrease in scores over the assessment time periods might reflect this. In the literature, outcome expectations had a minimal effect on physical activity, and was not significant (Rovniak et al., 2000). Petosa, Suminski and Hortz (2003) found a small correlation of r=.24 between outcome expectancy and total days of vigorous physical activity. Hallam and Petosa (1998; 2004) observed an increase in outcome expectations and expectancies scores from pre-test to post-test, although it was non-significant. The results of the current study do not match the literature, and it is evident from the analyses that outcome expectations and expectancies did not play a role in participant’s exercise.

**Limitations of the Study**

There are several limitations of the study that need to be discussed in order to properly interpret the results. The design of the study brings with it problems associated with multiple threats to validity that compromise the integrity of the study as well as a loss of subjects that can impact the outcomes of the study. Attrition (mortality) played a role in some of the results. The time of the year that the intervention was delivered was impacted by New Years and the season in which follow-up was conducted. Self-report exercise measurement may have brought about
over-estimations of exercise, and socially acceptable answers for the social cognitive theory constructs. Finally, an implementer effect may have positively influenced participation.

The separate-samples pre-test, post-test group design introduced several uncontrollable threats to internal and external validity, and omitted the post-test and follow-up comparison group data from the analyses. Regression, testing and selection are the only threats to internal validity that are controlled for in the current study design. This weakens the design of the study, and introduces multiple rival explanations when interpreting the results. In addition, there are multiple interactions that may have occurred during the intervention. Since a random sample was not used, these threats were not controlled for, and the generalizability of the results was greatly diminished. The second limitation of the chosen study design was the restraints the design placed on the analyses. The separate-samples study design does not use the comparison group’s data, which eliminates part of the sample in the analysis. By decreasing sample size, the power of the statistical tests to detect treatment group differences may be lowered. This limitation can directly influence the results of the study.

Similar to most interventions conducted at the worksite, the current study had a high mortality rate. From pre-test to post-test, there was a 43% attrition rate. Thirty-seven participants remained in the treatment group. By follow-up one, 24 participants remained in the treatment. By the second follow-up, 19 remained in the treatment group. Loss of subjects can result in non-significant findings, because of the reduced
power of statistical tests. As a threat to internal validity, mortality did not impact the results for moderate exercise, but it did affect the results for vigorous exercise by follow-up. It also affected the results for self-efficacy, exercise enjoyment, social support and outcome expectations and expectancies. More effort is needed to recruit larger samples and retain a greater number of participants. Larger sample sizes increase the power of statistical test to detect group mean differences.

The time of the year in which the intervention was conducted was a confounder to the study. The intervention began immediately in the New Year. Many people make New Years resolutions, and are motivated to “to get in shape”, “to lose weight” or “to start exercising”. This may have increased interest and enrollment in the program. The program was also concluded at the beginning of March, which is close to spring. Sallis and Owen (1999) state that it appears there are increases in exercise associated with movement from winter to spring. Greater levels of reported exercise may have been confounded by the more agreeable weather or by participants who were more motivated to exercise to “get in shape” by the beginning of the summer. Additionally, the first follow-up was conducted at the end of March, when people take spring vacations, and in late May. The nicer weather and participants who exercised more on their vacations noted increased exercise levels. Repeating this intervention in the different times of the year will help investigators better understand the influence seasonal effects in exercise adherence.

Self-reported measures are a limitation of the current study. Although all of the instruments used in the present study had established validity and reliability, self-
report measures rely upon the participants to accurately recall their exercise, and self-report instruments are less reliable than objective measures of exercise because they are subject to such biases as the over and underreporting of information and socially acceptable answers (Baronowski et al., 2000). To participate in the intervention, participants were required to complete a self-report, seven day recall about their exercise habits, as well as complete instruments measuring their psycho-cognitive abilities in relation to exercise participation. Participants may have under or over-reported their exercise participation and inaccurately responded to social cognitive theory instruments. Additionally, there was a time limit to completing the ten page questionnaire because it was the lunch hour. Participants may have felt rushed, distracted, or tiresome because the questionnaire was lengthy, and may not have accurately answered all of the items.

Lastly, an implementer effect may have influenced the study. The investigator controlled the high level of program fidelity and program implementation, but it may have created a level of demand characteristics that affected the participants. The investigator could have positively influenced participant’s dedication and level of commitment to the intervention, as well as to their own exercise programs, because they knew the value of the program to the investigator. Participants may have increased their exercise participation, knowing the study was a dissertation study. Additionally, if the study is to be implemented in the future, certain demand characteristics would have to be modified. Keeping track of attendance, assignments, designing classroom content, as well as traveling from worksite to worksite, need to be
less demanding. These improvements may increase program fidelity when disseminating an intervention.

**Recommendations for Future Studies**

There are several recommendations that need to be made for future studies, in order to effectively promote and implement successful exercise behavior change-based interventions. The first recommendation would be to use a different study design. The present study used the separate-samples pre-test, post-test group design. This design is ideal for when participant random assignment to differential experimental treatments is not allowed, as was the case in the current investigation. However, it is not a strong design (Campbell & Stanley, 1963, p. 52) and has multiple, uncontrollable threats to internal and external validity. Additionally, because the design dictates which groups are compared, the post-test and follow-up assessments of the comparison group are not used in the analyses. When eliminating sample size, statistical power is decreased, which can negatively impact the results. True experimental designs are difficult to conduct in the worksite, and not practical or feasible due to company restraints. Using another study design, such as the non-equivalent control group design, would be a better option. The design does not have pre-experimental sampling but uses a control group to compare the experimental group to. It also controls for additional threats to validity that the current study design did not, such as mortality and maturation. There are several, stronger study designs that can be used in place of the separate-samples pre-test, post-test group design.
The current intervention was eight weeks in duration, composed of six educational, classroom-based sessions. Because the pre-test and post-test were given in week one and eight, the total number of educational sessions was close to five. Each class session was one hour long, and all six constructs were covered in those five classes. The investigator discovered it was difficult to cover all six constructs in depth within five classes, and it is recommended that future investigations either add an additional classroom sessions to cover the six constructs, or omit a construct (outcome expectation and expectancies) in order to enhance another (self-efficacy). The constructs that increased slightly throughout the intervention, self-efficacy and exercise enjoyment, could perhaps have had a larger impact on exercise adherence if more time was spent on them. Outcome expectations and expectancies could have been furthered enhanced if more time had been spent on the construct, or a corresponding worksheet had been required to complete, to help participants learn how to utilize the construct in their exercise programs.

It was evident that the sample in the current study chose to engage in more moderate-intensity exercise than vigorous-intensity exercise. It is possible that one of the reasons why was because the investigator did not stress one over the other. Participants made the choice as to which intensity level they would engage in. A second reason may be that people, when beginning an exercise program, choose to engage in easier types of exercise, such as walking, which is considered a moderate-intensity exercise. The third reason is related to the demographics, particularly gender (female) and age (average 46). Females and older adults tend to engage in more
moderate pursuits of exercise (Boutelle et al., 2000; Seefeldt et. al., 2001; Kaewthummanukul & Brown, 2006). An important consideration in future investigations would be address both moderate and vigorous intensity exercise, but allow participants to freely choose which type of exercise they wish to engage in. The improved scores for moderate exercise tells us that sedentary and low active people tend to chose moderate exercise, and this intensity level of exercise should be promoted and encouraged in exercise adoption.

Theory testing is an important component of future research studies. The application of theory to physical activity interventions indicates increased compliance with and adherence to structured programs (Seedfelt et al., 2002). It provides a framework for understanding how and why an intervention produced the results. More so, construct validity of the treatment is essential to determine how programs produce the changes in health behavior (Flay, 1985). Construct validity of the treatment was established for self-regulation, as scores improved over the course of the study and were produced by the intervention. Construct validity of the treatment was tested, but not established, for the remaining five constructs. This was due to non-significant findings, rival explanations that affected the results, modest increases in some of the constructs, and decreased scores in others by post-test and follow-up. By establishing construct validity of the treatment for self-regulation, we know a positive relationship exists between exercise and self-regulation. Additional studies need to test the magnitude of the other constructs implemented in the current study on exercise behavior change.
Lastly, the same intervention implemented at a different time of the year can provide evidence as to whether the New Year had an influence on participation and retention. Additionally, future investigators need to work out communication issues ahead of time. Communication through email (firewalls) posed some challenges, and may have impacted program participation and subject retention. All class information had to be emailed to the worksite contact, and then disseminated to the participants. This caused heavy reliance on the worksite contact instead of autonomy on the side of the investigator. Participants may also not have been aware of class cancellations (weather), program announcements or classroom changes. This limitation could have impacted program fidelity and implementation, compromising subject retention and exercise rates.

**Implications for Practice**

From the results of the current study, theory-based, educational, workplace exercise interventions targeting sedentary and low active samples can be an effective, efficient and safe way to promote moderate and vigorous exercise, the use of self-regulation skills, and can provide evidence for modest gains in self-efficacy skills and exercise enjoyment. When investigators recruit and pre-screen for inactive samples, a strong case can be made for participant exercise improvement, because they will not exhibit a ceiling affect. Insufficiently active samples have ample room for increases in exercise. This was a method systematically built into the current intervention to strengthen the results of the study and support the alternative hypotheses.
Investigators will want to carefully consider which constructs are included in exercise interventions, the order in which they implemented, and how much time is spent instructing on each construct. Based on the negative results, outcome expectations and expectancies might be one construct to eliminate from future interventions. Focusing on other constructs that had modest gains, such as self-efficacy and exercise enjoyment, may help participants learn more tangible, valuable skills to help them adhere to exercise.

The investigator in the current study found it useful to document class attendance and collect homework assignments. Although it is unknown what the retention rate would have been without using these methods, it can be assumed the retention rate would have been lower. Participants may have felt obligated to come to class to submit assignments, and to be a part of the program. Attendance through participation can be used as both a measure of process and of outcome (Glasgow et al., 1993), and it is recommended that future studies routinely report these figures.
REFERENCES


Appendix A

Demographic Information

The following information will tell us a little bit about you.
The information on this sheet will be confidential.

Please complete the following information.

Name: _____________________________

Age: ______________

Height: ______________

Weight: _____________

Marital Status: Please check one.


Race: Please check all that apply.

1. Caucasian ______________  6. Middle Eastern: __________
3. Asian American__________________  8. Other: _____________
4. Hispanic/Latino ____________ (please specify)
5. Native American: ____________

Level of Education Attained: (please check the highest level of education completed)

1. High School _______  4. College Degree ________
2. Technical College_____  5. Post College Degree _______
3. Some College _______  6. Other: _______________

Current Position Title: ___________________________________________
Appendix B

Exercise Stage of Change Questionnaire

Exercise includes activities such as brisk walking, jogging, swimming, aerobic dancing, biking, rowing, weight lifting, etc. Activities that are primarily sedentary, such as bowling, or playing golf with a cart, would not be considered exercise.

Do you exercise regularly, that is, 3 or more times each week for at least 20 minutes each time? (Please check one statement below that best describes you.)

____ Yes, I have been exercising for more than 6 months.

____ Yes, I have been exercising but for less than 6 months.

____ No, but I am planning to start in the next 30 days.

____ No, but I am planning to start in the next 6 months.

____ No, and I don't have plans to start in the next 6 months.
Appendix C

Seven Day Recall of Exercise Questionnaire
During the LAST 7 DAYS, how much TIME did you spend doing MODERATE exercise?

MODERATE EXERCISE is planned physical activity done to enhance health/fitness. Moderate exercise:
1. is continuous for 10 minutes or more
2. mildly elevates heart rate
3. mildly elevates breathing rate
4. can hold a conversation while exercising

Moderate exercise examples:
low-impact aerobic/exercise classes, brisk walking or hiking, golfing without cart, recreational team sports (volleyball, soccer, etc.)

1. In the DAY column, mark a “0” for no exercise, an “X” for each day you engaged in MODERATE exercise.
2. In the ACTIVITY columns, list the MODERATE exercises you did (e.g. walking)
3. In the MINUTES column, write in the amount of time you did MODERATE exercise that day.
4. In the PLANNED/UNPLANNED column, specify whether the activity is part of a regular, planned exercise program. Mark “P” if activity was planned or "U" if it was unplanned.

<table>
<thead>
<tr>
<th>DAY</th>
<th>Activity 1</th>
<th>Minutes</th>
<th>Planned/Unplanned</th>
<th>Activity 2</th>
<th>Minutes</th>
<th>Planned/Unplanned</th>
</tr>
</thead>
<tbody>
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<td>Sun:</td>
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</table>

During the LAST 7 DAYS, how much TIME did you spend doing VIGOROUS exercise?

VIGOROUS EXERCISE is planned physical activity done to enhance health/fitness:
1. is continuous for 10 minutes or more
2. rapidly elevates heart rate
3. breathing rapidly and deeply
4. can NOT hold a conversation while exercising

Vigorous exercise examples:
running or jogging, high-intensity aerobic classes, competitive full-field sports (soccer) or basketball

1. In the DAY column, mark a “0” for no exercise, an “X” for each day you engaged in VIGOROUS exercise.
2. In the ACTIVITY columns, list the VIGOROUS exercises you did (e.g. running).
3. In the MINUTES column, write in the amount of time you did VIGOROUS exercise that day.
4. In the PLANNED/UNPLANNED column, specify whether the activity is part of a regular, planned exercise program. Mark “P” if activity was planned or "U" if it was unplanned.

<table>
<thead>
<tr>
<th>DAY</th>
<th>Activity 1</th>
<th>Minutes</th>
<th>Planned/Unplanned</th>
<th>Activity 2</th>
<th>Minutes</th>
<th>Planned/Unplanned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun:</td>
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<td>Sat:</td>
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Appendix D

Self Regulation

Part I. Items 1-40.
People use various techniques to help them exercise on a regular basis. Recalling your exercise activities performed in the last four (4) weeks, please answer the following questions regarding techniques you may have used to help you exercise. If you did not exercise during this time period, select “never”.

In the scale provided next to each item, circle the number that best represents how often you used the specified technique in the past four (4) weeks.

<table>
<thead>
<tr>
<th>Item</th>
<th>Technique Description</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I mentally kept track of my exercise activities.</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>2</td>
<td>I mentally noted specific things which helped me exercise</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>3</td>
<td>I recorded my exercise activities in a written record.</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>4</td>
<td>I recorded my exercise activities in a written record including duration or intensity of exercise performed.</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>5</td>
<td>I kept a written record of specific methods used to enhance my ability to perform exercise.</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>6</td>
<td>I established short term goals (daily or weekly) related to how often I exercise.</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>7</td>
<td>I established long term goals (monthly or longer) related to how often I exercise.</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>8</td>
<td>I established goals for exercise time or distance (e.g. swim 20 minutes, run three miles).</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>9</td>
<td>I established exercise goals that focused on my health (e.g. improved fitness).</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>10</td>
<td>I established exercise goals that focused on my appearance (e.g. lose weight, tone body).</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>11</td>
<td>I established a written commitment with others to exercise.</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>12</td>
<td>I established an oral commitment with others to exercise regularly.</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>13</td>
<td>I mentally set exercise goals.</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>14</td>
<td>I wrote down my exercise goals.</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>15</td>
<td>I exercise with someone to help me exercise regularly.</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>16</td>
<td>I exercised with a pet to help me exercise regularly.</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>17</td>
<td>I talked to someone while I exercised to help me exercise regularly.</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>18</td>
<td>I received verbal praise from someone for exercising.</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>19</td>
<td>I received a reward from someone for exercising.</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>20</td>
<td>I asked someone to remind me to exercise.</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>21</td>
<td>I asked someone to assume some of my responsibilities so I could exercise.</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>22</td>
<td>I asked someone for advice or demonstration of exercise activities.</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>23</td>
<td>I asked an exercise expert/health professional for advice or demonstration of exercise activities.</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td>24</td>
<td>I rewarded myself for exercising (e.g. snack, watch TV, movies, buy gift, etc.)</td>
<td>Never 2 3 4 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Never</td>
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</tr>
<tr>
<td>25.</td>
<td>I rewarded myself for reaching health goals related to exercise. (e.g. improved fitness).</td>
<td>1</td>
</tr>
<tr>
<td>26.</td>
<td>I rewarded myself for reaching appearance goals related to exercise (e.g. lose weight, tone body).</td>
<td>1</td>
</tr>
<tr>
<td>27.</td>
<td>I punished myself for not exercising (e.g. withhold reward if I don't exercise).</td>
<td>1</td>
</tr>
<tr>
<td>28.</td>
<td>When I exercised, I focused on how good I felt.</td>
<td>1</td>
</tr>
<tr>
<td>29.</td>
<td>After I exercised, I focused on how good I felt.</td>
<td>1</td>
</tr>
<tr>
<td>30.</td>
<td>I reminded myself of positive health benefits of exercise (e.g. lose weight, tone body).</td>
<td>1</td>
</tr>
<tr>
<td>31.</td>
<td>I reminded myself of negative health consequences of not exercising (e.g. heart disease).</td>
<td>1</td>
</tr>
<tr>
<td>32.</td>
<td>I remind myself of negative appearance consequences of not exercising (e.g. weight gain)</td>
<td>1</td>
</tr>
<tr>
<td>33.</td>
<td>I mentally schedule time periods to exercise</td>
<td>1</td>
</tr>
<tr>
<td>34.</td>
<td>I wrote down specific time periods to exercise.</td>
<td>1</td>
</tr>
<tr>
<td>35.</td>
<td>I rearranged my schedule of other activities to ensure I had time to exercise.</td>
<td>1</td>
</tr>
<tr>
<td>36.</td>
<td>If I had conflicts with my scheduled time periods for exercise, I chose exercise.</td>
<td>1</td>
</tr>
<tr>
<td>37.</td>
<td>I mentally noted barriers which influenced my ability to exercise.</td>
<td>1</td>
</tr>
<tr>
<td>38.</td>
<td>I mentally planned ways to overcome barriers to my exercise activities</td>
<td>1</td>
</tr>
<tr>
<td>39.</td>
<td>I wrote down barriers which influenced my ability to exercise.</td>
<td>1</td>
</tr>
<tr>
<td>40.</td>
<td>I wrote down ways to overcome barriers to my exercise activities.</td>
<td>1</td>
</tr>
<tr>
<td>41.</td>
<td>I asked others to identify barriers to my exercise activities.</td>
<td>1</td>
</tr>
<tr>
<td>42.</td>
<td>I purposely plan ways to exercise when I am on trips away from home.</td>
<td>1</td>
</tr>
<tr>
<td>43.</td>
<td>I purposely planned ways to exercise during bad weather.</td>
<td>1</td>
</tr>
<tr>
<td>44.</td>
<td>I place exercise equipment in a prominent place to remind me to exercise.</td>
<td>1</td>
</tr>
<tr>
<td>45.</td>
<td>I place posters or pictures in prominent places to motivate myself to exercise.</td>
<td>1</td>
</tr>
<tr>
<td>46.</td>
<td>I wrote a note to remind myself to exercise.</td>
<td>1</td>
</tr>
<tr>
<td>47.</td>
<td>I listened to music while I exercised.</td>
<td>1</td>
</tr>
<tr>
<td>48.</td>
<td>I watched television while I exercised.</td>
<td>1</td>
</tr>
<tr>
<td>49.</td>
<td>I read while I exercised.</td>
<td>1</td>
</tr>
<tr>
<td>50.</td>
<td>I used a home exercise facility to help me exercise regularly.</td>
<td>1</td>
</tr>
<tr>
<td>51.</td>
<td>I used a local exercise facility/club to help me to exercise regularly.</td>
<td>1</td>
</tr>
<tr>
<td>52.</td>
<td>On trips away from home, I purposely stay at places which have access to exercise facilities.</td>
<td>1</td>
</tr>
</tbody>
</table>
Appendix E

Self-Efficacy

How confident are you that you could exercise under each of the following conditions?

0%===10%===20%===30%===40%===50%===60%===70%===80%===90%==100%
Positively could NOT Exercise      Positively COULD exercise

Confidence Rating  0-100%

53. I could exercise when I am tired. __________
54. I could exercise during or following a personal crisis. __________
55. I could exercise when feeling depressed. __________
56. I could exercise when feeling anxious. __________
57. I could exercise during bad weather. __________
58. I could exercise when sore from the last work-out. __________
59. I could exercise when on vacation. __________
60. I could exercise when there are competing interests (e.g. watching television) __________
61. I could exercise when I have a lot of work to do. __________
62. I could exercise when I don't receive support from my family/ friends. __________
63. I could exercise when I have no one to exercise with. __________
64. I could exercise when my schedule is hectic. __________
65. I could exercise when exercising is not enjoyable. __________
66. I could exercise when I haven't reached my exercise goals. __________
Appendix F

Social Support

Please rate each question TWICE. Under FAMILY, rate how often anyone living in your household has said or done what is described during the last 3 months. Under FRIENDS, rate how often friends, co-workers, or acquaintances have said or done what is described during the last 3 months.


<table>
<thead>
<tr>
<th>None</th>
<th>Rarely</th>
<th>A Few Times</th>
<th>Often</th>
<th>Very Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Family  Friends

67. Exercised with me.
   _____  _____

68. Gave me encouragement to stick with my exercise program.
   _____  _____

69. Changed their schedule so we could exercise together.
   _____  _____

70. Offered to exercise with me.
   _____  _____

71. Gave me helpful reminders to exercise.
   _____  _____

72. Planned for exercise on recreational outings.
   _____  _____

73. Discussed exercise with me.
   _____  _____

74. Talked about how much they like to exercise
   _____  _____

75. Helped plan activities around my exercise
   _____  _____

76. Asked me for ideas on how they can get more exercise.
   _____  _____

77. Took over chores so I had more time to exercise.
   _____  _____

78. Made positive comments about my physical appearance.
   _____  _____
Appendix G

Exercise Enjoyment Scale

Please rate how you feel at this moment about the physical activity you have been doing. Below is a list of feelings with respect to physical activity. For each feeling, please circle the number that best describes you.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>79. I enjoy it</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I hate it</td>
</tr>
<tr>
<td>80. I feel bored</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I feel interested</td>
</tr>
<tr>
<td>81. I dislike it</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I like it</td>
</tr>
<tr>
<td>82. I find it pleasurable</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I find it unpleasurable</td>
</tr>
<tr>
<td>83. I am very absorbed in this activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I am not absorbed in this activity</td>
</tr>
<tr>
<td>84. It is no fun at all</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>It is a lot of fun</td>
</tr>
<tr>
<td>85. I find it energizing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I find it tiring</td>
</tr>
<tr>
<td>86. It makes me depressed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>It makes me happy</td>
</tr>
<tr>
<td>87. It’s very pleasant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>It’s very unpleasant</td>
</tr>
<tr>
<td>88. I feel good physically while doing it</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I feel bad physically while doing it</td>
</tr>
<tr>
<td>89. It’s very invigorating</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>It’s not at all invigorating</td>
</tr>
<tr>
<td>90. I am very frustrated by it</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I am not at all frustrated by it</td>
</tr>
<tr>
<td>91. It’s very gratifying</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>It is not gratifying</td>
</tr>
<tr>
<td>92. It’s very exhilarating</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>It is not exhilarating</td>
</tr>
<tr>
<td>93. It’s not at all stimulating</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>It is very stimulating</td>
</tr>
<tr>
<td>94. It gives me a strong sense of accomplishment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>It does not give me any sense of accomplishment</td>
</tr>
<tr>
<td>95. It is very refreshing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>It is not at all refreshing</td>
</tr>
</tbody>
</table>
96. I felt as though I would rather be doing something else

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

I felt as though there was nothing else I would rather be doing
Appendix H

PART V. Outcomes of Physical Activity

Below is a list of possible outcomes of participating in regular exercise. Please rate each question **twice**.

- Under the heading “**HOW LIKELY**” please indicate how likely it is that you would experience each of the outcomes.
- Under the heading “**HOW IMPORTANT**” please indicate how likely it would matter to you if each of the outcomes occurred.
- Please write one number from the following rating scale in each space.

<table>
<thead>
<tr>
<th>Not at all likely</th>
<th>1</th>
<th>Not at all important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somewhat likely</td>
<td>2</td>
<td>Somewhat important</td>
</tr>
<tr>
<td>Moderately likely</td>
<td>3</td>
<td>Moderately important</td>
</tr>
<tr>
<td>Very likely</td>
<td>4</td>
<td>Very important</td>
</tr>
<tr>
<td>Extremely likely</td>
<td>5</td>
<td>Extremely important</td>
</tr>
</tbody>
</table>

If I participate in regular physical activity or sports then:

<table>
<thead>
<tr>
<th></th>
<th>How Likely</th>
<th>How Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>97. I will build up my muscle strength.........................</td>
<td>1. _______</td>
<td>1. _______</td>
</tr>
<tr>
<td>98. It will be too time-consuming................................</td>
<td>2. _______</td>
<td>2. _______</td>
</tr>
<tr>
<td>99. I will feel less depressed and/or bored........................</td>
<td>3. _______</td>
<td>3. _______</td>
</tr>
<tr>
<td>100. I will improve my self-esteem................................</td>
<td>4. _______</td>
<td>4. _______</td>
</tr>
<tr>
<td>101. It will make me feel tired....................................</td>
<td>5. _______</td>
<td>5. _______</td>
</tr>
<tr>
<td>102. I will not be good at doing the activity.....................</td>
<td>6. _______</td>
<td>6. _______</td>
</tr>
<tr>
<td>103. It will take too long to achieve the outcomes I want........</td>
<td>7. _______</td>
<td>7. _______</td>
</tr>
<tr>
<td>104. I will not enjoy it............................................</td>
<td>8. _______</td>
<td>8. _______</td>
</tr>
<tr>
<td>105. I will feel less tension and stress...........................</td>
<td>9. _______</td>
<td>9. _______</td>
</tr>
<tr>
<td>106. It will be too much work &amp; effort to motivate myself to do it</td>
<td>10. _______</td>
<td>10. _______</td>
</tr>
<tr>
<td>107. I will improve my health or reduce my risk of disease......</td>
<td>11. _______</td>
<td>11. _______</td>
</tr>
<tr>
<td>108. I will do better on my job.....................................</td>
<td>12. _______</td>
<td>12. _______</td>
</tr>
<tr>
<td>109. I will feel physically uncomfortable while doing the activity.</td>
<td>13. _______</td>
<td>13. _______</td>
</tr>
<tr>
<td>110. It will be difficult to find friends to do the activity with me.</td>
<td>14. _______</td>
<td>14. _______</td>
</tr>
<tr>
<td>111. I will feel more attractive.....................................</td>
<td>15. _______</td>
<td>15. _______</td>
</tr>
<tr>
<td>112. I will improve my heart and lung fitness....................</td>
<td>16. _______</td>
<td>16. _______</td>
</tr>
<tr>
<td>113. It will cost too much money....................................</td>
<td>17. _______</td>
<td>17. _______</td>
</tr>
<tr>
<td>114. I will find it boring……………………………………</td>
<td>18. _____</td>
<td>18. _____</td>
</tr>
<tr>
<td>115. I will increase my energy level……………………..</td>
<td>19. _____</td>
<td>19. _____</td>
</tr>
<tr>
<td>116. I will improve my muscle tone………………………</td>
<td>20. _____</td>
<td>20. _____</td>
</tr>
<tr>
<td>117. It will take away from the time I have to spend with my friends</td>
<td>21. _____</td>
<td>21. _____</td>
</tr>
<tr>
<td>118. It will take away from the time I have to spend for work…</td>
<td>22. _____</td>
<td>22. _____</td>
</tr>
<tr>
<td>119. I will feel better about my body……………………..</td>
<td>23. _____</td>
<td>23. _____</td>
</tr>
<tr>
<td>120. I will gain muscle………………………………………</td>
<td>24. _____</td>
<td>24. _____</td>
</tr>
<tr>
<td>121. It will decrease the energy I have for other activities……</td>
<td>25. _____</td>
<td>25. _____</td>
</tr>
</tbody>
</table>

THANK YOU!!!
Appendix I

Evaluation of BE ACTIVE

Week 3

Please respond to the following statements, choosing the answer that best describes your opinion of the BE ACTIVE program.

1 = disagree; 2 = slightly disagree; 3 = neutral; 4 = slightly agree; 5 = agree

<table>
<thead>
<tr>
<th>Lesson Components</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1) The BE ACTIVE program is helping me to become a regular exerciser.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2) The BE ACTIVE lessons are easy to understand</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3) The BE ACTIVE lessons are straightforward.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4) The BE ACTIVE lessons are easy to understand</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5) The BE ACTIVE lessons are helping me understand the skills I need to maintain an exercise program.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6) The BE ACTIVE components are useful.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7) The BE ACTIVE program is appropriate for me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8) The pace of the BE ACTIVE program is suitable for me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9) The BE ACTIVE lessons are addressing exercise barriers appropriately.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10) The BE ACTIVE program is what I thought it would be.</td>
<td>1</td>
<td>2</td>
<td>3</td>
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</tr>
</tbody>
</table>

Instructor Evaluation

<table>
<thead>
<tr>
<th>Instructor Evaluation</th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1) The instructor provides clear directions on program lessons.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Evaluation of <strong>BE ACTIVE</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>Week 3</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>1 = disagree; 2 = slightly disagree; 3 = neutral; 4 = slightly agree; 5 = agree</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

2) The instructor provides clear directions on classroom assignments.  

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

3) The instructor creates an environment conducive to learning.  

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

4) The instructor addresses participant concerns.  

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

5) The instructor presents a wide range of information pertaining to physical activity and exercise.  

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

6) The instructor is knowledgeable on content.  

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

7) The instructor allows for sufficient time for participants to understand the BE ACTIVE program components.  

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
</table>

Do you have any additional comments or concerns?

Do you have any suggestions on how to make the program better?
Appendix J

Program Survey Questions

1) The BE ACTIVE lessons are straightforward.

Six participants slightly agreed (4) and 26 participants agreed (5) that the program lessons were straight-forward.

2) The BE ACTIVE lessons are easy to understand.

Five participants slightly agreed (4) and 27 participants agreed (5) that the program lessons were easy to understand.

3) The BE ACTIVE lessons are helping me understand the skills I need to maintain exercise.

One participant responded neutral to this question (3), while seven participants slightly agreed (4) and 24 participants agreed (5) that the lessons were helping them understand the skills they needed to maintain exercise.

4) The BE ACTIVE components are useful.

One participant was responded neutral to this question (3), while seven participants slightly agreed (4) and 23 participants agreed that the lesson components were useful.

5) The BE ACTIVE program is appropriate for me.
One participant disagreed (1), two participants responded with a neutral answer (3), nine participants slightly agreed (4) and 18 participants agreed that the program was appropriate for them.

6) The pace of the BE ACTIVE program is suitable for me.

Two participants responded with a neutral answer (2), seven participants slightly agreed (4) and 22 participants agreed that the program was suitable for them.

7) The BE ACTIVE lessons are addressing exercise barriers appropriately.

Three participants responded neutral (3), nine participants slightly agreed (4) and 20 participants agreed that the program was appropriately addressing the barriers to exercise.

8) The BE ACTIVE program is what I thought it would be.

Two participants slightly disagreed (2), three participants responded neutral (3), 11 participants slightly agreed (4) and 14 participants agreed (5) that the program was what they thought it would be.

9) The BE ACTIVE program is helping me become a regular exerciser.

One participant slightly disagreed (2), five participants responded neutral (3), eight participants slightly agreed (4) and 18 participants agreed that the program was helping them become regular exercisers.
Instructor Survey Questions

1) The instructor provides clear directions on program lessons.
   One participant slightly disagreed (2), four participants slightly
   agreed and 26 participants agreed (5) that the instructor provided clear
directions on program lessons.

2) The instructor provides clear directions on class assignments.
   One participant responded neutral (3), four participants slightly
   agreed (4) and 26 participants agreed (5) that the instructor provided clear
direction on class assignments.

3) The instructor creates an environment conducive to learning.
   One participant responded neutral (3), four participants slightly
   agreed (4) and 26 participants agreed (5) that the instructor created an
environment conducive to learning.

4) The instructor addresses participant concerns.
   Four participants slightly agreed (4) and 28 participants agreed that
the instructor addressed participant concerns.

5) The instructor presents a wide range of information pertaining to physical
activity and exercise.
Nine participants slightly agreed (4) and 23 participants agreed (5) that the instructor presented a wide range of information pertaining to physical activity and exercise.

6) The instructor is knowledgeable about the program content.

Two participants slightly agreed (4) and 30 participants agreed (5) that the instructor was knowledgeable about the program content.

7) The instructor allows for sufficient time for participants to understand the program components.

One participant responded neutral (3), four participants responded slightly agreed (4) and 26 participants responded agreed (5) that there was sufficient time to understand.
Appendix K

Assignment Submission

Participants had to submit the Exercise Opportunities WS at class two. 110 participants attended the second class session, and 100 participants showed the instructor a completed assignment.

Participants had to submit the Goal Setting WS in class three. 97 participants attended the third class session, and 58 participants showed the instructor a completed assignment.

Participants had to submit the Overcoming Barriers WS in class four. 64 participants attended the forth class session, and 55 participants showed the instructor a completed assignment.

Participants had to submit the Exercise Preferences WS in class five. 49 participants attended the fifth class session, and 31 participants showed the instructor a completed assignment.

Participants had to submit the Social Support WS in class six. 77 participants attended the sixth class session, and 30 participants showed the instructor a completed assignment.

Summary of Survey Evaluation and Assignment Submission

Thirty-two surveys were returned to the investigator during classes four, five and six. The participants were told the surveys were optional, and only had to complete them if they wished to do so. Overall, a majority of the
participants thought positively about the program and the program components, and positively about the instructor and the instructor’s dissemination of the program components.

Eighty-one percent of participants thought the program components were straight-forward, and 84% thought they were easy to understand. Seventy-five percent of participants thought the program was helping them understand the skills they needed to maintain regular exercise, and 74% thought the program components were useful. Sixty percent thought the program was appropriate for them and 29% more participants slightly agreed that the program was appropriate for them. Seventy-one percent thought the program was suitable for them. Sixty-three percent of participants thought the program addressed the barriers to exercise and 29% more slightly agreed. Less than half of the participants (47%) agreed that the program was what they thought it would be, but 37% slightly agreed, totaling 84% that agreed or slightly agreed that the program was what they thought it would be. Fifty-six percent agreed that the program was helping them become regular exercisers and 25% more slightly agreed.

Regarding the instructor, 84% agreed that the instructor gave clear directions on program lessons, class assignments, provided sufficient time to understand the program components and created an environment conducive to learning. Eighty-eight percent of participants agreed that the program addressed participant concerns and 94% agreed that the instructor was
knowledgeable about the program content. Seventy-four percent of participants agreed that there was a wide variety of exercise information provided by the instructor, and 28% slightly agreed.

Attendance, which is to help determine the level of participation and evaluate the program, ranged throughout the six weeks of classroom sessions. A majority of participants attended the first (100%), second (84%) and third class sessions (74%). Attendance began to decrease to less than fifty percent at the fourth class session (49%) and fifth class session (37%). Attendance increased again at the last class session (59%). The participants were sent out an email to remind them to attend the last class session, to complete the post-test questionnaire and receive a gift for program participation.

Completed worksheets/assignments were highest during the second class session (76%) and third class session (65%). Completed assignments decreased to less than fifty percent at the fourth class (42%), fifth class (24%) and sixth class (23%).

According to the instructor’s checklist of objectives, the instructor met and achieved all objectives set for each classroom session. As much as to the instructor’s knowledge, the program was fully implemented as planned. Participant reception of the program, program components and the instructor was generally positive, although varied slightly throughout the program.
Appendix L

Coding

Inclusion for Exercise Minutes per Week (Duration)

Exercise (activity) performed on any day of the week for more than ten minutes for moderate exercise or ten minutes for vigorous exercise will be included in the analysis. The daily exercise minute total will include activities that are performed interspersed throughout the day for a total of ten or more minutes, or one total bout of more than ten minutes.

Inclusion for Exercise Days per Week (Frequency)

Moderate and vigorous exercise (activity) performed on any day of the week for more than ten minutes will be coded as one day of activity. If ten minutes or more moderate exercise is performed, this will be equal to one day of activity. If ten minutes or more vigorous exercise is performed, this will be equal to one day of activity. If participants perform both moderate and vigorous exercise on the same day, it will be coded as one day of activity for each intensity level.

Coding for the 7DRE-Q Instrument (SDREQ)

The 7DRE-Q will be coded for each of the previous seven days for both moderate and vigorous intensity exercise levels. The data will be entered in the “scale” level of measurement. Each day of the week will be coded for two possible types of activities. Participants can record one or two different exercises per day. This can be done for both moderate-level and vigorous-level intensity activity. If an activity is recalled in both intensity levels, the activity is coded as moderate exercise.
A zero will be entered in the database if moderate or vigorous activity was not performed. A one will be entered if moderate or vigorous activity was performed.

SDREQ(+ Day of the week: SMTWRFS) Yes = 1 No = 0

The total time (duration) spent in moderate or vigorous exercise per activity will be entered. If the participant reports a second exercise on the same day, the time they report for activity two will be recorded. SDREQMIN

Planned and unplanned activities will also be coded. If the participant planned the activity, the activity will be coded 1. If the activity was unplanned, the activity will be coded 0. This will be done for each day of the week. If the participant fails to report if an activity was planned or unplanned, the activity will be coded as unplanned, or 0.

SDREQPUP Yes = 1 No = 0

Total duration, frequency and planned activity will be summed, for moderate and vigorous physical activity. SDREQDAY, SDREQMIN, SDREQP

**Coding for Self-Regulation (SR)**

There are fifty-two items on the self-regulation instrument. The item responses will be entered as “ordinal” measurement level. The self-regulation instrument items ask participants to assess their self-regulation behavior over the previous four weeks. The Likert-type scale has five options respondents can choose from. 1 = Never; 2 = Rarely; 3 = Sometimes; 4 = Often; 5 = Very Often. A person’s response will be coded from 1-5 in SPSS for each of the 52 instrument items. They items will be entered corresponding to the value the participants chose. The scores for each participant will be summed to determine their self-regulation score.
SR1 -> SR52
(SUM) SR1 -> SR52 = SR TOTAL

_Coding for Self-Efficacy (SE)_

There are fourteen items on the self-efficacy instrument. The items will be entered as “scale” measurement level. To complete the self-efficacy instrument, participants must select how confident they are in their ability to overcome a barrier presented to them on the instrument. They chose how confident they are in their ability, based upon a continuum of zero percent (positively could not exercise) to one hundred percent (positively could exercise). Individual participant scores are summed to determine their overall self-efficacy scores.

SE153 -> SE1465. The last 2 digits (53-65) represent the item number on the instrument as a whole. The first and/or second number (1-14) represent the self-efficacy item number.

(SUM) SE153 -> SE 1465 = SE TOTAL

_Coding for Social Support for Family and Friends (SSFam and SSFri)_

There are 12 total items on the social support instrument. The social support instrument allows respondents to examine family and friend support for the previous three months. Each item is broken down into 2 sub-items. There are 12 sub-items for family social support and 12 sub-items for friend social support. The level of measurement for this instrument is “scale”. Using a Likert-type scale, respondents can choose on a scale of one to five how supportive their family and friends have been for their exercise participation. 1 = Never; 2 = Rarely; 3 = A few times; 4 = Often; 5 = Very often. Each item response will be recorded as 1 – 5, according to the value
chosen by the participant. The scores for each participant will be summed to
determine their family social support score and their friend social support score.

SSFAM1 -> SSFAM12
SSFRI1 -> SSFAM12

(SUM) SSFAM1 -> SSFAM12 = SSFAMTOTAL
(SUM) SSFRI1 -> SSFAM12 = SSFRITOTAL

Coding for Physical Activity Enjoyment (PACES)

There are 18 items on the Physical Activity Enjoyment Scale (PACES)
instrument. The PACES instrument allows respondents to rate how they feel at that
moment about the physical activity they have been doing. The PACES instrument
uses the “scale” level of measurement. For each item, they circle a number closest to
the statement that best describes their feeling. Respondents choose from a scale of 1
– 7, depending on the respondent’s degree of agreement with the statement. A reverse
scale is applied to 11 of the items. For items a, d, e, g, i, j, k, m, n, p and q, the
reverse scale will be applied. 1 will be coded as a 7, 2 will be coded as a 6, 3 will be
coded as a 5…. And 7 will be coded as a 1. Items b, c, f, h, l, o and r will be coded on
the original scale of 1 to 7, from the left side of the column to the right. Individual
participant scores will be summed and then the average taken to determine the
participant’s PACES score.

PACES1 -> PACES18

(SUM) PACES1 -> PACES18 = PACESTOTAL/PACES AVERAGE =
PACESSCORE
Coding for Outcome Expectations and Expectancies (OEHL and OEHI)

There are twenty-five items on the outcome expectations and expectancies instrument. The outcome expectations and expectancies instrument presents a list of the possible outcomes of participating in regular exercise, both positive and negative. Outcome expectations and expectancies is being measured on the “ordinal” level of measurement. For each item, participants provide two answers. Under the heading “HOW LIKELY”, respondents indicate how likely it is that they would experience each of the outcomes. Under the heading “HOW IMPORTANT”, respondents indicate how likely it would matter to them if each of the outcomes occurred. Using a Likert-type scale, responses range from 1 – 5. For outcome expectations, responses range from 1 (not at all likely) to 5 (extremely likely). For outcome expectations, responses range from 1 (not at all important) to 5 (extremely important). Responses will be coded on the scale of 1 – 5. The two scores for each item are multiplied together, and then collectively summed, to determine the participant’s score.

OEHL1 → OEHL25 = OEHLTOTAL
OEHI1 → OEHI25 = OEHITOTAL
OEHLTOTAL x OEHITOTAL = OEHIIHLSCORE

Demographics

The demographic variables include AGE, HEIGHT, WEIGHT, MARITAL (marital status), RACE, EDUCATION, and GENDER. Demographic variables were collected at baseline only. Age, height and weight were based on the “scale” level of measurement. Marital, race, education, and gender were based on the “nominal” level
of measurement. For marital status, 1 = single, 2 = married, 3 = divorced, 4 =
widowed and 5 = partnered. For race, 1 = Caucasian, 2 = African-America, 3 =
Asian-American, 4 = Hispanic/Latino, 5 = Native American, 6 = Middle Easterner, 7
= Pacific Islander and 8 = Other. For level of education, 1 = high school, 2 =
technical college, 3 = some college, 4 = college degree, 5 = post-college and 6 =
other. For gender, 0 = male and 1 = female. Stage of Change was also included for
descriptive purposes. Individual’s Stage of Change was collected at pre and post-test.
The stages were based on the “nominal” level of measurement. For stage of change
pre-test (SOCPre) and stage of change post (SOCPost), 1 = precontemplation, 2 =
contemplation, 3 = preparation, 4 = action and 5 = maintenance.
Appendix M

Physical Activity & Exercise Opportunities

Name:

**Find physical activity and exercise opportunities**

Use the phone book, the internet, and other sources of information to find local places and opportunities for physical activity and exercise.

**Worksite Locations**

Please list various places in your workplace or workplace community for physical activity, exercise or fitness.

<table>
<thead>
<tr>
<th>Location 1:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location 2:</td>
</tr>
<tr>
<td>Location 3:</td>
</tr>
<tr>
<td>Location 4:</td>
</tr>
</tbody>
</table>

**Physical Activity and Exercise Equipment Store**

Please identify one store where you can purchase equipment for physical activity or exercise.

<table>
<thead>
<tr>
<th>Name of Store</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone &amp; Address</td>
</tr>
<tr>
<td>Hours of Operation</td>
</tr>
<tr>
<td>Types of equipment for sale of interest to you</td>
</tr>
</tbody>
</table>
Cost of equipment of interest to you

Community Locations
Please list various places in your home community for physical activity, exercise or fitness.

<table>
<thead>
<tr>
<th>Location 1:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location 2:</td>
</tr>
<tr>
<td>Location 3:</td>
</tr>
</tbody>
</table>

Facility 1:

<table>
<thead>
<tr>
<th>Name of Facility</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone &amp; Address</td>
<td></td>
</tr>
<tr>
<td>Hours of Operation</td>
<td></td>
</tr>
<tr>
<td>Programs offered of interest</td>
<td></td>
</tr>
<tr>
<td>Costs</td>
<td></td>
</tr>
</tbody>
</table>

Facility 2:

<table>
<thead>
<tr>
<th>Name of Facility</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Phone Number</td>
<td></td>
</tr>
<tr>
<td>Address</td>
<td></td>
</tr>
<tr>
<td>Hours of Operation</td>
<td></td>
</tr>
<tr>
<td>Programs offered of interest</td>
<td></td>
</tr>
<tr>
<td>Costs</td>
<td></td>
</tr>
</tbody>
</table>
# Goal Setting

Name:

<table>
<thead>
<tr>
<th>Goal</th>
<th>Deadline</th>
<th>Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>□ Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ No</td>
</tr>
<tr>
<td>Short Term</td>
<td></td>
<td>□ Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ No</td>
</tr>
<tr>
<td>Long Term</td>
<td></td>
<td>□ Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ No</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ No</td>
</tr>
</tbody>
</table>

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There are many factors that influence whether you participate in activity or exercise. Barriers to exercise are one of these factors. A barrier is anything that hinders your ability to perform exercise on a regular basis. *For example, I had household obligations, my kids had sports practice, or I had to stay late at work.*

1) Identify and describe the barriers that make it difficult to be physically active or exercise.

<table>
<thead>
<tr>
<th>Barrier 1:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barrier 2:</td>
</tr>
<tr>
<td>Barrier 3:</td>
</tr>
<tr>
<td>Barrier 4:</td>
</tr>
<tr>
<td>Barrier 5:</td>
</tr>
</tbody>
</table>

2) Rank your barriers to physical activity and exercise in order of severity.

<table>
<thead>
<tr>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
</tbody>
</table>
3) Identify how you plan to overcome the barriers.

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Plan to overcome barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

4) Recall your exercise patterns from last week. Think about the barriers that you came across.

- Did you run out of time?
- Was the weather bad and you like to exercise outside?
- Did you have other obligations that were more important?

5) How did the barriers affect your activity?

a. Did you not exercise?

b. Did you modify your schedule to include exercise?

c. Did you skip your exercise session?
**Exercise Preferences**

Listed below are questions designed to help you identify your exercise preferences. Please respond with a “X” in each box that applies to you.

1. I prefer to exercise:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Alone</td>
<td></td>
</tr>
<tr>
<td>With 1 partner</td>
<td></td>
</tr>
<tr>
<td>In a small group (less than 6 people)</td>
<td></td>
</tr>
<tr>
<td>Large group (6 or more people)</td>
<td></td>
</tr>
</tbody>
</table>

2. If I had to select ONE or TWO preferences that I enjoyed when exercising, it would be to:

<table>
<thead>
<tr>
<th>Preference</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Listen to music</td>
<td></td>
</tr>
<tr>
<td>Watch television</td>
<td></td>
</tr>
<tr>
<td>Talk to exercise partner</td>
<td></td>
</tr>
<tr>
<td>“zone-out”, meditate, relax my mind</td>
<td></td>
</tr>
<tr>
<td>Focus on how exercise feels</td>
<td></td>
</tr>
<tr>
<td>Other (list)</td>
<td></td>
</tr>
</tbody>
</table>

3. Which do you prefer – planned exercise (ex. Run 5 miles on Monday, Wednesday, Friday at 7:00) or spontaneous exercise (whenever you feel like it)?

<table>
<thead>
<tr>
<th>Exercise Type</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned exercise</td>
<td></td>
</tr>
<tr>
<td>Spontaneous exercise</td>
<td></td>
</tr>
</tbody>
</table>
4. When I exercise, I prefer:

<table>
<thead>
<tr>
<th>Exercising in the AM</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercising at lunch</td>
<td></td>
</tr>
<tr>
<td>Exercising at night</td>
<td></td>
</tr>
</tbody>
</table>

5. When I exercise, I prefer:

<table>
<thead>
<tr>
<th>Strength training (lifting weights)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular Exercise</td>
<td></td>
</tr>
<tr>
<td>Active sports or games (basketball, soccer)</td>
<td></td>
</tr>
<tr>
<td>Lifestyle activities (gardening, walking dog)</td>
<td></td>
</tr>
<tr>
<td>Supplemental activities (yoga or pilates)</td>
<td></td>
</tr>
</tbody>
</table>

6. When I exercise, I prefer:

<table>
<thead>
<tr>
<th>Light to moderate (breathing semi-hard but can still hold a conversation)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate pace (breathing hard but can still hold a conversation)</td>
<td></td>
</tr>
<tr>
<td>Hard pace (breathing rapidly)</td>
<td></td>
</tr>
<tr>
<td>Very hard pace (all out, cannot hold a conversation)</td>
<td></td>
</tr>
</tbody>
</table>

7. If I do aerobic exercise, I prefer:

<table>
<thead>
<tr>
<th>Stationary equipment (treadmill, elliptical, cycling)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Active sports and leagues</td>
<td></td>
</tr>
<tr>
<td>Walking, running or hiking outdoors</td>
<td></td>
</tr>
<tr>
<td>Aerobic classes with leader (aerobic dance, step, tae bo, water aerobics)</td>
<td></td>
</tr>
<tr>
<td>Others (please list):</td>
<td></td>
</tr>
</tbody>
</table>

9. How can you use your exercise preferences to help you become a regular exerciser?
Name:

**Informational and/or Instrumental Support**
Identify information from an instructor, a family member, or friend that will help you with your exercise program. List the type of information that you found and who you got the information from.

<table>
<thead>
<tr>
<th>Information</th>
<th>Person (or people) who supplied the information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Emotional and/or Appraisal Support**
Ask a family member or friend to help you make time to exercise, or to give you encouragement while you continue your exercise program. List the person who helped or encouraged you, and what they did to support your exercise program.

<table>
<thead>
<tr>
<th>Person</th>
<th>What they did</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Ask family members or friends to exercise with you on a regular basis. List who agreed to exercise with you, how often they will exercise with you, and what types of exercises you will do.

<table>
<thead>
<tr>
<th>Person</th>
<th>What they did</th>
<th>Types of exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Evaluation of Support**

1. Which type of support did you find most useful?

   

2. Which type of support did you not find useful?

   

3. Were you able to attain all of the above types of support? Explain.

   

4. How can you use your preferred type of social support to help you reach your goals? Explain.

   

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Appendix N

Be a Part of a New Years Exercise Program That Does Not Involve Exercise (well, sort of…)

Sign up for the BE ACTIVE program!

What could be better than:

Learning the skills necessary to a lifelong activity or exercise program

AND

Learning how to design an activity or exercise program to fit your needs and preferences

Who: Full-time employees from Battelle that need a little extra help starting and maintaining exercise.

What: A FREE two month exercise promotion program to help you increase your physical activity – a total of 6 classes. That’s a small commitment for a lifetime of health!

When: Wednesdays from 11:45-12:45. The program will begin on ________________.

Mark your calendars!

An incentive gift will be given to all participants.

If interested, call or email:

Megan Wolfe
wolfe.342@osu.edu
614.580.2959

Dr. Rick Petosa
petosa.1@osu.edu
614.292.2504

This free and easy program is run by the Ohio State Exercise Science Department.
Appendix O

Pre-Test Group Differences

Participant exercise levels at pre-test were collected using the 7DRE-Q. Moderate and vigorous frequency and duration analyses were conducted separately. If there were pre-test group differences between groups, co-variates were used in the analyses. Alpha level was at p=.05. The table below presents Levene’s Test of Normality for the pre-test analysis.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Treatment Group Mean</th>
<th>Standard Deviation</th>
<th>Comparison Group Mean</th>
<th>Standard Deviation</th>
<th>F</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate Exercise Duration</td>
<td>17.87</td>
<td>28.22</td>
<td>35.43</td>
<td>55.58</td>
<td>11.75</td>
<td>.001</td>
</tr>
<tr>
<td>Moderate Exercise Frequency</td>
<td>.88</td>
<td>1.48</td>
<td>1.25</td>
<td>1.85</td>
<td>2.102</td>
<td>.150</td>
</tr>
<tr>
<td>Vigorous Exercise Duration</td>
<td>1.90</td>
<td>11.19</td>
<td>2.42</td>
<td>14.77</td>
<td>.208</td>
<td>.649</td>
</tr>
<tr>
<td>Vigorous Exercise Frequency</td>
<td>.079</td>
<td>.45</td>
<td>.0625</td>
<td>.39</td>
<td>.212</td>
<td>.646</td>
</tr>
</tbody>
</table>

n=127

Levene’s Test of the Homogeneity of Variance Between Groups at Pre-Test.

The table demonstrates that we have not violated the assumption of homogeneity of covariance (p-values > 0.05), with the exception of minutes of
moderate exercise (MPA Duration). Although the assumption of equal variance is violated in this instance, ANOVA is robust against the violation because of the larger sample size.

Using an independent samples t-test to determine pre-test group differences, p=.027 for moderate exercise minutes (duration). This value is below the alpha p=.05. There were group differences between the two groups at pre-test. Using the same test to determine pre-test group differences, p=.228 for moderate exercise frequency (bouts). This value was not statistically significant. There were no group differences between the two groups at pre-test. For vigorous exercise, p=.825 for vigorous exercise minutes (duration) and p=.823 for vigorous exercise frequency (bouts). These values are not statistically significant, and there were no group differences between the two groups at pre-test. Because there were no group differences between the treatment and comparison groups at pre-test, co-variates were not used in the analysis of the primary research questions.

Social Cognitive Theory

The social cognitive theory construct group differences were analyzed in the pre-test assessment. The purpose of this was to detect possible group differences in the constructs. If there were pre-test group differences between groups, co-variates were used in the analysis. Alpha level was set at p=.05. The table on the following page presents Levene’s Test of Normality for the research questions.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Treatment Group Mean</th>
<th>Standard Deviation</th>
<th>Comparison Group Mean</th>
<th>Standard Deviation</th>
<th>F</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Regulation</td>
<td>77.19</td>
<td>24.30</td>
<td>88.43</td>
<td>23.91</td>
<td>.171</td>
<td>.680</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>48.59</td>
<td>16.81</td>
<td>49.99</td>
<td>18.23</td>
<td>.298</td>
<td>.586</td>
</tr>
<tr>
<td>Family Social Support</td>
<td>35.76</td>
<td>11.66</td>
<td>39.53</td>
<td>13.32</td>
<td>.174</td>
<td>.677</td>
</tr>
<tr>
<td>Friend Social Support</td>
<td>35.90</td>
<td>11.64</td>
<td>39.90</td>
<td>13.20</td>
<td>.088</td>
<td>.767</td>
</tr>
<tr>
<td>Exercise Enjoyment</td>
<td>3.9</td>
<td>1.07</td>
<td>4.21</td>
<td>.95</td>
<td>.529</td>
<td>.468</td>
</tr>
<tr>
<td>Outcome Expectations</td>
<td>422.33</td>
<td>85.27</td>
<td>432.60</td>
<td>97.94</td>
<td>2.18</td>
<td>.141</td>
</tr>
</tbody>
</table>

n=127

**Levene’s Test of the Homogeneity of Variance Between Groups at Pre-Test**

The table demonstrates that we have not violated the assumption of homogeneity of covariance (p-values > 0.05). Using an independent samples t-test to determine pre-test group differences, p=.323 for self-regulation. This value was not statistically significant. There were no group differences between the two groups for self-regulation at pre-test. For self-efficacy, p=.654. This value was not statistically significant. There were no group differences between the two groups for self-efficacy at pre-test. Family and friend social support were not statistically significant (p=.093 and p=.073, respectively). There were no group differences for family or friend social
support at pre-test. Using the independent samples t-test to determine pre-test group differences, p=.082 for exercise enjoyment. This value was not statistically significant and there were no group differences between the two groups for exercise enjoyment at pre-test. Outcome expectations and expectancies resulted in a p=.383. This value was not statistically significant. There were no group differences for outcomes of exercise at pre-test. Because there were no pre-test differences between groups on the social cognitive theory constructs, co-variates were not used in the analysis of the social cognitive theory research questions.