EXERCISE ADHERENCE IN EMPLOYEE EXERCISE PROGRAMS: IMPLEMENTATION OF A HEALTH EDUCATION INTERVENTION

By

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A DISSERTATION PRESENTED TO THE GRADUATE SCHOOL OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

UNIVERSITY OF FLORIDA

2000

ACKNOWLEDGEMENTS

The author wishes to acknowledge the Program Coordinator/Research Assistant, Julie Gibbard; Assessment Team Members, Yvonne Dumas, Chris Eaddy, Amy Hagan, Kristin Lauria, Robert Trimarche, and Roseanne Vullo; Health Promotion Consultants, Emily Christian, Chris Eaddy, Jenny Griggs, Kristin Lauria, Laura Pople, and Robert Trimarche; and Pilot Study Assistant, Jenny Griggs; whose hard work and dedication made this research program possible.

The author would also like to acknowledge the Living Well Employee Wellness Center at the University of Florida and the Orion Fitness Center, Gainesville, Florida, for lending needed assessment equipment, and the American Red Cross, Reebok, and United Way for donating participant program completion awards.

In addition, the author would like to acknowledge her dissertation committee members, Jill Varnes, Ed.D., Steve Dorman, Ph.D., Dan Connaughton, Ed.D., and Dave Miller, Ph.D., her parents Robert and Patricia Stouffer, and her fiancee Florencio Calderon, for their contributions and support of this project.

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August 2000

Chairperson: Dr. Jill Varnes
Major Department: Health Science Education

The purpose of this study was to determine if a behavioral health education intervention would increase exercise self-efficacy thereby increasing exercise adherence among elementary school employees. In addition, social support observations were made to determine what types of social support existed for the treatment intervention groups. The design of this study was a quasi-experimental matched-pair design using four elementary school worksites (three treatment schools and one control school). The treatment intervention consisted of health promotion consultants using self-efficacy techniques through a "Personal Exercise Plan" or "PEP" during monthly onsite participant sessions. Self-efficacy and social support were assessed using the Causal Dimension Scale II and Social Support for Exercise Habits Scale, respectively. Exercise adherence was assessed by use of self-reported exercise logs used to track adherence to a cardiovascular exercise program of at least three 20-minute sessions per week of aerobic

activity. Exercise-related outcomes measures (taken during onsite pre and post program fitness assessments) included resting heart rate, blood pressure, body composition percentage, and estimated VO_{2max}.

The study sample included 45 treatment and 15 control group participants comprising 88% females; 77% Caucasians and 18% African Americans; 88% between the ages of 31and 60 years of age; and 75% teachers and 25% office and custodial employees. Additionally, 93% of the control group and 60% of the treatment group were exercising before the start of the program.

The health education intervention increased self-efficacy in the intervention group at midpoint, but decreased somewhat at program end. Coworker support seemed to be the greatest form of social support for the intervention group throughout the program. The intervention groups did not have greater adherence than the control group in terms of frequency and duration of cardiovascular exercise, however more participants in the treatment group were exercising at the program goal compared with control participants. The intervention group increased significantly in resting heart rate and diastolic blood pressure compared with the control group, however, both treatment and control groups failed to significantly improve in weight or body composition but did improve in systolic blood pressure.

CHAPTER 1
INTRODUCTION

This chapter will introduce the main concepts of investigation in this study including, but not limited to, exercise adherence, self-efficacy, social support, and worksite exercise programs. It also will state the main research problem to be investigated as well as the primary and secondary research questions to be answered through the study. The assumptions, delimitations, limitations, and main definitions also will be described.

Introductory Background Statement

Heart disease is considered to be the most prevalent, costly, and chronic disease of lifestyle. Even though it is well known that regular participation in exercise will decrease the risk of heart disease, low exercise adherence and the high incidence of sedentary lifestyle continue to plague society. Better and more effective physical activity interventions are needed, which encompass social, psychological, and behavioral influences, to improve exercise adherence and long-term compliance to physical activity.

Two main social, psychological, and behavioral-related concepts influencing exercise behavior are social support and self-efficacy. The health education intervention tested in this study involved improvement of self-efficacy towards exercise and a measurement of types of social support that occur during the intervention. The intervention is part of a worksite health promotion program provided to elementary school employees. To better understand the roles of self-efficacy and social support in a worksite health

promotion exercise program, the subject areas of self-efficacy, social support, and employee exercise programs must be examined.

Social Support, Self-efficacy and Exercise Adherence

To better understand the role of social support and of self-efficacy, one must first understand the concept of self-efficacy and how it fits into Michael O'Donnell's Theory of Health Promotion Behavior (first presented in Wallston, 1994). Self-efficacy, introduced in Albert Bandura's social learning theory (Bandura, 1986), assesses the person's belief that he/she can practice the behavior to achieve a desired outcome. Self-efficacy has been shown to predict health behavior if the person both values health as an outcome and believes that personal actions play a role in determining personal health status (Wallston, 1994). In O'Donnell's Model of Health Promotion Behavior, social support and self-efficacy are included within the right-hand portion of the model that also includes components of the Theory of Planned Behavior (see Figure 1).

In O'Donnell's model, self-efficacy beliefs play a central role in predicting both intentions and behavior. This yet untested, model also incorporates the construct of social support as an important determinant of whether one's intentions do, indeed, get translated into action.

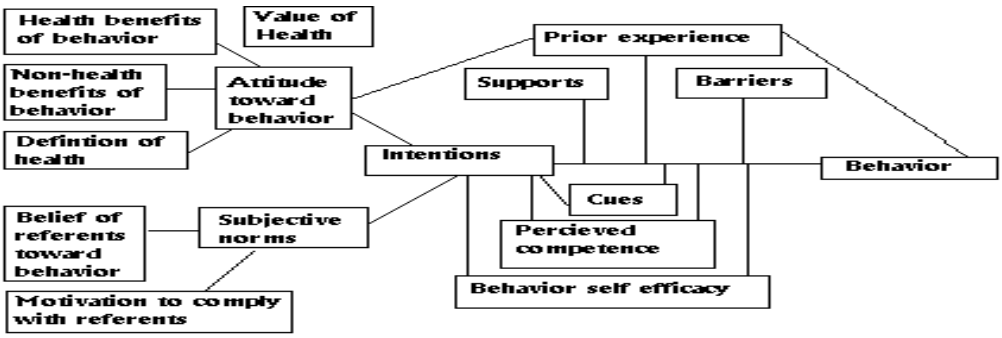

Figure 1
O'Donnell's Health Promotion Behavior Model

This model serves as a broad picture of how social support must be utilized as a function of self-efficacy to promote positive health behaviors. The implementation of the health education intervention in this study will test the latter half of O'Donnell's model in terms of self-efficacy issues, social support and barriers, and prior experience for the behavior.

Whereas it appears that no single variable solely determines adherence to either prescribed or self-initiated exercise regimens, self-efficacy has been consistently identified as playing an important role in health and exercise behaviors (Bandura, 1986). Numerous studies have linked social support to health enhancing and health impairing behaviors. From the perspective of exercise behavior, one might expect socially supportive behavior to play a particularly important role, especially in neophyte exercisers or at-risk populations. Buddy systems, spousal participation and encouragement, and positive feedback from exercise leaders and fellow participants all have been suggested to play a role in continued exercise participation (Duncan & McAuley, 1993).

Using positive reactions to an exercise program, goals for initially joining a program, and social support, Wankel (1985) differentiated between participants and dropouts in an exercise program. Dishman (1988) stated that social reinforcement in the form of group or family support may be the most influential factor in adherence. Wallace, Raglin, and Jastremski (1995) found that married pairs had significantly higher attendance and lower dropout than married singles in a 12-month fitness program that appeared to be primarily influenced by spousal support rather than by self-motivation. Oesterle (1988) found social support to be significant in the indirect role as a modifier of behavior. Duncan, Duncan, and McAuley (1993) found adherers perceived themselves to be socially

integrated recipients of adequate levels of guidance from members of their social network within the exercise program. Nonadherers, however, perceived themselves to be less socially integrated than adherers and recipients of higher levels of guidance.

Courneya and McAuley (1995) examined cognitive constructs as mediators of the relationship between selected social influence constructs and adherence to structured exercise classes. They found social support appeared to be mediated by perceived behavioral control and intention to exercise. In a meta-analysis of social influence and exercise, Carron, Hausenblas, and Mack (1996) supported an overall conclusion that social influence has a positive influence on exercise behavior (both adherence and compliance), cognitions about exercise involvement (both intentions to exercise and efficacy for exercise), and attitudes associated with the exercise experience. The results of this study also indicated that family did not represent the strongest source of social influence for adherence behavior, rather the influence of important others had a stronger impact. These researchers suggest that if important others can provide support without exerting control over behavior, the individual can retain a perception of self-determination, and adherence should be enhanced. Duncan, McAuley, Stoolmiller, and Duncan (1993) endorsed the utility of a multidimensional view of social support and found that specific provisions of support may play a significant role in an individual's decision to adhere to a prescribed exercise regimen.

Self-efficacy generally has its greatest impact during the action phase of behavior change (Wallston, 1994). According to Bandura (1986), there are four principle ways to change a person's efficacy beliefs. The first and most effective way is to help the person have an authentic mastery experience. Successful exercise attainments enhance

perceptions of physical efficacy, whereas failures debilitate perceived capabilities (McAuley & Courneya, 1993). Social modeling provides a second source of information from which self-efficacy can be enhanced. When participants are sedentary or older or have little experience in the activity of interest, such a social modeling source may be particularly salient. A third approach toward enhancing self-efficacy is through social persuasion or social support. In a combination of social modeling and persuasion, one can implement a "buddy exercise system," in which two or three individuals exercise together, serve as models and social supports, and take on a sense of responsibility for each other (McAuley & Courneya, 1993). A fourth means of enhancing self-efficacy beliefs, according to Bandura, is to modify one's physiological reactions and/or how one interpret signals from the body. Participants should be taught to interpret gradual change in the degree of physical symptoms (i.e. fatigue, cardiorespiratory responses, and muscular tension) as markers of improved conditioning and, thus, increased physical capabilities.

In summary, focusing on methods for boosting self-efficacy can safeguard against discouragement, feelings of displeasure and incompetence, and a proclivity to give up in the face of any real or perceived adversity and challenge of physical activity. Implementing a self-efficacy modeled exercise program should lead to increased exercise adherence and overall health benefits. However, before a self-efficacy modeled exercise program can be implemented within the worksite, exercise adherence issues within worksite exercise programs must be examined.

Exercise Adherence in Worksite Exercise Programs

About 30% of employees within an organization will actually start participating when a program is offered to them. Furthermore, 3 to 6 months after the start of a program, only 50-60% of the original participants are still participating in the program (Lechner & De Vries, 1995). Attitude toward physical activity, personality, type of exercise program (frequency, intensity, and duration of training and mode of activity), body weight and composition, medical problems (injuries, level of fitness, group supervision), staff, spouse influence, age, sex, socioeconomic status, cost/method of payment, and time-related factors are cited most frequently as factors affecting adherence to worksite exercise programs (Pollock, 1988). Self-motivation and whether one is a smoker or a blue-collar worker also have been shown to be significant in determining exercise adherence (Oldridge, 1984). The most commonly cited reasons for not participating in a corporate exercise class are "lack of time" and "lack of suitable facilities" (Shepard, 1988).

A literature review on the role of behavioral models in worksite exercise promotion has revealed that the habit of exercising, the attitude towards regular exercise, the perceived barriers to exercising, and the perceived self-efficacy to exercise were the strongest variables associated with an intention to exercise (Godin & Shepard, 1990). Godin and Gionet (1991) examined the psychosocial factors explaining an employee population's intention to exercise and found significant support for the roles of habit of exercise, attitude towards regular exercise, and perceived barriers to exercise, noting that perceived self-efficacy was not measured in the actual study. Kimiecik (1992) examined the theory of planned behavior in predicting the exercise intentions and behavior of

corporate employees and found subjects had the strongest intentions to exercise when they had a favorable attitude toward exercise and believed they could successfully perform the behavior. Also, a significant interaction between perceived control and intention indicates that the more the attainment of a behavioral goal is viewed as being under one's control, the stronger one's intention to perform the behavior.

In summary, the behaviors and needs of those exercise participants in the worksite are the same as or quite similar to those within the community or general population. The research suggests several guidelines when implementing exercise programs. First, educational efforts should be focused on enhancing physical activity-related knowledge, attitudes, and beliefs. Second, training in motivational and relapse prevention strategies should be offered as well as social support for exercise. Also, gender and age are factors that should be considered. Lastly, the individual's perceived motivation prior to beginning an exercise program must be considered as well as perception of having sufficient time to exercise (King, Taylor, Haskell, & DeBusk, 1990; Wilson, Wagner, & Dwyer, 1991). Hence, the need for implementation of a health education intervention enhancing self-efficacy and promoting social support among employees is clearly indicated.

Statement of the Problem

This study assessed differences in exercise adherence, self-efficacy and types of social support between employee groups receiving and not receiving a health education exercise promotion intervention.

Research Questions

The primary research questions focus on the main areas of interest in the study (i.e., self-efficacy, social support, and the relationship to exercise adherence). The secondary research questions focus on supporting areas of interest including additional outcome measures (blood pressure, body composition, and estimated VO_{2max}) and other categorical variables.

Primary Research Questions

1. Does exercise self-efficacy increase during and after implementation of a health education intervention to promote exercise adherence?
2. What types of social support for exercise are received by subjects during and after implementation of a health education intervention to promote exercise adherence?
3. Do intervention groups have greater adherence to the exercise prescription than the non-intervention group?

Secondary Research Questions

1. Does the intervention group have a greater improvement in blood pressure than the non-intervention group?
2. Does the intervention group have a greater improvement in resting heart rate than the non-intervention group?
3. Does the intervention group have a greater weight loss than the non-intervention group?
4. Does the intervention group have a greater improvement in body composition than the non-intervention group?

5. Does the intervention group have a greater improvement in cardiovascular fitness (i.e., improved estimated VO_{2max}) than the non-intervention group?
6. Does a relationship exist between previous exercise participation and adherence?
7. Does a relationship exist between previous sports or active leisure participation and adherence?

Significance of the Study

The contribution of regular physical activity to such physical benefits as cardiovascular health, strength, endurance and weight management is well established (Bouchard, Shepard, Stephens, Sutton, & McPherson, 1990; Wankel, 1993). It also is known that worksite exercise programs increase productivity; decrease absenteeism, turnover rate and industrial injuries; enhance health practices of workers; facilitate employee recruitment; and improve corporate image (Godin & Gionet, 1991). Many health promotion advocates also emphasize the economic benefits of exercise, in terms of cost-effectiveness, in addition to its contribution to better health (Hatziandreu, Koplan, Weinstein, Caspersen, & Warner, 1988). Despite all the positive benefits of exercise, adherence to exercise regimens continues to be a problem among the general population. Well-documented statistics consistently indicate that the attrition rate from exercise programs approximate 50% within the first six months (Duncan & McAuley, 1993).

It is clear that a gap exists between knowledge and behavior. There is a need for non-traditional behavioral programs that integrate social, psychological, interpersonal and cultural factors with knowledge to bridge the gap between information and behavior. Health education interventions are key to unlocking the potential of this multi-factor integrative approach that is needed to change health behavior. Health educators are

skilled in delivering interventions that consider the psychosocial, interpersonal and cultural aspects of health behavior. These aspects must be addressed if a change in health behavior, particularly adoption of exercise, is to take place.

Thus, the explanation and prediction of exercise behavior must be an important objective among researchers in the areas of exercise science, behavioral and preventative medicine (Dishman, 1987), and health education if any kind of impact on cardiovascular health is to be obtained. Little systematic research has demonstrated use of social support in helping people maintain exercise regimens. Even less research has analyzed types of social support and the function of self-efficacy in exercise adherence.

This study's proposed health education intervention will test use of increasing self-efficacy toward exercise through common methods of health education as well as assess the types of social support formed. The results of this study will provide definitive insight as to how a non-traditional modeled exercise program can effect exercise adherence and perpetuate long-term exercise compliance. The results also will imply the cost-effectiveness of a successful worksite exercise intervention program and the impact of such a program on various types of demographic subgroups. It is hoped the self-efficacy modeled health education intervention will serve as a benchmark intervention for integrating behavioral techniques to bridge the gap between exercise knowledge and actual exercise adherence and demonstrate that health educators are needed to implement interventions such as these in the workplace to increase exercise adherence.

Delimitations

1. Worksites used in the study consist of four Gainesville area elementary schools that volunteered to participate in the study.

2. Subjects were recruited through mini health fairs held at the school sites and flyer distribution.
3. Data were collected during Spring 2000. Participants had to be available during the Spring 2000 term from January through May.
4. The CDSII (McAuley, Duncan, & Russell, 1992) was employed to assess subjects' self-efficacy causal attributions for previous attrition from exercise programs.
5. The Social Support for Exercise Habits Scale was used to measure the types of social support that occur during the exercise program.
6. The YMCA 3-Minute Step Test was used to estimate $VO_{2max.}$
7. Anthropometric measures included height, weight, and three-site body composition.
8. All subjects interested in participating in the exercise program needed to meet the screening criteria of having no history of cardiac disease or orthopedic injuries that would contraindicate participation in an exercise program.

Limitations

1. Any level of workers (i.e., blue collar, administration, etc.) may choose to not participate in the study.
2. All classifications of race may not be equally represented in the study sample.
3. Both genders may not be equally represented in the study sample.
4. All employees dropping out of the program may not be available for final data collection due to relocation, etc.
5. Employees may not turn in all exercise verification sheets causing incomplete adherence data.

6. Findings depend on the ability of the CDSII and Social Support for Exercise Behavior Scales to accurately assess exercise self-efficacy and sources of social support, respectively.
7. The YMCA step test was only an estimation and not an actual measure of $VO_{2max.}$
8. Resting heart rate was measured at the end of the day, instead of the preferred time of morning wake.
9. Blood pressure was only measured one time at the pre and post fitness assessments.

Assumptions

1. School worksites participating have similar demographics and characteristics.
2. Gainesville area elementary school employees participating in the study adequately represent the population of elementary school employees at their respective schools.
3. The CDSII and Social Support for Exercise Behavior Scales are adequate for data collection necessary for the study.

Definition of Terms

Self-efficacy: A person's belief that he/she can perform a behavior in order to achieve a desired outcome. For purposes of this study, the intended behavior is engaging in regular exercise. The desired outcome is adhering to a given aerobic fitness plan.

Social support: Any support received by another individual for the promotion of engaging in regular exercise.

Exercise adherence: Those participants engaging in regular exercise (as defined below) for the duration of the program.

Regular exercise: Exercising aerobically (within the given target heart rate), for three 20-minute sessions per week for a total of approximately twelve 20-minute sessions per month for five months.

Drop out rate: Subjects identified as "drop outs" will be defined as discontinuing exercise or exercising below the program goal for at least seven weeks after the start of the program.

Pre-Participation Questionnaire (PPQ): A screening questionnaire designed to determine any contraindications for exercise reported by participants (see "Instruments" section in Chapter 3).

Estimated VO_{2max} (or aerobic fitness): The greatest rate of oxygen uptake by the body measured during dynamic (cardiovascular) exercise, via a step test (for purposes of this study). VO_{2max} is often used as a measure of aerobic fitness.

"Class A": A classification by the American Heart Association and American College of Sports Medicine for apparently healthy exercise participants or participants with no contraindicating risks for exercise.

Health Promotion Consultant: A health education or exercise physiology student who underwent training to deliver the health education intervention sessions to treatment program participants.

Personal Exercise Plan (PEP): A behavioral contract (in a worksheet format) designed to promote mastery experience within the consulting sessions. In the PEP, participants can set goals, work through barriers and strategies, create an activity schedule and have supporters sign the contract.

Non-starter: A participant recruited for the program, who underwent pre-program assessment, but for various reasons did not actually start the program.

Strength training: Any type of weight bearing exercise including, but not limited to weight lifting, calistenics, resistance bands, etc.

CHAPTER 2
REVIEW OF LITERATURE

Introduction

This chapter will present a literature review of the following areas of research: an introduction to physical inactivity as an epidemic; the benefits of exercise; the issues surrounding exercise adherence; characteristics of worksite exercise programs; an in depth look at self-efficacy and social support studies; research examining the relationship of self-efficacy and social support to exercise adherence; and behavioral techniques implemented in health education interventions. The chapter will conclude with a summary linking these areas together to set a research rationale for the present study.

The Problem

The message from the nation's scientists is clear, unequivocal, and unified: physical inactivity is a risk factor for cardiovascular disease (Fletcher, et al., 1996; Pate, et al., 1995) and its prevalence is an important public health issue. New scientific evidence based on epidemiological observational studies, cohort studies, controlled trials, and basic research has led to an unprecedented focus on physical activity and exercise (AHA/ACSM Scientific Statement, 1998). The promotion of physical activity is at the top of our national public health agenda, as seen in the publication of the 1996 report of the US Surgeon General on physical activity and health (USDHHS, 1996).

The promotion of regular exercise has become an important priority for public health interventions because of the documented physiological and psychological health benefits (Courneya & McAuley, 1995). These health benefits include reduced risks for all-cause mortality, coronary heart disease, hypertension, colorectal cancer, obesity, osteoporosis, depression, anxiety, and stress (Bouchard, Shepard, Stephens, Sutton, & McPherson, 1990). Regular aerobic physical activity increases exercise capacity and plays a role in both primary and secondary prevention of cardiovascular disease (Chandrashekhar & Anand, 1991; Morris & Froelicher 1991; Paffenbarger, Hyde, Wing, Hsieh, 1986; Smith et al., 1995; Wenger et al., 1995).

Exercise training increases cardiovascular functional capacity and decreases myocardial oxygen demand at any level of physical activity in apparently healthy persons as well as in most subjects with cardiovascular disease. Regular physical activity is required to maintain these training effects. The potential risk of physical activity can be reduced by medical evaluation, risk stratification, supervision, and education (Wenger et al., 1995). Exercise can help control blood lipid abnormalities, diabetes, and obesity. In addition, aerobic exercise adds an independent blood pressure-lowering effect in certain hypertensive groups with a decrease of 8 to 10 mm Hg in both systolic and diastolic blood pressure measurements (Braith, Pollock, Lowenthal, Graves, & Limacher, 1994; Hagberg, 1990; Hagberg, Montain, Martin, & Ehsani, 1989; Jennings, Deakin, Dewar, Laufer, & Nelson, 1989).

There is a direct relationship between physical inactivity and cardiovascular mortality, with physical inactivity also serving as an independent risk factor for the development of coronary artery disease (Blair, Kohl, Paffenbarger, et al., 1989; Lee,

Hsieh, & Paffenbarger, 1995; Morris, Clayton, Everitt, Semmence, & Burgess, 1990; Powell, Thompson, Caspersen, & Kendrick, 1987). There is a dose-response relation between the amount of exercise performed from approximately 700 to 2000 kcal of energy expenditure per week and all-cause mortality and cardiovascular disease mortality in middle-aged and elderly populations (Blair, Kohl, Barlow, et al., 1995; Lee, Hsieh, & Paffenbarger, 1995;). The greatest potential for reduced mortality is in the sedentary who become moderately active (Blair, Kohl, Barlow, et al., 1995). Most beneficial effects of physical activity on cardiovascular disease mortality can be attained through moderate-intensity activity (40% to 60% of maximal oxygen uptake, depending on age) (Blair, Kohl, Barlow, et al., 1995; Lee, Hsieh, & Paffenbarger, 1995; Pate et al., 1995). The activity can be accrued through formal training programs or leisure-time physical activities.

Although most of the supporting data are based on studies in men, more recent findings show similar results for women (Blair, Kohl, Paffenbarger, et al., 1989; Lemaitre, Heckbert, Psaty, & Siscovick, 1995). Results of pooled studies reveal that persons who modify their behavior after myocardial infarction to include regular exercise have improved rates of survival (O'Connor et al., 1989; Oldridge, Guyatt, Fischer, & Rimm, 1988). Recent studies also have revealed that intensive multiple interventions such as smoking cessation, blood lipid reduction, weight control, and physical activity significantly decreased rate of progression and, in some cases, led to regression in the severity of atherosclerotic lesions in persons with coronary disease (Gould et al., 1992; Haskell et al., 1994; Ornish et al., 1990; Schuler, Hambrecht, Schlierf, Grunze, et al., 1992; Schuler, Hambrecht, Schlierf, Niebauer, et al., 1992;). In addition, limited data

indicate that higher-intensity exercise compared with lower-intensity exercise improves left ventricular ejection fraction in persons with coronary artery disease (Oberman et al., 1995). Current activity status (ie, persons remaining physically active or having been sedentary and becoming physically active) revealed the greatest decline in coronary artery disease risk (Blair, Kohl, Barlow, et al., 1995; Lee, Hein, Suadicani, & Gyntelberg, 1992; Hsieh & Paffenbarger, 1995). Persons who remain sedentary have the highest risk for all-cause and cardiovascular disease mortality.

In summary, the problem of inactivity in this country has implications that go beyond what is currently seen to be plaguing our nation's health. We must address this health risk from many aspects of intervention to begin to make an impact on exercise or physical activity adoption and adherence.

Benefits of Exercise

Healthy persons as well as many persons with cardiovascular disease can improve exercise performance with training (Adamopoulos et al., 1993; Coats et al., 1992; Hambrecht et al., 1995; Kavanagh et al., 1988; Kobashigawa et al., 1994; Sullivan, Higginbotham, & Cobb, 1989). This improvement is the result of increased ability to use oxygen to derive energy for work. Exercise training increases maximum ventilatory oxygen uptake by increasing both maximum cardiac output (the volume of blood ejected by the heart per minute, which determines the amount of blood delivered to the exercising muscles) and the ability of muscles to extract and use oxygen from blood. Beneficial changes in hemodynamic, hormonal, metabolic, neurological, and respiratory function also occur with increased exercise capacity. These changes also can benefit persons with impaired left ventricular function, in whom most adaptations to exercise

training appear to be peripheral and may occur with low-intensity exercise (Adamopoulos et al., 1993; Belardinelli, Georgiou, Scocco, Barstow, & Purcaro, 1995; Coats et al., 1992; Hambrecht et al., 1995; Kavanagh et al., 1988; Kobashigawa et al., 1994; Sullivan, Higginbotham, & Cobb, 1989).

Exercise training results in decreased myocardial oxygen demands for the same level of external work performed, as demonstrated by a decrease in the product of heart rate × systolic arterial blood pressure (an index of myocardial oxygen demand). These changes also are beneficial in persons with coronary artery disease, who after exercise training may attain a higher level of physical work before reaching the level of myocardial oxygen requirement that results in myocardial ischemia (Trap-Jensen & Clausen, 1971).

Exercise training favorably alters lipid and carbohydrate metabolism. The exercise-induced increase in high-density lipoproteins is strongly associated with changes in body weight (King, Haskell, Young, Oka, & Stefanick, 1995; Tran & Weltman, 1985; Williams, 1996). Regular exercise in overweight women and men enhances the beneficial effect of a low-saturated fat and low-cholesterol diet on blood lipoprotein levels (Wood, Stefanick, Williams, & Haskell, 1991). Endurance training has effects on adipose tissue distribution (Schwartz et al.,1991), and the effect on adipose tissue distribution is likely to be important in reducing cardiovascular risk (Despres et al., 1990; Donahue, Abbott, Bloom, Reed, & Yano, 1987; Larsson et al., 1984; Krotkiewski, Bjorntorp, Sjostrom, & Smith, 1983). Exercise training also has an important effect on insulin sensitivity, (King et al., 1988; Rosenthal, Haskell, Solomon, Widstrom, & Reaven, 1983) and intense endurance training has a highly significant salutary effect on fibrinogen levels of healthy older men (Stratton et al., 1991). In addition, recent data support the role of physical

activity in the prevention and treatment of osteoporosis and certain neoplastic diseases, notably colon cancer (Lee, 1994).

Developing and maintaining aerobic endurance, joint flexibility, and muscle strength and endurance are important in a comprehensive exercise program, especially as people age (Ades, Hanson, Gunther, & Tonino, 1987; Ades and Grunvald, 1990; Ades, Waldmann, & Gillespie, 1995). Elderly women and men show comparable improvement in exercise training, and adherence to training in the elderly is high (Ades, Waldmann, & Gillespie, 1995). Resistance training exercise alone has only a modest effect on risk factors compared with aerobic endurance training, but it does aid carbohydrate metabolism through development or maintenance of muscle mass and effects on basal metabolism (Evans, 1995; Kohrt & Holloszy, 1995). Furthermore, resistance training is currently recommended by most health promotion organizations for its effects on maintenance of strength, muscle mass, bone mineral density, functional capacity, and prevention and/or rehabilitation of musculoskeletal problems (e.g., low back pain) (ACSM position stand on osteoporosis and exercise: American College of Sports Medicine, 1995). In the elderly, resistance training is both safe and beneficial in improving flexibility and quality of life (Ghilarducci, Holly, & Amsterdam, 1989; Sparling, Cantwell, Dolan, & Niederman, 1990; Stewart, Mason, & Kelemen, 1988). Persons with cardiovascular disease are usually asked to refrain from heavy lifting and forceful isometric exercises, but moderate-intensity dynamic strength training is safe and beneficial in persons at low risk.

Many activities of daily living require more arm work than leg work. Therefore, persons with coronary artery disease are advised to use their arms as well as their legs in

exercise training. The arms respond like the legs to exercise training both quantitatively and qualitatively, although ventilatory oxygen uptake is less with arm ergometry. Although peak heart rates are similar with arm and leg exercise, heart rate and blood pressure response during arm exercise is higher than leg exercise at any submaximal work rate. Therefore, target heart rates are designated 10 beats per minute lower for arm training than for leg training (Clausen, 1976; Franklin, Hellerstein, Gordon, & Timmis, 1989; Franklin, Vander, Wrisley, & Rubenfire, 1983).

Maximum ventilatory oxygen uptake drops 5% to 15% per decade between the ages of 20 and 80 years (Fletcher, et al., 1995; Pollock, Foster, Knapp, Rod & Schmidt, 1987; Trappe, Costill, Vukovich, Jones, & Melham, 1996); a lifetime of dynamic exercise maintains an individual's ventilatory oxygen uptake at a level higher than that expected for any given age. The rate of decline in oxygen uptake is directly related to maintenance of physical activity level, emphasizing the importance of physical activity (Jackson et al., 1995).

Middle-aged men and women who work in physically demanding jobs or perform moderate to strenuous recreational activities have fewer manifestations of coronary artery disease than their less active peers (Morris, Clayton, Everitt, Semmence, & Burgess, 1990; Powell, Thompson, Caspersen, & Kendrick, 1987). Meta-analysis studies of clinical trials reveal that medically prescribed and supervised exercise can reduce mortality rates of persons with coronary artery disease (Hillsdon, Thorogood, Anstiss, & Morris, 1995; O'Connor et al., 1989; Oldridge, Guyatt, Fischer, & Rimm, 1988).

In addition to the physical benefits of exercise, both short-term exercise and long-term aerobic exercise training are associated with improvements in various indices of

psychological functioning. Cross-sectional studies reveal that, compared with sedentary individuals, active persons are more likely to be better adjusted (Eysenck, Nias, & Cox, 1982), to perform better on tests of cognitive functioning (Spirduso, 1980), to exhibit reduced cardiovascular responses to stress (Crews & Landers, 1987), and to report fewer symptoms of anxiety and depression (Lobstein, Mosbacher, & Ismail, 1983). In one report (Camacho, Roberts, Lazarus, Kaplan, & Cohen, 1991), persons who increased their activity levels between the mid 1960s and mid 1970s were at no greater risk for depression than those individuals who were active all along; however, persons who were active and became inactive were 1.5 times as likely to become depressed by the mid 1980s compared with those who maintained an active lifestyle.

Longitudinal studies also have documented significant improvement in psychological functioning. Exercise training reduces depression in healthy older men (Blumenthal, Emery, Madden, et al., 1989), and in persons with cardiac disease (Kavanagh, Shephard, Tuck, & Qureshi, 1977) or major depression (Martinsen, Medhus, & Sandvik, 1985). Exercise also improves self-confidence and self-esteem (Folkins and Sime, 1981), attenuates cardiovascular and neurohumoral responses to mental stress (Blumenthal, Fredrikson et al., 1990), and reduces some type A behaviors (Blumenthal, Emery, Walsh, et al., 1988). Although exercise training generally has not been found to improve cognitive performance (Emery & Blumenthal, 1991), short bouts of exercise may have short-term facilitative effects (Tomporowski & Ellis, 1986).

It is apparent that the benefits of physical activity go beyond affecting overall physical health improved physical activity also makes an impact on an individual's social and psychological well being. Physical activity has been shown to serve as a gateway

behavior or motivator for encouraging changes in diet or smoking behavior (Emmons et al., 1994). Physical activity can therefore play an important role in comprehensive disease-prevention programs and health education interventions.

Exercise Adherence

Despite the evidence supporting the health benefits of regular exercise, the overall participation rates in regular physical activity are low. Advances in technology and increased mechanization have resulted in a progressive decline in occupational activity levels in the United States since World War II (Stephens, 1987). Furthermore, despite the fact that leisure-time activity has probably increased over the last 20 years (Blair, Mulder, & Kohl, 1987; Stephens, 1987), the prevalence of obesity, heart disease, and exercise related cancers is increasing. Early research on exercise recruitment and adherence emphasized the physical characteristics of exercise program participants. Relative to dropouts, exercise adherers apparently had a higher standard of cardiorespiratory fitness, less excess weight, and less subcutaneous fat (Massie & Shepard, 1971; Sidney & Shepard, 1977).

It is estimated that only 10% of the North American population exercise regularly (Stephens & Casperson, 1993; Stephens & Craig, 1990). Moreover, those who indicated an exercise program have trouble maintaining it. Dishman (1988) has estimated that approximately 50% of individuals who begin a structured exercise program will drop out within the first six months. This statistic seems to hold regardless of the demographic profile of the sample or the purpose of the exercise (Courneya & McAuley, 1995). Results have been similar for children, college students, and middle-aged and elderly persons and in primary prevention, secondary prevention, and worksite settings (Robison

& Rogers, 1994). The issue of non-adherence is particularly important because exercise is only beneficial if it is maintained for extended periods of time. Thus, it is important to develop strategies to improve exercise initiation and adherence, especially for persons who are among the least active--some African-American women, the less educated, the obese, and the elderly (King et al., 1992). As it is presented in Chapter 1, the problem of exercise adherence is impacting the potential benefits reaped by any implemented exercise program and must be addressed.

General Exercise Programs

Persons of all ages should include physical activity in a comprehensive program of health promotion and should increase their habitual physical activity to a level appropriate to their capacities, needs, and interest. Activities such as walking, hiking, stair-climbing, aerobic exercise, calisthenics, resistance training, jogging, running, bicycling, rowing, swimming, and sports such as tennis, racquetball, soccer, basketball, and "touch" football are especially beneficial when performed regularly. Brisk walking also is an excellent choice (Duncan, Gordon, & Scott, 1991; Rippe, Ward, Porcari, & Freedson, 1988).

The training effect of such activities is most apparent at exercise intensities exceeding 40% to 50% of exercise capacity. (Exercise capacity is defined as the point of maximum ventilatory oxygen uptake or the highest work intensity that can be achieved.) Evidence also supports that even low- to moderate-intensity activities performed daily can have some long-term health benefits and lower the risk of cardiovascular disease (Leon, Connett, Jacobs, & Rauramaa, 1987; Rippe, Ward, Porcari, & Freedson, 1988; Slattery, Jacobs, & Nichaman, 1989). Low-intensity activities generally range from 40% to 60%

of maximum capacity. The 40% to 60% of maximum capacity range is similar for young, middle-aged, and elderly persons. Such activities include walking for pleasure, gardening and yard work, dancing, and prescribed home exercise. For health promotion, dynamic exercise of the large muscles for extended periods of time (30 to 60 minutes, three to six times weekly) is recommended. This may include short periods of moderate intensity (60% to 75% of maximal capacity activity, approximately 5 to 10 minutes) that total 30 minutes on most days (DeBusk, Stenestrand, Sheehan, & Haskell, 1990).

Physical activity may have risks as well as benefits, although risks are relatively infrequent. Estimates of sudden cardiac death rates per 100,000 hours of exercise range from 0 to 2 per 100,000 in general populations and from 0.13 per 100,000 to 0.61 per 100,000 in cardiac rehabilitation programs (Haskell, 1978; Koplan, Siscovick, & Goldbaum, 1985; Van Camp & Peterson, 1986).

In addition to cardiac risks, resistance or strength training programs may present risk as well. However, studies have demonstrated the cardiovascular safety of maximum strength testing and training in healthy adults and low-risk cardiac patients (Gordon et al., 1995). Falls and joint injuries are additional risks associated with physical activity (especially in older women), but most of these injuries do not require medical treatment. The incidence of such complications is less in those participating in low-impact activities such as walking (Carroll et al., 1992; Pollock et al., 1991).

General Worksite Programs

The worksite is believed by many experts to be an optimal arena for making healthful lifestyle changes, and there has been a tremendous growth in the number of fitness programs offered where individuals work (Blair, Piserchia, Wilbur, & Crowder, 1986;

Cox, 1984; Edington, 1986; Gebhardt & Crump, 1990). Worksites are considered to be a key channel for the delivery of interventions designed to reduce chronic disease among adult populations (Abrams, 1991; Abrams et al.1994; Heimendinger et al.1990; Glasgow et al., 1995). Worksites provide researchers with access to over 60% of adults in the United States (US Department of Labor, 1992), as well as to diverse populations in terms of race/ethnicity, gender, age, and health status.

According to a meta-analysis of 26 worksite exercise and health promotion programs, adequate participation in worksite programs can reduce absenteeism and employee turnover, and result in increased productivity. In addition, this meta-analysis suggests that worksite wellness programs can lead to decreases in body fat and increases in aerobic power, muscle strength, and flexibility, and enhance mood (Shepard, 1999). Baseline assessment of an employee's health status can be performed at a relatively low cost and should include an assessment of physical conditioning. Public health interventions in the workplace have resulted in an increase in vigorous physical activity by participating employees that is associated with increases in objective measurements of physical conditioning (Blair, Piserchia, Wilbur, & Crowder, 1986). As healthcare costs continue to increase, these programs will become more attractive to both small and large businesses.

Exercise has received considerable attention at the worksite in recent years because of its association with reduced risk for cardiovascular and musculoskeletal diseases, obesity, and metal health problems, and its potential for minimizing the negative effects of such chronic conditions as diabetes, osteoporosis, and back pain (Bouchard, Shepard, Stephens, Sutton, & McPherson, 1990; Duncan et al., 1985; Harris, Caspersen, DeFries,

& Estes, 1989; Melby and Hyner, 1988; Powell, Caspersen, Koplan, & Ford, 1989; Taylor, Sallis, & Needle, 1985). As mentioned earlier, one very plausible approach to increasing adult fitness is to offer worksite fitness programs, as working adults spend a major part of their day in the work environment (USDHHS, 1991). Support for physical fitness and wellness programs in the workplace comes from both the private and public sectors (Gebhardt & Crump, 1990; USDHHS, 1991; U.S. Office of Personnel Management, 1991).

The proportion of worksites offering physical fitness programs has increased over time. For instance, the most recent, 1999 National Worksite Health Promotion Survey (AWHP, USDHHS, & Mercer, 1999) reported that the prevalence of physical activity programs, with the intention of changing behavior, increased 36% since 1992 (in 1992 42% of worksites had exercise/fitness activities). The number of worksites offering physical fitness programs is likely to continue increasing, as occupational settings are identified as a target for employer sponsored physical activity and fitness programs in the health objectives for the nation (USDHHS, 1991).

Worksite research suggests that improved physical fitness results in fewer worker injuries, fewer absences from work due to illness, and increased worker productivity (Bowne, Russell, Morgan, Optenberg, & Clarke, 1984; Cady, Bischoff, O'Connell, Thomas, & Allen, 1979; Hilyer, Brown, Sirles, & Peoples, 1990; Lynch, Golaszewski, Clearie, Snow, & Vickery, 1990; Shepard, Cox, & Corey, 1981; Sirles, Brown, & Hilyer, 1991). A number of worksite-based studies have been conducted on several key risk factors for chronic disease which included physical activity (Blake et al., 1996; Blair, Piserchia, et al., 1986; King, Carl, Birkel, & Haskell, 1988). Although there have been

varying outcomes from the single risk factor studies, overall any intervention effects that have occurred have typically been quite small (Emmons, Linnan, Shadel, Marcus, & Abrams, 1999). To date, however, there have been fewer randomized trials of worksite health promotion that targeted physical activity (Abrams, 1991; Abrams et al., 1994; Heimendinger et al., 1990).

Results show that about 30% of employees within an organization will actually start participating when a program is offered to them (Oldridge, 1984). Futhermore, studies show that 3 to 6 months after the start, only 50-60% of the original participants are still participating in the program (Dishman, 1988; Marcus et al., 1992; Oldrige, 1984). Adherence is important because lasting benefits of a worksite fitness program are more likely when workers participate in the exercise program over time. However, as in other settings, adherence to exercise at the worksite has been a major problem. It is clear that alternative approaches to the adherence problem are needed (Robison et al., 1992). Programs that incorporate strategies to increase exercise adherence will likely be more successful in terms of worker benefit and employer benefit than those without strategies (Blue & Conrad, 1995).

It is important to note that many weaknesses and limitations exist in the above mentioned and other (not mentioned) worksite studies which prove challenging when interpreting results. For example, many of these studies had small sample sizes, had a minority of health conscious employees participating in the programs, and had biased evaluators. These are important considerations in research design and implementation when conducting worksite health promotion studies, hence, few worksite health

promotion studies to date provide clear results with implications to worksite health promotion program delivery.

Worksite Programs in Schools

In the midst of the ongoing development and implementation of the Comprehensive School Health Program (Allensworth & Kolbe, 1987), schools are ideal settings for worksite health promotion programs because they have facilities and professional resources required to develop and implement the program, including pupil service professionals, the food service staff, and as health education, physical education, and home economics teachers. Schoolsite wellness programs have been shown to reduce weight, body fat, systolic and diastolic blood pressure, anxiety, depression, and smoking, and to increase exercise and consumption of a more balanced diet.

Schoolsite health promotion programs have decreased absenteeism, health care claim costs, and the need for substitute teachers, and have improved teacher morale and productivity (Allensworth & Kolbe, 1987). For example, the Institute for Aerobics Research (Blair, Collingwood, et al., 1984) assessed the impact of a health promotion program among four schools on health behaviors, general well-being, job satisfaction, stress management, and self-concept. The study's conclusions indicated that health promotion is feasible in a school setting, and significant and important changes occur in teachers exposed to health promotion programs (Blair, Collingwood, et al., 1984).

Other more recent, successful schoolsite wellness programs have included elements such as personalized counseling, lipid assessment, and on-site exercise facilities, as well as modification of the school food service (Glasgow, McCaul, & Fisher, 1993; Lovato & Green, 1990; Masey, Gilmarc, & Kronenfeld, 1988; Wong, Bauman, & Koch, 1996). In

addition, Allegrante and Michela (1990) implemented a comprehensive Health Enhancement Program (HEP) at ten New York City schools and found that the HEP had a significant impact on the morale of teachers and that teachers gave more favorable ratings of school quality and climate following the implementation of the program. The researchers concluded that the study provided empirical support for the potential that school-based workplace health promotion programs have the ability to enhance morale, improve individual and organizational well-being, and help to meet health-related needs of teachers and others who work in schools (Allegrante & Michela, 1990).

These literature findings support the notion that schools are viable worksites for employee health promotion programs, including exercise promotion, and can potentiate multiple positive outcomes, health-related and otherwise.

Self Efficacy

As presented in Chapter 1, whereas it appears that no single variable solely determines adherence to either prescribed or self-initiated exercise regimens (Sallis & Hovell, 1990), self-efficacy (Bandura, 1977, 1986) has been consistently identified as playing an important role in health (O'Leary, 1985) and exercise behaviors (McAuley, 1992; McAuley & Jacobson, 1991; Sallis et al., 1996; Sallis and Hovell, 1990). There is a growing consensus that self-efficacy is among the most important and modifiable predictors of physical activity behavior (Pate et al., 1995; Sallis, Hovell, Hofstetter, & Barrington, 1992; USDHHS, 1996). Individuals' beliefs regarding perceived capabilities in particularized domains are theorized to influence choice of activity, effort expenditure, and persistence in the face of adversity. Furthermore, self-efficacy also is proposed to influence thought patterns and emotional reactions (Duncan & McAuley, 1993).

Bandura's self-efficacy theory is a social cognitive model of behavioral causation which posits that behavior, physiological and cognitive factors, and environmental influences all function as interacting determinants of one another (Bandura, 1986). This theory of reciprocal determinism views healthy functioning as being determined by correspondent influence among the individual's physiological states, behavior, cognition, and the environment. Self-efficacy cognitions have consistently been shown to be important determinants of physical activity and exercise behavior as well as social, clinical, and health-related behaviors (Bandura, 1986; McAuley, 1992; O'Leary, 1985). As stated in Chapter 1, it is important to realize that self-efficacy is not concerned with individual skills but, rather, with the judgements of what an individual can do with the skills he or she possesses.

Individuals with high self-efficacy expectations tend to approach more challenging tasks, put forth more effort, and persist longer in the face of aversive stimuli. When faced with stressful stimuli, low efficacious individuals tend to give up, attribute failure internally, and experience greater anxiety or depression (Bandura, 1982). Expectations of personal self-efficacy are culled from four major sources of information: mastery accomplishments, social modeling, social persuasion, and physiological states. Mastery accomplishments are the most dependable and influential sources of efficacy information with a history of previous successes facilitating efficacy expectations, whereas previous failures will result in lowered perceptions of personal efficacy. Social modeling is a source of efficacy information derived through observation or imaging others engaging in the task to be performed. Social persuasion is a commonly used technique to bolster personal efficacy, but is less powerful than information based on personal

accomplishments. Finally, physiological states are postulated to affect behavior through the cognitive evaluation (efficacy expectations) of the information conveyed by the anxiety arousal, fatigue, and muscular strain and tension. That is, somatic sensations are often interpreted as inability to successfully carry out a course of action.

Self-efficacy theory (Bandura, 1986) has generated an enormous literature in multiple domains of behavioral functioning, including physical activity as a health-promoting behavior. Because exercise is a complex behavior, which appears particularly difficult for many individuals to change, it is of little surprise that self-regulatory skills have been consistently implicated in successful adoption and maintenance of this behavior. The presence of a robust sense of self-efficacy and the development and nurturing of skills and strategies to enhance such cognitions, continually have been identified as determinants of physical activity in acute bouts of exercise in laboratory settings (Ewart, Taylor, Reese, & DeBusk, 1983; Ewart et al., 1986; McAuley & Courneya, 1992), in long-term exercise participation (Ewart, Stewart, Gillian, Keleman, 1992; Garcia & King, 1991; McAuley, 1992), and in larger survey population studies (Sallis et al., 1986, 1989).

Self-Efficacy and Exercise Adherence

Exercise self-efficacy is the conviction that one can successfully engage in physical activity (McAuley, Lox, & Duncan, 1993). Self-efficacy theory predicts that highly self-efficacious individuals are more likely to adopt or engage in a greater number of like behaviors than are their counterparts whose personal efficacy has been impaired (Bandura, 1986). Where exercise is concerned, those who perceive themselves to be more efficacious with respect to their physical capabilities are more likely to adopt and maintain a lifestyle in which exercise plays an important role.

Several studies exist that document the role-played by perceived efficacy in adherence to prescribed exercise programs and maintenance of activity post-program termination in normal populations. Although not without their individual flaws, they do provide some support for the contention that self-efficacy influences exercise behavior. Desharnais, Bouillon, and Godin (1986) in predicting adherence to an 11-week adult exercise program demonstrated self-efficacy to be more capable of discriminating between subjects classified as adherers and those classified as dropouts. Similarly, Corbin, Lauric, Gruger, and Smiley (1984) reported that general self-confidence in sport and physical activity influenced commitment and involvement in physical activity.

Long (1984; 1985) and Long and Haney (1988) employed various cognitive and behavioral modalities to influence self-efficacy and reduce stress in females and to further examine the role played by efficacy in adherence to a jogging program for community males and females. In this study, however, both stress inoculation training and aerobic activity were reported to have increased self-efficacy significantly but not differentially (Long, 1984, 1985). Dzewaltowski (1989) and Dzewaltowski, Noble, & Shaw (1990) reported data that compare the relative merits of self-efficacy theory and attitudinal models of behavior change, specifically, the theory of reasoned action (Fishbein & Ajzen, 1975) and Ajzen's (1985) theory of planned behavior, in explaining physical activity behaviors in college undergraduates. In both studies, self-efficacy was a significant unique predictor of exercise behavior. The comparison of the differing theoretical approaches revealed efficacy rather than intention to be implicated in the prediction of physical activity when each variable was statistically controlled.

Clearly, the self-efficacy approach to the prediction of physical activity as a health-promoting behavior is governed by situationally dependent information processing. Dishman, Ickes, and Morgan (1980) espoused a more traitlike perspective, in which the more general dispositional characteristic of self-motivation is proposed as an important component of activity participation. Supporting Heiby, Onorato, and Sate (1987) and refuting Weber and Wertheim (1989) evidence for this latter proposition exists in the literature, and two studies have specifically contrasted the relative utility of the self-motivation and self-efficacy approaches (Garcia & King, 1991; McAuley & Jacobson, 1991). In a clinical trial involving sedentary, healthy, middle-aged males and females, Garcia and King (1991) reported efficacy cognitions but not self-motivation to be positively related to exercise adherence at 6 and 12 months. Moreover, more proximate aspects of the exercise experience (e.g. exercise, enjoyment, and convenience) did not account for significant variance beyond that accounted for by self-efficacy. McAuley and Jacobson (1991) reported similar findings in a study of formerly sedentary, middle-aged females engaged in aerobic activity. Self-efficacy rather than self-motivation predicted both in-class exercise participation and activity outside of class.

A large prospective study (McAuley, 1992, 1993), of sedentary males and females, tested the hypothesis that one would expect efficacy expectations to be more influential in those stages of exercise participation where demands of continued adherence are greater (e.g. early stages of adoption, resumption of activity following dropout, injury). In the first report of this study, path analysis revealed self-efficacy and body fat to be predictive of exercise frequency and intensity at the midpoint of a 5-month program, but exercise participation up to that point was the only predictor of adherence over the

remaining period of the program. Such findings are consistent with the perspective that cognitive control systems play their most important role in the acquisition of behavioral proficiencies (Bandura, 1989). When behaviors are less demanding and more easily engaged in (in this case, beyond adoption and adaptation), cognitive control systems give way to lower control systems (Bandura & Wood, 1989). Clearly, different mechanisms take on differing degrees of importance at various stages of the exercise process.

In a follow-up study (McAuley, 1993), the self-efficacy-exercise participation relationship was examined in a more demanding context – continued exercise maintenance following termination of the program. Participants were contacted 4 months after program completion and interviewed by telephone and surveyed by mail as to their exercise participation patterns since program termination. Hierarchical regression analyses indicated that self-efficacy predicted 12.5% of the unique variance in continued exercise participation and shared a further 14% of the variance with physiological (VO_{2max}) and behavioral (past exercise frequency and intensity) parameters. However, only efficacy was a significant individual predictor of behavior. Thus, it appears that when situations or behaviors become more demanding, efficacy cognitions assume a more important role. Once again, it is clear that diverse parameters take on varying degrees of influence at different stages of the exercise process (Dishman, 1990; McAuley, 1992; Sallis & Hovell, 1990).

Numerous studies by Ewart and colleagues (1983; 1986) as well as McAuley and others (1991; 1992) showed efficacy to be related to acute bouts of physical activity and the responses associated with such activity. Cardiovascular and muscular efficacy were related to aerobic capacity (especially VO_{2max}), muscular strength and endurance, and

cardiac responses in middle-aged males and females (McAuley et al., 1991). In addition, males reported significantly greater perceptions of efficacy than females at the onset of an exercise program. However, females following a 20-week exercise program became as efficacious, and in some domains, more efficacious than their male counterparts. McAuley and Courneya (1992) detailed the effects of pre-existing exercise efficacy on perceived exertion and affective responses during graded exercise testing. More efficacious subjects perceived the exercise bout as less effortful and reported more positive affective responses. In summary, the studies reported in this section provide consistent support for the mediational role played by the perceptions of personal efficacy in predicting the adoption of, and adherence to, exercise regimens.

Social Support

Social support appears to be an important determinant of success in changing health habits. Social support has been linked to a number of health outcomes, including adherence to medical regimens (Wallston, Alagna, DeVellis, & DeVellis, 1983) and success in smoking cessation (Mermelstein, McIntyre, & Lichtenstein, 1983), although the findings have not always been consistent (Malott, Glasgow, O'Neill, & Klesges, 1984). Social support is one social cognitive mechanism, which has been implied in the maintenance of various health-promoting regimens. Although definitions of support vary considerably, the assumption underlying the various models and empirical investigations of this phenomenon is that supported individuals are physically and emotionally healthier than non-supported individuals. Social support also has been shown to have both direct and indirect beneficial effects on measures of psychological well being and self-reported symptoms (Cohen & Willis, 1985; Cohen, 1988). Prospective studies also link a lack of

social support to premature mortality (Cohen, 1988). Numerous studies have identified social support in involvement in regular physical activity (Dunbar, Marshall, & Hovell, 1979; Heinzelman, 1973; King & Frederiken, 1984; Wankel, 1984, 1985).

Social support is defined as those activities performed by one individual that assist another individual in moving toward a desired goal (Caplan, Robinson, French, Caldwell, & Shinn, 1976). It is a dynamic process in which sources of social support considered important by the individual adopts a specific health behavior and moves toward the desired goal. There are various dimensions of general social support, including (a) social network or the existence or quantity and structure of social relationships and (b) the functional content of relationships, or behaviors that one person performs in support of another (Caplan et al., 1976). Cultrona and Russell (1987) have argued that Weiss' (1974) model of social provisions incorporates all of the major components proposed by other theorists plus one additional component. The six social support provisions proposed by Weiss are guidance (advice or information), reliable alliance (material assistance), reassurance of worth (recognition of competence and value), attachment (emotional closeness), social integration (a sense of belonging to a group that shares similar interests and concerns), and opportunity for nurturance (a sense of belonging to a group that shares similar interests and concerns), and opportunity for nuturance (the sense that others rely upon one for personal well-being).

Although these dimensions of general social support may enhance a person's ability to attain individual goals, they may be very different from the support necessary to adopt and maintain specific health behaviors such as exercise. Social network encompasses structural (e.g., type, number, density, proximity) and interactional (frequency, durability,

and intensity) aspects of social relations whereas social support focuses on behavioral or functional aspects of social relations (i.e., the provision of supportive behavior). Thus, social support is distinguished from social network in that the latter refers only to the linkages between people that may or may not provide social support (Israel & Schurman, 1990).

Social Support and Exercise Adherence

There is evidence to suggest that exercisers with supportive spouses are more likely to continue their exercise programs (Dishman, Sallis, & Orenstein, 1985; Martin & Dubbert, 1982). Several weight-loss studies indicate that spousal support and participation in treatment enhances weight loss (Brownell & Stunkard, 1981; Dubbert & Wilson, 1984; Murphy et al., 1982; Rosenthal, Allen, & Winter, 1980). Wallace, Raglin, & Jastremski (1995) found that the higher monthly attendance to exercise sessions of married couples may have been enhanced by social support or camaraderie provided by an exercising spouse rather than the individual factor of self-motivation. Other investigations have suggested that social support specific to exercise may be a better indicator of exercise adherence than general perceptions of support among both women and men (Oka, King, & Young, 1995).

A number of studies in the extant literature suggest that gender is an important influence on several aspects of interpersonal relationships relevant to the support process (Antonucci & House, 1983; Lowenthal & Haven, 1968; Stokes & Wilson, 1984). Antonucci and House (1983) and Fisher and Bishop (1986), suggest that different types of support influence men and women. Henderson, Byrne, Duncan-Jones, Scott, and Adcock (1980) demonstrated that social integration produced a stress-buffering effect for

males, whereas emotional support - analogous to reassurance of worth – served as a buffering effect for females.

Results of some studies suggest that although the social environment is important in influencing exercise participation in both men and women, it may play a more significant role in determining exercise participation in women (Wankel, 1984). For instance, in a study of adolescent males and females, social influence was an important predictor of physical activity in females, but not males (Reynolds et al., 1990). Sallis et al. (1989) found family influence was an important determinant of exercise participation in young men and older women only. In a later study by Sallis, Hovell, Hofstetter, and Barrington (1992), support of family and friends was found to be consistently associated with exercise participation.

Since social support has been identified to be a major determinant of compliance and adherence (Dishman, Sallis, & Ornstein, 1985), the opportunity for social support from coworkers is a critical feature of many health promotion programs at the worksite (Sorensen & Pechacek, 1987; Jose & Anderson, 1991). If social support at work is associated with employee health risk and predictive of subsequent behavior change toward healthier lifestyles, worksite health promotion interventions could be improved by including social support at work into the design and delivery of programs. Hence, both social support and self-efficacy need to be manipulated into employee exercise promotion programs for maximum impact on adherence.

The Self-Efficacy/Social Support Relationship to Exercise Adherence

Whereas social support infers the influence of others on an individual's coping responses, self-efficacy is concerned with the role played by personal or self-referent

resources in adaptive behavior. In many ways, the reception and effects of social support may well be mediated by the degree of efficacy one is perceived to possess. In essence, one might argue that social support is delivered based upon the beliefs about what the recipient is capable of accomplishing. Evidence to support this interdependence of social support and self-efficacy is provided by studies in a few strikingly different environments. Cutrona and Troutman (1986) demonstrated that perceived social support led to reduced postpartum depression in adolescent mothers through the mediation of parenting self-efficacy. Holahan and Holahan (1987) found that self-efficacy beliefs functioned indirectly through social support, in the form of social provisions, in the alleviation of depression in elderly adults. Taylor, Bandura, Ewart, Miller, and DeBusk (1985) reported that spouses of early myocardial infarction patients who believed their husbands to have greater cardiac and coping efficacy were more likely to encourage them to actively pursue rehabilitation and a normal life.

It appears, therefore, that social support and perceived self-efficacy are intimately related rather than orthogonal influences of health behavior (Ducan & McAuley, 1993). That is, the examination of the total resources available to individuals in health-promoting activities such as exercise and physical activity may be more informative in understanding these behaviors than mere reliance on a single construct (Duncan, 1989). Specifically, high levels of social support for a given endeavor are thought to boost a person' level of self-efficacy for that endeavor (Courneya & McAuley, 1995).

Bandura (1986) predicted that self-efficacy operates as a cognitive mediator linking psychosocial influences to various health promoting behaviors. Duncan and McAuley's (1993) finding that social support failed to influence exercise behaviors directly, but did

so indirectly, supports the contention that self-efficacy may be an important mediating variable, when explaining the effects of various provisions of social relationships on such health promoting behaviors as regular exercise. These researchers found that the relationship between social support and exercise adherence was mediated by self-efficacy. Consistent with the theoretical arguments from Bandura (1986) and empirical data from Duncan and McAuley (1993), social support influenced perceived behavioral control in a study conducted by Courneya and McAuley (1995). It was found that the higher the perceived social support, the higher the perceived control over attending a regular exercise class. Consequently, these researchers concluded that any intervention aimed at developing social support in the exercise domain is likely to enhance perceptions of control over exercise.

By providing continued support and enhancing the individual's beliefs in personal capabilities, social network members may help the individual avoid the downward spiral which ultimately leads to a relapse of health-impairing behaviors (Willis, 1985). Therefore, provisions of social relationships such as guidance, attachment, and social integration may act in concert to produce what is in effect a motivationally based support, which, in turn, bolsters the individual's self-percepts of efficacy.

As presented in Chapter 1, O'Donnell's Model of Health Promotion Behavior includes both social support and self-efficacy within the later portion of the model that includes components from the Theory of Planned Behavior (see figure 1, Chapter 1). Within O'Donnell's model, self-efficacy beliefs play a central role in predicting both intentions and behavior. The model also incorporates the construct of social support as an important determinant of whether one's intentions get translated into action as well as

social barriers and prior experience. This model depicts the self-efficacy/social support relationship in health education interventions designed to promote health behaviors such as exercise adherence and has not been tested prior to this study.

Use of Behavioral Techniques to Enhance Social Support and Self Efficacy in Health Education Interventions

As mentioned in Chapter I, Bandura (1986) poses several methods in which to increase self-efficacy, mainly, authentic mastery, social modeling, social support and modifying physiological reactions. In terms of health education application, O'Donnell (1992) incorporates self-efficacy and social support into a model for health behavior change. These theoretical concepts – increasing self-efficacy and social support within a health education intervention model to promote health behavior change – sets a direction for behavior techniques to be implemented within health education interventions promoting health behavior change.

Behavioral management techniques such as self-monitoring of exercise progress, improvement charts, personal exercise diaries, and goal-setting strategies may provide evidence of personal mastery and consequently increase perceptions of personal efficacy (Duncan & McAuley, 1993). Also, some researchers feel that the key to good exercise programs, specifically, is to offer a variety of opportunities from which to choose; this variety enhances not only participant health but also other positive emotions (Baun & Bernacki, 1988). Thompson and Wankel (1980) have shown that participants who perceive they have a choice in fitness activities will adhere better to exercise programs.

Hence, some of the key behavioral practices to increasing self-efficacy and social support for health behavior change, are behavioral contracting and goal setting. Once a program participant has tentatively committed to a course of action, the participant

requires additional guidance, structure, and support to make and carry through on an action plan for health behavior change. One effective means for doing this through a written contract specifying which behavior(s) the participant is going to perform during a specified time-period. The contract also specifies the rewards that the client will receive if the behaviors are successfully performed.

The most successful contracts are those whose details are openly negotiated between a program participant and a counselor (or health educator). This is preferable to foisting a ready-made contract on the participant (Boehm, 1989; Steckel, 1982). Having the participant participate actively in the contracting process fosters a high sense of behavioral control and commitment to the health behavior goals. Also it helps ensure that the reward given (contingent upon the performance of the behavior) is indeed meaningful to the client and will act as a reinforcement for future behavior. Built into this approach is some means of the participant and health educator monitoring of the participant's behavior. The acts of simply monitoring, recording, and reporting one's behavior constitute a very powerful set of behavioral strategies for bringing about desired health behavior change (Wallston, 1994).

Through behavioral contracting, the other key tenet to increasing self-efficacy and social support to change health behavior is behavioral goal setting. Two main considerations in behavioral goal setting is incorporating non-health-related goals and allowing goals to change over time. Wankel (1985) found that although health related goals (e.g., lose weight, relieve tension and anxiety, prevent cardiovascular disease, improve physical fitness) were reported to be the most important by all participants, they did not differentiate between continuing program participants and dropouts. Non-health

related goals such as developing recreational skills, developing social relationships, going out with friends, releasing competitive drive and satisfying one's curiosity, on the other hand, although rated less important, did significantly distinguish between adherence and drop-outs. This suggests that secondary, non-health related goals to be more readily attainable and more useful for facilitating continued involvement. Bandura (1987) has recognized the general importance of short-range goals to motivational behavior change in his social cognitive theory.

A second consideration with respect to behavioral goals is that they may change over time. The goals for maintaining participation may not be seen as those for initially undertaking a program (Oldridge, 1982). In an early study of factors affecting exercise involvement, Heinzelmann and Bagley (1970) found that the most important reasons for joining an adult fitness program were a desire to feel better and healthier and a concern about reducing the probability of having a heart attack. The major reasons given for staying in the program at a later time, however, were the program's organization and leadership (31%), recreational games (29%), and social aspects or camaraderie (26%).

Calfas, Sallis, Oldenburg, and French (1997) implemented an intervention designed to increase self-efficacy and social support using a protocol emphasizing specific actions such as setting goals, recruiting social support, and gradually increasing activity levels, which are reflected in the behavioral processes. Their results suggested that participants who received structured counseling were making some of the changes that were targeted in the intervention. These researchers concluded that their results provided preliminary support for a conclusion that activity-specific social support and self-efficacy may play a

role in influencing changes in physical activity (Calfas, Sallis, Oldenburg, & French, 1997).

Summary

It is apparent from the research presented in the introduction, the benefits of exercise and exercise adherence sections of this chapter, that the promotion of exercise or physical activity is a priority health behavior that must be taken seriously in order to make an impact on our nation's overall health. In addition, from the research presented in the sections dealing with self-efficacy, social support, and the relationship of self-efficacy and social support, these factors can have a dramatic impact on the adherence to exercise regimens if integrated effectively into exercise promotion programs. As seen in the behavioral techniques section, the most promising methods to integrating these affective factors into exercise programs is through behavioral processes such as goal setting, behavioral contracting and one-on-one consulting. Health education can provide this link from exercise benefit knowledge to actually engaging in regular exercise as adoption of a way of life.

Health educators are trained to use behavioral techniques such as those mentioned to assist others to adopt and adhere to health behaviors. As the research suggests, behavioral techniques designed to increase self-efficacy and social support can make a significant impact on exercise adherence. However, no research thus far has tested these behavioral techniques in the improvement of exercise adherence in worksite exercise promotion programs. Many worksites, more than ever, are offering exercise programs however, few are designed to support participation and adherence.

It is therefore the intent of this study, to test a health education intervention designed to increase self-efficacy and social support through behavioral techniques on adherence to a worksite exercise promotion program. Specifically, differences in exercise adherence, self-efficacy and types of social support between employee groups receiving and not receiving a health education exercise promotion intervention will be assessed to test the intervention. It is the hope that this health education intervention can demonstrate effectiveness in increasing exercise adherence in worksite exercise promotion programs and serve as a model for organizations to use in the future to impact participation and adherence.

CHAPTER 3
PROCEDURES AND METHODS OF ANALYSIS

This chapter will cover the population and sample, setting, research design and data sources, treatment, instruments, and statistical analysis for the present study. The information in these sections will describe all procedures, methods, and analysis for the study.

Population and Sample

The population under observation is elementary school employees in one North Central Florida school district. The gender and race demographics for the school district are 24% male and 76% female and 70% Caucasian and 28% African-American, respectively. The age demographics for the district are 13% under 30 years, 21% between 31 and 40 years, 32% between 41 and 50 years, 30% between 51 and 60 years, and 5% over 61 years. Finally, the job classification demographics for the district are 47% classified as teachers and 53% classified as career service.

Settings

This study was conducted at four participating elementary school worksites in Gainesville, FL. The study recruitment health fairs, pre and post program assessments,

and individualized health education sessions were conducted in school classrooms and media rooms after school hours. Each of these are described in more detail in the following sections.

Form (Design) and Sources of Data

This study will be a Quasi-Experimental One-to-One Matching Repeated Measures design. Four elementary school worksites from Alachua County have been designated as treatment and control sites. The treatment sites (worksites A, B & C) received the health education intervention with 50 total employees participating in the intervention for the intervention group analysis. Site D served as a control site having only pre and post assessment measures performed. Approximately 15 employees participated from the control site. A diagram depicting the stages of methodology and study design is shown below followed by specific information for each stage (see Figure 2).

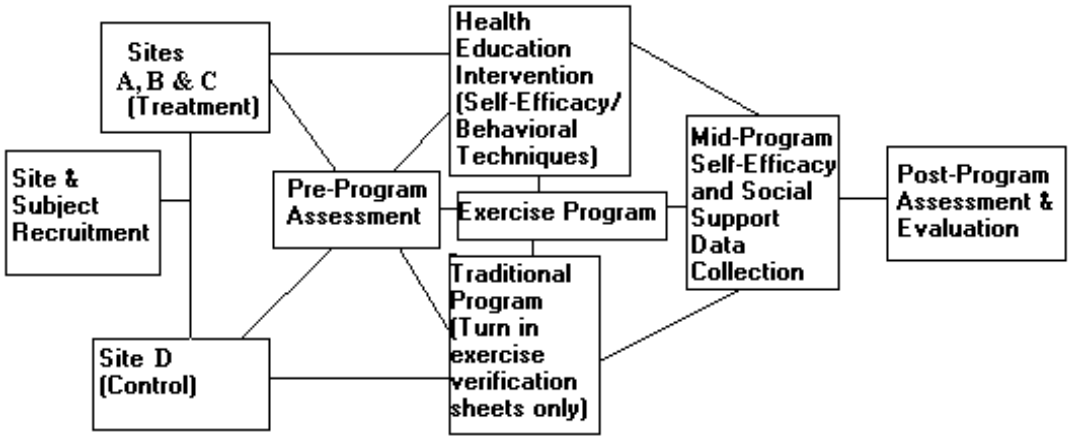

Figure 2
Methodology Design

Site and Subject Recruitment

Telephone calls and follow-up letters were sent to five Alachua county elementary schools for potential site recruitment. The four sites that volunteered to participate had

no formal exercise program and had available locations for health education consultations. These schools also had adequate assessment rooms in which to administer pre and post program assessments. The assessment rooms are deemed to be adequate if they conform to the most current ACSM guidelines, including appropriate room temperature, humidity, ventilation, and adequate lighting (ACSM, 1995). After the treatment and control sites were selected, subjects were recruited for participation via a mini health fair consisting of blood pressure measurement, completion of an Institutional Review Board consent form (see Appendix A), Pre-Participation Questionnaire (see Appendix B), fitness assessment instruction and other activities. All subjects received individual counseling to discuss their blood pressure screenings and to explain the purpose and nature of the exercise intervention and/or assessments to follow (depending on treatment or control site). Program flyers also were posted and distributed in staff boxes to advertise and recruit participants for the program.

All subjects interested in participating in the exercise program were required to meet the screening criteria of no history of cardiac disease or orthopedic injuries that would preclude participation in an exercise program. Prescreening included completion of the PPQ, resting heart rate and blood pressure measurements. Subjects were classified as Class A- apparently healthy exercise participants within the new American Heart Association and American College of Sports Medicine guidelines (AHA/ACSM, 1998). Subjects were not excluded from participating based on employment classification, gender, race, age, or socioeconomic status.

Pre-intervention assessment

All eligible subjects participated in an individual preprogram assessment session. After checking that prior consent and PPQ information had been given, subjects were asked to complete the CDSII and social support instruments (see Appendixes C & D). After completion of the questionnaires, a 10 second baseline heart rate was taken (multiplied by 6) followed by a 3 minute habituation period and recording of the resting blood pressure (systolic and diastolic) using a sphygmomanometer and stethoscope.

Following baseline recordings, subjects' Anthropometric measurements including, weight, height and body composition (as measured by a Lange skin caliper) were obtained followed by the YMCA aerobic step test. These assessments were recorded using assessment forms (see Appendix E). However, an exception was made concerning those participants who had special condition(s) with regards to the step test. Those participants with an orthopedic injury, taking certain medications or having certain other risk factors that may contraindicate performing a submaximal step test deemed by the Principal Investigator, were excluded from the step test portion of the assessment.

Basic exercise prescription

At the conclusion of the assessment, a generalized aerobic fitness plan, generated from the step test, was shared with the subject. This plan required all subjects to perform aerobic activity with a frequency of three times per week for a minimum duration of 20 minutes per session. Exercise intensity was determined by calculating a target heart rate range (THRR) for each subject. The aerobic fitness plan was explained and an assessment team member discussed the nature and benefits of aerobic exercise with each participant. Exercise Science graduate students and seniors with proper fitness

assessment training served as assessment team members for the project. These students had CPR certification and demonstrated competency in performing fitness assessments to the Principal Investigator. The scores from the CDSII and Social Support for Exercise Habits Scale and assessment measurements served as baseline sources of data.

Exercise Program

Before the start of the program, subjects had to attend one of a number of orientation meetings held for specific instructions regarding the completion and procedures for the exercise verification sheets. The on-site exercise program consisted of encouraging subjects to adhere to the basic exercise prescription of performing three, 20-minute sessions per week of aerobic activity within their THRR. Various types of aerobic activities such as brisk walking, biking, aerobic dance and use of cardiovascular equipment were suggested for participant participation. Participants were allowed to exercise with each other and with others outside the program as desired. They also could exercise at home, in the community, or on school grounds.

During the exercise program, participants turned in the monthly exercise verification sheets (indicating frequency and duration of exercise) as an exercise adherence data source (see Appendix F). Treatment site participants turned in their verification sheets to their health educators at the monthly sessions as well as verbally reported their adherence. Health promotion consultants turned in reports to the Program Coordinator that were added to the participant profiles as an additional source of qualitative data. The control site participants turned in their verification sheets at a designated location at each school site.

Mid-intervention self-efficacy and social support assessment

At the third monthly session of the intervention, the health promotion consultants administered the self-efficacy and social support measures to the treatment participants. These instruments provide crucial data points, midway through the study. The goal is to discern differences in social support relationships and levels of self-efficacy. The program coordinator personally administered and collected the instruments from the control site participants at their mid-program point.

Post-intervention assessment

At the end of the five-month exercise program, participants at all four sites were individually reassessed on the self-efficacy, social, anthropometric, and aerobic fitness measures (with those exceptions for step test).

Treatment

All treatment groups (sites A, B & C) received the health education intervention which is designed to promote self efficacy towards exercise through mastery experience and reinterpreting physical states (concepts described by Bandura). Both mastery experience and monitoring physical states were accomplished through monthly sessions between the individual subjects and a health promotion consultant during the course of the exercise program period. These twenty to thirty minute "exercise strategy" sessions were scheduled before, during, or after work hours at the school sites for employee convenience and were run according to a "Personal Exercise Plan" or "PEP" (see Appendix G).

For the purpose of mastery experience, realistic personal exercise-related goals were set within the PEP (as a behavioral contract). Participants were asked to identify the types

of physical activity in which they liked to participate, specifying their level of enjoyment; when and where they were active; and who supported their activity program.

Along with the encouraged overall goal of adhering to three, 20 minute aerobic sessions per week, participants also were encouraged to set a more individualized, personal exercise-related goal for their monthly contracts (i.e. weight or body fat loss, improvement in aerobic capacity, stress reduction, etc). Participants were asked to be specific and realistic when setting personal goals. As participants met their goals, they were able to revise or set a new goal each month. Within the personal goal section of the PEP, the health promotion consultant and participant could brainstorm barriers and strategies for achieving personal goals.

Reinterpreting physical states also was accomplished through these monthly sessions by teaching subjects to modify or reinterpret their impressions of their physiological states during exercise. After goal setting and strategizing, the health promotion consultant recorded and responded to the types of physical symptoms and changes experienced by the subject within the PEP. This process served as a venue to teach subjects to interpret gradual changes in physiological symptoms such as fatigue, muscle tension, aches and pains, dry throat, and shortness of breath, as markers of improved conditioning and not as a negative experience.

At the end of the PEP, spaces for names of people who would support the participant and sign as witnesses on the PEP for each of the three weekly reported exercise bouts by the participant through the verification sheets, were included. At least one verifier was required for all participant PEP contracts; however, multiple verifiers were encouraged as long as their names were included.

Once the subject and health promotion consultant agreed upon an overall physical activity strategy, the health promotion consultant summarized the plan at the bottom of the PEP, and both signed to indicate a commitment of attempting to achieve the goal for the next month. The health promotion consultants also could refer participants to the program website, which contained examples of moderate and vigorous activities to try and suggestions for how to overcome common barriers. The subject was given four monthly exercise verification sheets for the program and was asked to turn a log in each month at the designated worksite location.

Instruments

Causal Dimension Scale (CDSII). The CDSII (McAuley, Duncan, & Russell, 1992) assessed subjects' self-efficacy causal attributions for previous attrition from exercise programs. This measure allowed respondents to provide their own open-ended attribution for not engaging in regular exercise and then code their attribution along causal dimensions. The CDSII is a recently revised version of Russell's (1982) Causal Dimension Scale, a measure of how individuals perceive causes. This scale differs from the original in that it comprises four rather than three self-efficacy causal dimensions, locus of causality, stability, personal control, and external control. Twelve semantic differential scales, with three items representing each of the dimensions, comprise the CDSII. Values can range from 1-9 with higher values representing attributions that are more internal, stable and either personally or externally controllable. Several studies (McAuley, Poag, Gleason, & Wraith, 1990; Duncan et al., 1993; and Duncan & McAuley, 1993) have previously reported good internal consistency for all four dimensions of the CDSII with standardized alpha coefficients of $\alpha = .820$ for locus of

causality, α= .957 for stability, α= .956 for personal control, and α= .963 for external control (Cronbach, 1951).

Social support. Separate scales for family and friend social support for exercise have been found to have adequate reliability and validity (Sallis, Grossman, Pinski, Patterson, & Nader, 1987). In the Social Support for Exercise Habits Scales, subjects rate the frequency (1 indicating "none" through 5 indicating "very often") with which family and friends support their physical activity in 17 different ways (e.g., "gave me encouragement to stick with my exercise program"). These scales have undergone factor analysis along with several methods to determine reliability and validity. The first five questions comprise friend support for exercise (factor 1 or first subscale) with an Eigen value of 6.3. The last 12 questions comprise family support for exercise (factor 2 or second subscale) with an Eigen value of 7.2. The test-retest reliabilities range from 0.55 to 0.86 and the alpha coefficients range from 0.61 to 0.91.

For purposes of this study, the instrument was revised and piloted to include a "coworker" social support section using the same questions for friend as previously used for friend support. Gainesville area aerobics participants were used as pilot subjects to determine item total correlations, response patterns and other feedback for the purposes of making instrument revisions. The instrument was administered to approximately eighty respondents containing the same five questions in categories of both friend and co-worker support and the twelve family support items (see Appendix D). All items had good response distributions with standard deviations ranging from 0.82 to 1.49. The Cronbach's alpha was 0.92 and the Split half reliability coefficient was 0.93 for the

instrument, indicating excellent internal consistency and reliability for the instrument overall.

Pre-Participation Questionnaire (PPQ). All participants were required to complete a pre-participation questionnaire created for this study, which asked questions regarding basic demographic information; medications; heart conditions; discomfort during physical activity; self and family history of disease; hypertension; orthopedic problems; other physical and medical conditions; and current activity level. This questionnaire served as part of the screening measure for subject eligibility. As stated earlier, subjects must have met the screening criteria of no history of cardiac disease or orthopedic injuries that would preclude participation in an exercise program. Subjects' blood pressure and resting heart rate measurements were taken along with completion of this form. Subjects taking certain medications such as beta-blockers were not included in the analysis of the data due to contraindications in estimating a THRR.

Cardiovascular fitness. The YMCA 3-Minute Step Test was used to estimate VO_{2max}. This submaximal test involved stepping up and down on a 12-inch high step, at a rate of 24-steps-per-minute (96 beats per minute) for 3 minutes, then immediately stopping and having heart rate recorded by an assessment team member. Within 5 seconds the tester counts the pulse with the stethoscope for 15 seconds. The subject can take her or his own pulse at the same time by palpating the radial artery, providing a double check of the count. Prior to the test, the assessment team member provides instruction in proper stepping technique and demonstrates on the step. The participant "warms up" by taking practice steps onto the step and is encouraged to stretch. A metronome was used to set the 96 beats per minute cadence for the participants to step in time with the beat. The 15-

second count reflects the heart's ability to recover quickly, with a lower versus higher count reflecting a better fitness level. The total 1-minute post exercise heart rate (calculated from the 15 second count) is the score for the test and is converted to an estimated VO_{2max} by using a maximal oxygen uptake equation (McArdle, 1991) and recorded.

In terms of validity, according to the American College of Sports Medicine (1998), direct analysis of expired gases yields the most accurate determination of VO_{2max}, followed by maximal exercise testing. However, direct analysis is costly and time consuming and maximal exercise testing requires participants to exercise to the point of volitional fatigue. In lieu of these obstacles, submaximal testing was developed requiring a steady-state heart rate attainment for each exercise work rate. Submaximal exercise testing, though not as precise as maximal exercise testing, can still provide a reasonably accurate reflection of an individual's fitness. If an individual is given repeated submaximal exercise tests over a period of weeks and the heart rate response to a fixed work rate decreases over time, it is likely that the individual's cardiorespiratory fitness has improved, irrespective of the accuracy of the VO_{2max} prediction (ACSM, 1998).

Anthropometric measures. Three anthropometric measures were obtained from each subject - height, weight (as measured by a calibrated mechanical eye-level physician scale at each school) and a three-site body composition, as measured by a Lange skin caliper. All fitness assessment procedures followed the ACSM 1995 guidelines and procedures. The same testers were used for pre and post test assessments and the three sites measured in the skinfold body composition test were the triceps, iliac crest (hip), and thigh for women, and the pectoralis major, abdomen, and thigh for men.

In terms of validity, correlation coefficients between skinfolds and hydrostatically determined body fatness have consistently ranged from .70 to .90 (AAHPERD, 1980). In general, the inclusion of three skinfold sites in the regression equation produces a better prediction (lower standard of error of estimate) of body density than fewer sites. However, neither the feasibility nor accuracy is improved by using more than three sites (Pollock & Jackson, 1984).

Statistical Analysis

As mentioned earlier, self-efficacy beliefs and social support for exercise data (using CDSII and social support scale values) were collected before, during (midpoint of intervention) and after the intervention. Collecting data at these three points determines if exercise self-efficacy has changed and what types of social support have occurred over the course of the intervention. Physical assessments (cardiovascular, weight, and skinfold) also were measured before and after the intervention as additional outcome measures of exercise adherence (i.e. adherers will have more improved physical attributes and cardiovascular levels than non-adherers.) In addition, exercise adherence data was collected throughout the entire intervention period to determine an exercise adherence average for the treatment and control groups. Demographic data also was collected through the Pre-Participation Questionnaire.

Data analysis included basic descriptive statistics of all treatment and control groups. Statistical differences ($p<.05$) between the groups using mean average exercise adherence scores were evaluated using group t-test statistics. A Repeated Measures ANOVA was used to assess change between the three data collection points for self-efficacy and social support. A dependent samples t-test was used to assess change in physical outcomes

within treatment and control groups. Pearson correlations between exercise history related variables, self-efficacy and social support, and adherence measures were also performed to investigate construct relationships. Multiple regression models were then conducted to determine the independent contributions of self-efficacy and social support.

CHAPTER 4
RESULTS

Introduction

The primary purpose of this study was to assess differences in exercise adherence, self-efficacy and types of social support between employee groups receiving and not receiving a health education exercise promotion intervention. All results of this study including descriptive results, frequency data, correlational analyses, analyses of variance, and regression analyses will be described in this chapter. These results answer all primary and secondary research questions posed in Chapter 1 as well as follow the statistical analysis plan described in Chapter 3. All results will be discussed in Chapter 5.

Descriptive Results

Participant Demographics

Over 70 participants were initially assessed for this study, however only 58 actually began the program and could be considered in the overall analyses. Fifteen participants comprised the control group and 43 participants comprised the treatment group. The 15 employees who were initially assessed but decided not to participate in the program "the non-starters" (treatment and control) were similar demographically to the program participants. Program participant demographics included in the analyses were gender, race, age, and job title or classification. Table I contains the program participant, elementary school employee and overall school district employee demographics (described in Chapter 1), providing a sample to population comparison.

Table I
Demographic Profile for Program Participants and Representative County

	Treatment		Control		Elementary		County	
	N	Frequency	N	Frequency	N	Frequency	N	Frequency
Gender								
Male	7	16.3%	0	0.00%	232	13.17%	998	23.85%
Female	36	84.7%	15	100.00%	1530	86.83%	3187	76.15%
Unreported	0	0.00%						
Race								
Caucasian	31	72.1%	13	86.67%	1270	72.08%	2928	69.96%
African-American	10	23.2%	1	6.67%	448	25.43%	1160	27.72%
Hispanic	0	0.00%	0	0.00%	35	1.99%	78	1.86%
Asian	1	2.3%	0	0.00%	8	0.45%	16	0.38%
Other	1	2.3%	0	0.00%	1	0.06%	3	0.07%
Unreported	0	0.00%	1	6.67%				
Age								
30 and under	3	7.0%	0	0.00%	370	19.08%	187	12.60%
31-40	9	20.9%	2	13.33%	356	18.36%	315	21.23%
41-50	20	46.5%	8	53.33%	671	34.61%	469	31.60%
51-60	9	20.9%	3	20.00%	443	22.85%	441	29.72%
61 and over	2	4.6%	1	6.67%	99	5.11%	72	4.85%
Unreported	0	0.00%	1	6.67%				
Job Title								
Teacher	31	72.1%	13	86.67%	918	52.10%	1963	46.91%
Career Service (Office & Custodial)	11	25.6%	2	13.33%	844	47.90%	2222	53.09%
Office Staff only	7	16.3%	2	13.33%				
Custodial only	4	9.3%	0	0.00%				
Unreported	1	2.3%						

PPQ Descriptive Data

The Pre-Participation Questionnaire (PPQ) administered to all program participants prior to start of the program, included items regarding current exercise and past exercise habits. Along with these items were other descriptive items regarding participation in sports or leisure activities and types of activities commonly engaged. The percentages of program participants in both treatment and control groups responding “yes” or “no” to these items are shown in Table II. A frequency breakdown of types of activities reported by participants prior to the program also are included. Of the “non-starters,” 53.3%

reported that they were not currently exercising, 93.3% had not exercised in the past 6 months, and 26.7% had never exercised or engaged in sports or leisure activities.

Table II
Reported Participant Exercise and Sports/Leisure Status

	Treatment		Control	
Variable	N	Frequency (43)	N	Frequency (15)
Currently exercising				
Yes	15	34.8%	14	93.33%
No	26	60.4%	1	6.67%
Unreported	2	4.6%	0	0.00%
Exercised in past 6 months				
Yes	20	46.5%	10	66.67%
No	22	51.2%	4	26.67%
Unreported	1	2.3%	1	6.67%
Have ever exercised				
Yes	32	74.4%	10	66.67%
No	10	23.2%	5	33.33%
Unreported	1	2.3%	0	0.00%
Have ever participated in sports or leisure				
Yes	30	69.8%	11	73.33%
No	13	30.2%	4	26.67%
Types of activities from past				
Walking	10	24.44%	9	60.00%
Weight training	12	26.67%	2	13.33%
Running / Jogging	7	15.56%	2	13.33%
Aerobics	6	13.33%	2	13.33%
Gym or fitness center	5	11.11%	2	13.33%
Swimming	1	2.22%	2	13.33%
Tennis	2	4.44%	1	6.67%
Cycling	1	2.22%	2	13.33%

Personal Exercise Plan data

Within the Personal Exercise Plan (PEP), treatment participants reported activities they enjoyed doing, personal goals, strategies to achieve personal goals, barriers, and strategies to overcome barriers with their health promotion consultant. A summation of this information reported by all treatment group participants over the course of the program is listed in Table III. Ninety-one percent of participants reported exercising at

home, 53% reported exercising in a gym or recreational center, and 35% reported exercising at the worksite. In addition, 84% of participants reported exercising in the evening and 26% reported exercising in the morning.

Causal Dimension Scale Reason List

Within the Causal Dimension Scale (CDSII) that all program participants were given as a measure of self-efficacy towards exercise, participants were asked to list the main reason as to why they are unable to exercise. A summation of these reasons is listed in Table IV.

Table IV
Reported Reasons for Not Engaging in Regular Exercise Indicated on the CDSII

****	Poor time management/over scheduling
***	Lack of motivation/initiative
**	Tired/lack of energy
*	Medical reason/illness
	No reason
	Do not enjoy exercise
	Exercise is not a priority
	Fear of injury
	Lack of a routine
	Weather

**** Over 60% of participants
*** Over 20% of Participants
** Over 15% of Participants
* Over 10% of Participants

Self Efficacy and Social Support Results

Descriptive Statistics

Descriptive data for the self-efficacy and social support measures can be broken down into means and standard deviations for scores on each measure. For self-efficacy, a total self-efficacy score was computed for both treatment and control groups (a possible score of "9" could be attained for each item) and the items were then summed. For social

Table III
Summation of Personal Exercise Plan (PEP) Information Reported by Participants

Activities Enjoyed	Personal Goals	Strategies to Achieve Personal Goals	Barriers	Strategies to Overcome Barriers
Aerobics	Control diabetes	** Consistency	Family obligations	Be less critical on self
Basketball	Improve cardiovascular health	Do weight bearing exercise	Feeling stressed	Bring kids with them
Biking	Improve overall health	Exercise in THR	* Medical reasons/Injury	Develop a back-up plan
* Bowling	Improve self image	* Exercise more often	Over eating	Display reminders
Canoeing	Increase endurance	Exercise with more intensity	** Poor time-management	Do exercise indoors
Circuit training	Increase energy	Join a fitness center	Self	Do more indoor activity
Dancing	* Increase lean body mass	Keep an exercise log	** Feeling unmotivated/tired	Do weight-bearing exercise
Exercise tape	Increase strength	Maintain a positive attitude	Unexpected incidents	Improve time-management
Gardening	Lower cholesterol	Partner/peer motivation	Unsupportive environment	** Look in the mirror
Golf	Maintain weight loss	Self motivation	Weather	Make exercise a priority
Fitness center	* Make exercise a habit	Use time management skills		* Not procrastinating
* Hiking	Manage stress better	Vary exercise routine		Partner/peer motivation
Jumping-rope	Try new exercises	Watch diet		* Personal rewards
Racquet ball	** Weight loss			Self motivation
Rollerblade				* Watch diet
Rowing				
Running				
Stair climbing				
Swimming				
Tennis				
*** Walking				
Weights				
Yoga/Stretching				

*** Reported by over 60% of participants
** Reported by over 40% of participants
* Reported by over 20% of participants

support, three subtotal scores for coworker, those living with participants, and those not living with participants social support was computed (a possible score of "4" for each item could be attained) and these items were then summed. A total social support score also was computed for both groups (adding all three subtotals). The self-efficacy and social support descriptive information for both treatment and control groups is shown in Table V.

Table V
Self Efficacy and Social Support Descriptive Statistics

	Self-Efficacy		**Social Support**							
Baseline	**BSE Total**		**BSSCW**		**BSSL**		**BSSNL**		**BSS Total**	
	Treat	**Ctrl**	**Treat**	**Ctrl**	**Treat**	**Ctrl**	**Treat**	**Ctrl**	**Treat**	**Ctrl**
$\bar{x}$	67.3	64.5	6.9	4.3	14.8	15.7	5.2	7.4	26.2	27.4
SD	18.1	16.1	6.0	4.3	12.1	13.9	5.3	7.3	17.2	21.1
Midpoint	**MSE Total**		**MSSCW**		**MSSL**		**MSSNL**		**MSS Total**	
	Treat	**Ctrl**	**Treat**	**Ctrl**	**Treat**	**Ctrl**	**Treat**	**Ctrl**	**Treat**	**Ctrl**
$\bar{x}$	73.9	62.9	8.3	6.6	15.9	19.8	6.0	7.4	30.2	33.8
SD	17.5	9.7	5.8	3.1	11.4	13.7	5.9	7.2	15.9	19.9
Post	**PSE Total**		**PSSCW**		**PSSL**		**PSSNL**		**PSS Total**	
	Treat	**Ctrl**	**Treat**	**Ctrl**	**Treat**	**Ctrl**	**Treat**	**Ctrl**	**Treat**	**Ctrl**
$\bar{x}$	69.2	63.8	8.9	4.5	17.0	17.4	6.9	6.1	32.8	28.0
SD	13.0	11.6	6.0	4.1	12.0	14.8	6.7	7.0	19.0	18.9

(N) Treatment = 43
(N) Control = 15
BSE, MSE, and PSE = baseline, midpoint, and post program total self-efficacy
BSSCW, MSSCW, and PSSCW = baseline, midpoint, and post program social support from coworker
BSSL, MSSL, and PSSL = baseline, midpoint, and post program social support from those living with participants
BSSNL, MSSNL, and PSSNL = baseline, midpoint, and post program social support from those not living with participants
BSS, MSS, and PSS = baseline, midpoint, and post program total social support

Differences in Self-Efficacy and Social Support between Groups

An independent samples or group t-test statistic was used to compare self-efficacy and social support scores between treatment and control groups using the means and standard deviations shown in Table V. For total self-efficacy, the treatment groups had no significant difference on total self-efficacy scores than the control group prior to the program (baseline). However, at program mid-point, the treatment groups self-efficacy scores were significantly higher ($t = -2.74$, $DF=41.4$, $p=0.03$) than the control group. At program end (post), self-efficacy decreased in the treatment groups and increased slightly in the control group. Thus, the treatment groups ended with non-significantly higher self-efficacy than the control group.

For social support, three subscales of social support including coworker, those living with participants and those not living with participants and total social support were analyzed for differences between treatment and control groups. For pre-program (baseline) coworker social support, the treatment groups had non-significantly higher scores than the control group. At program midpoint, both treatment and control groups' coworker social support increased but did not significantly differ. At program end (post), the treatment groups coworker social support increased once again, however the control groups scores decreased, ending with significantly higher ($t=-2.9$, $DF=30.0$, $p=0.006$) coworker social support scores for the treatment groups versus the control group.

For social support from those living with participants (SSL), the treatment groups had non-significantly lower support at baseline than the control group at baseline. At program midpoint, both treatment and control groups had increased SSL, but did not significantly differ. At program end, the treatment group had increased SSL scores again,

from midpoint however, the control group had decreased SSL. Both treatment and control groups still did not significantly differ in SSL.

For social support from those not living with participants (SSNL), the treatment groups had non-significantly lower support than the control group. At program midpoint, the treatment groups had slightly increased SSNL from baseline however, the control group support remained the same and did not differ significantly from the treatment groups' scores. For program end, the treatment group had increased SSNL support again, from midpoint however the control group had decreased SSNL. Both treatment and control groups still did not significantly differ in SSNL.

For total social support from all three subscales, the treatment groups had non-significantly lower scores that the control group at baseline. At program midpoint, both treatment and control groups had increased total social support from baseline, but did not significantly differ. At program end, the treatment group had increased total support again, from midpoint, however the control group had decreased total support. Both treatment and control groups still did not significantly differ in total social support.

Overall, the treatment groups had a significant increase in self-efficacy compared to the control group at program midpoint but did not significantly differ from the control group at program end. For types of social support, both treatment and control groups had increased social support at program mid-point for co-worker (SSCW), cohabiting support (SSL), and total social support. However, for SSL and total social support, the treatment group had even higher support at program end and the control group had non-significantly lower support than the treatment group. For co-worker support, the treatment groups had significantly higher support at program end than the control group.

As for non-cohabiting social support (SSNL), the treatment groups had gained support at both program mid-point and end however, the control group had the same level of support at program mid-point, had decreased support at program end but did not significantly differ from the treatment groups.

Differences in Self-Efficacy and Social Support within Groups

A Repeated Measures (GLM) analysis was conducted to determine differences within treatment and control group between pre, mid and post program on both self-efficacy and social support measures however, no significant differences were found. Only pre versus mid program self-efficacy nearly significantly differed at the 0.10 alpha level for the treatment groups (SE=2.93, t=1.74, p=0.09) in an dependent t-test.

Dependent t-tests were conducted to determine differences between pre and midpoint and post program social support measures for both treatment and control groups. For the control group, only the difference in mid program versus post program co-worker social support was significant (SE=1.19, t=-2.23, p=0.05). For the treatment group however, pre versus post program co-worker and total social support differed significantly (SE=0.71, t=2.14. p=0.04 and SE=2.29, t=2.42, p=0.02, respectively).

Assessment Measures Results

Descriptive Statistics

The descriptive data for the pre and post program assessment measures included means and standard deviations for pulse, blood pressure, weight, body composition, and estimated VO_{2max} for the cardiovascular step test for both treatment and control groups before (baseline) and after (post) delivery of the program. This data is shown in Table VI.

Table VI
Assessment Measures Descriptive Statistics

	Baseline				Post Program			
	Treatment (N=43)		Control (N=15)		Treatment (N=43)		Control (N=15)	
	$\bar{x}$	SD	$\bar{X}$	SD	$\bar{x}$	SD	$\bar{x}$	SD
Resting Heart Rate	75.5	9.8	77.9	20.5	73.1	13.5	68.6	6.7
Blood pressure Systolic	126.4	13.8	131.1	13.0	119.5	13.0	120.2	6.3
Blood pressure Diastolic	80.7	8.6	80.6	8.4	71.3	8.4	71.8	6.4
Weight (in pounds)	161.1	33.9	144.3	16.4	163.4	33.5	142.1	14.4
Body Composition (%)	29.9	5.8	28.5	4.9	29.7	5.8	26.6	4.4
Step Test (Estimated VO_{2max})	44.4	6.0	43.3	4.2	42.7	14.4	20.6	6.8

Assessment Measure Differences between Treatment and Control Groups

As with analyzing differences in self-efficacy and social support, an independent samples or group t-test statistic was used to compare differences in assessment measures between treatment and control groups using the means and standard deviations shown in Table VI. No significant differences existed for any of the pre-program assessment measures between treatment and control groups except for weight (t=-2.43, DF=48.7, p=0.02). The treatment group had a significantly higher mean weight than the control group (see Table VI).

For the assessment measures at post program, no significant differences existed for resting heart rate and systolic and diastolic blood pressure between the treatment and control groups. However, weight (t=-3.14, DF=46.2, p=0.003), body composition percentage (t=-2.01, DF=27.7, p=0.05), and VO_{2max} (t=-6.52, DF=28.9, p=0.0001) differed significantly between treatment and control groups at program end.

Assessment Measures Differences within Treatment and Control Groups

A dependent samples t-test was used to determine significant differences between each assessment measure for pre and post program within the treatment and control groups. For the control group, there was no significant difference between pre and post program measures for resting heart rate, weight, and body composition percentage. However, the control group did improve significantly in systolic (SE= 3.08, t=-3.6, p=0.004) and diastolic blood pressure (SE=2.24, t=-3.36, p=0.006), but significantly worsened in estimated VO_{2max} (SE=1.8, T=-12.6, p=0.0001).

For the treatment groups, there were no significant differences between pre and post program measures for weight, body composition percentage, and $VO_{2max.}$ However, the treatment group did improve significantly in systolic (SE= 2.39, t=-2.97, p=0.005) and diastolic blood pressure (SE=1.72, t=-5.87, p=0.0001). The treatment groups also improved significantly in resting heart rate but only at the .10 alpha level (SE=1.83, t=-5.87, p=0.09).

Adherence Results

Descriptive Statistics

The adherence measures for the 14-week exercise program included cardiovascular exercise frequency and duration, strength training frequency, and leisure activity frequency. For cardiovascular exercise frequency each week, participants were given a "0" for exercising under 3 times per week (under program goal), a "1" for exercising three times per week (at program goal), and a "2" for exercising over three times per week (over the program goal). For cardiovascular exercise duration each week,

participants were given a “0” for exercising under 20 minutes per session (under program goal), a “1” for exercising at 20 minutes per session (at program goal), and a “2” for exercising over 20 minutes per session (over the program goal). For strength training and leisure activity frequency, the number of days of activity were recorded each week. The overall program weekly means and standard deviations for each type of physical activity are shown in Table VII. Types of leisure activities reported by participants included golf, playing with their children, bowling, dancing, and yard work.

Table VII
Adherence Descriptive Statistics for 14-Week Program

	Treatment (N=43)		**Control (N=15)**	
	$\bar{x}$	**SD**	$\bar{x}$	**SD**
Cardiovascular Frequency *(times/week)	0.8	0.7	0.9	0.7
Cardiovascular Duration **(length of session)	1.3	0.6	1.4	0.7
Strength Training Frequency (Days/Week)	0.7	1.1	0.7	1.0
Leisure Activities (Days/Week)	0.1	0.2	0.1	0.1

* For times/week, 0 = exercising under 3 times per week, 1 = exercising three times per week and 2 = exercising over three times per week

** For length of session, 0 = exercising under 20 minutes per session, 1 = exercising at 20 minutes per session, and 2 = exercising over 20 minutes per session.

Adherence Levels

Based on the adherence analyses and the overall program goal, the participants can be classified into four groups of adherers - dropouts, those exercising below program goal, at program goal, and above program goal - for both cardiovascular exercise frequency and duration. Ranges were set for classification of participants around the above mentioned values given for cardiovascular frequency and duration adherence for each week of the program.

Dropouts were those participants with weekly averages below 0.1. Below program goal exercisers are those participants with averages between 0.1 and 0.6. At program goal exercisers are those participants with weekly averages between 0.7 and 1.6. Above program goal exercisers are those participants with weekly averages above 1.7. The frequency breakdown of the percentage of participants in each of the adherence levels for cardiovascular frequency and duration is shown in Tables VIII and IX, respectively.

Table VIII
Levels of Adherence for Cardiovascular Frequency

	Treatment *(N=25)		**Control *(N=14)**	
	n	**Frequency**	**n**	**Frequency**
Dropouts	5	20%	2	14%
Exercising Below Program Goal	7	28%	5	36%
Exercising At Program Goal	9	36%	2	14%
Exercising Above Program Goal	4	16%	4	29%

* Due to missing data, only 25 treatment participants and 14 control participants had complete adherence data for the analysis.

Table IX
Levels of Adherence for Cardiovascular Duration

	Treatment *(N=25)		**Control *(N=14)**	
	n	**Frequency**	**n**	**frequency**
Dropouts	3	12%	1	7%
Exercising Below Program Goal	1	4%	2	14%
Exercising At Program Goal	13	52%	3	21%
Exercising Above Program Goal	8	32%	8	57%

* Due to missing data, only 25 treatment participants and 14 control participants had complete adherence data for the analysis.

Differences in Adherence between Treatment and Control Groups

For purposes of the overall program goal which was exercising for three, 20-minute bouts of cardiovascular activity a week, only cardiovascular frequency and duration were used as adherence measures for comparison between the treatment and control groups. For adherence differences between treatment and control groups, no significant differences existed (using independent samples t-test) in either cardiovascular frequency

or duration, or strength training frequency, based on overall program weekly means (see Table VI). As for levels of adherence between treatment and control groups, the treatment groups had a higher percentage of dropouts than the control group but a lower percentage of participants exercising below the program goal. The treatment groups also had a higher percentage of participants exercising at the program goal but had a lower percentage of participants exercising above the program goal than the control group.

For strength training and leisure activity frequency, only number of occasions reported each week by participants was calculated. For the treatment groups, 60% of participants reported some type of strength training at least one time over the course of the program. Thirty-two percent of these participants reported engaging in strength training less than once per week. Only 16% of these participants reported engaging in strength training between one and two times per week and only 12% reported engaging in strength training more than twice per week.

Only 24% of treatment participants reported engaging in leisure activities at least one time over the course of the program. Twelve percent of these participants reported engaging in leisure activity once per week and the other 12% engaged in leisure activity more than two times per week.

For the control group, 57% of participants reported some type of strength training or leisure activity at least one time over the course of the program. Twenty-eight percent of these participants reported engaging in strength training less than once per week. Only 7% of these participants reported engaging in strength training between one and two times per week and 21% reported engaging in strength training more than twice per week.

Thirty-six percent of treatment participants reported engaging in leisure activities at least one time over the course of the program. All of these participants averaged less than one time per week of leisure activity.

Correlational Analyses

For interest of construct relationships, several Pearson Correlation Coefficients were conducted including program end self-efficacy with both frequency and duration adherence, and program end social support. Also, the relationship between reported exercise six months prior to the program (exercise history) with both types of adherence and program end self-efficacy was analyzed. In addition, prior leisure/sport participation (leisure/sport history) with both types of adherence and program end self-efficacy was analyzed.

No significant relationship was found for program end self-efficacy with either frequency or duration adherence. However, program end self-efficacy was positively correlated with program end social support ($p = 0.02$). Exercise history was positively correlated with both types of adherence – cardiovascular frequency ($p = 0.01$) and cardiovascular duration ($p = 0.04$). Exercise history was not however, related to program end self-efficacy. Finally, leisure/sport history was not related to either type of cardiovascular adherence or program end self-efficacy.

To analyze the independent contributions that program end self-efficacy or social support may have on adherence a regression model analysis was conducted, which controlled for both self-efficacy and social support independently. There were no significant independent contributions from either program end self-efficacy or social support with respect to either cardiovascular frequency or duration adherence.

Summary

This chapter revealed all analyses needed to answer all the primary and secondary research questions presented in Chapter 3. The overall participant demographic and descriptive results were presented as well as the descriptive statistics and within and between group differences for self-efficacy, social support, assessment measures, and adherence data. Correlational construct analyses are also presented along with independent contributions of self-efficacy and social support on adherence. Chapter 5 will discuss these results in detail and use them to answer the proposed research questions.

CHAPTER 5
DISCUSSION AND CONCLUSIONS

Introduction

In this chapter, all descriptive and analytic results (including research questions) will be discussed as well as programming aspects of the intervention and strengths and weaknesses of the study. Study conclusions will be given as well as recommendations for future research and the implication for health education.

Discussion of Results

Demographics

For the program participant demographic data it is apparent that the majority of participants in this study are female, Caucasian, between the age of 31 and 60, and teachers. However, in the treatment groups in particular, 16% of participants are males, 23% are African-American, and 26% are office staff and custodial employees. Despite the slightly skewed distribution of demographics, the sample is representative of the county under study, particularly county elementary school employees (refer to Table I). As for the non-starter group of individuals who were initially assessed but did not start the program, this group was demographically similar, but had some distinct differences in exercise history (discussed in a subsequent section). Overall, in terms of demographics, most elementary schools across the country are comprised largely of female teachers within these reported age ranges. With respect to race, this sample was

representative of the county population however, a more even distribution of ethnicity would have been more consistent with national demographics.

Exercise Habits

It is clear from a comparison of exercise habits between the treatment and control groups that a much higher percentage of participants in the treatment groups reported that they were not currently exercising, had not exercised in the past six months, and had never engaged in sports or leisure activities, prior to the start of the program. Moreover, 93% of participants in the control group reported currently exercising, prior to the program. This would indicate a highly self-selected group for program participation within the control group. However, the treatment groups were comprised of participants with more varied fitness levels and of more participants who were recruited rather than self-selected. The distribution of those who reported never having exercised was about equal between treatment and control groups.

However, what is interesting about these findings, is that 53% of the treatment group and 27% of the control group reported not exercising in the past six months but 60% of the treatment group and 93% of the control group reported currently exercising. This observation may be due to participants wanting to make themselves feel better about not exercising in the past six months and reporting that they are currently exercising. Most likely, even though participants were not exercising in the past six months, they may have wanted to make themselves feel better or appear better to program staff (when completing the Pre-Participation Questionnaire) and thereby reported they were currently exercising because they would start exercising in the current week.

As for the "non-starters," noticeable differences were seen in the exercise histories between the treatment and control program participants and the non-starters. Fifty-four percent of the non-starters were not currently exercising as opposed to 26% in the treatment group and 7% in the control group. A startling 93% of non-starters had not exercised in the past six months compared to 22% in the treatment groups and 27% in the control group. The percentage of non-starters never having exercised or participated in sports or leisure activity was similar to all groups of program participants. These findings strongly support the notion that those with poorer exercise history (i.e. little past exercise) are less likely to start an exercise program.

As an anecdotal note however, these 15 non-starters had understandable personal reasons and obstacles for not beginning the program. These reasons ranged from transferring to another worksite, experiencing job changes, needing a more medically supervised exercise program, and caring for an ill spouse.

Personal Exercise Plan Data

In the Personal Exercise Plan (PEPs), participants had the opportunity to share several valuable pieces of information with program consultants regarding their exercise activities, goals, barriers, and strategies. From the information provided in Table III, it is apparent that most participants chose walking as a preferred exercise activity, wanted to loose weight for a personal goal, and cited poor time management and lack of motivation as main barriers to achieving their goals. It is no surprise that walking was the number one activity among participants for cardiovascular exercise. Virtually anyone, without major physical disabilities, can walk. Walking is easy to do and can be done practically anywhere. Moreover, moderate physical activities such as walking, when compared with

higher intensity fitness activities, are associated with a higher rate of adoption and maintenance of physical activity patterns in a population base; this is particularly true for women (Sallis, Haskell, Fortmann, Vranizan, Taylor, & Solomon, 1986).

Also interesting is that lack of motivation and feeling tired were cited equally as important as lack of time management. This barrier to exercise is an important justification for the role of the program consultants in motivating participants and convincing participants that moderate, regular exercise will increase energy over time. In addition, consistency was cited by 46% of participants as a strategy to achieve personal goals. This reinforces the importance of consistent exercise to achieve exercise-related benefits and goals. It seems that most individuals who start an exercise program remain consistent in their exercise routine for perhaps the first month, then become rather inconsistent in their routine thereafter. Inconsistent or sporadic exercise will not lead to significant improvements in exercise-related goals.

A final interesting finding in regards to the PEPs was that 91% of participants reported exercising at home and 84% reported exercising in the evenings. These significant proportions of participants call for exercise interventions targeting at-home, after work exercisers. An intervention such as the one tested in this study allows for participants to exercise where and when it was convenient for them. The literature supports the notion that if program participants are given the freedom to not only choose their own activities (Baun & Bernacki, 1988; Thompson & Wankel, 1980) but to do those activities where it is most convenient for them, those participants will be more successful in adhering to their exercise program.

Reasons for Not Exercising.

As is shown in Table IV, the common reasons cited on the CDSII by participants for not engaging in regular exercise, was poor time management/over scheduling, followed by lack of motivation, lack of energy and medical reasons. This reinforces the barriers cited in the PEPs. This finding also is consistent with the literature. Shepard (1988) found that one of the most commonly cited reasons for not participating in a corporate exercise program were "lack of time."

Even though the number one reason for being unable to exercise or not regularly engaging in exercise was lack of time, lack of energy and motivation closely followed. To encourage and promote regular exercise, individuals need assistance with time management (i.e. scheduling exercise) and motivation. These two catalysts for exercise were the reoccurring proponents within the program intervention that proved most successful in forming exercise habits.

Self-Efficacy and Social Support

Primary research question #1: "**Does exercise self-efficacy increase during and after implementation of a health education intervention to promote exercise adherence?"** The self-efficacy and social support descriptive data shown in Table V depict a greater overall increase in self-efficacy and social support for the treatment groups as compared to the control group. More specifically, to answer the first primary research question stated above, comparisons of pre, mid and post program self-efficacy means for the treatment group show a near significant (significance is measured at the $p = 0.05$ alpha level) increase in self-efficacy from pre-program to mid-program ($p = 0.09$)

and a slight but insignificant increase in self-efficacy from pre-program to post-program. The treatment group self-efficacy mean had actually decreased from mid-program to post program (midpoint $\overline{x}$ = 73.9 and post $\overline{x}$ = 69.2).

It is supposed that with the excitement of starting a new program and meeting with the health promotion consultants for the first and second times, that the treatment participants experienced the greatest increase in self-efficacy. Towards the end of the program however participants had more difficulty meeting with consultants due to increased hectic schedules in the school term and were not exercising as regularly. This decrease in time and energy for the exercise program may attribute to the decrease in self-efficacy at program end.

Primary research question #2: "What types of social support for exercise are received by subjects during and after implementation of a health education intervention to promote exercise adherence?" To answer the second primary research question, the social support subscale total means (i.e. the group mean subscale total score) in Table V were divided by the number of items in each subscale to compute an average item score for each social support subscale. These computations had to be performed in order to make equal comparisons across the three subscales, which had unequal numbers of items (i.e. coworker and cohabiting support had 5 items and non-cohabiting support has 13 items).

The greatest form of social support for the treatment groups was co-worker support (MSSCW $\overline{x}$ = 1.66, PSSCW $\overline{x}$ = 1.78). The support levels for those living and not living with participants was virtually the same (MSSL $\overline{x}$ = 1.22, PSSL $\overline{x}$ = 1.31 and MSSNL

$\overline{x}$ = 1.20, PSSNL $\overline{x}$ = 1.38, respectively). These findings are not surprising since it is expected that social support from co-workers would be higher than other forms of support in a worksite program. In fact, one treatment site actually started an exercise group, comprised of program participants that met after school hours twice a week in the "assessment" classroom, to exercise to aerobic videotapes. These findings are supported by a meta-analysis of social influence and exercise (Carron, Hausenblaus, & Mack, 1996) which revealed that family did not represent the strongest source of social influence for adherence behavior, rather the influence of important others had a stronger impact. This study strongly indicates that the "important others" in the exercise program were in fact coworkers. Perhaps, if spouses, significant others, and friends were allowed to participate, the other types of social support would increase, however this is unknown.

For the control group, support from individuals living with participants was the greatest form of support (MSSL $\overline{x}$ = 1.52, PSSL $\overline{x}$ = 1.34). Support from those not living with participants was the second greatest form of support (MSSNL $\overline{x}$ = 1.48. PSSNL $\overline{x}$ = 1.22) and support from co-workers was the least form of social support (MSSCW $\overline{x}$ = 1.32. PSSCW $\overline{x}$ = 0.9). These comparisons also are not surprising since most of the control group participants were already regular exercisers prior to the program and did not receive the worksite intervention. These participants were receiving more support for their exercise from individuals living with them than the treatment groups at baseline (treatment BSSL $\overline{x}$ = 14.8 and control BSSL $\overline{x}$ = 15.7), which continued to increase at mid and post program. Also of interest, is the fact that co-worker support remained low without the treatment intervention but in lieu of assessments being performed at the

worksite. It is supposed that merely conducting fitness assessments onsite is not sufficient to increase coworker support for exercise.

Adherence

Primary research question #3: "Do the intervention groups have greater adherence to the exercise prescription than non-intervention group?" To answer the third primary question, comparisons of means for cardiovascular frequency and duration, shown in Table VII, indicate that the treatment groups have slightly lower cardiovascular exercise adherence than the control group (treatment $\overline{x}$ = 0.8, $\overline{x}$ = 1.3 and control $\overline{x}$ = 0.9, $\overline{x}$ = 1.4, respectively). In addition, no significant differences existed (using independent samples t-test) in either exercise cardiovascular frequency or duration and strength training frequency, based on overall program weekly means (see Table VI). This could again be explained by the high percentage (93%) of control group participants who were already exercising. These control group participants seemed to merely continue their regular exercise throughout the program, whereas many of the treatment group participants were just exercising again for the first time in many months, even years (i.e. 53% of treatment group reported not exercising in the past 6 months, as stated in previous section).

As for levels of cardiovascular exercise frequency and duration adherence between treatment and control groups, shown in Tables VIII and IX, the treatment groups had a higher percentage of dropouts than the control group but a lower percentage of participants exercising below the program goal. The treatment groups also had a higher percentage of participants exercising at the program goal but had a lower percentage of participants exercising above the program goal than the control group.

In other words, even though the treatment groups had higher dropout rates than the control group, the treatment group had more participants exercising at the program goal. The control group seemed to have a split of participants exercising either below or above the program goal (frequency: 36% below goal, 29% above goal). The treatment group had most participants exercising at the program goal (frequency at goal = 36%, duration at goal = 52%). As stated above, the control group exercisers continuing to exercise at their previous levels may explain this. However, the treatment groups seemed to more closely follow the program exercise goals due to the treatment intervention.

Moreover, in terms of overall program dropout levels, the treatment groups had only 20% participants drop out in terms of cardiovascular exercise frequency and 12% drop out in terms of cardiovascular exercise duration. The control group had only 14% drop out in terms of cardiovascular frequency and 7% drop out in cardiovascular exercise duration. For both treatment and control groups these percentages are below the dropout rates of most studies which show that 3 to 6 months after program start, only 50-60% of the original participants are still participating in the program (Dishman, 1988; Marcus, et al., 1992; Oldridge, 1984). These percentages show that, in spite of the high percentage of previous exercisers in the control group, that the intervention served to greatly improve exercise adherence as compared to most other studies.

As for strength training and leisure activity frequency, 16% of treatment and 7% of control participants reported engaging in strength training between one and two times per week. Twelve percent of treatment and 21% of control participants reported engaging in strength training more than twice per week. Twelve percent of treatment and 36% of control participants engaged in leisure activity once per week and 12% of treatment

participants engaged in leisure activity more than two times per week. Even though strength training and leisure activity were not part of the exercise program, it is interesting to note the percentages of participants in both groups that chose to engage in these types of activities.

Assessment Measures

Secondary research questions #1-5: " Does the intervention group have a greater improvement in blood pressure, resting heart rate, weight loss, body composition, and cardiovascular fitness (i.e., improved estimated VO_{2max}) than the non-intervention group?" To answer secondary research questions 1-5, the within group comparisons for the assessment measures reveal that the treatment (intervention) groups had greater improvement in diastolic blood pressure (treatment $p = 0.0001$ and control $p = 0.006$) and resting heart rate (treatment $p = 0.09$ and control $p = 0.11$) than the control group. However, neither treatment nor control groups significantly improved in weight, body composition or estimated VO_{2max} and both treatment and control groups significantly improved in systolic blood pressure.

The improvement in resting heart rate and blood pressure in the treatment groups is assumed to be due to the fact that most participants in the treatment group had started exercising again, after a great lapse of not exercising. So even after just 14 weeks of exercise, blood pressure and resting heart rate improved.

Although, the control group also had significantly increased systolic ($p = 0.004$) and diastolic blood pressure ($p = 0.006$), even with the high percentage of previous exercisers. This may be due to the previous exercisers improving their consistency of exercise during the program as compared to their poorer consistency of exercise before the program.

As for weight and body composition, the adherence levels of both treatment and control groups were perhaps, not high enough and program length not long enough, to reveal significant improvements in these measures.

Correlational Analyses

Before the last two secondary research questions are answered by the correlational relationship findings, the relationship of self-efficacy and social support deserves mention. In Chapter 4, program end self-efficacy and social support were positively correlated ($p = 0.02$). This finding is consistent with the literature (Courneya & McAuley, 1995; Cutrona & Troutman, 1986; Duncan & McAuley, 1993; Holahan & Holahan, 1987; Taylor, et al., 1985) which supports the notion that self-efficacy is mediated by social support, as described in Chapter 2. This relationship is described in more detail in the subsequent conclusions section.

Secondary research questions # 6 & 7: "Does a relationship exist between previous exercise participation and adherence?" and "Does a relationship exist between previous sports or active leisure participation and adherence?" To answer the last two secondary research questions, the correlational analyses reveal that previous exercise participation (exercise history) was positively correlated with both types of adherence (cardiovascular frequency $p = 0.01$, duration $p = 0.04$), however previous leisure/sport activity did not correlate with adherence.

The relationship between exercise history and program adherence (participation) is supported by the literature. According to Kendzierski (1990), experienced exercisers already have a plan of action for starting an exercise program (i.e. decide they'll start, tell their friends, buy some new walking/running shoes, pick a day to start, etc.). In addition,

once the experienced exerciser takes the first actions in a behavioral sequence for starting an exercise program, they are more likely to continue through the sequence (Kendzierski, 1990).

Aside from the research questions posed in this study, an additional interesting correlational finding was that exercise history or exercise experience was not significantly correlated with pre, mid, or post program self-efficacy. This finding seems contrary to the theory of self-efficacy in that having confidence in the ability to perform a behavior leads to higher self-efficacy for that behavior. It seems reasonable that previously engaging in the behavior (in this case, exercise) would increase confidence in one's ability to re-engage in the behavior. However, the previous exercisers in the control group may be an exception to the theory.

Independent Contributions of Self-Efficacy and Social Support on Adherence

Neither program end self-efficacy or total social support had an independent contribution to cardiovascular adherence. However, this finding should be taken with caution for two reasons. First, since program end self-efficacy decreased from mid-program self-efficacy, program end self-efficacy may not truly reflect the self-efficacy level of the program for most program participants since the largest increase in self-efficacy was between pre and mid program. Second, program end total social support reflects all social support subscales which may not provide the best measure of social support for participants since the subscales means varied greatly between treatment and control groups.

Discussion of Programming Aspects

Program planning. Some aspects of program planning unique to this study intervention included scheduling assessments and advertising recruitment health fairs and assessments. Developing assessment schedules with school employees provided a unique challenge to program staff in that assessments could only be scheduled during after school hours (i.e. after students had left, but when employees were still on-site) and around holiday breaks. These circumstances not only left a two-hour window to conduct assessments in the afternoons, but also required development of an assessment rotation through four school worksites.

Another unique program planning aspect of this intervention was developing a marketing plan. It was first thought to post flyers or posters in the staff/teacher lounges however, since every employee in most schools had a personal mailbox in the school office, placing flyers and memos in staff boxes seemed more effective. An extremely unique marketing tool to school worksites was the use of the public address or "PA" system throughout the schools. Physical Education teachers/Wellness Coordinators alerted program staff to the use of the PA system in making "all calls" throughout all rooms in the school as well as in calling teachers in individual classrooms. In the marketing plan, announcements were written for office staff to read during regular morning announcements and immediately after students left in the afternoons as a reminder to employees participating in the program. These announcements could be used to advertise recruitment health fairs and assessment schedules.

Program implementation. Several unique aspects of program implementation arose in this study. These aspects included working with physical education (PE)

teachers/wellness coordinators, teacher in-service days, “using word of mouth,” and organizational/work styles of elementary school employees.

Depending on the planning style, and the motivation and attitude of the PE teacher at a given school, the course of the program implementation differed slightly. In the schools that had highly motivated and organized PE teachers, more employees were recruited for participation and participants were reminded by their PE teachers about upcoming assessments and other program updates. PE teachers with these characteristics also assisted program consultants in “tracking down” participants for their scheduled sessions.

The characteristics of these motivated PE teachers are those commonly held by a “program champion.” A program champion is a key employee who has a secure position in the organization (or school in this case), the respect of peers, and sufficient influence to help move progressive programming ideas that challenge the norms of the worksite culture regarding the program being delivered (Wilson & Glaros, 1994, chap. 21). In many cases, the program champion is critical to the success of implementation of a worksite health promotion program. It can be concluded that those PE teachers serving as program champions had a definite impact on the success of this program delivery.

A second unique aspect of program implementation was the use of teacher in-service days. At one school, in particular, the PE teacher suggested holding pre-program assessments on their teacher in-service day. Since students were off for the day and employees could come by at any time during morning hours for assessments, the program assessment team was able to perform over 30 employee assessments in a morning. This situation proved most convenient for employees and effective for completing a large number of assessments.

A third unique aspect of program implementation was using "word of mouth" as a marketing tool throughout the program's implementation. Since teachers at most schools were arranged in teams according to grade, "word of mouth" could travel quickly among teams and other co-workers. By continually updating certain program participants about the program and having them bring the information back to their team or other co-workers, program information and reminders could be spread quickly.

A final aspect, in terms of program implementation, which proved challenging at times, was the organizational/work style of the majority of the teachers participating in the program. Due to the hectic, energy absorbing nature of some teachers' workdays, tutoring obligations, and after school meetings, these teachers had difficulty keeping appointments made with program consultants. Some teachers would simply forget they had scheduled a session with their consultant or that they had an off-site meeting to attend. The program consultants, in turn, would have difficulty from time-to-time "tracking down" teachers for after school program sessions. Despite an observation of occasional forgetfulness and disorganization of some teachers, all participants made continued efforts throughout the program to meet with their consultant.

Program evaluation. Both submission of exercise verification sheets and submission of PEPs deserve discussion as critical components in the program evaluation process. For submission of exercise verification sheets, employees were to submit their sheets monthly to either their program consultant or PE teacher's box. However, several employees submitted all or part of their sheets to program staff at the time of their post program or final assessment. This proved challenging in terms of data entry, however the sheets had complete information. This occurrence could again be explained by the

forgetful nature of some employees and inconvenience of having to submit sheets monthly.

As for submission of Personal Exercise Plans (PEPs), program consultants had to use carbon paper to generate multiple copies of the PEP. Three copies of the PEP were generated for each session. One copy was given to the participant, one was submitted to the PI for the participant files, and one was kept by the consultant to use as reference for subsequent sessions (in the frequent case when the participant failed to bring their copy to the session). This process enabled constant feedback to the PI regarding participant sessions. In addition, consultants submitted a monthly PEP summary with information summarizing all of their assigned participants' PEP information. Consultants also provided overall program feedback in a program-end staff meeting.

Overall, several components of the worksite exercise program planning, implementation, and evaluation were found to attribute to the effectiveness of the program in this study and can be recommended for future programs. First, considering employees' schedules and work styles is important when planning assessments and consultations. At the school sites, health coordinators should take advantage of teacher in-service days and schedule around after school meetings. Second, thoroughly investigating all marketing and advertising sources (mailboxes, PA system, "word of mouth", etc.) within the worksite organization (or schoolsite organization in this case) by asking involved employees can aid in participant recruitment. Many successful schoolsite health promotion programs (Glasgow, McCaul, & Fisher, 1993; Masey, Gilmarc, & Kronenfeld, 1988; Wong, Bauman & Koch, 1996; Lovato & Green, 1990) have used

intensive social marketing campaigns and incentive strategies to recruit participants and maintain participation throughout the program.

Third, using program champions, such as PE teachers, can greatly increase the success of program implementation. And, lastly, using a behavioral assessment tool (such as the PEPs) and exercise verification sheets can enable tracking of participants progress and consultant feedback reporting in the program evaluation process. It seems that providing the exercise verification sheets in a notebook of some sort or journal to be handed in at the end of the program would prove more convenient for the teachers and staff.

Strengths

There are several strengths to this study. First, the sample was highly representative of the elementary employee population and all program schools were equally "matched" geographically and demographically for the experimental design. Second, the intervention tested was implemented smoothly within the school worksites and for very little cost. Third, the study had a very high retention rate (80% in the treatment group and 86% in the control group). Fourth, all participants improved in several fitness assessment measures, particularly blood pressure. Fifth, the intervention did, in fact, increase self-efficacy and reveal a distinct form of social support. Lastly, the adherence rates of study participants were much higher than most of those in previous studies, mentioned previously.

Weaknesses

Some of the weaknesses of this study were a relatively small sample size and a large percentage of previous exercisers in the control group. Because of the high percentage of regular exercisers in the control group, the treatment group did not demonstrate

significant improvements in several analyses than would otherwise be expected. Also, due to limited time among the assessment and consultant teams and the elementary school break schedule, the exercise program could only run for 14 weeks. This short program length may have limited any significant differences in some of the exercise outcome measures from being revealed. Thirdly, some error exists in measurement of body composition using skinfold measurements and the use of a submaximal test that is somewhat less accurate than a maximal test. Therefore, the body composition and step test hold some limitations within the methodology.

Conclusions

Based on the primary and secondary research questions posed in this study, several conclusions can be made. First, the health education intervention did in fact, increase self-efficacy in the intervention group, however self-efficacy decreased somewhat by program end. Second, co-worker support seemed to be the greatest form of social support for the intervention group throughout the program, with other forms of social support having also increased by program end. Third, the intervention groups did not have greater adherence than the control group in terms of frequency and duration of cardiovascular exercise, however more participants in the intervention group were exercising at the program goal as compared to the control participants. In addition, adherence rates for the study participants were higher than most other reported studies. Fourth, the intervention group had increased significantly in resting heart rate and diastolic blood pressure as compared to the control group however, both treatment and control groups did not significantly improve in weight or body composition but did improve in systolic blood pressure. Finally, previous exercise history was positively

related to adherence but not related to self-efficacy and previous sports or active leisure participation was not related to adherence.

Moreover, the intent of this study was to test a health education intervention designed to increase self-efficacy and social support through behavioral techniques to effect exercise adherence to a worksite exercise promotion program. Little systematic research has demonstrated the use of social support in helping people maintain exercise regimens. Even less research has analyzed types of social support and the function of self-efficacy in regard to exercise adherence. The intervention in this study did increase self-efficacy and social support, even though social support was not directly manipulated.

The findings of this study support the self-efficacy social support relationship and its effect on exercise adherence, which is identified in the literature. According to Bandura (1986), self-efficacy has been consistently identified as playing an important role in health and exercise behaviors and numerous studies have linked social support to health enhancing and health impairing behaviors. In terms of social support, buddy systems, spousal participation and encouragement, and positive feedback from exercise leaders and fellow participants have all been suggested to play a role in continued exercise participation (Duncan & McAuley, 1993). In addition, Dishman (1988) stated that social reinforcement in the form of group support may be the most influential factor in adherence.

Hence, the results of this study reveal that the behavioral health education program increased self-efficacy and social support, which had a positive effect on exercise adherence. Even though exercise adherence was not greater in the intervention group as compared to the control group (due to a high percentage of previous exerciser in the

control group), the intervention groups had comparable adherence levels and improved significantly in some important exercise-related health outcomes. In addition, the overall exercise adherence rates were higher than most other studies.

This intervention demonstrates how important behavioral considerations are in the battle to lead Americans to adopt physical activity in their daily lives. Focusing on methods for boosting self-efficacy can safeguard against discouragement, feelings of displeasure and incompetence, and a proclivity to give up in the face of any real or perceived adversity and challenge of physical activity. Implementing a self-efficacy modeled exercise program such as the one in this study can lead to increased exercise adherence and overall health benefits.

Implications for Health Education

The need for implementation of a health education intervention enhancing self-efficacy and promoting social support among employees is clearly indicated in the literature in Chapters 1 and 2. This study tested the implementation of a behavioral health education intervention designed to increase self-efficacy among elementary school employees. The intervention not only increased self-efficacy and social support (even though social support was not directly manipulated) but also greatly improved exercise adherence as compared to most published studies.

This behavioral health education intervention is based on O'Donnell's model (Wallaston, 1992) which portrays self-efficacy beliefs as playing a central role in predicting both intentions and behavior (see Figure I, Chapter 1). The model also incorporates the constructs of support and prior experience as counterbalancing determinants of whether one's intentions get translated into action (performing the

behavior). Interestingly, self-efficacy promotion was built into this study intervention however, social support and prior experience (previous exercise) were not directly manipulated, rather observed. In lieu of this study design, the findings reveal that the intervention increased both self-efficacy and social support and that those with previous exercise experience had greater adherence to the exercise program. It seems, even without direct manipulation, the constructs of social support and previous exercise experience do play a role in self-efficacy, thereby upholding O'Donnell's model. This study is the first to test O'Donnells's model and these findings indicate that this model should be tested further to be promoted as a framework for future health promotion programming. The findings also reveal a positive correlation between self-efficacy and social support. This relationship also supports the model and the notion that social support can indeed enhance self-efficacy.

The findings of this study in support of O'Donnell's model (as the first study to test the model) and the theory of self-efficacy hold implications for health education in the delivery of exercise promotion programs and improving exercise adherence. Exercise programs must include strategies to promote self-efficacy and social support to improve exercise adherence and thus ultimately improve overall health outcomes. Worksite and community health educators can provide the necessary link needed to bride the gap between exercise knowledge and behavior and make physical activity adoption a reality for our nation's adults. Health educators are skilled in delivering interventions that consider the psychosocial, interpersonal, and cultural aspects of health behavior. As is shown in the present study, these aspects must be addressed if a change in health behavior, particularly adoption of exercise, is to take place.

Specifically, the school worksite setting, used in this study, offers an ideal opportunity for educators and health professionals to work together to endow students and school employees with health promotion knowledge and skills that can potentate lasting benefits. The expanded Comprehensive School Health Program (mentioned in Chapter 2) includes schoolsite employee wellness to maximize the potential for making the school an agent for community health behavior change. Employee wellness programs at the school worksite can not only address some of the training and staff development needs of teachers in health education and health promotion, but can also serve to increase the support of top school administrators for school health education programs (Masey, Gilmarc, & Kronenfeld, 1988). Furthermore, the benefits of a schoolsite wellness program may have a multiplier effect. School staff who become interested and active in maintaining and improving their own health may become more interested and active in improving the health of students and my provide powerful role models. Schoolsite health promotion programs for faculty and staff can provide economic benefits for the district and can improve the productivity of school personnel (Allensworth & Kolbe, 1987).

Overall, the current study provides evidence that a behavioral health education intervention designed to increase self-efficacy can improve exercise adherence and make a difference in health-related outcomes. Regardless of setting, the more that health educators can encourage individuals to adopt and adhere to regular physical activity, the more health education can have an impact on exercise-related health outcomes. In addition, the adoption of exercise can serve as a gateway behavior for health educators to encourage individuals to integrate other positive health behaviors to adopt into their lifestyle.

Recommendations

Futher investigation of the issues presented in this study could enhance understanding of exercise adherence and advance the present findings. Recommendations for future research would be to implement this program again to more participants in a different school district with more blue and pink collar representation. The program also should be run for a longer amount of time to allow greater time intervals between social support and self-efficacy measures. A second recommendation would be to include strength training in the exercise prescription to determine the psycho-behavioral effects of improving body tone and appearance along with cardiovascular exercise. A third recommendation would be to implement this type of health education behavior intervention in different types of worksites such as hospitals, factories, and corporations. Finally, more careful screening should be done at participant recruitment to ensure that an equal representation of previous exercisers comprise both the treatment and control groups.

Moreover, in addition to the recommendations for future testing of this study intervention, some questions have arisen from this study that need to be addressed in future research. First, the question of whether social support, if actively manipulated, in a self-efficacy intervention would have an increased effect in exercise adherence needs to be investigated. Additionally, the question of whether allowing friends and significant others to participate in programs would further increase social support and enhance self-efficacy should be investigated. Third, the impact of controlling for previous exercise experience in lieu of promoting self-efficacy or social support needs to be tested in terms of exercise adherence. It is the hope that this intervention will be implemented again by

numerous researchers and be used as a model for the integration of behavioral health education in regular physical activity adoption.

APPENDIX A
INFORMED CONSENT

Project Title: Exercise adherence in employee exercise programs: Implementation health education intervention

Please read this consent document carefully before consenting to participate in this study.

Purpose of the research study: The purpose of this investigation is to determine if exercise adherence is increased through a health education intervention.

What you will be asked to do in the study: Following the completion of this consent document, you will be asked to complete a pre intervention assessment which will include completion of a pre-participation questionnaire, the Causal Dimension Scale II, and a social support questionnaire. These are all written forms and should take no longer than 15 minutes to complete. After completion of these forms, the second part of the pre-program assessment will entail a fitness assessment including blood pressure and pulse readings, body composition skin-fold measurements and a cardiovascular step test to determine individual fitness levels. Included in the basic Anthropometric measurements will be an assessment of your height, weight and body composition as measured by a skin-fold caliper. The cardiovascular step test will entail stepping up on a step for three minutes. Upon completion of this pre-program assessment, you will be given an aerobic fitness plan based on your individual target heart rate and aerobic activity of your choice. After the five-month program, you will be reassessed with the same assessment measures as described in the pre-assessment.

Program length: 5 months

Risks: Participation in physical activity may result in the remote possibility of adverse changes including abnormal blood pressure, fainting, disorders of heart rhythm, muscle pain, discomfort, fatigue and very rare instances of heart attack or even death. However, completion of the pre-participation questionnaire, individual exercise plans, health educator monitoring, and any needed physician consultation will reduce any health risks related to the program activities to an extremely low risk level. These exercise-related symptoms will subside as your fitness levels improve.

Benefits/Compensation: You will not be compensated for your participation in this study. However, the potential benefits of increased fitness and overall improved health will result.

Confidentiality: Your identity will be kept confidential to the extent provided to you by law. Your information will be assigned a code number. The list connecting your name to this number will be kept in a locked file in my faculty supervisor's office. When the study is completed and the data have been analyzed, the list will be destroyed. Your name will not be used in any report.

Voluntary participation: Your participation in this study is completely voluntary. There is no penalty for not participating.

Right to withdraw from the study: You have the right to withdraw from the study at anytime without consequence.

Whom to contact if you have questions about the study: Kristine Stouffer, Doctoral Candidate, Department of Health Science Education, College of Health and Human Performance, P.O. Box 118200, University of Florida, Gainesville, FL 32611 ph (352) 392-0578 ext. 268, kstouffer@hhp.ufl.edu or you may contact my supervisor, Jill Varnes, Ed.D., Professor and Assistant Dean, Health Science Education, P.O. Box 118202, (352) 392-3187, jvarnes@hhp.ufl.edu.

Whom to contact about your rights in the study: UFIRB Office, Box 112250, University of Florida, Gainesville, FL 32611-2250; ph (352) 392-0433.

Agreement: I have read the procedure described above. I voluntarily agree to participate in the procedure and I have received a copy of this description. If I am injured during this study, as a result of the negligence of the principal investigator, the University of Florida, the Board of Regents of the State of Florida and the State of Florida shall be liable only as provided by law. I may seek appropriate compensation for injury by contacting the Insurance Coordinator at 316 Stadium, University of Florida, (352) 392-2556.

Participant:_____
Date:_____

Principal Investigator:_____
Date:_____

APPENDIX B
PRE-PARTICIPATION QUESTIONNAIRE

In order to provide a more effective and safer exercise program, please complete this form honestly and accurately. You do not have to answer any question you do not wish to answer.

Name (Last, First): _____Age: _____
Gender: male ( ) female( )
Race: _____
Job Title:_____

Please check ( ) your response to the following questions: if yes, please explain.

Yes	No	
( )	( )	1. Are you currently taking any prescribed or over-the-counter medications? List the medication(s) and its (their) purpose. _____
( )	( )	a. Are any of the above medications listed a beta blocker, heart, or stroke medication? If yes, please indicate:_____
( )	( )	2. Has a physician ever told you that you have a heart condition? Explain. _____
( )	( )	3. Do you feel pain or pressure in your chest, neck, shoulder(s) or arm(s) during or after physical activity?
( )	( )	4. Do you lose your balance because of dizziness during physical activity?
( )	( )	5. Do you ever lose consciousness during physical activity?
( )	( )	6. Has a physician ever told you or are you aware that you have high blood pressure?
( )	( )	7. Has anyone in your immediate family (parents, brothers, sisters) had a heart attack, stroke, or other cardiovascular disease before age 50? Explain. _____

( ) ( ) 8. Has a physician ever told you or are you aware that you have a high cholesterol level?

( ) ( ) 9. Do you currently smoke?

( ) ( ) 10. Do you have any joint or bone problems that could be made worse by a change in your physical activity?
Explain. _____

( ) ( ) 11. Do you have any physical or medical conditions (e.g. diabetes, recent surgery, arthritis, pregnancy, etc) not mentioned above, nor do you know of any other reason why you should not engage in physical activity? Explain._____

( ) ( ) 12. Are you currently exercising? If so, how many times per week do you exercise?_____

( ) ( ) 13. Have you been involved in a regular exercise regimen within the six months prior to now?

( ) ( ) 14. Was there a period of time in your life when you regularly engaged physical activity prior to this year? If so, types of activities did you engage in?_____

( ) ( ) 15. Was there a period of time in your life when you regularly engaged in sports or active leisure activities?

All answers provided are honest and accurate to the best of my knowledge.

Participant Signature: _____

APPENDIX C
CAUSAL DIMENSION SCALE II

Please follow the instructions indicated for both parts listed. You do not have to answer any question you do not wish to answer.

Part I
Instructions: In the space provided below, please list one main reason as to why you are unable to or do not engage in regular exercise.

Part II
Instructions: Think about the reason you have written above. The items below concern your impressions or opinions of the cause of why you are unable to exercise regularly. Circle one number that indicates your position in the spectrum of the scale for each of the following statements.

To what degree is the cause something:

1. That reflects an aspect of yourself	9 8 7 6 5 4 3 2 1	reflects an aspect of the situation
2. Manageable by you	9 8 7 6 5 4 3 2 1	not manageable by you
3. Permanent	9 8 7 6 5 4 3 2 1	temporary
4. You can regulate	9 8 7 6 5 4 3 2 1	you cannot regulate
5. Over which others have control	9 8 7 6 5 4 3 2 1	over which others have no control
6. Inside of you	9 8 7 6 5 4 3 2 1	outside of you

7. Stable over time	9 8 7 6 5 4 3 2 1	variable over time
8. Under the power of other people	9 8 7 6 5 4 3 2 1	not under the power of other people
9. Something about you	9 8 7 6 5 4 3 2 1	something about others
10. Over which you have power	9 8 7 6 5 4 3 2 1	over which you do not have power
11. Unchangeable	9 8 7 6 5 4 3 2 1	changeable
12. Other people can regulate	9 8 7 6 5 4 3 2 1	other people regulate

APPENDIX D
SOCIAL SUPPORT FOR EXERCISE HABITS SCALE

Please check the appropriate box next to the statement describing the frequency of support for exercise from those listed.

In the previous 6 months, how often has a coworker (not living with you)…	**None**	**Seldom**	**Occasionally**	**Often**	**Very Often**
1. exercised with me?					
2. offered to exercise with me?					
3. gave me helpful reminders to exercise?					
4. gave me encouragement to stick with my exercise program?					
5. changed their schedule so we could exercise together?					

****Note:** If you live alone, please check "none" for all items in the category below.**

In the previous 6 months, how often has an individual living with you (i.e. family, roommate, etc.)…	**None**	**Seldom**	**Occasionally**	**Often**	**Very Often**
1. exercised with me?					
2. offered to exercise with me?					
3. gave me helpful reminders to exercise?					
4. gave me encouragement to stick with my exercise program?					
5. changed their schedule so we could exercise together?					
6. planned for exercise on recreational outings?					
7. discussed exercise with me?					
8. talked about how much they like to exercise?					
9. helped plan activities around my exercise?					
10. asked me for ideas on how they can get more exercise?					
11. shared my household responsibilities so I had more time to exercise?					
12. ran errands for me so I had more time to exercise?					

13. made positive comments about my physical appearance?					

In the previous 6 months, how often has an individual not living with you (i.e. friend, significant other, etc.)…	None	Seldom	Occasionally	Often	Very Often
1. exercised with me?					
2. offered to exercise with me?					
3. gave me helpful reminders to exercise?					
4. gave me encouragement to stick with my exercise program?					
5. changed their schedule so we could exercise together?					

APPENDIX E
ASSESSMENT FORM

Fitness Assessment Information

Participant Number_____ **Age_____**

STATION 1

_____1. PPQ check-off

_____2. Completion of CDSII and Social Support Questionnaires

_____3. Pulse Reading _____ (10 sec. count x 6 = one minute heart rate)

_____4. Blood Pressure Reading _____

STATION 2 Assessment team member _____

_____1. Height

_____2. Weight

_____3. Body Composition

Female: Tricep _____ Hip_____ Thigh_____

Total Sum _____

Male: Chest_____ Abdomen_____ Thigh_____

Total Sum _____

STATION 3

_____1. Aerobic Step Test

_____2. Heart Rate (15 sec. count) _____

_____3. Calculated Target Heart Rate _____

220
- Age
( ) x .6 =
" x .8 =

(record all results on participant slip)

APPENDIX F
EXERCISE VERFICATION SHEET (ONE MONTH EXAMPLE)

Monthly Exercise Verification Sheet

For each week of the month, please record the type and duration of exercise completed each day.
(i.e. What kind of exercise you did and for how long?) Example: powerwalking – 30 minutes
At the end of each week, record the number of days you exercised. That's it!

January

Day	Week of 1/10 – 1/16	Week of 1/17 – 1/23	Week of 1/24 – 1/30
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Saturday			
Sunday			
Total Days of Exercise			

Participant number:_____ Please turn in by February 4th

APPENDIX G
PERSONAL EXERCISE PLAN

Personal Exercise Plan

PROGRAM GOAL

Activities I enjoy and I can do.

1. _____
2. _____
3. _____
4. _____

Where can I do these activities?

1. _____
2. _____
3. _____
4. _____

When can I do these activities?

	Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
AM							
PM							

Remember to exercise at your Target Heart Rate! _____

MONTHLY PERSONAL GOAL

**Remember goals are specific, measurable and within a time frame!

Your personal goal can be anything you want to achieve related to exercise.

_____

_____

Specific strategies that will help me achieve my goal.

1. _____
2. _____
2. _____

BARRIERS

I may sabotage my plan by:

1. _____
2. _____
3. _____

I plan to overcome these barriers by:

1. _____
2. _____
3. _____

- For use after 1st session only!

GOAL EVALUTION

Was my goal met?

_____

What can I do now?

Revise goal?

Set new goal?

Keep & Continue this goal?

How are you feeling while you exercise?

_____

_____

_____

Signed

_____ _____

Participant Date

_____ _____

Consultant Date

_____ _____

Your Exercise Supporter Date

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BIOGRAPHICAL SKETCH

Kristine Stouffer received her Bachelor of Arts degree in psychology from the University of Central Florida in 1993. While pursuing her undergraduate degree, Kristine worked as a wellness peer consultant and biofeedback consultant as well as conducted biofeedback research and programming. Upon completion of her bachelor's degree, Kristine worked as a counselor in the psychiatric field where she designed and implemented a wellness/health promotion program for psychiatric residents.

Kristine came to the University of Florida (UF) in 1995 and received her master's degree in Health science education. During the course of her master's degree, Kristine worked as a graduate assistant for Project WISE-UP; a comprehensive after-school federally funded grant program for at-risk youth. She also presented at several conferences and meetings, published scholarly articles, assisted with UF's employee wellness program development, and was inducted into Eta Sigma Gamma Honor Society.

As a doctoral student in the College of Health and Human Performance and research assistant to Dr. Jill Varnes, Kristine served as the editor of the FAHPERD newsletter, continued scholarly publishing and presenting, taught a dual undergraduate and graduate course in worksite health promotion, and received the Norma Leavitt Graduate Scholarship and the Patrick Bird Dissertation Award. Kristine also maintains her aerobic certification of nine years and is currently teaching as a certified aerobics instructor at Orion Fitness of Gainesville, Florida. Kristine will graduate in August of 2000 with her

Ph.D. in health and human performance, specializing in health behavior, and will work as a post-doctoral faculty researcher for a three-year biofeedback-hypertension grant for the Office of Research Support for UF's College of Nursing.