PROJECT PHIT: A 10-WEEK UNIVERSITY INTERVENTION IMPROVES HEALTH-RELATED VARIABLES, PHYSICAL ACTIVITY, AND NUTRITION

by

Jennifer Ashley Summers

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Jennifer Ashley Summers

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Caile Spear, Ph.D.	Chair, Supervisory Committee
Lynda Ransdell, Ph.D.	Member, Supervisory Committee
Tedd McDonald, Ph.D.	Member, Supervisory Committee

The final reading approval of the thesis was granted by Caile Spear, Ph.D., Chair of the Supervisory Committee. The thesis was approved for the Graduate College by John R. Pelton, Ph.D., Dean of the Graduate College.

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ABSTRACT

Project PHIT: A 10-Week University Program Improves Health-Related Variables, Physical Activity, and Nutrition

by Jennifer Ashley Summers

Despite increasing evidence regarding the benefits of regular physical activity and healthy nutritional habits, a large percentage of the population does not participate in regular exercise or eat the recommended daily servings of fruits and vegetables. Previous studies have identified the use of social support as a means to modify health behavior. The purpose of this study was to assess the effects of a 10-week Project PHIT intervention on university employees' health behaviors. Grounded in social support theory, Project PHIT was designed to help employees improve health behaviors such as physical activity and nutritional intake, and increase fitness. It was expected that an intervention with activities designed to increase social support would be associated with changes in nutritional intake and physical activity behavior. Data were collected from participants (N= 26, 81% female, age *M*=41.13, *SD*= 12.28) before and after a 10-week intervention period. Participants met twice a week for 60 minutes to participate in both educational and physical activity components. Health-related fitness variables measured before and after the intervention included blood pressure, body weight, regular activity participation (e.g., PHIT class days were two days/week), and aerobic fitness (i.e., maximal oxygen uptake). Participants completed four questionnaires: 1) The

Demographic and Health History Questionnaire to gather data such as age, health history, and ability to perform physical activity; 2) The *Social Support Questionnaire* to determine participants' perceived level of social support relative to nutritional and physical activity habits; 3) the *Fitnessgram Physical Activity Questionnaire* to detect physical activity changes; and 4) *The Block Food Frequency: Rapid Food Screener for Fruits, Vegetables and Fiber* to detect nutrition changes, as a result of the intervention. The majority of participants (24 out of 26 or 92.3%) attended at least 86% of the sessions. Repeated measures multivariate analysis of variances indicated: (a) significant positive changes in body mass (kilograms) (p=0.01), reduced systolic blood pressure (mmHg) (p=0.033), reduced diastolic blood pressure (mmHg) (p=0.03), and aerobic capacity (VO_2 max) (p=0 .01); (b) increased fruit and vegetable servings per day (p=0.03) and fiber (grams) intake (p=0.02); and (c) increased participation (two days/week) in aerobic (p<0.001), muscular strength (p<0.001) and flexibility activities (p =0.01), and average number of steps (p=0.01). Positive changes were also observed in exercise and nutrition-related social support (p<0.001). Perceived nutrition-based social support was positively correlated with participants' positive changes in vegetable intake (r= 0.48, p=0.02) and fiber intake (r=0.40, p=0.05). Overall, university employees responded positively to the Project PHIT program. The use of social support as a behavioral change strategy in conjunction with a variety of physical activities within a university setting may be useful for modifying health behaviors.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER ONE: INTRODUCTION

Introduction

Regular physical activity has long been praised for its positive impact on health and disease prevention. Additionally, low levels of physical activity have been linked to a number of health concerns including obesity, diabetes, osteoporosis, depression, and other mental health-related conditions (Centers for Disease Control and Prevention (CDC), 2011). Despite the proven benefits of physical activity, more than 50% of American adults do not get enough physical activity to provide health benefits and more than 25% are not active in their leisure time (CDC, 2011). These low levels of physical activity have led to an increase in population-wide interventions aimed at increasing exercise behavior (Sallis, Calfas, Alcaraz, Gehrman, & Johnson, 1999).

Dietary behavior changes provide another opportunity for disease prevention. Increasing fruit and vegetable intake is one of the most important components of improving diet to prevent disease (Knoops et al., 2004). A diet high in fruits and vegetables is associated with a decreased risk for chronic disease (United States Department of Agriculture (USDA), 2010). According to the 2010 Dietary Guidelines for Americans, adults should consume 3 ½ to 6 ½ cups of fruit and vegetables every day; however, most Americans fail to meet this recommendation (USDA, 2010).

Results of the CDC's Idaho Behavioral Risk Factor Surveillance System (BRFSS) survey (2009) found that 36.2% of adult Idahoans are overweight and 25.1% are obese;

almost one-fourth (21%) of adult Idahoans reported no participation in physical activity in the prior month surveyed, and more than 75% did not eat the recommended minimum of five servings of fruits and vegetables per day (Centers for Disease Control and Prevention (CDC), 2009). Reasons for low levels of physical activity involvement include material influences (e.g., program cost and access), psychological influences (e.g., lack of motivation and confidence in physical abilities), and social influences (e.g., peer pressure) (Hanlon, Morris, & Nabbs, 2010; Ransdell, Dratt, Kennedy, O'Neill, & DeVoe, 2001). Reasons for low levels of fruit and vegetable consumption can also be attributed to factors such as material influences (e.g., cost and income level), environment (e.g., lack of acceptable food at work), psychological influences (e.g., self-efficacy and perceived barriers), and social influence (e.g., social support) (Backman, Gonzaga, Sugerman, Francis, & Cook, 2011; Kamphuis et al., 2006).

The worksite is an optimal setting for making healthy lifestyle modifications because of the established channels of communication, existing support networks, and opportunities for developing norms of behavior (DeJoy et al., 2008; Sallis et al., 1999). Workplaces, such as university campuses, can provide a means to improve physical activity participation and unhealthy dietary practices because workers spend such a large portion of each work day at their worksites (Abood, Black, & Feral, 2003; Backman et al., 2011; Conn, Hafdahl, Cooper, Brown, & Lusk, 2009). Workplace-based settings provide an ideal environment for nutrition and physical activity interventions (Katz et al., 2005).

The Social Cognitive Theory (SCT), developed by Albert Bandura, suggests several factors, including social, cognitive, and environmental, are responsible for

motivating behavior change (1986). SCT references an individual's ability to learn behavior through social, cognition, and environmental factors. A key component of the SCT is the importance it assigns to social support in terms of producing and maintaining behavior change. Social support can be described as a person's perception of the help that is received from their social environment (Amaya & Petosa, 2011).

The importance of social support can be found within all stages of life and arguably it is as important during adulthood (e.g., lack of confidence, lack of access and/or travel time to physical activity classes) as it is during childhood and adolescence (Ransdell et al., 2003). Research has suggested that social support provides benefits for a person's physical health and has been linked to a number of health outcomes (Hale, Hannum, & Espelage, 2005; Manning & Fusilier, 1999; Sallis, Grossman, Pinski, Patterson, & Nader, 1987). For example, psychological (e.g., depression, overall happiness, life satisfaction) and physical health have been studied and both have been linked to social support (Wallen & Lachman, 2000). It is also likely that the lack of social support is associated with increased risk of cardiovascular disease (Manning & Fusilier, 1999).

According to Sallis et al. (1987), social support, including emotional, instrumental, and informational support, is an important determinant of success for changing health habits. Specifically, social support is associated with positive health behaviors, including fruit and vegetable consumption, adherence to dietary change programs and increasing physical activity (Bandura, 2001; Hendry, Williams, Markland, Wilkinson, & Maddison, 2006; Jackson, 2006; McNeill, Kreuter, & Subramanian, 2006; Shaikh, Yaroch, Nebeling, Yeh, & Resnicow, 2008).

Increasing social support is also a promising, well-researched strategy for facilitating health behavior changes among employees (Backman et al., 2011; DeJoy et al., 2008; Griffin-Blake & DeJoy, 2005). For example, Plotnikoff et al. (2007) suggested that "The most efficacious workplace interventions are based on social-cognitive theories" (as cited in Plotnikoff et al., 2007, p. 502). Additional studies examining intervention methods that incorporate social support strategies within workplace-based physical activity and nutrition programs are necessary to move the health promotion field forward. More specifically, additional research is needed to determine the role of social support within a university-based setting.

To examine the role of social support among employees in a university-based setting, two pilot programs of Project PHIT (Personal Health Intervention Team) were performed in the spring and fall of 2009 (n=18 and n=17 participants, respectively). Activities were designed to incorporate strategies that sought to create a supportive environment for increasing an individual's physical activity and healthy eating habits. Each of the pilot Project PHIT programs focused employees known to have significant health risks including individuals who reported being overweight (64%), never/rarely exercising (17%), and/or having diabetes or heart disease (both at 19%) (Health Risk Appraisal, 2007).

Qualitative interview data collected from participants at the end of each pilot program revealed that participants felt that the "social support" from fellow Project PHIT participants was an important influence that helped them initiate and maintain physical activity and eat more fruits and vegetables daily. Participants reported that words of encouragement, questions about physical activity involvement and/or nutrition intake

during leisure time, and working out with fellow colleagues (i.e., all potential indicators of social support), were aspects of the program that helped create a positive, healthy environment conducive to making health behavior modifications. These findings provided the information needed to examine the role of social support further as a means for increasing health behavior among the employees in a university-based setting.

Statement of Problem

Previous research studies have provided evidence regarding factors that may contribute to increasing physical activity levels and healthy nutrition habits among individuals at their workplace (Backman et al., 2011; Dishman, DeJoy, Wilson, & Vandenberg, 2009; Plotnikoff et al., 2007). Few studies have attempted to increase social support among employees in a university-based setting in order to increase physical activity and healthy eating habits.

Purpose

Due to the limited information about university-based worksite health promotion programs that use social support as a facilitator of behavior change, the purpose of this thesis was to test the efficacy of a 10-week workplace-based lifestyle and physical activity intervention in terms of increasing social support, fruit, vegetable, and fiber intake, and physical activity participation in a convenience sample of university employees. In addition, the effect of social support on the aforementioned behaviors will also be assessed. Based on the two previous pilot programs, Project PHIT is designed to introduce university employees to health behavior modifications, including improving eating habits (e.g., eating less fat and more fruits, vegetables and fiber) and increasing

physical activity (e.g. increasing number of steps taken daily). This study will use activities designed to increase social support to determine whether social support is a mediator of the predicted changes in health behaviors.

Research Questions

The specific research questions for this study are:

1. Will a 10-week Project PHIT intervention change physical activity as measured objectively with pedometers in this sample?
2. Will a 10-week Project PHIT intervention change physical activity (e.g., aerobic, weight training, and flexibility exercises) as measured subjectively with a questionnaire in this sample?
3. Will a 10-week Project PHIT intervention change the intake of fruits, vegetables, and fiber in this sample?
4. Will a 10-week Project PHIT intervention change health-related fitness (e.g., weight, blood pressure, and cardiovascular fitness) in this sample?
5. Will social support facilitate changes in physical activity, fitness, and intake of fruits, vegetables, and fiber that occur as a result of participating in the 10-week Project PHIT intervention?

Delimitations

Individuals were included in the study if they were healthy (i.e., self-reported ability to participate in light-moderate exercise) and employees of Boise State University. Additional inclusion criteria for participating in the study were at least 18 years old, apparently able to participate in physical activity with no medical condition(s) that would

prevent participation in the program and signed a consent form as a record of agreement to participate in the program (see Appendix A). Participants were excluded from the study if, based on their own self-reported health history, they had any physical injuries, health concerns or complications that would prevent them from light to moderate exercises. Additionally, participants were excluded if they were pregnant.

Limitations

Findings should be considered in the context of the following limitations. First, the sample was not randomly selected; additionally, participants were not assigned to a control group. Although the design assumes that changes are attributable to the effects of the intervention, it is possible that factors other than the intervention affected the reported changes. Generalization is limited in the sense that all findings stem from a small convenience sample of employees within a metropolitan, research university. The small sample size and single site for this research limit the extent to which the findings can be generalized to other contexts.

A second limitation was that the amount of exercise was variable across participants. Some individuals had injuries restricting the range of exercises in which they could participate. Every attempt was made to provide alternative exercises in order to try to keep the participants engaged in physical activity (i.e., about 30 minutes of physical activity) and maintain comparable frequency and duration of weekly physical activity.

Thirdly, all data obtained from the questionnaires contained self-reported information. Therefore, it is not certain that participants answered accurately about their personal health information, physical activity levels, and nutrition habits. Consequently,

the effectiveness of the intervention, at least as measured by questionnaires, may be gleaned only from the employees who completed the pre- and post-intervention questionnaires.

A fourth limitation stems from the fact that Sallis et al. (1987) originally created the Social Support Questionnaire to address support only from family and friends. Therefore, the Social Support Questionnaire was modified for purposes of this study to include information about social support provided by participants in a 10-week faculty and staff Project PHIT program.

Definition of Terms

Baseline activity. "The light-intensity activities of daily life, such as standing, walking slowly, and lifting lightweight objects" (as cited in United States Department of Health and Human Services (USDHHS), 2008, chapter 1).

Healthy eating habits. Healthy eating habits consist of a combination of the two points below:

1. Adults should consume 3 ½ to 6 ½ cups of fruit and vegetables every day.

2. Adults should choose a variety of fruits and vegetables each day. In particular, vegetables should be from all five vegetable subgroups (e.g., dark green, orange, legumes, starchy vegetables, and other vegetables) several times a week (USDA, 2010).

Healthy physical activity levels. Healthy physical activity levels consist of at least 150 minutes a week of moderate-intensity physical activity (e.g., five or more days per week for at least 30 minutes) (USDHHS, 2008).

Hypokinetic disease. A disease or condition that is related to or caused by chronic physical inactivity and poor fitness. Examples of such conditions include heart disease and obesity (Corbin, Lindsey, Welk, & Corbin, 2002).

Intervention. A specific prevention measure or activity designed to meet a program objective.

Perceived social support. The possibility of exchange of resources between two people or more that is perceived by the recipient as intended to increase well being.

Physical activity (PA). Any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above and enhances health (USDHHS, 2008).

CHAPTER TWO: LITERATURE REVIEW

The purpose of this literature review is to provide background information about this thesis, the topic, and the methodology selected to support the research hypotheses that University employees will benefit from a 10-week workplace-based, physical activity, and nutrition intervention. In the first section, the prevalence of obesity in American adults is explored along with the relationship between physical activity and disease. Next, the dietary habits of American adults and the relationship between diet and health are examined. Third, workplace-based health interventions are examined. Finally, social support models and theories are assessed, and specific applications within physical activity and nutrition behaviors are explored.

Prevalence of Physical Activity in American Adults and the Relationship Between Physical Activity and Disease

Physical activity, defined as any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above and enhances health (USDHHS, 2008), is one of the 10 "Leading Health Indicators" identified by Healthy People 2010 (USDHHS, 2000). Americans should engage in regular physical activity to reduce the risk of many adverse health outcomes. Most health benefits occur with at least 150 minutes a week of moderate intensity aerobic activity, such as brisk walking, reduces the risk of many chronic diseases (USDHHS, 2008). Additionally, adults should engage in two types of physical activity—aerobic and muscle strengthening—each week to improve

health (USDHHS, 2008). Despite the positive effects of exercise, more than 80% of American adults do not meet the guidelines for physical activity (USDHHS, 2008).

The lack of physical activity in American adults is disconcerting because regular physical activity is associated with enhanced health such as aerobic capacity, muscular strength, and enhanced metabolic functioning (USDHHS, 2008). Likewise, low levels of physical activity have been linked to a number of chronic diseases and health concerns including (but not limited to) obesity, diabetes, coronary heart disease, osteoporosis, lower back pain, depression and other mental health conditions (CDC, 2011). Benefits increase as the frequency and intensity of physical activity increases. Even moderate levels of activity, such as raking leaves for 30 minutes or taking a brisk walk for 20 minutes, provide substantial benefits (e.g., lower risk of falls and injury, improved mood, and quality of life) and help prevent chronic diseases (USDHHS, 2008).

Another condition that physical activity can address is the loss of mobility that often accompanies the aging process. According to the USDHHS (2008), the perception that old age results in frailty and a loss of function (e.g., difficulty walking long distances or climbing the stairs) is in large part due to physical inactivity. Even in the absence of being overweight, studies have linked unhealthy eating habits, low physical activity levels, high body mass index, and smoking with the major causes of morbidity and mortality in older adults (LaCroix, Guralnik, Berkman, Wallace & Satterfield, 1993; USDA, 2010). Overall, the health benefits of physical activity far outweigh the possible risks.

Of the aforementioned conditions, many are also related to overweight and obesity. Overweight is defined as an adult with a body mass index (BMI= weight in

kilograms/height in meters^2) between 25 or higher and obesity is defined as adults with a BMI of 30 or higher (CDC, 2011). According to the CDC (2011), more than one-third of U.S. adults are obese. The prevalence of obesity doubled for adults during 1980-2008, which translates into approximately 72 million adults (CDC, 2011). Medical care costs equal billions of dollars each year. In 2008, the national estimated cost of annual medical spending attributable to obesity was $147 billion (Finkelstein, Trogdon, Cohen, & Dietz, 2009). Obesity is also a contributor to disability, sick leave, injuries, and health care claims in the workplace (Ostbye, Dement, & Krause, 2007). Clearly, there is a need to develop physical activity interventions that address the problem of overweight and obesity in today's worksites interventions that address a workplace environment that can often support low activity levels and overeating.

Overall, the research has supported a consistent and inverse relationship between physical activity and disease (e.g., more physical activity = less disease risk). To assist with health care costs and improve the health of their workers, some employers are implementing health promotion programs and interventions at the workplace. Some of the most promising interventions have been found to result from programs that focus on individual risk reduction and efforts to address the social and environmental factors that support unhealthy behaviors (e.g., low physical activity and over-consumption of calories) (DeJoy et al., 2008). Further studies are needed to explore the mediating factors that influence behavior change in the workplace.

Current Dietary Habits of Americans and the Relationship Between Diet and Health

"Unhealthy lifestyle, including a lack of physical activity and poor nutrition, and being overweight, is the second leading cause of preventable death after tobacco" (as

cited in Green, Cheadle, Pellegrini, & Harris, 2007, p. 1). Currently, most Americans consume too many calories compared to their energy expenditure (i.e., energy imbalance = energy in from foods > energy out/calories used in physical activity and daily activities) (CDC, 2011). Energy imbalance can be attributed to greater access and consumption of high-calorie foods coupled with a lack of physical activity throughout the day (e.g., sitting behind a desk at work), which ultimately contributes to obesity.

As a result of poor dietary quality among Americans, the risk of disease including cardiovascular disease, stroke, cancer, diabetes, and obesity has increased over the last decade (Backman et al., 2011; Vandelanotte, Spathonis, Eakin, & Owen, 2007). Specifically, many Americans eat too many calories from fat, added sugars, and refined grains while consuming too few fruits and vegetables (USDA, 2010). Increased incidence of obesity among Americans has been linked to high-sugar drinks such as soda, which are abundantly available in the workplace (e.g., vending machines), more sedentary jobs, a higher availability to energy-rich foods and higher rates of occupational conditions such as cardiovascular disease, cancer, injury, and lowered immune response (Anderson et al., 2009; DeJoy et al., 2008).

Fruit and vegetable intake is one of the leading protective factors for disease prevention (Backman et al., 2011). According to the USDA Dietary Guidelines of Americans (2010), the more fruits and vegetables you consume, the more likely you will reduce the risk of chronic diseases, stroke, and cancer. A high consumption of fiber has also been linked to a reduced risk in coronary heart disease. Even though poor nutrition has been linked to numerous health concerns, many Americans fail to meet the recommended fruit, vegetable, and fiber intake (USDA, 2010).

Studies suggest dietary behavior change is influenced by a combination of environmental, community, and societal factors (Parker, DeJoy, Wilson, Bowen, & Goetzel, 2010). Researchers continue to investigate mediating factors to understand the impact of nutrition interventions. Health promotion programs have often used conceptual models of behavior change (e.g., SCT) and program planning models to evaluate psychosocial, predisposing (e.g., knowledge), and enabling factors (e.g., social support) factors as mediators of change (Kristal, Glanz, Tilley, & Li, 2000). According to Kristal et al. (2000), interventions that target eating environments (e.g., the workplace), skills, and knowledge can increase intervention effectiveness. In particular, research continues to suggest that the workplace is an ideal setting for improving nutrition and physical activity behavior (Aldana et al., 2005).

Overall, the literature supports that a combination of poor dietary choices, increased caloric intake, and physical inactivity has contributed to obesity in this country. The adoption of healthy eating behaviors can lead to many health benefits and prevent hypokinetic health conditions. Workplace-based interventions that encourage healthy dietary and physical activity behaviors can improve the health of individuals while decreasing health care cost and the incidence of obesity and chronic disease in this country.

Workplace-Based Interventions

Worksites offer an opportunity to reach up to 65% of American adults, many of whom spend half of their waking hours at work (Katz et al., 2005). Worksites present an optimal arena for making healthy lifestyle changes such as increasing physical activity and making healthy dietary habits (Backman et al., 2011; Dishman et al., 2009;

Plotnikoff et al., 2007). Workplace physical activity interventions can improve health and important worksite outcomes, as well as result in cost savings for the employer (Backman et al., 2011; Conn et al., 2009). For example, workplace physical activity programs have the potential to lower absenteeism, short-term sick leave, health care costs, and job turnover as well as increase job productivity and morale (Katz et al., 2005; USDHHS, 2008).

Specifically, interventions have been used at the workplace to improve healthy dietary behaviors. According to Backman et al. (2011), building self-efficacy in the workplace (e.g., increasing opportunities to observe social models and experience social persuasion) can encourage a higher consumption of fruits and vegetables. Low-fat vending machine options have also been proven to be successful in improving the dietary choices among employees (French et al., 2001). Abood et al. (2003) created a program for university staff and evaluated the effects of this theory-based, Health-Belief Model, nutrition intervention. Results indicated a significant reduction in total calories, fat, saturated fat, and cholesterol intake; however, it was noted that psychosocial models might enhance the effectiveness of nutrition interventions (Abood et al., 2003).

White and Ransdell (2003) found the use of behavioral change strategies in conjunction with a variety of physical activities was effective in improving physical activity among employees in a worksite intervention. Walking programs featuring the use of pedometers (Aldana et al., 2006; Freak-Poli, Wolfe, Backholer, Courten, & Peeters, 2011; Gilson, McKenna, Cooke, & Brown, 2007; Haines et al., 2007) and web-based physical activity interventions (Sternfeld et al., 2009; Vandelanotte et al., 2007) have been effective in achieving significant improvement in physical activity.

The promotion of physical activity via written materials does not tend to significantly impact physical activity levels (Plotnikoff et al., 2007), whereas theory-based interventions (e.g., those based on SCT, Health Belief Model, etc.) have shown significant changes in physical activity in the workplace. Theory-based interventions that have applied strategies such as the development of a supportive environment, activities that enhance self-efficacy, and role modeling techniques to encourage physical activity improved activity levels (Elbel, Aldana, Bloswick, & Lyon, 2003; Plotnikoff et al., 2007; Titze, Martin, Seiler, Stronegger, & Marti, 2001).

Research indicates that successful theory-based, physical activity interventions can be attributed to changes in particular mediators (e.g., self-efficacy and social support); however, few studies have examined the change in potential mediators to predict change in healthy behaviors (e.g., physical activity and healthy dietary habits) (DeJoy et al, 2011; DeJoy et al., 2008; Lewis, Marcus, Pate, & Dunn, 2002). There is a need to measure mediating variables and determine whether intervention variables change with the inclusion of mediators (Baranowski, Anderson, & Carmack, 1998; Lewis et al., 2002). Additionally, there is a need to further evaluate psychosocial mediators of physical activity and nutrition behaviors among adults in the workplace.

Clearly, the workplace can be an effective venue for health behavior modification interventions; however, a review of the literature suggests that there is a void in research that focuses on universities as worksite-based settings. Abood et al. (2003) found that workplaces, such as university campuses, were successful venues to support healthy behavior changes. Individuals within a shared community (e.g., university campuses) tend to have similar values, access to facilities, work schedules, and daily activities as

well as established channels of communication and existing support networks (Plotnikoff et al., 2007).

An electronic search using the databases PubMed, MEDLINE, and ERIC between 1993 through 2011 produced only a few studies that focused on physical activity or nutrition interventions in the university workplace (Abood et al., 2003; Gilson et al., 2007; White & Ransdell, 2003), but failed to produce any studies that incorporated each of the following requirements: 1) workplace-based, 2) theory-based, 3) nutrition, and 4) physical activity interventions that focused on university employees.

Workplace-based interventions have yielded many positive outcomes including disease prevention (Vandelanotte et al., 2007) and lowered health care costs for the employer (Anderson et. al., 2009). It is estimated that approximately 90% of workplaces with more than 50 employees have some form of health promotion or disease prevention program (Aldana et al., 2006). The outcomes of the programs vary considerably, however, and more studies need to focus on theory-based (e.g., SCT) nutrition and physical activity interventions for employees in the workplace. Additionally, there is a need to conduct further investigations of theoretical constructs (e.g., social support) that are hypothesized to create changes in behavior as a result of the intervention.

Social Support Theories and Models and Applications within Interventions

Social support has many identified dimensions (e.g., social relationships) and has been defined as "activities that help the individual move toward goals" (Sallis et al., 1987, pg. 826). Social support is a moderator of stress and a positive predictor of good health (Chakradhar, Raj, & Raj, 2009). It may come from several sources (e.g., coworkers, family and friends) and has been described as a multidimensional concept

consisting of structural (e.g., social support networks), functional (e.g., exchange of social support resources), and perceived (e.g., perception of the quality and quantity of social support) dimensions (Barrera, Strycker, MacKinnon, & Toobert, 2006; Chronister, Johnson, & Berven, 2006; Holt & Hoar, 2006). In particular, perceived social support (i.e., perception of being cared for and loved) is associated with well being and health (Gould, Greenleaf, Chung, & Guinan, 2002). For example, Barrera et al. (2006) noted the positive effects of social support on alcoholism, smoking, obesity, and heart disease.

According to the Task Force on Community Prevention Services (2002), social support interventions in community settings are strongly recommended due to their effectiveness for increasing physical activity (i.e., time spent exercising and frequency of exercise), improving physical fitness, increasing muscular strength, and flexibility and decreasing body fat. For example, Belza et al. (2004) determined that many older adults experience a lack of social support, lack of transportation (to specific physical activity facilities), fear of injury, and/or potential program costs keeping them from engaging in regular physical activity.

According to Ransdell et al. (2008), the SCT is one of the most successful theory-based frameworks for physical activity interventions. A major concept of the SCT is that social factors play an influential role in cognitive development, motivation, and ultimately behavior change (Bandura, 1986). For example, changing health-related behaviors such as physical inactivity and diet may require targeting a person's social support system.

Social support, in addition to being a key component in disease prevention, has also been viewed as an important variable in the adoption and maintenance of healthful

eating behaviors and habits (Sallis et al., 1987; Shaikh et al., 2008; Stanton, Green, & Fries, 2007). Kristal et al. (2000) found that predisposing (i.e., motivation, beliefs, and knowledge) and enabling factors (i.e., social support, norms, and workplace environment) were mediators for dietary change behavior (i.e., increase in fiber, fruits, and vegetables; and a decrease in fat intake).

There is evidence that social support is an important determinant in changing physical activity (Bandura, 2001; McNeill et al., 2006). Grounded in the SCT, studies using website-based interventions (Napolitano et al., 2003) and walking interventions (Rovniak, Hovell, Wojcik, Winett, & Martinez-Donate, 2005) found positive changes in physical activity in the workplace. In addition, telephone-based interventions (Opdenacker & Filip, 2008) and community-based interventions (Jackson, 2006) acknowledged social support as a mediating factor for increasing physical activity. Table 2.1 provides an overview of social support studies with a focus on diet and/or physical activity.

Table 2.1 Overview of Social Support Studies

Study	Design	Intervention	Theory	Intervention Effects
Elbel et al. (2003)	**Focus:** PA **Participants:** 148 employees (mean age= 40 years)	**Groups:** 1) professional led, 2) peer led, and 3) control group **Duration:** 3.5 weeks with 7 courses **Format:** Educational courses 2x week, self study materials, video, self study materials, and classroom instruction	SCT	Average steps increased for each intervention group. Peer intervention enhanced self efficacy and self reported PA; professional led intervention enhanced PA.

Table 2.1 (cont.) Overview of Social Support Studies

Study	Design	Intervention	Theory	Intervention Effects
Kristal et al.	**Focus:** Diet and Mediating	**Groups:** Next Step Trial	SCT and Trans-	Changes in mediating variables

(2000)	Factors **Participants:** 1,795 employees (mean age= 58 years)	participants from 28 worksites **Duration/Format:** 3 year observation (year 1, 5 classes and mailed materials were provided; year 2, personalized feedback materials), both years newsletters and activities were provided	theoretical model (TTM)	had significant effects on dietary change (predisposing factors and enabling factors such as social support)
Napolitano et al. (2003)	**Focus**: PA **Participants**: 65 sedentary employees (18-65 years; mean age=43)	**Groups**: 1) website and email 2) Control group (those on the waiting list) **Duration:** 3 months **Format:** Internet plus weekly email tips	SCT and TTM	Minimal PA (walking) was significantly higher in intervention group
Opdenacker et al. (2008)	**Focus:** PA and Mental Health **Participants:** 66 university employees (mean age= 39 years)	**Groups:** 1) face-to-face support group or 2) telephone based support group **Duration:** 3 month coaching program **Format:** Class courses, brochures, telephone support groups, weekly feedback	Not reported-focus on self-efficacy and social support	Both groups increased leisure-time PA, self-efficacy, and social support and decreased sitting time and trait anxiety
Rovinak et al. (2005)	**Focus:** Walking **Participants:** 2,121 workplace employees (mean age= 45)	**Groups:** 1) walking program with SCT feedback 2) walking program with tailored SCT feedback **Duration:** 12 weeks **Format:** Walking program, walking logs via email, feedback, emails	SCT	Significant improvement in 1 mile walk test, improvement in estimated VO_2max and greater program satisfaction in tailored SCT feedback group
Stanton et al. (2007)	**Focus:** Diet and social support **Participants:** 1,942 students (mean age= 12 years)	**Groups:** Data collected from 22 counties in Virginia and New York **Duration/ Format:** Cross sectional baseline health surveys administered in classrooms	Not reported-Evaluated relationships among social support sources and eating behaviors	Positive support (family and friend) for healthful eating was related to healthful dietary practices (fat and fiber intake)

Health interventions need to have a comprehensive approach, including a culture that supports health promotion, support from management, and encouragement from peers (Dishman et al., 2009; Plotnikoff et al., 2007). Further studies found that

researchers should take into account the individual approach and the development of a supportive environment when establishing an intervention (Titze et al., 2001).

Sallis et al. (1987) conducted one of the few studies that developed scales to determine whether social support is a mediator for dietary and physical activity behavior modifications. Positive support was more closely related to health enhancing behaviors than negative support. The results indicated that dietary social support was strongly related to change in dietary behaviors and exercise social support was strongly related to exercise behaviors. Sallis et al. (1987) also found that the friend and family support scales were shown to have good reliability (reliability test and retest reliabilities of the factors are r=0.55-0.86) and validity (validity coefficients of the positive factors were moderate). The diet and physical activity social support scales "may be the first systematic description of patterns of interpersonal support for health-related dietary and exercise behaviors and the first psychometric evaluation of social support measures for dietary and exercise habits" (as cited in Sallis et al., 1987, p. 834). The scales developed in this study were used in the Project PHIT intervention in order to understand the role that social support played in health-behavior change.

In previous pilot tests of Project PHIT (spring and fall 2009), it was evident that social support may have facilitated some of the changes in physical activity and nutrition reported. During the two pilot programs, participants were asked to detail ways in which family, friends, and fellow Project PHIT participants had been supportive and non-supportive of their dietary and physical activity behavior changes and how they would like to be supported in the future. Discussions pre- and post-interventions allowed participants to provide feedback on the types of activities in which they would like to

participate, the desired timeframe for the intervention, and optimal days and times of the week to hold the program. Using the SCT, promising intervention components and feedback from the two pilot programs, the Project PHIT program was developed (see Table 2.2 for a summary of the SCT aspects of Project PHIT program).

Table 2.2 Application of SCT to Project PHIT Program

SCT Concept	Definition	Implications	Application of SCT to Project PHIT
Environment	Factors physically external to the person	Provides opportunities and social support	• Workplace environment • Social environment including family, friends and peers at work
Situation	Perception of the environment	Correct misperceptions and promote healthful forms	• Participants assumed to be healthy • Promote that physical activity is fun and can be performed conveniently at the office • Promote the notion that intensity can be moderate to vigorous • Promote the notion that healthy dietary habits can be small changes in eating patterns • Use mental imagery and positive self-talk to facilitate confidence in physical activity and dietary habits
Behavioral capacity	Knowledge and skill to perform a given behavior	Promote mastery learning through skills training	• Teach participants circuit training and aerobic physical activity • Teach participants alternative fun activities (e.g., ultimate frisbee, soccer, basketball, yoga, etc) • Teach participants healthy dietary behaviors • Teach participants disease prevention
Outcome Expectations	Anticipatory outcomes of behavior (own experiences or observe others)	Model positive outcomes of healthful behavior	• Peer-to-peer training • Researcher-to-subject training • Project PHIT team members-to- team members group activities (e.g., social persuasion) • Previous Project PHIT participants-new participants

Table 2.2 (cont.) Application of SCT to Project PHIT Program

SCT Concept	Definition	Implications	Application of SCT to Project PHIT
Outcome Expectancies	Values that a person places on a given outcome (incentives)	Present outcomes of change that have functional meaning	• Presentation of pre- and post- testing results • Emphasize long-term behavior change • Prizes for individual goal attainment (e.g., average number of steps per day, recommended number of fruits and vegetables consumed, etc)
Self Control	Personal regulation of goal-directed behavior or performance	Provide opportunities for self-monitoring, goal-setting, problem solving and self reward	• "Food Bowl" contest • Steps logs • Monitor attendance • Role playing of overcoming physical activity and nutrition barriers
Observational Learning	Acquire behavior by watching actions and outcomes of others'	Include credible role models of the targeted behavior	• Instructors spoke frequently of their own physical activity and nutrition behaviors • Project PHIT participants spoke about their own experiences in the pilot Project PHIT programs
Reinforcement	Responses to a person's behavior that increase or decreases the likelihood of reoccurrence	Promote self-initiated rewards and incentives (move from valuing extrinsic to intrinsic)	• Use handouts and email to keep participants informed • Make activities fun • Make nutrition simple and fun (e.g., "Food Bowl" contest- points for positive behavior and negative points for negative behavior) • Teach positive reinforcement between Project PHIT teams
Self-efficacy	Situation-specific self-confidence	Approach behavioral change in small steps to ensure success; seek specificity about the change sought	• Set goals to increase average number of steps taken each week • Set goals to increase fruit, vegetable and fiber intake • Set goals to increase physical activity each week • Provide basic and progressive instructions in a variety of physical activities and nutrition behavior changes
Emotional Coping Responses	Strategies or tactics that are used by a person to deal with emotional stimuli	Provide training in problem solving and stress management Include opportunities to practice skills in emotionally arousing situations	• Use mental imagery and positive self-talk to facilitate confidence in physical activity and dietary habits • Positive self-talk while performing physical activity • Positive feedback while discussing healthy nutrition behaviors

Table 2.2 (cont.) Application of SCT to Project PHIT Program

SCT Concept	Definition	Implications	Application of SCT to Project PHIT
Reciprocal Determinism	The dynamic interaction of the person, the behavior and the environment in which the behavior is performed	Consider multiple avenues to behavioral change including environmental, skill and personal change	• Multi-factorial methods of instructional delivery • 10-week program with follow-ups (vs. one-shot intervention) • Consideration of environmental, personal, psychosocial and behavioral factors that determine physical activity and nutrition behaviors

Researchers continue to explore which key factors influence behavior change (e.g., physical activity participation, healthy dietary habits, etc.). Likewise, there is a need for well-designed physical activity and nutrition interventions within the workplace. Employees in the workplace can alter sedentary lifestyles and engage in more regular physical activity levels as well as healthier eating habits in order to prevent obesity and to reduce the risk of many adverse health outcomes. Applications of the SCT within workplace-based interventions suggest positive findings. Project PHIT was designed to further evaluate social support as a healthy behavior change strategy.

CHAPTER THREE: METHOD

Recruitment

Marketing for Project PHIT was performed through the university health center via regular postal route as well as the health center website and email advertisements. All participants were able to sign up for Project PHIT through an online registration program. In order to sign up for the program, participants were required to complete a self-reported health questionnaire with their online registration. The Demographic and Health History Questionnaire (see Appendix A) gathered information including: age, health history, and ability to perform physical activity. The information was used to identify participants' eligibility for participation. The inclusion criteria for participating in the study were that participants: 1) were able to participate in light-moderate physical activity; 2) worked at the university; 3) were between the ages of 18 and 60 years old; and 4) were able to participate in at least 80% of the sessions. Individuals were excluded from the program if they were pregnant or lactating.

Participants

The participants (N=26) included healthy male and female persons (university faculty and staff) between the ages of 18 and 60 years who were recruited for this study. The participants completed a health history questionnaire (Appendix A) and a consent form (see Appendix B Project PHIT Consent Form) before the physical activity began. All participants were screened for potential contraindications and were excluded if they

suffered from any physical injuries, health concerns, or complications that prevented them from completing light to moderate exercise. Participation was voluntary. Approval for this study was obtained from the Boise State University Institutional Review Board for the Protection of the Human Subjects in Research.

Intervention Description

Prior to the development of the intervention, two pilot programs of Project PHIT (spring and fall 2009) were conducted along with focus groups at the end of each program. In these focus groups, participants were asked to discuss the types of activities in which they would like to participate, the desired time frame for the intervention and the optimal days and times of the week to participate in physical activity. Using feedback from the two pilot programs, the SCT and effective health intervention/health program models, Project PHIT was planned (see Literature Review Section on "Social Support," Table 2.2 for the theoretical underpinnings of the study and Appendix C Schedule of Topics and Activities for PHIT). The program focused on improving physical activity and healthy eating habits among university employees in a workplace-based setting.

Adherence and Compliance

Table 3.1 contains a summary of program adherence (i.e., the percentage of participants who completed the program compared to the number who started). To enhance adherence to and compliance with the program in the spring 2010 version, the following program components were included: incentives, team competitions, and additional physical activity opportunities (e.g., access to the campus recreation center). Attendance at each of the classes was tracked and averaged. Participants attended an

average of 89% of the 20 classes. The completion rate was 92% (24 of 26 participants) during the 10-week program. Of the two participants who discontinued participation in the program, one did so due to a scheduling conflict and the other due to a previous injury.

Table 3.1 Project PHIT Interventions

Programs	#Participants Beginning	# Participants Who Finished (% completed)
Spring 2009 Pilot Program	25	18 (72%)
Fall 2009 Pilot Program	25	17 (68%)
Spring 2010 Program	26	24 (92%)

Procedures

Project PHIT was a 10-week program. Participants met twice a week (Mondays and Wednesdays) from noon-1 PM in the Kinesiology Building Gym from March 1-May 12, 2010. Each session lasted 50-60 minutes and included both education and physical activity components. Each Monday began with a 20-minute education session and involved participants in discussions on ways to improve healthy behaviors (e.g., nutrition, benefits of physical activity, and stress management). The remainder of the time was spent on circuit training exercises. These exercises included basic movements such as push-ups, squats, or crunches and allowed participants to push themselves to their own limits. Prior to each activity or exercise, participants were presented with a visual demonstration of each exercise as well as pictures at each "station" and a paper copy of the program of exercises to guide them on form and technique. Project PHIT facilitators monitored the participants throughout each of the excercises.

Sessions held on Wednesdays began with a group exercise activity (e.g., trip to the university stadium track, group fitness class within the university recreation center,

relay races and games). Activity selection was based on participant input collected from the two previous pilot programs and on the first day of the program. To facilitate the development of regular physical activity habits, participants were encouraged to increase their physical activity levels outside the intervention. Specifically, participants were encouraged to increase the average number of steps they took each day (as measured by pedometer) and to participate in additional exercise sessions (e.g., fitness classes through the campus recreation department) each week.

To teach effective self-monitoring of activity, a three-day self-recorded pedometer log was maintained by each participant. Participants were asked to log their average steps at the beginning and the end of the intervention (i.e., the first three days of the intervention and the last three days of the 10-week intervention). Participants were encouraged to meet the recommended 10,000 steps per day (Le Masurier, Sidman, & Corbin, 2003). Pedometers have been shown to be reliable and valid for measuring walking on a variety of surfaces at a variety of speeds, and they provide an inexpensive way to motivate participants to be more active (Tudor-Locke, 2002).

The intervention was designed to encourage social support using SCT concepts (e.g., environment, situation, outcome expectations, behavioral capacity, observational learning, and reciprocal determinism) (see Table 2.2). For example, participants were: 1) placed on teams and assigned points based on levels of social support amongst their teammates and healthy eating habits; 2) asked to encourage their fellow participants to engage in physical activity outside of the two sessions on a weekly basis; 3) encouraged to cheer for other participants throughout the workouts and group exercise activities; and 4) asked to vote on “the most valuable Project PHIT member,” “the most motivating

Project PHIT member," and "the most improved Project PHIT member." Winners received prizes such as water bottles, clothing, and exercise equipment at the end of the intervention.

Data were collected before and after the 10-week intervention. Multiple questionnaires and physical tests were conducted prior to the start of the project and upon completion of the project. In an attempt to prevent program attrition, several incentives were offered throughout the 10-weeks. Incentives included items related to physical activity (e.g., water bottles, heart rate monitors, and yoga mats). Participants who were absent for class on two consecutive occasions were sent a reminder email and/or called on the phone to identify possible barriers to participation and to encourage them to continue participation.

Instrumentation

Physical activity changes were assessed using objective and subjective measures. The Fitnessgram Physical Activity Questionnaire contained seven questions to detect physical activity changes that occurred as a result of the intervention (see Appendix D). For example, to assess participation in muscular strength building activities, one of the questions asked: "On how many of the past seven days did you do exercises to strengthen your muscles (e.g., push-ups, sit-ups and weight lifting)?" Participants were asked to answer between zero to seven days. The Fitnessgram Physical Activity Questionnaire was used to detect physical activity changes that occurred as a result of the intervention. This questionnaire, developed using questions from the Youth Risk Behavioral Surveillance Survey (YRBSS) is reliable and valid in a number of populations including adults (Cooper Institute for Aerobic Research, 1999). Physical activity was measured

objectively using a 3-day step log, using the average mean of each 3-day step log (pre- and post-intervention). Although most individuals were compliant with tracking their step logs, the researchers provided follow up via email to a few individuals who did not fill them out.

The Block Food Frequency: Rapid Food Screener for Fruits, Vegetables, and Fiber (see Appendix E) was used to document changes in eating behaviors. It contained 10 questions and provided an analysis of estimated fruit, vegetable, and fiber intake (Block, 1982; Block, Clifford, Naughton, Henderson, & McAdams, 1989). An example of a Block Food Frequency item is, "How often do you eat the following foods?" Response options to this item included: 1) less than once a week, 2) once a week, 3) two-three times a week, 4) four-six times a week, 5) once a day, or 6) two plus a day. The validity of this instrument has been tested in numerous scientific studies and the instrument is comparable to a detailed food record for identifying people with low nutrient intake (Block, Gillespie, Rosenbaum, & Jenson, 2000).

In order to determine whether social support was a significant mediator of physical activity and nutrition behaviors for Project PHIT participants, social support on nutrition, and physical activity change was measured using a questionnaire designed by Sallis et al. (1987**)** (see Appendix F). For this study, the social support questionnaire was modified. To determine the level of social support among Project PHIT class participants relative to nutrition and physical activity, "Project PHIT participants" was added as a source of social support.

For example, one of the social support questions was, "During the past three months, my family (or members of my household), friends, or Project PHIT class

participants have: encouraged me not to eat "unhealthy foods" (e.g., cake, salted chips) when I am tempted to do so." Questions were scored on a Likert scale with a range from one to five (i.e., 1=none and 5=very often). Scores for family, friends, and class participants were scored separately and were totaled for discouragement and encouragement scores. The Social Support Questionnaire is valid and reliable for use with adults **(**Sallis et al., 1987).

Health-Related Fitness Variables

Health-related fitness variables included: weight (kilograms or kg), blood pressure (millimeters of mercury or mmHg), number of steps taken (assessed using a pedometer pre- and post-intervention), and cardiovascular fitness (as estimated using the 12-minute Cooper Test to assess VO_2 max). Within the intervention, there were seven facilitators that performed the health-related fitness variable testing and monitored all physical activity sessions. The facilitators participated in intense 3-hour training before the intervention to ensure consistent and reliable testing with each participant in Project PHIT.

Weight, to the nearest 0.1 kg, was measured in light clothing without shoes using a calibrated electronic scale: Tanita Weigh System, Model C400 (Tanita Weigh System, 2011).

Blood pressure was assessed using guidelines from the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure (1993). Participants were asked to rest in a seated position for 5-10 minutes prior to having their blood pressure measured. During the time they were resting, upper arm circumference was measured (centimeters or cm) to determine proper cuff size (e.g., child, adult, or large

adult). Two blood pressure measurements (systolic/diastolic, in mmHg), with 1-2 minutes between each, were performed on the left side of the body and the average of the two readings was used for the analyses. If the two measurements varied by more than five mmHg (either systolic or diastolic), a third measurement was taken and the average of the two closest values were used. Values for systolic and diastolic blood pressure (mmHg) were recorded and individuals were classified by age-specific health risk (optimal, normal, high normal, stages 1-4). To minimize the potential for multiple-tester error, maximize reliability of measures, and maximize ability to detect changes as a result of the intervention, the Omron, Model HEM 707 electronic blood pressure was used to assess blood pressure.

Average Number of Steps was measured with a TIMEX, Time Watch 793 pedometer (TIMEX, 2004). The average number of steps was calculated to determine whether participants increased their ambulatory activity as a result of the intervention. Number of steps walked was measured for three days on two occasions: 1) at baseline (pre-intervention) and 2) post-intervention. At the start of the program, participants received a pedometer as well as instructions on how to use it. Pedometers were used instead of other devices (e.g., accelerometers) because they are considerably less expensive than other monitoring devices. To account for potential variation in steps based on discretionary time (i.e., physical activity variances during the week and the weekend), participants were asked to track their steps during one weekend day and two weekdays. Placement of the pedometer was standardized (on a belt or waistband, approximately 5-7 cm from umbilicus), and the number of steps walked during the days measured were averaged.

C*ardiovascular fitness* was assessed using the Cooper 12-minute walk/run test (Cooper, 1968). To complete this test, participants used an 8-foot wide, 146 meters long indoor track. Participants were asked to walk or run (at a pace comfortable to them) for 12 minutes. Aerobic capacity was estimated by measuring the distance in meters completed and participant's weight, age, and gender. Cooper (1968) reported a correlation of 0.90 between VO_2 max and the distance covered in a 12-minute walk/run. Based on the measured distance, VO_2 max (ml/min/kg) was estimated as follows:

$$\mathrm{VO_2\ max} = \frac{d_{12} - 505}{45}$$

Where d_{12} is distance (in meters) covered in 12-minutes. Table 3.2 and 3.3 display standard VO_2 max classification ranges for both men and women (The Cooper Institute for Aerobics Research, 2006; Heyward, 2005).

Table 3.2 VO_2 max Classification Ranges for Women

Age (years)	Poor	Fair	Good	Excellent	Superior
20-29	≤ 35	36-39	40-43	44-49	50+
30-39	≤ 33	34-36	37-40	41-45	46+
40-49	≤ 31	32-34	35-38	39-44	45+
50-59	≤ 24	25-28	29-30	31-34	35+
60-69	≤ 25	26-28	29-31	32-35	36+
70-79	≤ 23	24-26	27-29	30-35	36+

Table 3.3 VO_2 max Classification Ranges for Men

Age (years)	Poor	Fair	Good	Excellent	Superior
20-29	≤ 41	42-45	46-50	51-55	56+
30-39	≤ 40	41-43	44-47	48-53	54+
40-49	≤ 37	38-41	42-45	46-52	53+
50-59	≤ 34	35-37	38-42	43-49	50+
60-69	≤ 30	31-34	35-38	39-45	46+
70-79	≤ 27	28-30	31-35	336-41	42+

Data Analysis

Statistical analysis was performed using SPSS (Version 16.0) (SPSS, 2007). Alpha was set at $p<0.05$. Health variables measured before and after the 10-week intervention included blood pressure, body weight, regular activity participation, and aerobic fitness (i.e., VO_2max). Means and standard deviations were calculated for each variable. Paired samples t-tests and repeated measures multivariate analysis of variance (MANOVA) analysis was used to analyze: 1) changes in health-related fitness (e.g., weight, blood pressure and VO_2max); 2) changes in fruit, vegetable, and fiber intake; and 3) changes in participation in physical activity. Correlations were used in this study to analyze the relationship between changes in physical activity and healthy eating behaviors and social support. Effect sizes (d) were computed to assess the magnitude of the intervention effects. According to Cohen (1988), effect size is defined as "small at d=0.2, medium at d=0.5 and large at d=0.8" (p. 25).

CHAPTER FOUR: RESULTS

Participants

Data were collected from 26 participants. The majority of participants (24 of 26, or 92.3%) attended at least 86% of the sessions (i.e., at least 20 total sessions). All participants were staff members at Boise State University during March through May in 2010. Each of the 24 participants completed the post-intervention questionnaires and health-related variables testing. The mean age for participants in the intervention was 41 years old (M=41.13, SD= 12.28). The sample was predominantly female (81%).

Health-Related Variables

Participants' values on the health-related variables including weight, blood pressure, and VO_2max are listed in Table 4.1. There was an overall statistically significant difference between pre- and post-intervention on health-related variables, Hotellings $F(5, 19)=3.76$, $p=0.02$. Analyses indicated a statistically significant positive physiological change in weight with a mean 183.91 pounds at the start of the intervention and 182.08 pounds at the conclusion ($p=0.01$). Participants also saw a reduction in blood pressure, both systolic and diastolic (systolic $p=0.03$, diastolic $p=0.03$). Positive changes in VO_2max also occurred ($p=0.01$). According to Cohen (1988), effect sizes for changes in health-related variables were in the medium range (d range= 0.3-0.5); however, effect size for weight was small ($d=0.05$).

Table 4.1 Project PHIT Participants' Health-Related Variables Pre- and Post-Intervention

Health-related variables	M_{pre}	SD_{pre}	$Range_{pre}$	M_{post}	SD_{post}	$Range_{post}$	*P*	Effect Size (*d*)**
Weight (lbs)	183.91	37.52	130-271	182.09	35.68	132-261	0.01*	0.05
Systolic (mmHg)	125.13	12.26	110-160	121.79	7.99	114-144	0.03*	0.3
Diastolic (mmHg)	79.83	6.53	70-98	75.88	8.07	60-92	0.03*	0.5
VO_2max (ml/min/kg)	24.41	8.33	11.6-43.5	27.79	10.34	13-53	0.01*	0.4

* Note: Significantly different $p<0.05$; *P* value for change over time by paired samples t-test (N= 24). ** Small-0.2; medium-0.5; large-0.8.

Physical Activity

Physical activity participation. Data were analyzed from the Fitnessgram Physical Activity Questionnaire (e.g., used to assess the number of days per week of participation in aerobic, strengthening, and flexibility exercises) and the average number of steps taken pre- and post-intervention. Table 4.2 presents physical activity participation data. Physical activity significantly changed from before to after the intervention. A MANOVA exploring pre- and post-intervention differences in aerobic, muscular strength, flexibility activities, and average number of steps found an overall difference, Hotellings $F(4, 20)=7.81$, $p=0.001$. Project PHIT participants increased participation in aerobic ($p<0.001$), muscular strength ($p<0.001$), flexibility activities ($p=0.01$), and average number of steps ($p=0.01$). Effect sizes for changes in aerobic and muscular strength physical participation were large ($d= 1.2$); whereas, effect sizes for changes in flexibility activities and average number of steps were medium (d range= 0.5-0.7) (Cohen, 1988).

Table 4.2 Project PHIT Participants' Physical Activity Participation Pre- and Post-Intervention

Physical Activity	M_{pre}	SD_{pre}	$Range_{pre}$	M_{post}	SD_{post}	$Range_{post}$	*P*	Effect Size (*d*)**
Days per week moderate-vigorous exercise	2.46	1.35	0-5	4.25	1.45	2-7	<0.001*	-0.5
Days per week strengthening exercises	1.33	1.37	0-4	2.75	1.11	2-7	<0.001*	-0.5
Days per week stretching exercises	2.00	1.79	0-6	3.13	1.33	2-7	0.01*	-0.3
Average steps (3-day average)	9,075	3,595	3,937-16,121	10,639	3,346	4,579-20,455	0.01*	-0.2

* Note: Significantly different $p<0.05$; *P* value for change over time by paired samples t-test (N=24). ** Small-0.2; medium-0.5; large-0.8.

Nutrition

A MANOVA exploring pre- and post-intervention differences in fruit, vegetable, and fiber intake found an overall statistically significant difference, Hotellings $F(3,21)=8.87$, $p=0.001$. Inspection of Table 4.3 and comparison of these data with the U.S. guidelines reveal that, at baseline, the participants' fruit and vegetables daily intake (mean of 3.79 servings per day) was at the lower end of the recommended levels (i.e., adults should consume 3 ½ to 6 ½ cups of fruit and vegetables every day [USDA, 2010]). In other words, at least by their own self-reports, the participants were relatively healthy eaters prior to the intervention. Participants' fiber daily intake, at baseline, was lower (14.85 grams) than the recommended amount (i.e., 25 grams per day for females and 38

grams per day for males [USDA, 2010]). Following the intervention, participants increased their fruit and vegetable servings per day (M = 4.32, p=0.03) and fiber (gm) consumed per day (M= 16.91 gm, p=0.02). Effect sizes for changes in fruit, vegetable, and fiber intake were medium (d range=0.4-0.5) (Cohen, 1988).

Table 4.3 Project PHIT Participants' Fruit, Vegetable and Fiber Intake Pre- and Post-Intervention

Characteristics	**M_{pre}**	**SD_{pre}**	**$Range_{pre}$**	**M_{post}**	**SD_{post}**	**$Range_{post}$**	***P***	**Effect Size (*d*)****
Fruit and vegetable servings per day	3.79	1.58	1-8	4.32	0.88	3-6	0.03*	0.4
Dietary fiber (gm)	14.85	4.53	7-29	16.91	3.34	9-23	0.02*	0.5

* Note: Significantly different p<0.05; P value for change over time by paired samples t-test (N=24). ** Small-0.2; medium-0.5; large-0.8.

Social Support

Results indicate there was a statistically significant difference between pre- and post-intervention on participants overall perception of social support, Hotellings $F(3,21)=49.51$, p<0.001. Table 4.4 presents results from the Social Support Questionnaire for Nutrition and Exercise (Sallis et al., 1987). There were significant increases over time (pre- vs. post-intervention) in perceived social support for nutrition (M_{pre}= 8.92, M_{post}= 12.54, p=0.001) and physical activity (M_{pre} = 16.46, M_{post}=27.75, p<0.001) from fellow Project PHIT participants. The effect sizes for changes in social support was larger for nutrition (d=0.7) compared to physical activity (d=0.5) (Cohen, 1988).

Table 4.4 Project PHIT Participants' Perceived Social Support Scores Pre- and Post-Intervention

Characteristics	M_{pre}	SD_{pre}	$Range_{pre}$	M_{post}	SD_{post}	$Range_{post}$	*P*	Effect Size (*d*)**
Social support from Project PHIT for nutrition	8.92	5.49	5-18	12.54	4.98	1-19	0.001*	0.7
Social support from Project PHIT for exercise	16.46	10.73	9-39	27.75	9.63	13-49	<0.001*	0.05

* Note: Significantly different $p<0.05$; *P* value for change over time by paired samples t-test (N=24); higher values=more social support. ** Small-0.2; medium-0.5; large-0.8.

It was expected that an intervention with activities designed to increase social support would be associated with changes in nutritional intake and physical activity behavior. Correlation analyses were conducted to determine if perceived social support is correlated to health behavior changes. Perceived nutrition-based social support was positively correlated with participants' positive changes in fruit and vegetable servings per day and fiber (gm) intake $r(22)=0.48$, $p=0.02$ and $r(22)= 0.40$, $p=0.05$, respectively. Analyses of r^2 values showed that 23% of changes in daily fruit and vegetable servings and 16% of daily fiber (gm) intake were accounted for by perceived nutrition-based social support. Perceived physical activity based social support was not significantly correlated with participants' positive changes in physical activity participation (i.e., average number of steps) $r(22)= 0.29$, $p=0.16$.

CHAPTER FIVE: DISCUSSION

The purpose of this study was to assess the effects of a 10-week Project PHIT intervention on levels of physical activity and dietary intake (e.g., fruit and vegetable servings per day and fiber intake) among university employees. The Project PHIT intervention yielded many positive results. This intervention, grounded in SCT, promoted positive changes in health-related variables, nutrition behaviors, and physical activity as well as positive changes in social support among the university employees. The use of social support as a behavioral change strategy in conjunction with a variety of physical activities may be useful for improving healthy behaviors. The most important findings are presented as they related to the thesis research questions.

Research Question 1: Will a 10-week Project PHIT intervention change physical activity as measured objectively with pedometers in this sample?

In order to increase participants' overall physical activity levels, participants were given a pedometer, instructed how to use the device, and encouraged to meet the recommended 10,000 steps per day (Le Masurier et al., 2003). This study found that pedometers combined with 3-day steps logs helped university employees increase their physical activity levels. This activity significantly increased participants' average steps from 9,075 steps prior to the beginning of the intervention to 10,639 steps at the end of the intervention.

Although participants significantly increased their number of steps (from pre- to post-intervention), it should be noted that participants started the intervention with an average number of steps that was very close (i.e., 9,075 average steps per day) to the recommended number of steps per day (i.e., 10,000 steps per day) indicating the participants to be relatively healthy prior to the start of the intervention. One possible explanation of this may be the fact that previous pilot Project PHIT program participants (N=11) were familiar with the 10,000 steps per day recommendations. A second explanation may be due to the fact that some university employees have to walk across campus several times a day (e.g., teach a class).

It should also be noted that the participants' final 3-day average was only slightly over the recommended 10,000 steps per day (i.e., 10,639 steps per day post-intervention) despite the Project PHIT recommendation of improving at least 500 steps per day more than their pre-intervention 3-day average. According to the CDC (2011), participants can still see health benefits by increasing the frequency and intensity of daily physical activity (i.e., walk more than 10,000 steps per day). In doing so, participants could see improved quality of life and could help prevent chronic diseases (USDHHS, 2008).

Lastly, the use of pedometers within Project PHIT applied to several SCT constructs including, but not limited to, situation, outcome expectancies, self-control, observational learning, self-efficacy, and reciprocal determinism (see Table 2). Pedometers provided an inexpensive tool to increase physical activity as well as an opportunity to build situation-specific self-confidence (i.e., self-efficacy), which is a critical component in SCT for producing and maintaining behavior change (Bandura, 1986). Similar to the Backman et al. (2011) findings, this study found that building self-

efficacy in the workplace can encourage health behavior changes. Follow-up studies are needed to determine participants' maintenance of health behavior changes.

Research question 2: Will a 10-week Project PHIT intervention change physical activity (aerobic, weight training, and flexibility exercises) as measured subjectively with a questionnaire in this sample?

At the time of this study, there were limited data findings to indicate the daily physical activity levels of the university employees. Survey findings revealed that almost one-fourth of adult Idahoans reported no physical activity involvement (in the prior month surveyed) and on campus 17% of university employees reported never/rarely exercising (CDC, 2009; Health Risk Appraisal, 2007). Findings from surveys and requests from faculty and staff indicated the need for a physical activity intervention at the university. Research supports the fact that workplaces, such as university campuses, can provide a means to improve physical activity and dietary practices because workers spend such a large portion of each day at their workplace (Abood et al., 2003; Backman et al., 2011; Conn et al., 2009; Katz et al., 2005).

According to the USDHHS (2008), adults should engage in regular physical activity and should perform both aerobic and muscle strengthening exercises to improve health. To determine participants' change in physical activity, the Fitnessgram Physical Activity Questionnaire was administered before and after the intervention. Participants indicated a significant increase in: 1) the average days per week for moderate-vigorous exercise (i.e., aerobic activity) (mean= 2.46 days pre-intervention and 4.25 days post-intervention, $p<0.001$), 2) the average days per week for strengthening exercises (mean=

1.33 days pre-intervention and 2.75 days post-intervention, $p<0.001$), and 3) the average days per week for stretching exercises.

Results were investigated to determine whether the participants met the USDHHS physical activity guidelines (e.g., 150 minutes a week of moderate intensity aerobic activity). Specifically, researchers examined the Fitnessgram question, "On how many of the past 7 days did you participate in physical activity for a total of 30-60 minutes or more over the course of a day?" At pre-intervention, participants indicated an average of 2.46 days of moderate to vigorous activities per week. This can be translated into roughly 75-150 minutes per week of moderate to vigorous activities. It would appear that participants were relatively healthy and many were meeting the USDHHS (2008) physical activity recommendations prior to the Project PHIT intervention; however, this conclusion is dependent on which end of the time spectrum participants were referring to when answering the Fitnessgram questionnaire (i.e., activity levels closer 60 minutes over the course of a day) and the intensity of exercise (i.e., moderate or vigorous activity).

Post-intervention participants indicated participation was roughly 130-260 minutes per week of moderate to vigorous activities. Findings show a statistical significance in positive changes in physical activity ($p<0.001$). Results were again dependent on which end of the time spectrum participants were referring to (i.e., activity levels closer to 60 minutes over the course of a day) and the intensity their physical activity (i.e., moderate or vigorous); however, the post-intervention results show findings that exceed the USDHHS (2008) guidelines of 150 minutes a week of moderate intensity physical activity. Project PHIT included intervention activities twice a week but participants were encouraged to increase their physical activity levels on other days of the

week. These post-intervention findings indicated participants were engaging in increased physical activity outside of the Project PHIT intervention.

Overall, the intervention was successful with producing significant increases in physical activity (aerobic, strengthening, and stretching exercise) in the participants' lifestyle. Participants had high participation rates (86%). As noted in previous chapters, pilot Project PHIT program participants provided feedback for days and times of the week that were most convenient for participants' schedules. Activities and circuit training exercises were also built around participants' feedback. The use of participants' feedback, previous Project PHIT participants, and the workplace setting within the Project PHIT intervention provided additional SCT constructs (e.g., environment, situation, behavioral capacity and outcome expectation) (see Table 2.2). For example, the intensity of physical activity was closely monitored to promote self-efficacy.

Future Project PHIT intervention programs or similar programs should consider similar application of SCT including the use of the workplace environment and a social environment. Additionally, a 10-week intervention seemed to be a sufficient amount of time to produce increased physical activities levels in university employees. In order to compare physical activity levels with the USDHHS (2008) physical activity recommendations, future researchers should consider modifying the questions on Fitnessgram Physical Activity Questionnaire (e.g., ask a question that capture the USDHHS recommended physical activity levels).

Research question 3: Will a 10-week Project PHIT intervention change the intake of fruits, vegetables, and fiber in this sample?

National attention to the obesity epidemic will likely spur more employers to direct attention to prevention efforts such as increased physical activity and healthy eating habits. Researchers have contributed the increased obesity rates to the availability of high-sugary drinks, which are found abundantly in the workplace, and higher rates of sedentary jobs (Anderson et al., 2009; DeJoy et al., 2008). Employees benefit from interventions that focus on healthy dietary habits (Dishman et al., 2009). This study offered particular insight to nutritional concerns and lifestyles of university employees.

One goal of the Project PHIT intervention was to increase participants' healthy dietary behaviors by systematically increasing nutrition knowledge and modifying specific SCT constructs. Out of 20 total Project PHIT intervention classes, 10 classes were dedicated to 20-minutes educational sessions that discussed several nutrition topics. Nutrition education topics were determined by pilot Project PHIT programs and included personalized components, practical strategies for healthful meal planning, basic nutrition knowledge, and basic skills for increasing fruit, vegetable, and fiber intake (see Appendix C). SCT constructs included the use of self-monitoring (e.g., logging dietary behaviors), incentives (e.g., eating the recommended number of fruits and vegetables), and social support (e.g., from peers at work).

According to the USDA guidelines (2010), adults should consume 3 ½ to 6 ½ cups of fruit and vegetables per day and 25 grams per day of fiber for females and 38 grams per day of fiber for males. Following the Project PHIT intervention, participants increased fruit and vegetable intake as well as their daily fiber intake. Although these results were statistically significant, the participants could still benefit from higher levels of fiber intake in order to meet the USDA guidelines (post-intervention was 16.91 grams

per day). It should be noted that participants' pre-intervention mean fruit and vegetables servings was 3.79 servings per day indicating participants were consuming the USDA guidelines prior to the intervention. Post-intervention Project PHIT results indicate participants increased their servings to 4.32 servings per day.

Despite previous studies claiming it to be more difficult to add new behaviors (versus avoiding or limiting a behavior), the goal of this program was to encourage participants to increase fruit, vegetable, and fiber consumption versus decrease total calorie intake (Abood et al., 2003). A nutrition team activity titled the Food Bowl was created for Project PHIT to encourage healthy nutrition behaviors. Participants were randomly selected to be on teams of 4-5 people. The Food Bowl was a football-themed nutrition activity named after the Super Bowl. Participants were given points (i.e., a touchdown) for positive nutrition behaviors (e.g., consuming vegetables) and deducted points (i.e., a fumble) for negative nutrition behaviors (e.g.., consumption of high fat foods). Participants were expected to track their daily points and time was provided in class each week to add up total team points. Team standings were announced and provided the participants with a fun, competitive social support component for the intervention.

The Block Food Frequency: Rapid Food Screener for Fruits, Vegetables, and Fiber was used to document changes in eating behaviors pre- and post-intervention. Because nutrition intake was not observed, self-reported bias may have occurred. Results from the Block Questionnaire should be viewed as estimates of change. Future nutrition interventions grounded in SCT constructs should consider activities such as the Food Bowl to help facilitate social support among participants.

Research question 4: Will a 10-week Project PHIT intervention change health-related fitness (e.g. weight, blood pressure and cardiovascular fitness) in this sample?

Project PHIT intervention measured a change in health fitness variables in pre- and post-interventions measurements. Participants saw an average weight loss of roughly 2 pounds (p=0.01) as well as a reduction in blood pressure, both systolic (p=0.03) and diastolic (p=0.03) had roughly 3 mmHg decrease in readings. Considering the fact that weight loss was not one of the Project PHIT goals, an average weight loss of two pounds over a 10-week intervention was a positive outcome. Weight loss focused interventions should consider similar nutrition and physical activity strategies (e.g., encourage higher consumptions of fruit, vegetables, and fiber). Results from this study may help contribute to obesity and disease prevention programs.

Participants' blood pressure measurements pre-intervention provided relatively healthy measurement findings. With an average systolic level of 125 mmHg and an average diastolic level of 80 mmHg, most participants were close to "normal" blood pressure levels prior to their involvement in Project PHIT. According to USDHHS National Heart, Lung, and Blood Institute normal blood pressure include systolic levels less than 120 mmHg and diastolic levels less than 80 mmHg, whereas pre-hypertension levels include systolic levels between 120-139 mmHg or diastolic levels between 80-89 mmHg (USDHHS, 2011).

Cardiovascular fitness (VO_2max) was another health-related variable measurement within Project PHIT. Aerobic capacity was estimated by measuring the distance (meters completed within 12 minutes) and participants' weight, age, and gender.

Although participants had statistically significant positive changes in values from pre- to post-intervention, many participants failed to meet the "good," "excellent," or "superior" ranges (see Table 3.2 and 3.3 for VO_2max Classification Ranges for Women and Men).

Cardiovascular fitness testing was assessed on the university student recreation center indoor track. Usually people need to be paying members of the recreation center to use the indoor track but special considerations were given to those participating in the Project PHIT intervention. The recreation center also permitted track use as well as free opportunities to explore fitness classes (e.g., yoga, spin classes, and more). These classes were integrated into the normal Project PHIT intervention class times and led by trained fitness instructors. Following the intervention, several participants purchased new memberships to the recreation center. It can be assumed this component of the intervention provided further application of SCT to Project PHIT and that participants found value and self-confidence in being able to participate in physical activity at the workplace environment. These additional SCT constructs, including self-efficacy and reciprocal determinism (i.e., the dynamic interaction of participants, free access to the student recreation center and the supportive environment in which the behavior were performed), contributed to additional positive results from the intervention (e.g., recreation center memberships). Future university interventions should explore free opportunities for employees to explore the university recreation center and cardiovascular fitness contests among university employees. Lastly, future studies should evaluate the potential impact that Project PHIT had on other health benefits (e.g., body mass index, heart disease, diabetes, etc.), important worksite outcomes (e.g., job satisfaction), and/or cost savings for the university (e.g., reduced number of sick days).

Research question 5: Will social support facilitate changes in physical activity, fitness, and intake of fruits, vegetables, and fiber that occur as a result of participating in the 10-week Project PHIT intervention?

The relationship between social support and physical activity and/or nutrition behaviors has been widely studied (Bandura, 2001; McNeill et al., 2006; Sallis et al., 1987; Shaikh et al., 2008; Stanton et al., 2007). In addition to this study's positive finding concerning improved physical activity levels, healthy eating habits and health-related variables, Project PHIT also led to positive changes in perceived social support. Results from the Social Support Questionnaire for Nutrition and Exercise found significant increases in perceived social support for nutrition and physical activity (see Table 4.4). The social support scales (Sallis et al., 1987) used in this study were useful in documenting the positive social support among the Project PHIT participants.

In addition, perceived nutrition-based social support (among Project PHIT participants) was positively correlated with participants' increases in fruit and vegetable servings per day and fiber intake. There was no significant relationship between perceived social support for physical activity and increased physical activity participation despite the perceived increased social support for physical activity. Although there are instances in the literature where social support has been shown to be an important factor to physical activity adherence (Elbel et al., 2003; Napolitano et al., 2003; Opdenacker & Filip, 2008; Rovniak et al., 2005), the results of this study did not prove the same. This may be due to the small sample size and corresponding low level of statistical power in the analyses, because the *r*-value, at .29, was particularly small. It simply did not reach

the magnitude necessary for statistical significant given the size of the sample. Therefore, exploring this relationship with a larger sample size would potentially have value.

Despite the opportunities for employees to bond in a variety of challenging and rewarding situations in the workplace, one explanation for these findings may be the fact that there was no weekly point system/incentive program for physical activity. The use of the Food Bowl program, a football-themed nutrition program, provided weekly points for healthy eating habits (i.e., touchdowns) and took points away (i.e., fumbles) when participants consumed high fat, high sugar or high salt-containing foods. The activity facilitated group support, conversations, and accountability outside of the Project PHIT classes. There was no comparable weekly point system program for physical activity. Future interventions should explore the use of similar, point-based physical activity programs to determine if employees' respond similarly.

Research studies consistently indicate improvements in employees' physical activity levels and nutrition habits during worksite interventions and businesses should invest money in quality theory-based programs (Anderson et. al., 2009). These thesis findings should add valuable insight into the benefits of health interventions within the workplace, specifically on a university campus. Universities would benefit from expanding Project PHIT or similar physical activity and nutrition interventions to include more university employees. The findings in this study indicate that the success of the intervention was likely attributed to: 1) the use of a theory-based intervention (i.e., SCT); 2) the thoughtful selection of activities based on Project PHIT pilot programs and university employee concerns; 3) the location of the intervention (i.e., workplace).

Although pilot testing may have contributed to the success, this study may serve as a framework for future applications of such programs among this population of workplace-based employees. Although Project PHIT provided insight into the benefits of social support on university employees, further research is needed to explore: 1) difference among various employee classifications (e.g., classified staff versus non-classified versus faculty); 2) difference among male and female university staff; and 3) possible difference with a larger sample size. There are many other factors that may contribute to increases in physical activity, nutrition, and health-related variables, however we should not ignore the results of this study. This research should add valuable insight into the benefits of instituting Project PHIT or similar programs within the university workplace. Additionally, future research should concentrate on which strategies facilitate long-term healthy physical activity levels and healthy eating habits.

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APPENDIX A

The Demographic and Health History Questionnaire

Employee Project PHIT

* Email:

* First Name:

* Last Name:

* Department:

* Work Phone:

* Date of Birth: mm dd yyyy

* Gender: Male Female

Your Password:

Create your own password below (6-20 characters long).

*Password:

*Re-Enter Password:

Other Personal Information:

*Do you have any of (or history of) the following?

- Heart Disease
- High Blood Pressure
- Diabetes
- High Cholesterol
- Thyroid Disease
- Sleep Apnea
- Arthritis
- I have 2 or more of the medical conditions listed
- Other
- None

*Smoking History:

- I have never smoked.
- I currently smoke.
- I am in the process of quitting smoking.
- I quit smoking within the past 6 months.
- I am a previous smoker, but quit at least 6 months ago.

*Have you ever been told by your physician that you have abnormal values (too high or low) of any of the following?

- LDL Cholesterol
- HDL Cholesterol
- Total Cholesterol
- Fasting Blood Sugar
- I have been told I have abnormal values for 2 or more of the items listed.
- None

*Do you currently exercise for at least 30 minutes at moderate intensity (including brisk walking) all or most days of the week?

- Yes
- No

*List exercises you most enjoy:

*List exercises you least enjoy:

*Do you have any injuries or physical reasons that might prevent you from performing light-moderate exercise? Please describe.

*List the number of alcoholic beverages you ingest per week:

- 0 per week
- 1-2 per week
- 3-5 per week
- more than 5 per week

*List current medications, herbs and supplements you currently take. Please include the name of medication, dosage and duration.

*List any mental health issues you have, including any eating disorders and/or depression.

*Have you ever had weight loss surgery? If yes, when and what type?

*Female only question: please mark one of the following:

- I am planning to become pregnant during the next 12 months.
- I was pregnant within the past 6 months.
- I am not currently pregnant.

*Height

*Current Weight (in pounds)

*Target Weight (in pounds)

*When do you hope to reach your target weight (weeks, months, etc)?

*What has prevented you from reaching your target weight in the past?

*How confident do you feel about being able to reach your target weight?

- 1 - Not Confident
- 2
- 3 - Neutral
- 4
- 5 - Very Confident

*How motivated are you to make long-term lifestyle changes including healthy eating habits and exercising more?

- 1 - Not Motivated
- 2
- 3 - Neutral
- 4
- 5 - Very Motivated

*What do you hope to gain from Project PHIT? Please list 3 goals you wish to achieve by the end of this 10 week program.

APPENDIX B

Project PHIT: Consent Form

This consent form will give you the information you will need to understand why this study is being done and why you are being invited to participate. It will also describe what you will need to do to participate and any known risks, inconveniences or discomforts that you may have while participating. We encourage you to ask some questions now and at any time. If you decide to participate, you will be asked to sign this form and it will be a record of your agreement to participate. You will be given a copy of this form.

You are invited to participate in a research study to test the efficacy of a workplace- based/ lifestyle physical activity intervention designed to increase physical activity behavior, improve nutritional intake. You are being asked to participate because you are an employee at Boise State University, over the age of 18, apparently able to participate in physical activity and do not have any health concerns that would restrict participation. The purpose of this 10-week program is to introduce Boise State University employees to health behavior modifications focusing mostly on improving eating habits (i.e., eating less fat and more fruits, vegetables and fiber) and increasing physical activity. Project PHIT (Personal Health Intervention Team), has pilot tested this intervention twice previously with staff from Boise State University. The Spring 2010 Project PHIT program will administer this program as a research project associated with the completion of a thesis.

I, (print name) _____, in consideration of being permitted to participate in Project PHIT, hereby agree to the following terms and conditions:

1. I understand that prior to beginning this program I was screened for potential contraindications based on my own self reported health history inclding any physical injuries, health concerns, or complications that would prevent them from completing exercise. I understand it is my responsibility to consult with a physician prior to and regarding my participation in the program. I hereby represent and warrant that I am physically fit and have no medical condition(s) that would prevent me from participating in the program.

2. In the event I become sick or injured during the course of the research study, I will immediately notify my personal physician and the principal investigator.

3. I understand Project Phit is a 10-week program that meets twice a week, Mondays and Wednesdays, at the Kinesiology Gym at Boise State University. Each session will last 50-60 minutes and include both education and physical activity components. Each session includes circuit training exercises (e.g. basic movements such as push ups, squats, crunches, etc.) and will allow me to push myself as much as I feel comfortable. I recognize that my participation in the program requires physical exertion, which may be strenuous and may cause physical injury, and I am fully aware of the risks and hazards involved. I understand that I may discontinue exercise at any point.

4. I understand that this program will assess my physical activity and nutrition both subjectively and objectively, and I agree to take part in the following:

a. Physical health testing: (a) blood pressure, (b) weight, (c) height, (d) waist circumference, (e) measures of health related fitness including muscular strength and maximal oxygen consumption.
b. The Fitnessgram Physical Activity Questionnaire
c. The Block Food Frequency: Rapid Food Screener for Fruits, Vegetables and Fiber Questionnaire
d. The Social Support Questionnaire

5. During my participation in the program I will receive health, nutrition and fitness information. I will also receive information and instruction about weight loss.

6. For this research project, we are requesting demographic information. Due to the make-up of Idaho's population, the combined answers to these questions may make an individual person identifiable. We will make every effort to protect participants' confidentiality. However, if you are uncomfortable answering any of these questions, you may leave them blank.

7. I recognize that the overall risks are reasonable in relation to the benefits/ knowledge gained because the information that I will receive through participation in Project PHIT (e.g. healthy lifestyles and physical activity habits) will provide lifetime benefits. I understand I will learn more about the relationship between physical activity and nutrition with health as well as learn to design and implement their my own fitness activities.

8. I understand that participation in research may involve a loss of confidentiality; however, my records will be handled as confidentially as possible. Data confidentiality will be maintained by storing data in a locked file drawer and entering it into a computer that is password protected. I also understand that all data will be on file for no longer than 2 years and will only be accessible by the research staff. In case of a confidentiality breach, I recognize that I will be informed and every attempt to minimize the consequences of such a breach will be made.

9. I agree that at the conclusion of this study, the research staff may publish our findings. I recognize that the information will be presented in summary format and will not personally identify me in any publication or presentation.

10. I understand I will not be paid for my participation in this study.

11. I understand I do not have to be in this study if you do not want to. I may also refuse to answer any questions I do not want to answer. I agree that as a volunteer in this study, I may withdraw from it at any time without consequences of any kind or loss of benefits to which I am otherwise entitled.

I have read this form and decided that I will participate in the project described above. Its general purposes, the particulars of involvement and possible risks have been explained to my satisfaction. I understand I can withdraw at any time.

_____ _____

Signature of Study Participant Date

Signature of Person Obtaining Consent	Date

If you have any questions or concerns about your participation in this study, you should first talk with the principal investigator at jennsummers@boisestate.edu, 426-2701. If for some reason you do not wish to do this, you may contact the Institutional Review Board, which is concerned with the protection of volunteers in research projects. You may reach the board office between 8:00 AM and 5:00 PM, Monday through Friday, by calling (208) 426-5401 or by writing: Institutional Review Board, Office of Research Compliance, Boise State University, 1910 University Dr., Boise, ID 83725-1138.

APPENDIX C

Schedule of Topics and Activities for Project PHIT

March 2010						
Sunday	**Monday**	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**
All Classes in Kinesiology Main Gym (unless noted) Noon-1PM	1 (1st Day) Program Overview Introductions Notebook Goal Setting Activity Questionnaires	2	3 Meet @ REC Initial Measurements Cooper Test at the REC	4	5	6
7 WEEK 2	8 Education Session: **Goal Setting- *Just Do It!*** Circuit Training	9	10 Group Activity: **Team Game** Circuit Training	11	12	13
14 WEEK 3	15 Education Session: **Healthy Playbook- *Food Bowl*** Circuit Training	16	17 Group Activity: **Basketball** Circuit Training	18	19	20
21 WEEK 5	22 Education Session: **Calories In & Calories Out For Good** Circuit Training	23	24 Group Activity: **Relay on the Track** Circuit Training	25	26	27

April 2010

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4 WEEK 6	5 Education Session: **Benefits of the REC/ Exercise-** ***guest*** Circuit Training	6	7 Group Activity: **Competition** Circuit Training	8	9	10
11 WEEK 7 Participants choose class: Kickboxing, Cycle, Lift or Yoga Class	12 Group Activity at the REC	13	14 Group Activity at the REC	15	16	17
18 WEEK 8	19 Education Session: **Stress No More** Circuit Training	20	21 Group Activity: **Yoga** Circuit Training	22	23	24
25 WEEK 9	26 Education Session: **Nutrition – Grocery Checkout** Circuit Training	27	28 Group Activity: **Kickboxing** Circuit Training	29	30	

May 2010

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3 Education Session: **Active for Life** End of Food Bowl Turn in Steps Logs Circuit Training	4	5 Cooper Test at the REC Final Measurements Prize Giveaways Food Bowl Winners Announced	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23/30	24/31	25	26	27	28	29

APPENDIX D

Project PHIT: Fitnessgram Physical Activity Questionnaire

NAME: _____

1) Do you exercise regularly so that your heart rate increases, your breathing rate increases, and you start to sweat?

☐ yes
☐ no

2) How often do you exercise? _____ Days per week

3) How long is your typical exercise session? _____ Minutes

4) What type of exercise do you perform most often?
_____

5) On how many of the past 7 days did you participate in physical activity for a total of 30-60 minutes or more over the course of a day? This includes moderate activities (walking, slow bicycling, or outdoor play) as well as vigorous activities (jogging, active games, or active sports such as basketball, tennis, or soccer)
_____ Days during the past 7 days

6) On how many of the past 7 days did you do exercises to strengthen your muscles? This includes exercises such as push-ups, sit-ups, or weight lifting.
_____ Days during the past 7 days

7) On how many of the past 7 days did you do stretching exercises to loosen up or relax your muscles? This includes exercises such as toe touches, knee bends, or leg stretching.
_____ Days during the past 7 days

APPENDIX E

Project PHIT: Block Food Frequency- Rapid Food Screener for Fruit, Vegetable and Fiber

Fruit-Vegetable-Fiber Screener©

Name : _____

Age: _____

Sex: ○ Male ○ Female

Think about your eating habits over the past year or so. About how often do you eat each of the following foods? Remember breakfast, lunch, dinner, snacks and eating out. Mark one bubble for each food.

Fruits and Vegetables	(0) Less than 1/WEEK	(1) Once a WEEK	(2) 2-3 times a WEEK	(3) 4-6 times a WEEK	(4) Once a DAY	(5) 2+ a DAY	Score
Fruit juice, like orange, apple, grape, fresh, frozen or canned. (Not sodas or other drinks)	○	○	○	○	○	○	____
How often do you eat any fruit, fresh or canned (not counting juice?)	○	○	○	○	○	○	____
Vegetable juice, like tomato juice, V-8, carrot	○	○	○	○	○	○	____
Green salad	○	○	○	○	○	○	____
Potatoes, any kind, including baked, mashed or french fried	○	○	○	○	○	○	____
Vegetable soup, or stew with vegetables	○	○	○	○	○	○	____
Any other vegetables, including string beans, peas, corn, broccoli or any other kind	○	○	○	○	○	○	____
Fiber cereals like Raisin Bran, Shredded Wheat or Fruit-n-Fiber	○	○	○	○	○	○	____
Beans such as baked beans, pinto, kidney, or lentils (not green beans)	○	○	○	○	○	○	____
Dark bread such as whole wheat or rye	○	○	○	○	○	○	____
				Fruit Vegetable Score = ___			

APPENDIX F

Project PHIT: Social Support Questionnaires

Social Support and Eating Habits

The following is a list of things people might do or say to someone who is trying to develop healthy eating habit. Some of the questions may not apply to you, but please read each statement and give an answer to every question.

Rate each question twice. Under Family, rate how often your family members and/or anyone living in your household has said or done what is described during the last 3 months. Under Friends, rate how often your friends or acquaintances have said or done what is described during the last 3 months. Under Project PHIT Class Participants, rate how often your fellow class participants within Project PHIT have said or done what is described during the last 3 months.

SAMPLE: *If my family rarely offers me fruit for a snack, my friends very often do and my Project PHIT classmates do often, I would answer like this:*	**Family**	**Friends**	**Class Participants**
Offers me fruit for a snack.	2	5	5

None	Rarely	A few times	Often	Very often	Does not apply
1	2	3	4	5	8

Please write *one* number from the rating scale shown above in each space:

During the past 3 months, my Family (or members of my household), Friends or Project PHIT Class Participants have...

	Family	**Friends**	**Class**
1. Encouraged me not to eat "unhealthy foods" (cake, salted chips) when I'm tempted to do so.	1.____	1.____	1.____
2. Discussed my eating habit changes with me (asked me how I'm doing with my eating changes).	2.____	2.____	2.____
3. Reminded me not to eat high fat, high salt foods.	3.____	3.____	3.____
4. Complimented me on changing my eating habits ("Keep it up", "We are proud of you").	4.____	4.____	4.____
5. Commented if I went back to my old eating habits.	5.____	5.____	5.____
6. Ate high fat or high salt foods in front of me.	6.____	6.____	6.____
7. Refused to eat the same foods I eat.	7.____	7.____	7.____
8. Brought home foods I'm trying not to eat.	8.____	8.____	8.____
9. Got angry when I encouraged them to eat low salt, low fat foods.	9.____	9.____	9.____
10. Offered me food I'm trying not to eat.	10.____	10.____	10.____

Social Support and Exercise

The following is a list of things people might do or say to someone who is trying to exercise regularly. If you are not trying to exercise, then some of the questions may not apply to you, but please read statement and give an answer to every question.

Rate each question twice. Under Family, rate how often your family members and/or anyone living in your household has said or done what is described during the last 3 months. Under Friends, rate how often your friends or acquaintances have said or done what is described during the last 3 months. Under Project PHIT Class Participants, rate how often your fellow class participants within Project PHIT have said or done what is described during the last 3 months.

SAMPLE:	**Family**	**Friends**	**Class Participants**
If my family rarely does physical activities with me, my friends very often do and my Project PHIT classmates often do, I would answer like this:			
Did physical activities with me.	2	5	5

None Rarely A few times Often Very often Does not apply

1 2 3 4 5 8

Please write *one* number from the rating scale shown above in each space:

During the past 3 months, my Family (or members of my household) Friends or Project PHIT Class Participants have...

	Family	Friends	Class
1. Exercised with me.	1.____	1.____	1.____
2. Offered to exercise with me.	2.____	2.____	2.____
3. Gave me helpful reminders to exercise. ("Are you going to exercise tonight?").	3.____	3.____	3.____
4. Gave me encouragement to stick with my exercise program.	4.____	4.____	4.____
5. Changed their schedule so we could exercise together.	5.____	5.____	5.____
6. Discussed exercise with me.	7.____	7.____	7.____
7. Criticized me or made fun of me for exercising.	8.____	8.____	8.____
8. Gave me rewards for exercising (Bought me something or gave me something I like)	9.____	9.____	9.____
9. Planned for exercise on recreational outings.	10.____	10.____	10.____
10. Helped plan events around my exercise.	11.____	11.____	11.____
11. Asked me for ideas on how *they* can get more exercise.	12.____	12.____	12.____
12. Talked about how much they like to exercise.	13.____	13.____	13.____

APPENDIX G

Examples of Activities from Project PHIT Pilot Programs

Summary: Project PHIT Spring 2009
5-Week Program
Include Physical Activities and Educational Sessions Every Week
Wednesday & Fridays in the Kinesiology Gym from noon-1PM
Participants Involved= 25

Weekly Activities Included:

1. Week 1:
    a. Introduction and Program Overview
    b. Pre –Test Physical Outcome Variables (i.e. blood pressure, weight, height, resting heart rate, waist circumferences, body composition and cardiovascular fitness assessment)
    c. Health Survey
    d. Identify Goals and Barriers
2. Week 2:
    a. Educational Session: Stress Management
    b. Group Activity (i.e. relay races, group exercise class such as yoga)
    c. Physical Activity Session (i.e. cardio, weight resistance, and circuit training)
3. Week 3:
    a. Educational Session: Nutrition
    b. Group Activity
    c. Physical Activity Session
4. Week 4:
    a. Educational Session: Benefits of Exercise
    b. Group Activity
    c. Physical Activity Session
5. Week 5:
    a. Post- Test Physical Outcome Variables
    b. Health Survey
    c. Program Evaluation
    d. Incentives (i.e. give out prizes for completing program, accomplishing goals, and working hard- voted on by their fellow classmates)

Summary: Project PHIT Fall 2009
7-Week Program
Include Physical Activities and Educational Sessions Every Week
Mondays & Wednesdays in the Kinesiology Gym from noon-1PM
Participants Involved= 25

Weekly Activities Included:

1. Week 1:
    a. Introduction and Program Overview
    b. Pre –Test Physical Outcome Variables
    c. Questionnaires
    d. Food Logs
    e. Cooper Test
2. Week 2:
    a. Educational Session: Nutrition
    b. Food Logs
    c. Group Activity
    d. Physical Activity Session
3. Week 3:
    a. Educational Session: Nutrition Continued
    b. Food Logs
    c. Group Activity
    d. Physical Activity Session
4. Week 4:
    a. Educational Session: Rewards of Exercise
    b. Food Logs
    c. Group Activity
    d. Physical Activity Session
5. Week 5:
    a. Educational Session: Calculate Your Energy Expediture
    b. Food Logs
    c. Group Activity
    d. Physical Activity Session
6. Week 6:
    a. Educational Session: Techniques to Help Manage Stress
    b. Food Logs
    c. Group Activity
    d. Physical Activity Session
7. Week 7:
    a. Post- Test Physical Outcome Variables
    b. Questionnaires
    c. Program Evaluation
    d. Incentives (i.e. give out prizes for completing program, completing food logs, recording steps, accomplishing goals, and working hard- voted on by their fellow classmates)

APPENDIX H

Example of Project PHIT Flyer

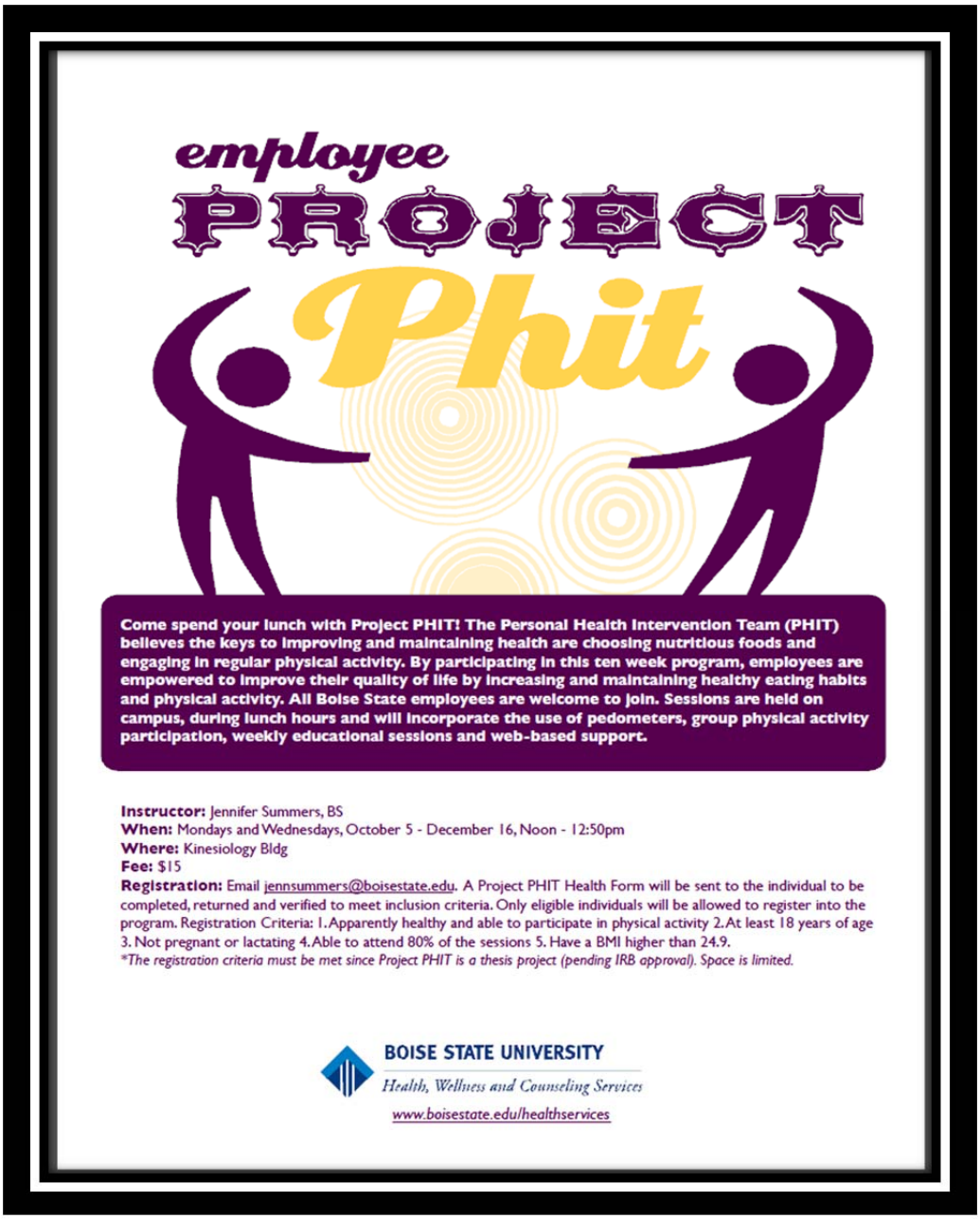

Table 1 Overview of Social Support Studies

Study	Design	Intervention	Theory	Intervention Effects
Elbel et al. (2003)	**Focus:** PA **Participants:** 148 employees (mean age= 40 years)	**Groups:** 1) professional led, 2) peer led and 3) control group **Duration:** 3.5 weeks with 7 courses **Format:** Educational courses 2x week, self study materials, video, self study materials and classroom instruction	SCT	Average steps increased for each intervention group Peer intervention enhanced self efficacy and self reported physical activity; professional led intervention enhanced physical activity
Kristal et al. (2000)	**Focus:** Diet and Mediating Factors **Participants:** 1,795 employees (mean age= 58 years)	**Groups:** Next Step Trial participants from 28 worksites **Duration/Format:** 3 year observation (year 1, 5 classes and mailed materials were provided; year 2, personalized feedback materials), both years newsletters and activities were provided	SCT and Trans-theoretical model (TTM)	Changes in mediating variables had significant effects on dietary change (predisposing factors and enabling factors such as social support)
Napolitano et al. (2003)	**Focus**: PA **Participants**: 65 sedentary employees (18-65 years; mean age=43)	**Groups**: 1) website and email 2) Control group (those on the waiting list) **Duration:** 3 months **Format:** Internet plus weekly email tips	SCT and TTM	Minimal PA (walking) was significantly higher in intervention group
Opdenacker et al. (2008)	**Focus:** PA and Mental Health **Participants:** 66 university employees (mean age= 39 years)	**Groups:** 1) face-to-face support group or 2) telephone based support group **Duration:** 3 month coaching program **Format:** Class courses, brochures, telephone support groups, weekly feedback	Not reported-focus on self-efficacy and social support	Both groups increased leisure-time PA, self-efficacy, and social support and decreased sitting time and trait anxiety
Rovinak et al. (2005)	**Focus:** Walking **Participants:** 2,121 workplace employees (mean age= 45)	**Groups:** 1) walking program with SCT feedback 2) walking program with tailored SCT feedback **Duration:** 12 weeks **Format:** Walking program, walking logs via email, feedback, emails	SCT	Significant improvement in 1 mile walk test, improvement in estimated VO_2max and greater program satisfaction in tailored SCT feedback group

Table 1 (cont.) Overview of Social Support Studies

Study	Design	Intervention	Theory	Intervention Effects
Stanton et al. (2007)	**Focus:** Diet and social support **Participants:** 1,942 students (mean age= 12 years)	**Groups:** Data collected from 22 counties in Virginia and New York **Duration/ Format:** Cross sectional baseline health surveys administered in classrooms	Not reported- Evaluated relationships among social support sources and eating behaviors	Positive support (family and friend) for healthful eating was related to healthful dietary practices (fat and fiber intake)

Table 2 Application of SCT to Project PHIT Program

SCT Concept	Definition	Implications	Application of SCT to Project PHIT
Environment	Factors physically external to the person	Provides opportunities and social support	• Workplace environment • Social environment including family, friends and peers at work
Situation	Perception of the environment	Correct misperceptions and promote healthful forms	• Participants assumed to be healthy • Promote that physical activity is fun and can be performed conveniently at the office • Promote the notion that intensity can be moderate to vigorous • Promote the notion that healthy dietary habits can be small changes in eating patterns • Use mental imagery and positive self-talk to facilitate confidence in physical activity and dietary habits
Behavioral capacity	Knowledge and skill to perform a given behavior	Promote mastery learning through skills training	• Teach participants circuit training and aerobic physical activity • Teach participants alternative fun activities (e.g., ultimate frisbee, soccer, basketball, yoga, etc) • Teach participants healthy dietary behaviors • Teach participants disease prevention
Outcome Expectations	Anticipatory outcomes of behavior (own experiences or observe others)	Model positive outcomes of healthful behavior	• Peer-to-peer training • Researcher-to-subject training • Project PHIT team members-to- team members group activities (e.g., social persuasion) • Previous Project PHIT participants-new participants
Outcome Expectancies	Values that a person places on a given outcome (incentives	Present outcomes of change that have functional meaning	• Presentation of pre- and post-testing results • Emphasize long-term behavior change • Prizes for individual goal attainment (e.g., average number of steps per day, recommended number of fruits and vegetables consumed, etc)
Self Control	Personal regulation of goal-directed behavior or performance	Provide opportunities for self-monitoring, goal-setting, problem solving and self reward	• "Food Bowl" contest • Steps logs • Monitor attendance • Role playing of overcoming physical activity and nutrition barriers

Table 2 (cont.) Application of SCT to Project PHIT Program

SCT Concept	Definition	Implications	Application of SCT to Project PHIT
Observational Learning	Acquire behavior by watching actions and outcomes of others'	Include credible role models of the targeted behavior	• Instructors spoke frequently of their own physical activity and nutrition behaviors • Project PHIT participants spoke about their own experiences in the pilot Project PHIT programs
Reinforcement	Responses to a person's behavior that increase or decreases the likelihood of reoccurrence	Promote self-initiated rewards and incentives (move from valuing extrinsic to intrinsic)	• Use handouts and email to keep participants informed • Make activities fun • Make nutrition simple and fun (e.g., "Food Bowl" contest- points for positive behavior and negative points for negative behavior) • Teach positive reinforcement between Project PHIT teams
Self-efficacy	Situation-specific self-confidence	Approach behavioral change in small steps to ensure success; seek specificity about the change sought	• Set goals to increase average number of steps taken each week • Set goals to increase fruit, vegetable and fiber intake • Set goals to increase physical activity each week • Provide basic and progressive instructions in a variety of physical activities and nutrition behavior changes
Emotional Coping Responses	Strategies or tactics that are used by a person to deal with emotional stimuli	Provide training in problem solving and stress management Include opportunities to practice skills in emotionally arousing situations	• Use mental imagery and positive self-talk to facilitate confidence in physical activity and dietary habits • Positive self-talk while performing physical activity • Positive feedback while discussing healthy nutrition behaviors
Reciprocal Determinism	The dynamic interaction of the person, the behavior and the environment in which the behavior is performed	Consider multiple avenues to behavioral change including environmental, skill and personal change	• Multi-factorial methods of instructional delivery • 10-week program with follow-ups (vs. one-shot intervention) • Consideration of environmental, personal, psychosocial and behavioral factors that determine physical activity and nutrition behaviors

Table 3 Project PHIT Program Adherence

Programs	#Participants Beginning	# Participants Who Finished (% completed)
Spring 2009 Pilot Program	25	18 (72%)
Fall 2009 Pilot Program	25	17 (68%)
Spring 2010 Program	28	26 (92%)

Table 4 VO_2 max Classification Ranges for Women

Age (years)	Poor	Fair	Good	Excellent	Superior
20-29	≤ 35	36-39	40-43	44-49	50+
30-39	≤ 33	34-36	37-40	41-45	46+
40-49	≤ 31	32-34	35-38	39-44	45+
50-59	≤ 24	25-28	29-30	31-34	35+
60-69	≤ 25	26-28	29-31	32-35	36+
70-79	≤ 23	24-26	27-29	30-35	36+

Table 5 VO_2 max Classification Ranges for Men

Age (years)	Poor	Fair	Good	Excellent	Superior
20-29	≤ 41	42-45	46-50	51-55	56+
30-39	≤ 40	41-43	44-47	48-53	54+
40-49	≤ 37	38-41	42-45	46-52	53+
50-59	≤ 34	35-37	38-42	43-49	50+
60-69	≤ 30	31-34	35-38	39-45	46+
70-79	≤ 27	28-30	31-35	336-41	42+

Table 6 Project PHIT Participants' Health-Related Variables Pre- and Post-Intervention

Health-related variables	M_{pre}	SD_{pre}	$Range_{pre}$	M_{post}	SD_{post}	$Range_{post}$	*P*	Effect Size (*d*)**
Weight (lbs)	183.91	37.52	130-271	182.09	35.68	132-261	0.01*	0.05
Systolic (mmHg)	125.13	12.26	110-160	121.79	7.99	114-144	0.03*	0.3
Diastolic (mmHg)	79.83	6.53	70-98	75.88	8.07	60-92	0.03*	0.5
VO_2max (ml/min/kg)	24.41	8.33	11.6-43.5	27.79	10.34	13-53	0.01*	0.4

* Note: Significantly different $p<0.05$; *P* value for change over time by paired samples t-test (N= 24). ** Small-0.2; medium-0.5; large-0.8.

Table 7 Project PHIT Physical Activity Participation

Physical Activity	M_{pre}	SD_{pre}	$Range_{pre}$	M_{post}	SD_{post}	$Range_{post}$	*P*	Effect Size (*d*)**
Days per week moderate-vigorous exercise	2.46	1.35	0-5	4.25	1.45	2-7	<0.001*	-0.5
Days per week strengthening exercises	1.33	1.37	0-4	2.75	1.11	2-7	<0.001*	-0.5
Days per week stretching exercises	2.00	1.79	0-6	3.13	1.33	2-7	0.01*	-0.3
Average steps (3-day average)	9,075	3,595	3,937-16,121	10,639	3,346	4,579-20,455	0.01*	-0.2

* Note: Significantly different p<0.05; *P* value for change over time by paired samples t-test (N=24). ** Small-0.2; medium-0.5; large-0.8.

Table 8 Project PHIT Fruit, Vegetable and Fiber Intake Pre- and Post-Intervention

Characteristics	**M_{pre}**	**SD_{pre}**	**$Range_{pre}$**	**M_{post}**	**SD_{post}**	**$Range_{post}$**	***P***	**Effect Size (*d*)****
Fruit and vegetable servings per day	3.79	1.58	1-8	4.32	0.88	3-6	0.03*	0.4
Dietary fiber (gm)	14.85	4.53	7-29	16.91	3.34	9-23	0.02*	0.5

*Note: Significantly different $p<0.05$; *P* value for change over time by paired samples t-test (N=24). ** Small-0.2; medium-0.5; large-0.8.

Table 9 Project PHIT Participants' Perceived Social Support Scores Pre- and Post-Intervention

Characteristics	**M_{pre}**	**SD_{pre}**	**$Range_{pre}$**	**M_{post}**	**SD_{post}**	**$Range_{post}$**	***P***	**Effect Size (*d*)****
Social support from Project PHIT for nutrition	8.92	5.49	5-18	12.54	4.98	1-19	0.001*	0.7
Social support from Project PHIT for exercise	16.46	10.73	9-39	27.75	9.63	13-49	<0.001*	0.05

* Note: Significantly different $p<0.05$; *P* value for change over time by paired samples t-test (N=24); higher values=more social support. ** Small-0.2; medium-0.5; large-0.8.