BARRIERS TO REPEAT PARTICIPATION IN A WORKSITE

PEDOMETER PROGRAM

By

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Submitted to the

Faculty of the College of Arts and Sciences

of American University

in Partial Fulfillment of

the Requirements for the Degree

of Masters of Science

In

Health Promotion Management

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August 4, 2011
Date

2011
American University
Washington, D.C. 20016

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ABSTRACT

Worksite pedometer programs are effective tools in promoting movement by helping participants break down common barriers to physical activity and improve health outcomes. When practitioners implement these types of health promotion programs multiple times, they may see an unexplained drop off in involvement in subsequent iterations. The purpose of this study was to determine the barriers that prevent repeat participation. A sample of 344 employees at American University who participated in a 2009 worksite pedometer challenge were surveyed about barriers that prevented them from also participating in 2010. This study examined the most common physical activity and program-related barriers to repeat participation. Respondents disagreed that any of the identified barriers prevented them from repeat participation except for already being physically active. It was concluded that practitioners should implement programming that encourages repeat participation from individuals with health risks and those who are already taking part in healthy activities.

ACKNOWLEDGMENTS

Completion of this thesis would not have been possible without the help of Dr. Anastasia Snelling, Dr. Jonathan Beard, and Amy Farr. Dr. Snelling's frequent check-ins and support throughout the entire writing process helped ensure that my final work would be polished and something to be proud of. Dr. Snelling, thank you for your encouragement and belief that I could actually write a thesis. I would like to thank Dr. Beard for being Superman, swooping in, and saving the day for this project. Without his help, I would still be trying to figure out which statistical analysis to perform. Thank you to Amy for allowing me to design my thesis as a project that would benefit our work with A*healthy*U. The insight into health promotion programming and support in general that Amy provided was invaluable to the completion of this thesis.

I would also like to thank my friends and family for all of their support and encouragement through the thesis writing process. Your prayers were uplifting, your questions were challenging, and they were all very much needed and appreciated.

Finally, my Joyfus, you have supported me through the ups and downs of my entire graduate school experience. Thank you for being my number one cheerleader, my best friend, and the love of my life. Without your constant words of encouragement and even a few late-night proofreading session, we never would have gotten here. I love you and am so excited about how God has blessed us and that He chose us to spend the rest of our lives together (with Babyrresi too)!

TABLE OF CONTENTS

LIST OF TABLES

Table

CHAPTER 1

INTRODUCTION

Physical Inactivity and Sedentary Lifestyle in the United States

According to the United States Department of Health and Human Services (DHHS), nearly one quarter of American adults do not participate in any leisure time physical activity (Centers for Disease Control and Prevention, 2010). In addition, more than 80% of adults in the US fail to meet recommendations for aerobic exercise and strength training (U.S. Department of Health and Human Services, 2009). It is estimated that 400,000 deaths in the United States in 2000 were due to physical inactivity and poor diet, marking them as the second leading cause of death in this country (Mokdad, Marks, Stroup, & Gerberding, 2004).

A sedentary lifestyle brings with it serious health risks and financial burdens. More active men and women have lower rates of all-cause mortality, coronary heart disease, high blood pressure, stroke, type 2 diabetes, metabolic syndrome, colon cancer, breast cancer and depression compared to less active adults (Physical Activity Guidelines Advisory Committee, 2008). Both aerobic exercise and resistance training have been shown to reduce the risk of cardiovascular disease (CVD) (Bassuk & Manson, 2005) a disease that has estimated yearly costs in America of $400 billion (Mensah & Brown, 2007). Physical activity has also been proven to reduce the risk of other costly diseases

including type 2 diabetes, cancer, and osteoporosis (Albanes, Blair, & Taylor, 1989; John, Horn-Ross, & Koo, 2003; Kemmler et al., 2004; Lee, Paffenbarger, & Hsieh, 1991; Mayer-Davis & Costacou, 2001; Park et al., 2007).

Barriers to Participation in Physical Activity Programs

Despite the wealth of research demonstrating the importance of living an active lifestyle, the statistics on physical inactivity in America show that many people struggle to overcome barriers to physical activity. The most common obstacles preventing people from moving away from a sedentary lifestyle or incorporating more activity into their routine include not having enough time, skills, knowledge, support, or resources to exercise (Centers for Disease Control and Prevention, 2011b). Certain elements pertaining to the implementation of a physical activity program can also influence people's decisions to participate. People are more likely to participate with a group and if tangible incentives are made available (Phipps, Madison, Pomerantz, & Klein, 2010). Additionally, factors like poor quality communication related to a program and a lack of leadership may deter participation (Robinson, Driedger, Elliott, & Eyles, 2006).

Use of Worksite Pedometer Programs to Promote Physical Activity

Worksite pedometer programs have proven to be successful in helping employees break down barriers to physical activity. Health promotion programs in the workplace can facilitate the improvement of health behaviors and bring about positive health changes (Pohjonen & Ranta, 2001). Physical activity programs in the workplace may lead to a reduction of risk factors for cardiovascular disease and improved fitness levels in

participants (Anand Keller, Lehmann, & Milligan, 2009; Gebhardt & Crump, 1990). The use of pedometers as a tool in wellness interventions has shown a moderate and positive effect on physical activity levels in programs for various ages and intervention lengths (Kang, Marshall, Barreira, & Lee, 2009). Studies by Musto, Haines, and Croteau all found a significant increase in the average number of daily steps accumulated by participants in employee pedometer programs in college and university settings (Croteau, 2004; Haines et al., 2007; Musto, Jacobs, Nash, DelRossi, & Perry, 2010). Musto and Croteau were also able to demonstrate positive health status changes in participants including decreases in BMI, decreases in blood pressure, and reduced blood glucose levels. These results demonstrate the value that worksite pedometer programs can have on employee health.

Barriers to Repeat Participation

Despite the importance of continued engagement in physical activity and health promotion programs for improving health status, little research has been performed to examine barriers that prevent repeat participation, or the rejoining of annual programs. It has been shown that repeat participants in an employer sponsored Health Risk Assessment (HRA) have higher odds of maintaining or improving health status versus those who only take the HRA once (Pai, Hagen, Bender, Shoemaker, & Edington, 2009). Research also shows that healthier individuals are more likely to be repeat users of health behavior change programs (Verheijden, Jans, Hildebrandt, & Hopman-Rock, 2007). This means that current health condition may play a role as a perceived deterrent or catalyst to repeat participation in a program. Deterrents to repeat participation may also arise from

the perceived quality of the original program. Studies show that perceptions of quality service lead to customer satisfaction, and satisfied customers are more likely to refer others to a program and be repeat participants themselves (Crawford, Greenwell, & Andrew, 2007).

Significance of the Study

Physical activity programs exist to help prevent the rise of inactivity and sedentary lifestyles in our society. However, barriers to participation and continued or repeat participation prevent many people from taking advantage of worksite physical activity programs. This study aims to identify the common barriers to repeat participation in a worksite physical activity program. In doing so, the study may aid practitioners in developing programs that facilitate overcoming such obstacles.

Purpose

The purpose of this study was to determine the barriers that prevented employees from reenrolling in a worksite pedometer program. Specifically, this study examined the most commonly cited barriers to participating in the 2010 Steps to A*healthy*U Pedometer Challenge at American University (AU) by faculty and staff members who participated in the 2009 Steps to A*healthy*U Pedometer Challenge.

Primary Hypothesis

1. Relative to the programmatic barriers to participation, the commonly recognized barriers to physical activity participation would be more strongly agreed upon as obstacles to repeat participation in the worksite pedometer program across all demographics.

Secondary Hypotheses

1. Relative to participants identified as faculty members, staff members will more strongly agree that the commonly recognized barriers to participation in physical activity prevented them from repeat participation in the worksite pedometer program.
2. Relative to staff members, faculty members will more strongly agree that programmatic barriers prevented them from repeat participation.
3. Relative to all other barriers, being already physically active will be the least strongly agreed upon reason for choosing to not participate in the pedometer challenge a second time.

Definition of Terms

The following terms are used throughout this paper.

A*healthy*U: the name of American University's faculty and staff wellness program.

Faculty: employees at a university involved and responsible for teaching and/or research.

Pedometer: simple and inexpensive body-worn motion sensors that researchers and practitioners use to assess and motivate physical activity behaviors (Kang, et al., 2009).

Physical Activity Barrier: personal variables, including physiological, behavioral, and psychological, that may affect a person's plans to become more physically active (Centers for Disease Control and Prevention, 2011b).

Programmatic Barrier/Program-related Barrier: elements related to the way that a program is implemented that may affect a person's plans to participate in that program.

Repeat Participation: reenrollment and/or recurrent exposure to the same or similar physical activity or wellness related program.

Staff: university employees who are responsible for operations and support functions.

Worksite: place of employment.

Limitations

The survey for this study was sent to potential participants in March 2011, 10 months after they decided not to participate in the 2010 Steps to A*healthy*U Pedometer Challenge (May 2010). Historically, American University faculty and staff members have a poor response rate to surveys. The descriptive study design eliminates the ability to determine causality of responses. Additionally, for the purpose of data analysis, equal numeric weight was given to each of the ordinal response options.

Delimitations

All subjects were selected for the study based on their participation in the 2009 Steps to A*healthy*U Pedometer Challenge and non-participation in the 2010 Steps to A*healthy*U Pedometer Challenge at American University. All participants were over 18 years of age. All participants were at one time associated with American University through employment or a family member's employment.

Assumptions

It was assumed that the barriers to repeat participation in the survey included all of those that would be mentioned, and that no other common barriers were recognized. It was also assumed that participants would recall their reasons for not participating in the 2010 Steps to A*healthy*U Pedometer Challenge and would not draw on current life circumstances for their responses. Finally, it was assumed that all respondents provided honest answers.

CHAPTER 2

REVIEW OF LITERATURE

This chapter reviews literature related to the risk of physical inactivity on the health of Americans. Additional literature on barriers to participation in physical activity programs and methods of diminishing these obstacles will also be examined.

Physical Inactivity in the United States

The United States Department of Health and Human Services (DHHS) highlighted physical activity as one of the most important things that Americans could do to improve their health in the ”2008 Physical Activity Guidelines for Americans.” According to the Surgeon General’s Report on Physical Activity and Health from 1996, nearly one quarter of American adults do not participate in any leisure-time physical activity. National averages from 2008 show that this number has held fairly steady with 25.4% of American adults over age 18 not participating in leisure-time physical activity (Centers for Disease Control and Prevention, 2010). The negative results of this problem are evident as an estimated 400,000 deaths in the United States in the year 2000 were a result of physical inactivity and poor diet. This makes physical inactivity the second leading cause of death in America and the fastest rising category (Mokdad, et al., 2004). Women are more likely to be classified as being inactive or having insufficient physical activity levels than men. Hispanic adults in the United States have the highest levels of inactivity compared to Whites, Blacks, and other racial groups. Statistics also show that

the likelihood of achieving recommended levels of physical activity increase with education level. The lowest levels are found in adults who have not completed high school (Centers for Disease Control and Prevention, 2010). In all, more than 80% of American adults fail to meet guidelines for recommended levels of aerobic and strength training activity (U.S. Department of Health and Human Services, 2009).

The guidelines released by DHHS acknowledge that *some* physical activity is better than none at all. The DHHS recommends that adults should be participating in at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic activity each week. Bouts of exercise can be broken up into segments that last at least 10 minutes each to experience substantial health benefits. For more extensive health benefits of physical activity, DHHS suggests 300 minutes of moderate aerobic activity or 150 minutes of vigorous aerobic activity each week. Also outlined is the need for American adults to engage in strength training activities for the major muscle groups two or more days each week (U.S. Department of Health and Human Services, 2008). Similarly, the American College of Sports Medicine (ACSM) recommends that all healthy adults age 18 to 65 years partake in moderate aerobic physical activity for a minimum of 30 minutes five days a week, or vigorous aerobic activity for 20 minutes three or more days per week. ACSM concurs with DHHS by identifying strength training as a necessary component of physical activity that should be performed at least two times each week (American College of Sports Medicine, 2010).

Examples of moderate aerobic activity include walking briskly, playing doubles tennis, general gardening, and ballroom dancing. Jogging, running, bicycling more than ten miles per hour, heavy gardening, and hiking uphill are all considered examples of

vigorous physical activity. According to DHHS, strength activities can be performed using specific exercise equipment like resistance bands and dumbbells, or by using your own body weight as resistance. Additionally, carrying heavy loads and digging creates resistance which the body responds to like strength training (U.S. Department of Health and Human Services, 2008).

Risk of Sedentary Lifestyle

Living an active lifestyle has been shown to lessen health risks, lower health care costs, and improve longevity. The DHHS recognizes that more active men and women have lower rates of all-cause mortality, coronary heart disease, high blood pressure, stroke, type 2 diabetes, metabolic syndrome, colon cancer, breast cancer and depression compared to less active adults. DHHS research also suggests that more active adults exhibit a health profile that is favorable for preventing cardiovascular disease and improving bone health (Physical Activity Guidelines Advisory Committee, 2008).

Cardiovascular Disease

Cardiovascular disease (CVD) is the term used to describe a wide scope of conditions affecting the heart and blood vessels. The major conditions usually associated with CVD include atherosclerosis, congestive heart failure, stroke, hypertension, atrial fibrillation, and sudden cardiac death (Weisfeldt & Zieman, 2007). CVD is the leading cause of death and lost productivity in the world. An estimated 71.3 million American adults have one or more forms of CVD that carry with them estimated indirect and direct costs exceeding $400 billion (Mensah & Brown, 2007). The relationship between a sedentary lifestyle and an increased risk of CVD has been examined in many studies.

Bassuk and Manson (2005) looked at the effect of physical activity on the risk for CVD through various epidemiologic studies. They were able to determine that both cardiovascular and resistance exercise were important tools in the reduction of CVD. One study in their collaboration showed that men who participated in resistance training for at least 30 minutes per week were less likely to develop CVD over an 8 year period. Other prospective studies demonstrated that walking was predictive of reduced incidence of CVD and of CVD mortality. The noted physiological benefits of regular physical activity, all of which reduce the risk of CVD, include regulated body weight, reduced blood pressure, and reduced high-density lipoprotein (HDL) cholesterol levels. Bassuk and Manson concluded that just 30 minutes a day of moderate level physical activity can greatly reduce the incidence of cardiovascular problems. This research greatly supports the importance of the physical activity and exercise guidelines published by DHHS and ACSM.

Petrella, Lattanzio, Demeray, Varallo, and Blore (2005) studied the impact of adopting an exercise routine later in life on the development of markers for heart disease. The study followed two cohorts of healthy adults aged 55-75 over 10 years in Canada. The active cohort was comprised of adults who initiated participation in a supervised physical activity program. The sedentary control cohort was comprised of randomly selected subjects from the same geographic location as the active cohort. Baseline assessments of both groups were similar for age, sex, fitness levels, and anthropometric measures. At follow up, Patrella et al. determined that the active group had fewer exercise induced cardiac abnormalities and a reduced level of risk factors for CVD. Additionally, the sedentary group showed a significantly higher prevalence of metabolic

syndrome after ten years. These findings suggest that even adopting a physically active lifestyle later in life can be beneficial in preventing heart disease.

By demonstrating how a physically active lifestyle can serve as a protective mechanism against CVD, these studies have highlighted the dangers associated with a sedentary lifestyle. They have also shown the positive impact that short sessions of moderate intensity exercise can have on heart health.

Type 2 Diabetes

The Centers for Disease Control and Prevention (CDC) estimates that the total cost of diabetes in the United States is $174 billion. This disease is the leading reason for kidney failure, non-traumatic leg amputations, and new cases of blindness in the United States. Diabetes is also a top cause of heart disease and stroke and is the seventh leading cause of death in America (Centers for Disease Control and Prevention, 2011a).There are two major types of diabetes; type 1 and type 2. Type 2 diabetes, or non-insulin-dependent diabetes mellitus, occurs when the pancreas loses its ability produce enough insulin in response to meals (National Diabetes Information Clearinghouse). According to the CDC, type 2 diabetes accounts for 90-95% of all diagnosed diabetes cases in the United States. Many previous research studies have demonstrated the link between inactivity, obesity, and the development of Type 2 diabetes.

Television (TV) watching may be the most easily identified sedentary activity in American households. In the study “Sedentary Lifestyle and Risk of Obesity and Type 2 Diabetes,” Frank Hu examined the association between time spent watching TV and the risk of developing type 2 diabetes (2003). By using the data collected in the Health

Professionals' Follow-up Study, a prospective cohort study, Hu was able to determine that a two-hour increment spent watching TV daily was associated with a 20% increase in risk for diabetes. Additionally, men who spent over forty hours a week watching TV had almost three times the likelihood of developing type 2 diabetes than men who watched less than one-hour of TV. Hu's research strongly supports the notion that reducing sedentary activities plays an important role in preventing type 2 diabetes in the same way that increasing physical activity levels does.

Mayer-Davis and Costacou (2001) compiled results from various studies as supportive evidence that increased physical activity reduces the risk for type 2 diabetes. The Nurses' Health Study showed that the incidence level of diabetes over eight years was significantly reduced in women who participated in higher levels of physical activity. Mayer-Davis and Costacou also point to observational studies that demonstrate both moderate and vigorous physical activity improves insulin sensitivity. They conclude that the improved insulin sensitivity and incidence of type 2 diabetes associated with physical activity is partially due to changes in body mass index (BMI) as a result of increased activity levels. A decline in body weight has not been determined to be the sole reason that physical activity reduces the risk for type 2 diabetes. This supports the importance of focusing not just on weight reduction, but also on minimizing sedentary behaviors which may be achieved through simple physical activity programs.

Cancer

One in 4 deaths, more than 1500 each day, is attributable to cancer in the United States (Jemal, Siegel, Xu, & Ward, 2010). Cancer, a group of diseases in which abnormal

body tissues grow and multiply uncontrollably destroying healthy tissue in the process, can impact various parts of the body in people of all ages (National Cancer Institute). Men have a 44% probability of developing invasive cancer in their lifetime. Women have a slightly lower 38% lifetime probability, but due to higher rates of breast cancer have a higher probability under age 60. Lung cancer, largely blamed on tobacco use, is the form of cancer responsible for the highest number of deaths in the United States among both men and women. For men specifically, prostate cancer accounts for the second highest percentage of cancer related deaths at 11%. For women, breast cancer can be blamed for 15% of cancer deaths. Colon cancer, the cause of 9% of deaths in both men and women, falls third on the list of leading cancer related deaths (Jemal, et al., 2010). While the causes of cancer are not fully known, many studies have examined and confirmed links between a lack of physical activity and cancer development.

Using data from the National Health and Nutrition Examination Survey, Albanes et al. (1989) observed an increased risk of cancer for inactive adults compared with active adults. The researchers used self reported physical activity and later development of cancer from a cohort of American adults as information for their study. For men, it was concluded that there was nearly double the risk of getting any form of cancer for inactive individuals versus active individuals who did not participate in recreational exercise. Women demonstrated a similar trend, though the difference in risk was smaller at 1.3 to 1.0 for inactive to active persons. The researchers also established a strong association between levels of physical inactivity leading to a higher risk of lung and colorectal cancer in men, breast cancer in post menopausal women, and cervical cancer in women.

John et al. (2003) researched the relationship between lifetime physical activity average and the risk of breast cancer in a case control study of adult women in the San Francisco Bay area. Women with breast cancer were identified through a cancer registry. A cancer free control group was established through random digit dialing. The study sample was made up of women of all ethnic backgrounds from ages 35 to 79. Lifetime physical activity in the study was self reported and determined from all sources including normal recreation and household activities, not just dedicated exercise. Premenopausal women identified as accumulating the highest levels of physical activity showed a 40% lower risk for breast cancer than premenopausal women with the lowest levels of physical activity in the study. Similar results were found for postmenopausal women, though with less of a risk reduction. When stratified into age groups of over 50 and under 50, results showed a significantly reduced risk of breast cancer for the most active women compared to the least active women. Risk reduction was found to be similar in women who participated in either moderate (<6 MET) or vigorous (≥6 MET) activity. This shows that the type of physical activity did not have as great of an impact on the reduced risk of breast cancer as the total amount of activity.

In a prospective study of Harvard alumni, Lee et al. (1991) also determined that consistently high levels of physical activity could protect against colon cancer. The research followed male graduates for either 11 or 15 years, tracking their initial physical activity levels, their activity level at follow up, and their colon and rectal cancer status. Men who were categorized as highly active at both measurements, equal to expending greater than 2,500 kilocalories per week, had half the risk of developing colon cancer as men inactive at both measurements. Men who were moderately active, expending

between 1,000 and 2,500 kilocalories per week, also demonstrated a significantly lower rate of colon cancer than inactive men. The relative risk of colon cancer for moderately active and highly active men was very similar at .52 and .50 respectively when compared to inactive subjects. Lee et al. also found that Harvard alumni who increased their physical activity levels from first assessment to second assessment had a reduced risk for developing colon cancer, though not at a significant level.

These studies support the need for programs that help individuals increase and maintain moderate to high levels of physical activity. There is a demonstrated strong connection between a reduction in risk of developing cancer and accumulated lifetime activity minutes. And as demonstrated, exercise performed does not necessarily need to be vigorous to gain the reduction in risk of developing many types of cancer.

Bone Health

Over 52 million adults in the United States live with osteoporosis or low bone mass (National Osteoporosis Foundation). Osteoporosis is a skeletal disease where bones deteriorate and lose density. Those impacted experience higher incidence of falls and bone fractures, which can inhibit the ability to perform many day to day tasks (Division of Nutrition & National Center for Chronic Disease Prevention and Health Promotion, 2011). Estimates show that by the year 2020, there will be over 61 million Americans suffering from osteoporosis or low bone mass. This figure includes half of all adults in the United States over age 50 (National Osteoporosis Foundation). Physical activity and proper diet have shown to be very important in establishing and maintaining good bone health and reducing the risk of osteoporosis later in life.

Kemmler et al. (2004) conducted an experiment to determine the impact of exercise on bone density, fitness, and blood lipids. The researchers provided calcium supplements to everyone in their sample of postmenopausal women. The women self selected into the experimental exercise group or the control group. Over 26 weeks the exercise group participated in four sessions a week that included warm-up, jumping exercises, strength training, and flexibility training. Bone density measurements were taken 3.5 months before the start of the exercise program and then again 26 weeks into the program in the lumbar spine, forearm, and femur. There was a significant difference in the amount of bone loss seen in the lumbar spine and femur between the exercise group and control group. The control group lost substantial bone density in these areas while the exercise group saw an increase of bone mass density in the spine and just a slight decrease in the femur. Additionally, the exercise group showed improvement in self reported pain intensity and frequency in the spine further supporting the benefit of exercise on bone health.

In their study examining the relationship between walking and bone health in Japan, Park et al. (2007) were similarly able to determine that physical activity could improve osteosonic index (OSI), a measure of bone stiffness in the calcaneus. Over the course of a year, OSI scores in men and women increased linearly with increases in physical activity levels. Participants' steps and exercise intensity were measured 24 hours a day for one year using an accelerometer. Park et al. determined that men and women who met minimum activity requirements of between 6,800 and 6,900 steps per day and maintained exercise intensity of at least 3 METs for between 16 and 18 minutes each day had OSI measurements above those used for clinical diagnosis of osteoporosis. They also

found that men who walked fewer than 6,800 steps and exercised moderately for less than 16 minutes a day were between 4.9 and 8.4 times more likely to sustain fractures than men who walked at least 8,200 steps and performed at least 25 minutes of moderate intensity exercise. Women in the same category for number of steps and exercise intensity and duration were between 2.2 and 3.5 more likely to sustain fractures than those who walked more and maintained longer bouts of moderate exercise. Park et al.'s conclusions further support that walking can be a very effective means of improving bone health through physical activity.

These studies show the benefits that physical activity can have on the bone health of at risk and healthy people. Increased bone density measures have been demonstrated in adults who accumulate larger amounts of exercise. Simple physical activity, such as walking, has been shown to provide the same benefits as more structured fitness and exercise routines.

Barriers to Participation in Physical Activity Programs

While there is overwhelming evidence to support the health benefits of living an active lifestyle, many people still struggle to do so. The Centers for Disease Control and Prevention (2011b) recognize ten barriers that are most likely to prevent people from engaging in physical activity:

1. Do not have enough time to exercise
2. Find it inconvenient to exercise
3. Lack self-motivation
4. Do not find exercise enjoyable

5. Find exercise boring
6. Lack confidence in their ability to be physically active (low self-efficacy)
7. Fear being injured or have been injured recently
8. Lack self-management skills, such as the ability to set personal goals, monitor progress, or reward progress toward such goals
9. Lack encouragement, support, or companionship from family and friends
10. Do not have parks, sidewalks, bicycle trails, or safe and pleasant walking paths convenient to their homes or offices

Researchers in the medical, health and fitness, and psychology fields have demonstrated findings in agreement with the CDC's assessment of the top barriers to physical activity. The CDC also developed a twenty one question "Barriers to Being Active Quiz" to aid people in recognizing their own barriers to participation in physical activity (2003). Many studies have also examined the best methods for overcoming these obstacles.

In a study researching potential barriers and incentives for using a worksite health promotion program, Kruger, Yore, Bauer, and Kohl (2007) found that a lack of time was the most commonly reported barrier. This study used the 2004 HealthStyles Survey, a volunteer mail survey, to gather information from 2337 adults who worked either full or part-time outside of the home. Respondents chose which, if any, of six barriers were the most likely to keep them from participating in a worksite health promotion program: being too tired, having no interest, having no time during the workday, having no time before or after work, already being involved in other programs, and not wanting to

participate with coworkers. Respondents identified having no time during the workday (42.5%) and having no time before or after work (39.4%) as the top two barriers to participation.

Cerin, Leslie, Sugiyama, and Owen (2010) found similar results in their examination of barriers to leisure time physical activity in adults. This study used data from Physical Activity in Localities and Community Environments (PLACE) study in Adelaide, Australia in which households were randomly surveyed in 2003 and 2004. Survey respondents identified how often each of eight barriers prevented them from getting regular physical activity: concerns about appearance, bad weather, poor health, lack of motivation, lack of social support, lack of skills/knowledge, lack of facilities, and time constraints. Self-reported leisure time physical activity levels were also collected in the survey. Responses were analyzed to show correlations between perceived barriers to physical activity and actual physical activity levels. Cerin et al. determined that the perceived barriers of lack of time and lack of motivation were the only significant predictors of level of physical activity for respondents. They also found that the perceived barriers of lack of motivation, poor health, and lack of access were associated with the odds of people not participating in leisure time physical activity.

A less commonly discussed barrier to physical activity was identified by Phipps et al. (2010) in their research on apprehensions related to worksite physical activity programs. Through their focus groups and surveys, the research team documented concerns for personal safety as the most commonly discussed barrier. Phipps et al. determined this response was a result of the infrequently patrolled areas outside of the building and feelings of insecurity experienced by workers in low-traffic areas, including

stairwells, inside of the building. Workload, lack of existing walking paths, and limited break time or lack of time to exercise in general were also commonly brought up as reasons for nonparticipation. They found that people who did not currently participate in exercise, but intended to start doing so in the next month to six months were more likely to identify lack of walking paths and personal safety as preventing them from physical activity than people who were already active.

Zlot, Librett, Buchner, and Schmid (2006) looked to draw similar conclusions about the impact of barriers to physical activity on level of physical activity. Their data was taken from the national Greenstyles survey that examined American's attitudes towards health. Examining environmental, social, transportation, and time influences, Zlot et al. categorized respondents as having a high, medium, or low number of barriers to physical activity. Environmental barriers included availability of paths and sidewalks, crime, traffic, safety, and weather. The respondent's level of community participation, perceived community involvement, and satisfaction of government involvement in community issues were considered social barriers. The time that people spent in their cars and at the workplace was used to determine time barriers. Transportation barriers only took into account the reason people did or did not use public transportation to get to and from the workplace. Those subjects in the high tertile had significant risk of being below recommended levels for physical activity versus those in the low tertile. This same trend was found when examined individually for environmental, social, transportation, and time barriers. Zlot et al. also found that people in both the medium and high level of barrier groups were at significant risk of being sedentary.

Perceived barriers to participation in physical activity present a very real problem in moving a sedentary society towards becoming an active society. Many health promotion professionals use research based best practices to design programs that help break down these common barriers to physical activity. In creating and implementing interventions, alternate barriers can arise as a result of the program design and environment.

The research of Phipps et al. (2010) discussed earlier also examined various aspects of health promotion programming specific to the program design that could entice or possibly deter people from participating. They found that 61% of their survey respondents would be more likely to participate in a worksite physical activity program if they were allowed to do so as part of a group or with a buddy. Phipps et al. also discovered that 57% of those surveyed would be more likely to participate if enticed by tangible incentives. These results show that group options and incentives offered could both present themselves as barriers to participation in physical activity programs. Phipps et al. also found that implementing physical activity programs in the workplace can introduce barriers related to a perception of how an employee feels that they are valued by the company. A number of focus group and survey participants noted that the presence of a physical activity program at work signaled that the organization cared about its workers.

In their research examining health promotion programming, Robinson et al. (2006) were also able to identify important aspects of program design that may present themselves as facilitators or barriers to participation. They gathered project reports and interviews from key informants from five of the eight provincial projects involved in the

Canadian Heart Health Initiative (CHHI). Data collection yielded qualitative and quantitative information about program processes, outcomes, activities, and facilitators or barriers to increased participation and information dissemination. In accordance with previous research, competing priorities and/or a lack of interest was a highly rated barrier to participation having been mentioned in 49% of responses. Robinson et al. also identified less commonly recognized program-related barriers. Poor communication (7% of responses), unsupportive structure and/or poor coordination (16%), lack of leadership (19%), and a lack of skilled and/or committed people (49%) all appeared to play a substantial roles as barriers.

Both common barriers to physical activity and program-related barriers present themselves as too large to overcome for the sedentary population in the United States. It is important that practitioners recognize these barriers as they work to develop successful interventions.

Benefits of Implementing Health Promotion Programs in the Worksite

Implementing wellness programs in a worksite setting has shown to aid in bringing about positive health changes and improving overall employee health. Employees typically spend 40 hours each week in the workplace, allowing for many of the common barriers to physical activity to be eliminated or diminished in this setting. A lack of time and access are commonly addressed by the availability of programs in the workplace during the workday. The issue of minimal social support may be overcome through encouragement from coworkers and supervisors. With this information, the worksite has become a valuable tool in promoting an active lifestyle.

Pohjonen and Ranta (2001) examined the effects and constancy of a worksite physical exercise program for female workers at the Social Services Department in Helsinki, Finland. Workers were split into two groups. The first was an intervention group, who took part in a nine month long supervised exercise program meeting twice weekly for 60 minutes each session. The second was a control group who did not take part in the exercise program. Employees took part in the exercise program with their entire work unit, including the foreman, at a facility near their worksite. Employees were allowed to participate during standard work hours and were not required to make up any missed work time. Physical fitness, perceived health status, and work ability were recorded at baseline, one year after the beginning of the study, and five years after the start of the study. After one year, Pohjonen and Ranta observed a decrease in body fat and weight, along with an increase in muscular strength and endurance in the intervention group. The control group also demonstrated an increase in strength and endurance, though the changes for the intervention group were larger and the differences between the groups were significant. These differences were consistent at the five year follow up. Additionally, the researchers found that the work ability index of the control group declined nearly three times faster than that of the intervention group over five years. These results support the usefulness of worksite physical exercise programs in improving fitness and work performance.

Anand Keller et al. (2009) were able to determine that worksite health promotion programs can significantly improve employee health when population make up and size are taken into account. They found that many worksite programs were able to report decreases in participant blood pressure and increases in participant fitness levels. Both of

these values were associated with a reduction in health care costs. They also discovered that fitness programs have a more positive impact on female employees. Anand Keller et al. concluded that worksite health promotion programs can be challenging to implement due to the multitude of target health issues and unique employee populations. When done effectively though, these programs can bring about positive health status changes that may result in a reduction in health care costs.

Gebhardt and Crump (1990) identified that worksite fitness and wellness programs can be implemented on three different levels, with each level resulting in different degrees of health and behavior change in employees. Level I implementation consists of awareness and education campaigns. These programs do not necessarily result in positive health and behavior changes, but can increase awareness of health issues and programs. Level II implementation focuses on lifestyle modification programs lasting a minimum of 8 to 12 weeks. These programs may take the form of classes, access to fitness facilities, or even physical activity programs like a pedometer challenge. Level III implementation entails creating an environment conducive to living a healthy lifestyle in the workplace. This can be achieved through providing equipment and facilities for exercise, and also by making changes to the food options available at the worksite. In their research, Gebhardt and Crump discovered that over a two-year period a significant percentage of nonexercising employees of companies who implemented either a Level I program or a Level II and III program began and continued regular vigorous exercise. They also found that many employees for these companies improved their aerobic capacity and that those who did had a significant decrease in body weight, body fat percentage, and systolic blood pressure.

This research shows the positive impact that health promotion programs in the workplace can have on employee health. Worksite physical activity interventions have successfully encouraged positive health behavior changes and have demonstrated the ability to improve fitness and lower health risks. Many different tools and intervention options are available for wellness professionals to use in administering effective wellness programs in corporate settings.

Use of Worksite Pedometer Programs to Promote Physical Activity

Through research and practice health promotion professionals have identified many tools to aid in overcoming barriers to physical activity. The pedometer, a small electronic tool that counts the number of steps taken by the wearer, has shown to be an effective goal-setting instrument to increase physical activity levels. Kang et al. (2009) found that the use of pedometers has a moderate and positive effect on physical activity levels in intervention programs. This effect was equal to an average increase of 2,000 steps per day in participants in intervention groups across multiple studies. Kang et al. also concluded that similar positive effects of pedometer programs could be seen across all age groups and intervention lengths. Thus, targeted pedometer programs implemented in the workplace environment may provide beneficial outcomes and improved physical activity among participants.

Musto et al. (2010) examined the outcomes of a 12-week pedometer program on sedentary female university employees. Baseline metabolic measurements were taken from all of the study participants prior to their participation and again at the end of the program. Women who improved their average step total by 3,000 steps per day were

assigned to the active group, while those who did not complete the program or did not improve their step average by the determined level were placed in the control group. Musto et al. found that there was a significant improvement in the number of steps taken by members of both groups in the study. The active group also experienced significant decreases in body weight, BMI, and resting heart rate. Additionally, the active group experienced a significant decrease of 2.9% in fasting glucose levels. Musto et al. concluded that the incremental approach to increasing steps in this pedometer program allowed for sedentary participants to ease into increasing their physical activity levels and experience positive health changes.

Similar conclusions were drawn by Haines et al. (2007) as a result of their pilot pedometer intervention program for faculty and staff members at a different university. This pedometer program also followed a 12-week plan that started and ended with biometric screenings to collect data. The program included daily step tracking, informational emails, and an educational computer program to assist in participant behavior change. Over the course of the program, the average number of steps improved by 27% for the entire study group. The researchers also noted a decrease in mean BMI from 29.06 to 28.76. Total cholesterol levels dropped from 184.68 to 178.81 for all participants who completed the pedometer program. The program did see a 50% drop out rate, which is noted as being consistent with other studies. Haines et al. held focus groups with the people who did not complete the program and found that common barriers to physical activity including time, motivation, job responsibilities and physical limitations were most often cited as the reason for stopping. They concluded that the pedometer program did provide a sufficient means for overcoming many of the barriers for those

who completed the program. Those participants experienced positive health outcomes and also responded with increased perceptions of work productivity and health awareness.

Croteau (2004) also sought to research the effectiveness of a worksite pedometer program on a college campus. Her study tracked the impact of a pedometer program that incorporated goal setting and self monitoring on 37 college employees. Baseline step averages were collected using pedometers over a one week period with totals hidden from the participants. Prior to the start of the 8-week intervention, participants took part in a counseling session where strategies to increase daily step totals were discussed. The employees also set step goals for themselves in these sessions. Participants were responsible for monitoring their step totals daily and were reminded once a week by the researchers about the program. The group demonstrated a 23% increase in daily step totals at follow up. Overweight and obese participants showed the largest gains in daily step totals at 24.0% and 34.3% respectively. From this study, Croteau was able to conclude that a minimal contact, self-managed worksite pedometer program can be effective in increasing physical activity levels of participants.

These studies demonstrate the usefulness of implementing worksite pedometer programs for faculty and staff members in a university setting. This study will determine what barriers are most prevalent in preventing repeat participation in a university based worksite pedometer program.

Barriers to Repeat Participation

While current research provides significant evidence of common barriers to participation in physical activity programs and ways to overcome them, little research is available that examines barriers to repeat participation. High initial involvement numbers are often followed by large drop offs in subsequent iterations of the same or similar programs. Programs that occur repeatedly or cyclically could benefit greatly from additional research in this area. This information is also important for companies and health promotion programs that must constantly target recurring health problems with programs and interventions.

Crawford et al. (2007) chose to examine the trend of decreased repeat participation in physical activity programs by examining reenrollment in college and university instructional classes. They surveyed 300 students at a public Midwestern university who were enrolled in basic instructional programs for physical activity. The questions assessed students' perceptions of the quality of the course along with their motives for taking the course. Responses showed that 65.3% of the respondents were repeat enrollers in basic instructional programs. Crawford et al. discovered that program content and facilitators significantly influenced a student's satisfaction with the program. With this information they were able to conclude that perceptions of quality service led to customer satisfaction, and satisfied customers were more likely to take additional classes and refer others to the classes. This study highlights the role that poor program content and uninspiring leaders can play in creating barriers to repeat participation in physical activity programs.

In another study on barriers to repeat participation, Verheijden et al. (2007) looked at the deterrents to reusing an online health behavior change program. The free online program included a questionnaire with items related to anthropometrics (height, weight, and waist circumference), physical activity, dietary habits, alcohol intake, smoking, work, cardiorespiratory fitness, and muscle strength that provided users with customized feedback based on their responses. Participants were encouraged to revisit the site three months after their initial visit to monitor their progress. The researchers found mixed results when examining who was most likely to return to the website. Overweight and obese participants had higher odds of repeat participations (1.20, 1.54) compared with healthy weight participants. While those participants who met physical activity guidelines (moderate intensity 1.31, high intensity 1.23) and met guidelines for fruit (1.26) and vegetable (1.39) consumption had higher odds of returning than those who did not. Smokers were also less likely to reuse the program than those people who used to smoke or had never smoked. In all, the researchers saw repeat participation in only 10% of initial users. The researchers concluded that people who lived healthier lifestyles were more likely to be repeat participants, even if their weight possibly did not reflect a healthy level. They were disappointed in the repeat usage levels and identified a lack of interest in the type of information provided by the program as the most likely cause.

While few studies have been able to demonstrate actual barriers to repeat participation in physical activity or other health related programs, Pai et al. (2009) were able to show the health benefits experienced by returners. Using results from a yearly Health Risk Assessment (HRA), they were able to track the changes in health status of employees who took the assessment more than once. The repeat participants in the HRA

were compared with employees from the same company who only took the HRA one time. Results showed that employees who took the HRA two to three times from 2002 to 2004 had increased odds (1.861) for maintaining or improving health status when compared with one-time HRA participants during the same time period. Both the one-time and repeat HRA groups did see an increase in overall health status, which supports the benefit of implementing a health promotion program, if only once. Pai et al. did find that a higher percentage of people in the repeat participation group improved their health (41.4%) than in the one-time group (38.1%). It was also noted that a lower percentage of people in the repeat group saw a decline in health status (26%) versus the one-time group (31%). Their research shows that there are added health benefits to repeat participation in health promotion programs.

Summary

The continued increase in the sedentary population in the United States creates an immense burden on society in the form of cost and disease. Many barriers exist that prevent people from participating in physical activity and other health related program that could help improve their health status. Worksite pedometer programs have proven to be a successful means of improving health for workers. While repeat participation in these programs shows increased benefits over one-time participation, new barriers may be introduced or old barriers may be reintroduced that prevent people from reenrolling. This study will attempt to identify the most common barriers to repeat participation in a worksite pedometer program.

CHAPTER 3

METHODOLOGY

Overview

This chapter will discuss the methodology for this study, including information regarding the sample, study design, independent and dependent measures, study procedure, and data analysis.

Steps to A*healthy*U Pedometer Challenge

The Steps to A*healthy*U Pedometer Challenge is an annual eight-week physical activity intervention implemented by A*healthy*U, American University's faculty and staff wellness program. The goal of the program was to increase awareness of physical activity levels among participants while also encouraging them to boost their time spent in daily walking and exercise. All full and part-time faculty and staff members at AU were invited to participate in the program. The first iteration of the Pedometer Challenge took place May 26, 2009 – July 20, 2009, for a total of eight weeks. The second year the program lasted eight weeks and four days, from May 20, 2010 – July 18, 2010. The campus-wide initiative offered many options to registrants including participating as an individual or on a team, and using various methods of physical activity to earn steps.

In 2009, participants signed up for the Pedometer Challenge by submitting a paper registration form to A*healthy*U. For the 2010 Challenge, electronic registration via the

A*healthy*U website replaced the paper registration method. Registration cost $10.00 in both the first and second years of the program. In 2009, registrants received a pedometer and a walking log book. In the 2010 Pedometer Challenge, participants were given a choice between receiving a pedometer and log book, or walking socks and a grocery tote upon registration. The registration fee was waived for captains of teams with four or more members.

Both the 2009 and 2010 Pedometer Challenges were marketed to the AU community in very similar ways. Advertisements were published in Today@AU, the AU community's daily electronic newsletter, as well as on electronic billboards at the school. An email postcard invitation was also sent to all AU faculty and staff members. Additionally, A*healthy*U staff members visited different department meetings across campus to promote the Challenge. Two alternate means of marketing were utilized prior to the 2009 Pedometer Challenge. A*healthy*U hosted a luncheon for prospective team captains and other allies on campus to encourage them to participate and to support them in recruiting their colleagues to also participate. In addition to the electronic postcard, a physical postcard advertisement was sent to faculty and staff members via campus mail in 2009.

The premise of the Pedometer Challenge was that faculty and staff members would wear their pedometer daily, recording the daily number of steps that they accumulated. For activities during which it was not possible to wear a pedometer, participants were provided with a chart that allowed them to convert activity time into steps. This included activities such as swimming and cycling. At the end of each week

during the Challenge, step totals would be submitted in to an A*healthy*U staff member. Step totals were sent in via email using team or individual excel spreadsheets. Data was then compiled by the A*healthy*U staff and the top steppers could earn recognition and prizes.

Faculty and staff members were able to participate as individuals or as members of a team. Individual participants challenged themselves to reach certain step goals and did not take part in competition against other walkers. Despite the lack of an individual competition, individual participants who earned the most steps were recognized in email updates and on-line throughout the Challenge. Participating on a team introduced a competitive aspect to the program with teams vying to be the top stepping group. The top team each week in each of three categories, 4-6 team members, 7-10 team members, and 11+ team members was rewarded with a free breakfast of bagels, fruit, and juice. The teams with the highest step average at the end of the Challenge also earned prizes.

All participants could also earn individual prizes for tallying a certain number of steps. In 2009, prizes were given when a person reached 80,000 steps, 160,000 steps, and 250,000 steps. People who reached these step goals were allowed to choose from select incentive options including: athletic socks, physical activity instruction books, insect repellent, water bottles, lunchboxes, lip balm, and safety wrist wallets. For the 2010 Challenge, prize levels were set at 240,000 steps and 480,000 steps. All participants who totaled over 240,000 steps won a Pedometer Challenge t-shirt. The participants that earned over 480,000 steps were allowed to choose their prize as walking socks, a planter kit, or a stainless steel water bottle. As added incentive for higher achievers in the

program, A*healthy*U introduced the “Beat the Team A*healthy*U Challenge” in 2010. Participants who beat the step total average of the two A*healthy*U staff members over the course of eight weeks were entered into a raffle drawing for a Nike+ Sports Band at the end of the program.

Program communication from A*healthy*U was consistent during both the 2009 and 2010 Pedometer Challenges. Participants were sent weekly emails reminding them to send in their step totals to A*healthy*U. Once step total data had been compiled, a weekly update email was sent out highlighting the top stepping teams and individuals. These update emails also highlighted various people throughout the Challenge for achieving different goals and milestones. A*healthy*U also posted team standings and other accomplishments on their website.

The end of the 2009 and 2010 Pedometer Challenges were marked with celebration luncheons for participants. Free sandwiches, snacks, and refreshments were provided for attendees. At the luncheon, A*healthy*U recognized the top stepping teams and individuals. Participants were also able to pick up any prizes that they had earned during the Challenge at these events.

As follow-up to both years of the Challenge, program participants were invited to respond to a program evaluation survey. Results from both 2009 and 2010 were favorable towards the program. In 2009, 89.3% of survey respondents indicated that they would participate in another Pedometer Challenge. Additionally, 77.8% of survey takers reported that the program added value to their employment at AU. In 2010, tallies showed that 88.6% of respondents would participate in the same or similar program again

and would recommend the program to a friend or colleague. Also in 2010, 78.4% of people who took the survey responded that the Pedometer Challenge added value to their employment at the University. Evaluation results for the 2009 Steps to A*healthy*U Pedometer Challenge can be seen in Appendix D.

Subjects

American University employs over 2,300 full and part-time faculty and staff members. A purposive sample of 420 of these employees was originally identified as possible study participants. Subjects were identified from a list of American University faculty and staff members who participated in the 2009 Steps to A*healthy*U Pedometer Challenge sponsored by A*healthy*U, American University's Faculty and Staff Wellness Program, but did not participate in the 2010 Steps to A*healthy*U Pedometer Challenge. A total of 630 faculty and staff members participated in the 2009 Pedometer Challenge and 382 faculty and staff members participated in 2010. The combined participation for the two years of the program totaled 1012 participants. The breakdown of participation numbers saw 420 people participate only in the 2009 program, 172 people participate only in the 2010 program, and 210 faculty and staff members participate in both 2009 and 2010. These participant totals can be seen in Table 1.

Of the 420 employees who only participated in the 2009 Pedometer Challenge, 37 had terminated employment at the University prior to the start of the 2010 Pedometer Challenge. This left 383 potential study subjects. Twenty additional faculty and staff members, who were still employed at the University at the start of the 2010 Pedometer

Challenge, left the University prior to the initiation of this study resulting in their inability to participate. One faculty member was unable to participate due to being on sabbatical. Of the 362 remaining available participants, 17 had invalid or unknown email addresses and one employee had participated under a different name. As a result of these adjustments, a sample of 344 American University faculty and staff members remained as the participant pool.

Table 1

Pedometer Challenge Participant Totals

Pedometer Challenge year	Number of participants
2009	630
2010	382
Total Participants for 2009 and 2010	1012
2009 Only	420
2010 Only	172
Both 2009 and 2010	210
Total Unique Participants for 2009 and 2010	802

The subjects were made aware of the opportunity to participate in the study through an electronic survey sent to the e-mail address that they provided to AhealthyU when registering for the 2009 Steps to AhealthyU Pedometer Challenge. They were not notified of the study prior to receiving this email.

Design

This was a non-experimental descriptive research study that attempted to identify the most common physical activity and program-related barriers to repeat participation in

an annual worksite pedometer program. This study also attempted to determine if specific demographic groups, being a faculty or staff member, were more likely to identify with certain barriers to repeat participation.

Procedure

Prior to Data Collection

This study received approval from the American University Institution Review Board (IB) under Exemption Category 2: research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior. The following steps were taken in the process toward being granted this exemption:

1. The "Protecting Human Research Participants" National Institutes of Health web-based training course was successfully completed on 12/08/2011 as acknowledged by certificate number 582652.
2. On 12/21/2010, the Human Subjects Research Determination Form was submitted to the AU Institutional Review Board (IRB).
3. On 1/17/2011, notification was given from the AU IRB that the proposed study qualified as human research and would need to be submitted for full IRB approval.
4. On 2/11/2011, a Request for Exemption form was submitted to the AU IRB asking for exemption based on Exemption Category 2 as outlined above. A Request for Waiver of Written Documentation of Consent was also submitted to the AU IRB at this time.

5. On 3/3/2011, the AU IRB determined that the proposed research met the criteria for exemption.

Survey Development

For the purpose of this study, a custom survey was developed to identify the most common barriers, related to physical activity and program design, to repeat participation in the Steps to A*healthy*U Pedometer Challenge in 2010. The questionnaire was adopted from the CDC's online "Barriers to Being Active Quiz" (2003). Common program-related barriers were determined through research and evidence-based best practices. Questions pertaining to these programmatic barriers were written in a similar style to the CDC quiz for inclusion in the custom survey. Appendix C contains a copy of the CDC quiz. The online survey was hosted by www.surveygizmo.com.

The survey included three questions gathering basic demographic data: current age, gender that you most closely identify with, and employment status at American University. These were followed by 26 statements for which respondents were asked to rate their level of agreement on a six-level Likert scale (Strongly Disagree, Disagree, Slightly Disagree, Slightly Agree, Agree, and Strongly Agree). The statements were broken up into two questions. The first question asked respondents to rate why they did not participate in the 2010 Steps to A*healthy*U Pedometer Challenge. The second question asked for a reflection on their experience in the 2009 Pedometer Challenge and how that impacted the decision to forgo participation in 2010. Thirteen of the 26 statements directly correlated to one of the ten most commonly recognized barriers to

physical activity. Three of these barriers were seen as compound ideas, which is why they required more than one statement for questioning. Twelve of the 26 statements pointed directly to program-related barriers that were determined through research and previous program evaluations. Two of these barriers were identified as requiring secondary survey statements to cover the full scope of the barrier from responses. The final statement in the set of 26 asked survey respondents whether they agreed that already being physically active prior to the 2010 Pedometer Challenge prevented them from participating. These statement questions were followed by an open-ended question to allow participants to identify any other barriers that may have prevented them from participating in the 2010 Pedometer Challenge. The final two questions of the survey were focused on program evaluation. Respondents were asked if they would recommend the Pedometer Challenge to friends and coworkers and if they planned on registering for the 2011 Steps to A*healthy*U Pedometer Challenge. Appendix A contains a copy of the survey.

Data Collection

The 344 possible survey respondents were sent an email to the email address provided during the 2009 Steps to A*healthy*U Pedometer Challenge on Friday, March 11, 2011. The email was sent by Amy Farr, American University Health Promotion Manager, who oversaw the implementation of both the 2009 and 2010 Pedometer Challenges. The email contained a brief description of the survey, information on anonymity and confidentiality, and a link to the online survey. A reminder email was sent to all 344 possible respondents on Monday, March 21, 2011. A final notice about the survey was

emailed to all 344 people on Wednesday, March 30, 2011. The survey was closed to responses at midnight on Thursday, March 31, 2011. These email notes can be seen in Appendix B.

The SurveyGizmo website did not allow for multiple survey completions from the same subject. This resulted in 110 unique survey respondents (32.0%) out of the original 344 who were contacted. Of these respondents, 85 fully completed the survey. Similar distributions for gender and employment status were seen between the Pedometer Challenge participants, the sample population and the survey respondents. Table 2 provides the gender distribution of the study population. Table 3 provides employment status distribution of the same group. The 25 partially completed surveys were not utilized for the study.

Table 2

Gender Distribution in Study Population

Population	Gender	Gender count	Gender %
All 2009 Steps to A*healthy*U Pedometer Challenge Participants	M	171	27.1%
	F	405	64.3%
	Unknown	54	8.6%
	Total	630	
Sample Population	M	126	30.0%
	F	254	60.5%
	Unknown	40	9.5%
	Total	420	
Completed Survey Respondents	M	21	24.7%
	F	64	75.3%
	Unknown	0	0.0%
	Total	85	

To ensure confidentiality and anonymity, the online survey did not collect names or email addresses from survey takers. The only identifying information recorded was current age, gender, and employment status.

Table 3

Employment Status Distribution in Study Population

Population	Employment status	Status count	Status %
All 2009 Steps to A*healthy*U Pedometer Challenge Participants	Faculty	61	9.7%
	Staff	393	62.4%
	Other	2	0.3%
	Unknown	174	27.6%
	Total	630	
Sample Population	Faculty	47	11.2%
	Staff	254	60.5%
	Other	2	0.5%
	Unknown	117	27.9%
	Total	420	
Completed Survey Respondents	Faculty	11	12.9%
	Staff	72	84.7%
	Other	2	2.4%
	Unknown	0	0.0%
	Total	85	

Measures

Independent Variables

The independent variable, employment status, was self-reported for each of the survey respondents. They were able to identify as full time faculty, part time/adjunct faculty, full time staff, part time staff, student worker, or other, where the respondent

could type in their status. The "other" category was included as an option because in special cases during the Pedometer Challenge family and friends of AU employees were able to register and participate.

Dependent Variables

Three categories of dependent variables were used in this study. The first two categories included physical activity barriers and program-related barriers. Responses to the survey question about current physical activity level serving as a barrier to repeat participation were utilized as the final dependent variable. Table 4 provides a list of each survey question along with the barrier category and specific barrier that each question corresponds to. The table is arranged using the order of questions as respondents answered them in the survey. All dependent variables were operationalized as degrees of agreement on a six-level Likert scale (Strongly Disagree, Disagree, Slightly Disagree, Slightly Agree, Agree, and Strongly Agree) according to survey response ratings.

Physical Activity Barriers

Responses about the ten most common barriers to physical activity, as recognized by the CDC, and how they impacted the decision to not participate in the 2010 Steps to A*healthy*U Pedometer Challenge were utilized as one category of dependent variables in this study. The ten barriers are listed in Table 4. Due to the compound nature of three of the recognized barriers, fear of being injured or have been injured recently, lacking self-management skills, and lack of support, two questions were required to fully explore the impact of these barriers.

Programmatic Barriers

Responses regarding ten common program-related barriers and how they influenced survey participants' decision to forgo participation in the 2010 Steps to A*healthy*U Pedometer Challenge were also utilized as a category of dependent variables. The ten program-related barriers can be seen in Table 4. As with the physical activity barriers, two questions were needed to fully analyze the impact of the quality of communication during the program and difficulty or confusion surrounding the step logging process.

Already Physically Active

The barrier of being already physically active was withdrawn from consideration in either of the two dependent variable categories. An already physically active individual would not struggle with a barrier to physical activity because they were already physically active. In the same way, the implementation of the program could not be determined to be the explanation for why that the person was already physically active. For this reason, this response was analyzed as its own dependent variable classification.

Table 4

Barrier Category and Specific Barrier Targeted by Each Question in the Survey

Question	Barrier category	Specific barrier
I did not participate in the 2010 Steps to AhealthyU Pedometer Challenge because...	[redacted]	

Question	Barrier category	Specific barrier
I was already physically active.	Already Active	Already Physically Active
I found it inconvenient as a means for improving my physical activity levels.	Common PA	Find it inconvenient to exercise
I did not feel motivated to improve my level of physical activity.	Common PA	Lack self-motivation
I was not confident in my ability to maintain a satisfactory level of physical activity during the program.	Common PA	Lack confidence in their ability to be physically active (low self-efficacy)
I was injured prior to the start of the program.	Common PA	Fear being injured or have been injured recently
I did not feel comfortable with my ability to set personal step total goals.	Common PA	Lack self-management skills, such as the ability to set personal goals, monitor progress, or reward progress toward such goals
I was not comfortable in my ability to monitor my progress towards my step total goals.	Common PA	Lack self-management skills, such as the ability to set personal goals, monitor progress, or reward progress toward such goals
The rewards for participation that were offered were not appealing to me.	Programmatic	Unappealing incentives
The registration fee was too high.	Programmatic	Monetary cost
The workplace environment and culture at American University was not conducive to participation.	Programmatic	Workplace not conducive to participation
I was not aware that the 2010 Steps to AhealthyU Pedometer Challenge was taking place.	Programmatic	Insufficient program marketing
I did not participate in the 2010 Steps to AhealthyU Pedometer Challenge because in 2009...	[redacted]	

Question	Barrier category	Specific barrier
The Challenge required a large time commitment.	Common PA	Do not have enough time to exercise
I did not find the Pedometer Challenge to be enjoyable.	Common PA	Do not find exercise enjoyable
I thought that the Pedometer Challenge was boring.	Common PA	Find exercise boring
I got hurt or injured while participating.	Common PA	Fear being injured or have been injured recently
I felt a lack of encouragement, support and/or companionship from my family and friends.	Common PA	Lack encouragement, support, or companionship from family and friends
I felt a lack of encouragement, support and/or companionship from my co-workers and supervisor.	Common PA	Lack encouragement, support, or companionship from family and friends
I did not have easy access to places where I could walk or exercise.	Common PA	Do not have parks, sidewalks, bicycle trails, or safe and pleasant walking paths convenient to their homes or offices
The team competition created added stress and tension for me.	Programmatic	Dislike team aspect
The value I received from participating in the Pedometer Challenge was low compared to the cost of the program.	Programmatic	Low value received from the program for the cost
The Pedometer Challenge did not enhance my employee experience at American University.	Programmatic	Program did not enhance employment
I was displeased with the content of the weekly emails from AhealthyU during the Pedometer Challenge.	Programmatic	Low quality communication during the program
The frequency of communication from AhealthyU during the Pedometer Challenge was too high.	Programmatic	Low quality communication during the program
The step total logging process was difficult and confusing.	Programmatic	Difficulty or confusion with step logging process

Question	Barrier category	Specific barrier
The step total logging process was time consuming.	Programmatic	Difficulty or confusion with step logging process
The registration process was complicated.	Programmatic	Registration process was complicated

Data Analysis

For the purpose of analysis, all survey responses were assigned interval values (Strongly Disagree = 1, Disagree = 2, Slightly Disagree =3, Slightly Agree = 4, Agree = 5, and Strongly Agree = 6). A p-value of less than or equal to 0.05 was considered significant for all tests. Data analyses were performed using either SPSS or SAS.

A z-test was used to compare the difference between the total mean response value for all common barriers to physical activity and all program-related barriers. The value for all common barriers to physical activity was computed by calculating the mean value of all responses to the thirteen questions relating to common barriers to physical activity. The value for all program-related barriers was computed by taking the mean value of all responses to the twelve program-related barrier questions.

A multivariate analysis was used to compare the difference between mean response values of faculty and staff members for all survey questions relating to common barriers to physical activity and program-related barriers. Post-hoc t-tests were performed to compare the differences in mean response values of faculty and staff members for each individual survey question.

To compare the mean response value for the question about already being physically active with program-related barriers and common barriers to physical activity the overlap of the 95% confidence intervals for each was interpreted as an indication of significance.

CHAPTER 4

DISCUSSION

Overview

This chapter reviews the results of the data analysis in association with the four hypotheses of the study. A review of the research hypotheses, findings of the study, and possible explanation for the results will also be discussed.

Results

Common Physical Activity Barriers versus Programmatic Barriers

The primary hypothesis of the study stated that survey respondents would more strongly agree that the common barriers to physical activity prevented them from repeat participation in the 2010 Steps to A*healthy*U Pedometer Challenge relative to the program-related barriers. For all respondents (n=85), there was no difference between the average of programmatic barriers when compared to the average of physical activity barriers. Table 5 shows the means and 95% confidence intervals of each variable.

Table 5

Basic Confidence Limits Assuming Normality – Common Physical Activity Barriers and Programmatic Barriers

Variable	Mean	95% Confidence limits	
Common Physical Activity Barriers	2.23801	2.10252	2.37350
Programmatic Barriers	2.26569	2.11103	2.42035

Faculty and Staff Perceptions of Largest Barriers

The initial secondary hypothesis of the study stated that staff members would more strongly agree that the common barriers to physical activity prevented them from repeat participation in the Steps to A*healthy*U Pedometer Challenge relative to faculty members. The next secondary hypothesis of the study stated that faculty members would more strongly agree that the program-related barriers prevented them from repeat participation in the Steps to A*healthy*U Pedometer Challenge relative to staff members. A multivariate analysis was used to simultaneously test the difference between average programmatic and average physical barriers between faculty and staff instead of examining each individual variable in a pairwise fashion between the two groups. A multivariate analysis was preformed because it was the most powerful and efficient test for finding a global effect across all of the variables. There was no difference between the two variables between faculty and staff. Using Wilks' Λ as the criterion, the F-statistic was not significant (F=.31, p=0.73). Since there were only two groups, Wilks' Λ is an exact test. The Hotelling-Lawley trace (U) is provided for convenience to convert to the exact T^2 value using: $T^2 = (n_1 + n_2 - 2) \times U$ (Table 6) (Rencher, 2002).

Table 6

MANOVA Test Criteria and Exact F Statistics for the Hypothesis of No Overall Employee Status Effect – Total Mean Values

Statistic	Value	F-value	Num DF	Den DF	Pr > F
Wilks' Lambda	0.99222122	0.31	2	80	0.7317
Hotelling-Lawley Trace	0.00783976	0.31	2	80	0.7317

The same analysis was carried out using all the original variables (as opposed to taking the average of physical and programmatic barriers). The F-value was not significant for Wilks' Λ=.6499 (F=1.23, p=.26) (Table 7). When considering all the individual variables simultaneously, there was no difference between staff and faculty mean vectors.

Table 7

MANOVA Test Criteria and Exact F Statistics for the Hypothesis of No Overall Employee Status Effect – All Original Variables

Statistic	Value	F-value	Num DF	Den DF	Pr > F
Wilks' Lambda	0.64986717	1.23	25	57	0.2564
Hotelling-Lawley Trace	0.53877599	1.23	25	57	0.2564

One post-hoc t-test came back significant for the variable PAUnEnjoyable (the mean response value for the question "I did not find the Pedometer Challenge to be enjoyable.") between faculty and staff (Table 8). It may be worth discussing, however, with 25 variables available, the inflation of alpha results in the probability of finding at least one significant result: $1-(1-.05)^{25} = .72$.

Table 8

T-test for Mean Differences on PAUnEnjoyable

Faculty		Staff		t	p
Mean	N	Mean	N		
1.82	11	2.67	72	2.12	.04

Considering all of the tests together, there is about a 75% probability that a significant result would be found by chance. Post-hoc t-tests were performed even with the knowledge that alpha was inflated to provide an exploratory look at specific barriers to repeat participation. Some of these results may be very useful and insightful for health promotion practitioners during program design and implementation.

The mean response value for staff was numerically higher than the mean response value of faculty for a majority (nine out of thirteen) of the questions about common barriers to physical activity, though only the PAUnEnjoyable difference was significant (as noted above).

A mean response value of 3.5 for an individual survey question would fall directly in the middle of the rating scale between Agree and Disagree. It should be noted that all of the mean response values for common barriers to physical activity from faculty and staff members fell below this level, placing them all in the disagree range (Slightly Disagree, Disagree, Strongly Disagree) of responses, except for one. The faculty respondents mean response value for the question “I found it inconvenient as a means for improving my physical activity levels” was 3.82, making it the only value to fall in the agree range (Slightly Agree, Agree, Strongly Agree).

The mean response value for faculty members was numerically greater than the mean response value of staff members for only three out of twelve program-related barrier questions: “The rewards for participation that were offered were not appealing to me;” “The team competition added stress and tension for me;” and “The value I received from participating in the Pedometer Challenge was low compared to the cost of the program.” Similar to the common barriers to physical activity, it should be noted that

neither faculty nor staff members' mean response values for any of the program-related barrier questions fell above the 3.5 value, placing them all in the disagree range of responses.

Already Physically Active

The final secondary hypothesis of the study stated that already being physically active will be the least strongly agreed upon barrier to repeat participation in the Pedometer Challenge relative to all other barriers. This was not supported despite the presence of a significant difference between the mean response value for already being physically active and the mean response values of all other barriers to repeat participation. Descriptive statistics showed that the mean response value for AlreadyActive ($\bar{X}$=3.96) did not fall within the 95% confidence interval for the means of either the total programmatic ($\bar{X}$=2.27) or total common barriers to physical activity ($\bar{X}$=2.24). The means and 95% confidence intervals of each variable are presented in Table 9.

Table 9

Basic Confidence Limits Assuming Normality – Common Physical Activity Barriers, Programmatic Barriers, and Already Physically Active

Variable	Mean	95% Confidence limits	
Mean of Common Physical Activity Barriers	2.24	2.10	2.37
Mean of Programmatic Barriers	2.27	2.11	2.42
Already Physically Active	3.96	3.58	4.35

Note. Mean of Common Physical Activity Barriers was comprised of response values from 13 survey questions. Mean of Programmatic Barriers was comprised of response values from 12 survey questions.

Already being physically active was also the only barrier to fall above the 3.5 value that is directly between the agree and disagree ranges.

Discussion

The four hypotheses of this study focused on determining the most common barriers to repeat participation in a worksite pedometer program. There was a lack of support for the primary hypothesis, and all three secondary hypotheses. No significant difference was found between barriers for faculty and staff members or between program-related barriers and common barriers to physical activity. A significant difference did exist between being already physically active and the program-related barriers and common barriers to physical activity. This difference was contrary to what was hypothesized, as being already physically active was more strongly agreed upon than the other barriers. The following discussion will cover possible explanations for these results.

The subject population for this study was comprised entirely of participants from the 2009 Steps to A*healthy*U Pedometer Challenge who did not participate in the 2010 Pedometer Challenge. The researcher wanted to examine barriers to participation, so people who repeated participation in the program were excluded from the survey. Their participation in 2010 indicated that any barriers to repeat participation that they encountered did not fully deter them from registering for the 2010 program. Limiting the subject population to non-repeat participants eliminated the ability to examine responses from a comparison group. The commonality of not being repeat participants may have

contributed to the consistency in responses among all survey respondents and lack of significant results.

This limited selection created a small sample population of 420 people. A low survey response rate resulted in 85 completed surveys that were used for the study. While the low response rate was not ideal, proportions of faculty members to staff members and males to females were fairly consistent among 2009 Pedometer Challenge Participants, the total sample population, and the completed surveys (Table 1). Still, this small sample size, particularly having only 11 faculty responses made it very difficult to demonstrate significant differences for mean response values within the sample.

The mean response value of the survey responses for all common physical activity barriers and all programmatic barriers fell in the disagree range. According to these mean values, all participants in the survey disagreed that any of the common physical activity barriers or programmatic barriers prevented them from repeating participation in the Pedometer Challenge. The lack of recognition from survey takers that one or more of these barriers contributed to their decision to not participate in the Challenge seemingly strongly influenced the non-significant results of the study. There was also the possibility that all barriers that may have influenced people to not repeat participation were not queried about in the survey.

While none of the programmatic or common barriers to physical activity were identified by respondents as having prevented them from repeat participation, already being physically active had an average response value that fell in the agree range. There were 54 respondents (63.5%) who slightly agreed, agreed, or strongly agreed that they did not participate in the 2010 Steps to A*healthy*U Pedometer Challenge because they

were already physically active. The high number of people who self reported that they were already physically active may be attributed to a lack of explanation in the survey of recommended levels of physical activity. This could be avoided in future studies by gathering information regarding duration and type of exercise that each respondent participates in. Having this information would eliminate self identification as already being physically active. Researchers would be able to sort participants into different categories based on level of physical activity.

In conclusion, the non-significant results of this study could be a result of many factors. The small, uniform sample, as well as a misunderstanding or misconception of the impact that certain barriers played on the decision to repeat participation are possible explanations. There was also the possibility that the list of barriers included in the survey was not an exhaustive list.

Are Common Barriers to Physical Activity Stronger than Programmatic Barriers?

The first hypothesis of this study states that respondents would more strongly agree that common barriers to physical activity prevented them from repeat participation in the Steps to A*healthy*U Pedometer Challenge compared with programmatic barriers, but was not supported. The researcher believed that American University faculty and staff members had a favorable opinion of the Pedometer Challenge program from their previous experience. This was based on the results of a program evaluation survey (Appendix D) and supported by previous research that focused on barriers to initial program participation. It was believed that this positive experience with the program

would minimize the influence of program-related barriers and intensify the impact of common barriers to physical activity.

A program evaluation survey was sent by the American University wellness team to all participants following the 2009 Steps to AhealthyU Pedometer Challenge. A majority of respondents to the survey indicated that they were either satisfied or very satisfied with the registration process (91.8%), program specific communication (96.3%), and incentives for the program (74.6%). Additionally, 89.3% of respondents indicated that they would participate in another A*healthy*U pedometer program. This program evaluation indicated that there would be a high number of repeat participants for the 2010 Steps to A*healthy*U Pedometer Challenge. The responses also appeared to indicate that if people did not participate a second time, the program design and implementation may not be a major reason behind their decision.

The Steps to A*healthy*U Pedometer Challenge was also designed and implemented in both 2009 and 2010 using practice-based evidence to eliminate the impact of program-related barriers. Phipps et al. (2010) found that employees were more likely to participate in worksite physical activity programs if allowed to do so in a group. The team participation option of the Pedometer Challenge was a highlight of the program design. Only 12 out of 630 (1.9%) participants in the 2009 Challenge were not on teams. For 2010, 34 out of 382 (8.9%) participants were individuals. In this study, 77.6% of respondents for the question about team participation creating a barrier to repeat participation disagreed that having a team component created a barrier to repeat participation. The results of this study do not allow for a claim that the team component could increase repeat participation. Though, the results of this study coupled with the

research of Phipps et al. shows that wellness professionals may benefit from including team participation in worksite pedometer programs because it does not appear to deter repeat participation.

Tangible incentives were also included in the Steps to A*healthy*U Pedometer Challenge as their inclusion has demonstrated the ability to make people more likely to participate in previous research. Phipps et al. found that 57% of employees in their study were more likely to participate if incentives were involved. Both the 2009 and 2010 Pedometer Challenges offered a wide range of incentives in hopes of appealing to a large audience. Prizes included athletic socks, t-shirts, lunchboxes, water bottles, and gardening kits. Social recognition in weekly emails for top achievers was also used as an incentive during the Challenge. Participants in the program responded favorably to the incentives and respondents in this study seemed to as well with 70.6% answering that they disagreed that the prizes offered served as a barrier to repeat participation in the program. These results also support that the inclusion of tangible incentives in wellness offerings may encourage participation or repeat participation in worksite physical activity programs.

A study by Robinson et al. (2006) introduced poor communication and poor structure and coordination as possible program-related deterrents for participants. These were two areas of the Pedometer Challenge examined by this study. Questions about content of communication and frequency of communication creating barriers to repeat participation yielded mean response values of 1.85 and 1.96 respectively. While the study by Robinson et al. identified poor communication as a possible barrier, these results show that it was not a barrier to repeat participation in the Pedometer Challenge for survey

takers. Additionally, responses to the study survey showed that the structure and coordination of the program did not present themselves as barriers to repeat participation. The results showed that 81.2% of responses disagreed that they did not repeat participation due to a difficult and confusion logging process. Also, 95.3% of respondents disagreed that the registration process was a barrier to repeat participation.

Results of this study relating to programmatic barriers to participation proved to be fairly consistent with previous research. Responses indicate that the methodology by which the Pedometer Challenge was implemented using practice-based evidence may have effectively managed possible program-related barriers to participation and repeat participation. Yet, there was still a large drop off in number of participants between 2009 and 2010.

The results of this study were unable to account for why common barriers to physical activity were not more likely to be agreed upon as barriers to repeat participation in the program. Further insight into how the common barriers to physical activity may have impacted the study population can be found in the discussion of the three secondary hypotheses of this study. The similarity between the response values for the two categories of barriers leads to a conclusion that health promotion professionals may see a drop off in participation in subsequent years of a program despite best efforts to target both common physical activity and program-related barriers in their program design. At the same time, previous research shows that it is still important to focus on minimizing the possible impact of both barrier categories.

Employment Status Impact on Barriers to Repeat Participation

The first and second secondary hypotheses of the study examined the relationship between employment status and barriers to repeat participation in the Steps to A*healthy*U Pedometer Challenge. The first hypothesis, that staff members would be more likely to agree that common barriers to physical activity prevented them from repeat participation compared with faculty members, was not supported. The second hypothesis, that faculty members would be more likely to agree that programmatic barriers prevented them from repeat participation compared with staff members, was also not supported. It was believed that usual job functions and characteristics for faculty and staff members would impact the type of barrier that most greatly influenced the decision to forgo participation in the 2010 Pedometer Challenge.

Typical staff jobs at American University follow a 9:00am to 5:00pm schedule. A majority of full time staff members work a 5-day, 35-hour work-week. Generally, these positions require long hours seated at a desk and would be classified as sedentary roles. The education level of staff members may range from high school graduates to individuals who hold advanced post-graduate degrees. As a contrast, faculty members mostly do not tend to follow a standard nine to five, 35-hour schedule. Though, they are required to hold self-scheduled office hours each week during the academic year and may teach classes anytime between 8:30am and 8:10pm. Generally, faculty members at the University are expected to hold advanced degrees. Also, faculty members are hired on nine-month contracts and are not paid to work in the summer. These differences in job

function were thought to increase susceptibility to varying barriers to participation between faculty and staff at American University.

As demonstrated by the research of Kruger et al. (2007), a lack of time is a very common, if not the most common, barrier to participation in physical activity. Not having enough time is also recognized by the CDC as the number one barrier in their list of the ten most common barriers to physical activity (2011b). The 9:00am to 5:00pm schedule of staff members at American University would appear to make them more vulnerable to this barrier than the flexible schedules of faculty. In this study, the mean response value of staff members ($\bar{X}$=2.81) for the question on time as a barrier to repeat participation was slightly, though not significantly, higher than the value of faculty ($\bar{X}$=2.36). This pattern of a higher, but not significant, mean value for staff was repeated in a majority of questions pertaining to common barriers to physical activity (9 out of 13).

As mentioned above, including common program elements, like the ability to participate as a group, has been shown to increase participation in wellness offerings (Phipps, et al., 2010). Staff members spend a large number of hours each week in the workplace allowing them to forge strong relationships with other employees. This may enhance their ability to find and create groups to participate in wellness activities with. The nature of faculty members' job roles may lead them away from forming similar relationships and groups due to their limited time spent on campus and the personal nature of their work. The work of the American University faculty is evaluated on an individual basis. The belief is that this would make faculty members agree that the team aspect, and possibly other program-related barriers, were more likely to prevent them from repeat participation than common barriers to physical activity. This was not

supported in this study as staff members actually rated 9 out of 12 questions regarding program-related barriers higher, but not at significant values, than faculty.

Anecdotally it seemed that faculty members would be more susceptible to program-related barriers while staff members would be more vulnerable to common barriers to physical activity. The results of this study showed that this did not hold true for the study population. Faculty and staff members combined did not identify any program-related or common barriers to physical activity as the reason that they did not participate in the 2010 Pedometer Challenge. In fact, "I found [the Pedometer Challenge] inconvenient as a means for improving my physical activity levels", was the only question that resulted in a mean response value in the agree range by either faculty or staff (faculty, $\bar{X}$=3.82). These findings, as with those above, are unable to account for why there was a large decline in the number of participants between 2009 and 2010. The results of this study support the need for further exploration into the different needs and barriers of faculty and staff members.

Already Physically Active

The final secondary hypothesis of this study, that being already physically active would be the least agreed upon barrier to repeat participation in the Steps to A*healthy*U Pedometer Challenge, was also not supported. It was believed that participants who were already physically active would not be hindered by the common barriers to physical activity, as they had already overcome them. Also, previous studies supported the belief that people who were already engaging in physical activity were less likely to experience barriers to participation in worksite programs.

A study by Smith, Chen and McKyer (2009) supported the hypothesis that being physically active would not present itself as a barrier to participation in worksite programs. Their study examined the physical activity levels of faculty members at a university and how those levels correlated with the preference to engage in higher levels of physical activity and the number of recognized barriers to physical activity. Smith et al. determined that faculty members who did not meet the Surgeon General's guidelines for physical activity were more likely to desire increasing their level of physical activity as well as more likely to identify more barriers to physical activity than the faculty members who met the Surgeon General's guidelines.

In this study, the most strongly agreed upon barrier to repeat participation in the pedometer program was already being physically active; a result contrary to the findings of Smith et al. Being already physically active was the only question in the survey that had a total mean response value that fell in the agree range ($\bar{X}$=3.96).

Previous research fails to fully explain or support this outcome. One possible explanation for these results could be the central focus of the Steps to A*healthy*U Pedometer Challenge; the pedometer. Kang et al. (2009), Musto et al. (2010), and Croteau (2004) all identified the pedometer and pedometer programs as being effective tools for helping people increase their physical activity levels. If the research of Smith et al. (2009) holds true that people who are already physically active are less likely to desire increasing their level of physical activity, physically active people may have avoided joining the program and using the pedometer as a tool to do so. The results of this study support the need for developing worksite physical activity programs, including those

using the pedometer, that appeal to and encourage participation from both sedentary and physically active employees.

Summary

This study produced non-significant findings when trying to identify the strongest barriers to repeat participation in a worksite pedometer program. None of the four study hypotheses was supported. Several factors may have contributed to these results including the small sample size and varying interpretations of survey questions. The intent was that using an anonymous survey would allow respondents to be more honest with their responses. The trade-off was that survey takers were left to answer according to their own interpretation of each question. Additionally, there was a large time gap between when the respondents participated in the Pedometer Challenge (May-July, 2009), when they decided not to repeat participation (May-July, 2010) and when they took the survey (March 2011). Recall bias may have been introduced as a result of this gap.

Although the results of the study did not provide any significant findings, they may still be used to guide future worksite physical activity program design. This study showed that programmatic and common barriers to physical activity may have a similar impact on repeat participation. These barriers also may affect both faculty and staff members in similar fashions. Health promotion professionals can use this information to help design programs that minimize barriers to participation and repeat participation across both categories with the hope of increasing physical activity levels for their target population and improving health risk factors in the process.

CHAPTER 5

SUMMARY AND RECOMMENDATIONS

Summary

The purpose of this study was to determine the most significant barriers for university faculty and staff members that prevented them from repeat participation in a worksite pedometer program. There were 85 American University faculty and staff members who had participated in the 2009 Steps to A*healthy*U Pedometer Challenge that completed the online survey with questions about what kept them from taking part in the 2010 Challenge. Participants rated how strongly they felt that certain common barriers to physical activity or program-related barriers served as obstacles to reregistering for the program. There was one primary and three secondary hypotheses in this study:

- Relative to the programmatic barriers to participation, the commonly recognized barriers to physical activity participation would be more strongly agreed upon as obstacles to repeat participation in the worksite pedometer program across all demographics
- Relative to participants identified as faculty members, staff members will more strongly agree that the commonly recognized barriers to participation in physical activity prevented them from repeat participation in the worksite pedometer program.

- Relative to staff members, faculty members will more strongly agree that programmatic barriers prevented them from repeat participation
- Relative to all other barriers, being already physically active will be the least strongly agreed upon reason for choosing to not participate in the pedometer challenge a second time

None of the four hypotheses were supported by the results of the study. However, being already physically active was found to be the only barrier that the survey respondents agreed had prevented them from repeat participation in the pedometer program. There were many limitations that may have contributed to these inconclusive results.

It is important to note that respondents rated common physical activity barriers and programmatic barriers very similarly. This may indicate that both types of barriers carry the same weight in influencing the decision to repeat participation in a worksite physical activity program. Because of this, it appears that both types of barriers should be addressed equally by wellness professionals during program design when trying to improve the number of repeat participants in a program.

Recommendations

Based on the results of this study, there are several recommendations that can be made for future studies that examine barriers to repeat participation in worksite wellness programs:

- Future studies may include participants who did participate in the program in the second or subsequent years. This is suggested because it would provide insight into why

people chose to participate, as opposed to not participate, a second time. This would also provide a comparison group for analysis.

- Requesting additional demographics data in the survey and analysis may identify larger barriers to repeat participation among certain groups. Categories that may be considered include department on campus, physical location at the University, age, and gender. Both gender and age information were collected in this survey but not utilized in data analysis.

- An update to this study may be done to examine changing perceptions and attitudes in the population each year that the Pedometer Challenge is held. This may provide insight into how slight program modifications impact perceived barriers to participation and repeat participation.

- This program did not perform an impact evaluation of physiological changes in participants as a result of participating in the Steps to A*healthy*U Pedometer Challenge. More people may have been encouraged to repeat participation had an evaluation like this been performed with similar positive results to what other programs and studies have demonstrated. Future studies may examine the influence of tracking physiological changes on repeat participation.

APPENDIX A

ONLINE SURVEY

2009 Steps to AhealthyU Pedometer Challenge Evaluation

As part of our continued efforts to improve the quality of wellness programs provided by AhealthyU, AU's Faculty & Staff Wellness Program, we kindly ask that you take few minutes to complete the following survey.

You were identified as a potential participant in this survey as a result of your participation in the 2009 Steps to AhealthyU Pedometer Challenge, and decision to forgo participating the following year. In this survey, we would like to ask a few questions about the reasons you may have chosen to participate in the pedometer challenge, which could have an influence on the success of this and other wellness programs at AU. The survey will take about 5 minutes to complete.

While the primary purpose for this evaluation is for the improvement of wellness program efforts at AU, aggregate data will also be used as part of a research project conducted by Matthew Barresi, Health Promotion Program Assistant and a graduate student in the Health Promotion Management Program.

This survey is anonymous. No one, including members of the AhealthyU team, will be

able to associate your responses with your identity. Your participation is voluntary. You may choose not to take the survey or to stop responding at any time. You must be at least 18 years of age to participate in this study. Your completion of the survey serves as your voluntary agreement to participate in this research project and your certification that you are 18 or older.

All responses will be kept confidential and will only be reported at the group level. Your individual responses will never be shared publicly.

Questions regarding the purpose or procedures of the research should be directed to Amy Farr at 202-885-3589 or farr@american.edu or Matthew Barresi at 202-885-3742 or barresi@american.edu. This study has been exempted from Institutional Review Board (IRB) review in accordance with Federal regulations. The IRB, a university committee established by Federal law, is responsible for protecting the rights and welfare of research participants. If you have concerns or questions about your rights as a research participant, you may contact the IRB Administrator at 202-885-3447 or irb@american.edu.

Thank you for taking the time to participate in this important evaluation.

Page One

1.) Current Age

2.) Gender that you most closely identify with

( ) Male

( ) Female

3.) Employment status

( ) Full time faculty

( ) Part time / adjunct faculty

( ) Full time staff

( ) Part time staff

( ) Student Worker

( ) Other

Page Two

Please rate how closely you agree with the following statements regarding your participation in the Steps to AhealthyU Pedometer Challenge.

4.) I did not participate in the 2010 Steps to AhealthyU Pedometer Challenge because...

	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
I was already physically active.	( )	( )	( )	( )	( )	( )
I found it inconvenient as a means for improving my physical activity levels.	( )	( )	( )	( )	( )	( )
I did not feel motivated to improve my level of physical activity.	( )	( )	( )	( )	( )	( )
I was not confident in my ability to maintain a satisfactory level of physical activity during the program.	( )	( )	( )	( )	( )	( )
I was injured prior to the start of the program.	( )	( )	( )	( )	( )	( )
I did not feel comfortable with my ability to set personal step total goals.	( )	( )	( )	( )	( )	( )
I was not comfortable in my ability to monitor my progress towards my step total goals.	( )	( )	( )	( )	( )	( )
The rewards for participation that were offered were not appealing to me.	( )	( )	( )	( )	( )	( )

	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
The registration fee was too high.	( )	( )	( )	( )	( )	( )
The workplace environment and culture at American University was not conducive to participation.	( )	( )	( )	( )	( )	( )
I was not aware that the 2010 Steps to AhealthyU Pedometer Challenge was taking place.	( )	( )	( )	( )	( )	( )

Page Three

Please rate how closely you agree with the following statements regarding your participation in the Steps to AhealthyU Pedometer Challenge.

5.) I did not participate in the 2010 Steps to AhealthyU Pedometer Challenge because in 2009...

	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
The Challenge required a large time commitment.	( )	( )	( )	( )	( )	( )
I did not find the Pedometer Challenge to be enjoyable.	( )	( )	( )	( )	( )	( )
I thought that the	( )	( )	( )	( )	( )	( )

	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
Pedometer Challenge was boring.						
I got hurt or injured while participating.	( )	( )	( )	( )	( )	( )
I felt a lack of encouragement, support and/or companionship from my family and friends.	( )	( )	( )	( )	( )	( )
I felt a lack of encouragement, support and/or companionship from my co-workers and supervisor.	( )	( )	( )	( )	( )	( )
I did not have easy access to places where I could walk or exercise.	( )	( )	( )	( )	( )	( )
The team competition created added stress and tension for me.	( )	( )	( )	( )	( )	( )
The value I received from participating in the Pedometer Challenge was low compared to the cost of the program.	( )	( )	( )	( )	( )	( )
The Pedometer Challenge did not	( )	( )	( )	( )	( )	( )

	Strongly Disagree	Disagree	Slightly Disagree	Slightly Agree	Agree	Strongly Agree
enhance my employee experience at American University.						
I was displeased with the content of the weekly emails from AhealthyU during the Pedometer Challenge.	( )	( )	( )	( )	( )	( )
The frequency of communication from AhealthyU during the Pedometer Challenge was too high.	( )	( )	( )	( )	( )	( )
The step total logging process was difficult and confusing.	( )	( )	( )	( )	( )	( )
The step total logging process was time consuming.	( )	( )	( )	( )	( )	( )
The registration process was complicated.	( )	( )	( )	( )	( )	( )

Page Four

6.) Please indicate any additional circumstances that prevented you from participating in the 2010 Steps to AhealthyU Pedometer Challenge

7.) Would you recommend the Steps to AhealthyU Pedometer Challenge to a co-worker or friend?

( ) Yes

( ) No

( ) Maybe

8.) Do you plan on participating in the 2011 Steps to AhealthyU Pedometer Challenge, starting in May 2011?

( ) Yes

( ) No

( ) Maybe

Thank You!

A study report will be made available at the request of survey participants. If you would like to view the report at the completion of the study, please contact Matthew Barresi at 202-885-3742 or barresi@american.edu.

We appreciate you taking the time to complete our survey.

APPENDIX B

EMAILS

March 11, 2011 Email

Good Afternoon!

As part of our continued efforts to improve the quality of wellness programs provided by AhealthyU, AU's Faculty & Staff Wellness Program, we kindly ask that you take few minutes to complete the following survey.

You were identified as a potential participant in this survey as a result of your participation in the 2009 Steps to AhealthyU Pedometer Challenge and your decision to forgo participation the following year. In this survey, we would like to ask a few questions about your participation in the pedometer challenge, which could have an influence on the success of this and other wellness programs at AU. The survey will take about 5 minutes to complete.

While the primary purpose for this evaluation is for the improvement of wellness program efforts at AU, aggregate data will also be used as part of a research project conducted by Matthew Barresi, Health Promotion Program Assistant and a graduate student in the Health Promotion Management Program.

This survey is anonymous. No one, including members of the AhealthyU team, will be able to associate your responses with your identity. Your participation is voluntary. You may choose not to take the survey or to stop responding at any time. You must be at least 18 years of age to participate in this study. Your completion of the survey serves as your voluntary agreement to participate in this research project and your certification that you are 18 or older.

All responses will be kept confidential and will only be reported at the group level. Your individual responses will never be shared publicly. Questions regarding the purpose or procedures of the research should be directed to Amy Farr at 202-885-3589 or farr@american.edu or Matthew Barresi at 202-885-3742 or barresi@american.edu. This study has been exempted from Institutional Review Board (IRB) review in accordance with Federal regulations. The IRB, a university committee established by Federal law, is responsible for protecting the rights and welfare of research participants. If you have

concerns or questions about your rights as a research participant, you may contact the IRB Administrator at 202-885-3447 or irb@american.edu.

Thank you for taking the time to participate in this important evaluation.

Survey Link: http://edu.surveygizmo.com/s3/484769/Participation-in-a-Worksite-Pedometer-Program

In health,

Amy

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March 21, 2011 Email

Good Afternoon!

A little over a week ago you received an email inviting you to participate in an online survey to help AhealthyU, AU's Faculty & Staff Wellness Program, improve the quality of our wellness programs.

We appreciate that many of you have already taken the time to fill out this short evaluation about the Steps to AhealthyU Pedometer Challenge. For those of you who have yet to finish the survey, we would like you to know that we truly value your responses. The anonymous questionnaire takes about 5 minutes to complete. The survey is only available until April 1, so we ask that you respond as quickly as possible.

As a reminder, while the primary purpose for this evaluation is for the improvement of wellness program efforts at AU, aggregate data will also be used as part of a thesis project conducted by Matthew Barresi, Health Promotion Program Assistant and a graduate student in the Health Promotion Management Program.

Thank you for taking the time to participate in this important evaluation.

Survey Link: http://edu.surveygizmo.com/s3/484769/Participation-in-a-Worksite-Pedometer-Program

Questions regarding the purpose or procedures of this survey should be directed to Amy Farr at 202-885-3589 or farr@american.edu or Matthew Barresi at 202-885-3742 or barresi@american.edu.

In health,

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March 30, 2011 Email

Hello,

This is the final reminder to complete the Steps to AhealthyU Pedometer Challenge online evaluation. This evaluation will close on April 1.

If you have not yet had the opportunity to complete the survey, we ask that you do so right away. Each person's responses hold great value to AhealthyU as we strive to provide AU faculty and staff with the highest qualitywellness programming.

The survey can be access by clicking on the following link:
http://edu.surveygizmo.com/s3/484769/Participation-in-a-Worksite-Pedometer-Program

Due to the anonymous nature of the survey, we are unable to determine which participants have already finished the questionnaire. If you have already taken the time to complete the Steps to AhealthyU Pedometer Challenge online evaluation, we thank you for your time and efforts.

As a reminder, the primary purpose for this evaluation is for the improvement of wellness program efforts at AU. Aggregate data will also be used as part of a thesis project conducted by Matthew Barresi, Health Promotion Program Assistant and a graduate student in the Health Promotion Management Program.

Thank you for taking the time to participate in this important evaluation.

Questions regarding the purpose or procedures of this survey should be directed to Amy Farr at 202-885-3589 or farr@american.edu or Matthew Barresi at 202-885-3742 or barresi@american.edu.
In health,

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--
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APPENDIX C

CDC BARRIERS TO BEING ACTIVE QUIZ

What keeps you from being more active?

Directions: Listed below are reasons that people give to describe why they do not get as much physical activity as they think they should. Please read each statement and indicate how likely you are to say each of the following statements:

How likely are you to say?	Very likely	Somewhat likely	Somewhat unlikely	Very unlikely
1. My day is so busy now, I just don't think I can make the time to include physical activity in my regular schedule.	3	2	1	0
2. None of my family members or friends like to do anything active, so I don't have a chance to exercise.	3	2	1	0
3. I'm just too tired after work to get any exercise.	3	2	1	0
4. I've been thinking about getting more exercise, but I just can't seem to get started	3	2	1	0
5. I'm getting older so exercise can be risky.	3	2	1	0
6. I don't get enough exercise because I have never learned the skills for any sport.	3	2	1	0
7. I don't have access to jogging trails, swimming pools, bike paths, etc.	3	2	1	0
8. Physical activity takes too much time away from other commitments—time, work, family, etc.	3	2	1	0

How likely are you to say?	Very likely	Somewhat likely	Somewhat unlikely	Very unlikely
9. I'm embarrassed about how I will look when I exercise with others.	3	2	1	0
10. I don't get enough sleep as it is. I just couldn't get up early or stay up late to get some exercise.	3	2	1	0
11. It's easier for me to find excuses not to exercise than to go out to do something.	3	2	1	0
12. I know of too many people who have hurt themselves by overdoing it with exercise.	3	2	1	0
13. I really can't see learning a new sport at my age.	3	2	1	0
14. It's just too expensive. You have to take a class or join a club or buy the right equipment.	3	2	1	0
15. My free times during the day are too short to include exercise.	3	2	1	0
16. My usual social activities with family or friends to not include physical activity.	3	2	1	0
17. I'm too tired during the week and I need the weekend to catch up on my rest.	3	2	1	0
18. I want to get more exercise, but I just can't seem to make myself stick to anything.	3	2	1	0
19. I'm afraid I might injure myself or have a heart attack.	3	2	1	0
20. I'm not good enough at any physical activity to make it fun.	3	2	1	0
21. If we had exercise facilities and showers at work, then I would be more likely to exercise.	3	2	1	0

Follow these instructions to score yourself:

• Enter the circled number in the spaces provided, putting together the number for statement 1 on line 1, statement 2 on line 2, and so on.

• Add the three scores on each line. Your barriers to physical activity fall into one or more of seven categories: lack of time, social influences, lack of energy, lack of willpower, fear of injury, lack of skill, and lack of resources. A score of 5 or above in any category shows that this is an important barrier for you to overcome.

____ + ____ + ____ = _____

1 8 15 Lack of time

____ + ____ + ____ = _____

2 9 16 Social influence

____ + ____ + ____ = _____

3 10 17 Lack of energy

____ + ____ + ____ = _____

4 11 18 Lack of willpower

____ + ____ + ____ = _____

5 12 19 Fear of injury

____ + ____ + ____ = _____

6 13 20 Lack of skill

____ + ____ + ____ = _____

7 14 21 Lack of resources

APPENDIX D

2009 PEDOMETER CHALLENGE

EVALUATION RESULTS

Question	Response option	Response value	Response %	N for question
Please select your status at AU				
	Faculty	29	11.9%	243
	Staff	214	88.1%	
Gender				
	Female	187	77.0%	243
	Male	56	23.0%	
How did you find out about the program? Check all that apply.				
	Web site	19	5.1%	376
	Today@AU	124	33.0%	
	Post card via campus mail	57	15.2%	
	Co-worker	136	36.2%	
	Manager	11	2.9%	
	Steps to AhealthyU informational luncheon	17	4.5%	
	Other, please specify	12	3.2%	

Question	Response option	Response value	Response %	N for question
What were your favorite aspects of the program? Check all that apply.				
	Incentives	135	13.2%	1025
	Informational Luncheon	11	1.1%	
	Grand Finale Picnic	30	2.9%	
	Improved awareness of physical activity	145	14.1%	
	Increased physical activity	140	13.7%	
	Motivation	133	13.0%	
	Goal setting	92	9.0%	
	Office morale	125	12.2%	
	Team building	114	11.1%	
	Competition	85	8.3%	
	Other, List	15	1.5%	
How satisfied were you with the registration process?				
	Very Satisfied	113	47.3%	239
	Satisfied	105	43.9%	
	Neither Satisfied nor Dissatisfied	18	7.5%	
	Dissatisfied	3	1.3%	
	Very Dissatisfied	0	0.0%	
How would you rate program specific communication throughout the 8 week pedometer challenge?				
	Very Satisfied	141	58.3%	242
	Satisfied	92	38.0%	
	Neither Satisfied nor Dissatisfied	6	2.5%	
	Dissatisfied	2	0.8%	
	Very Dissatisfied	1	0.4%	

Question	Response option	Response value	Response %	N for question
How satisfied were you with the incentives provided for the pedometer challenge?				
	Very Satisfied	71	29.6%	240
	Satisfied	108	45.0%	
	Neither Satisfied nor Dissatisfied	49	20.4%	
	Dissatisfied	9	3.8%	
	Very Dissatisfied	3	1.3%	
I feel that the program was a good value for my money ($10 registration).				
	Agree, what I received for my money exceeded my expectations	144	59.8%	241
	Agree, what I received for my money met my expectations	74	30.7%	
	Neutral	22	9.1%	
	Disagree, what I received for my money did not meet my expectations	1	0.4%	
Would you participate in another pedometer challenge sponsored by AhealthyU?				
	Yes	216	89.3%	242
	No	4	1.7%	
	Undecided	22	9.1%	
Did this program provide an added value to your employment at AU?				
	Yes	186	77.8%	239
	No	27	11.3%	
	Undesided	26	10.9%	

Question	Response option	Response value	Response %	N for question
How many days did you typically participate in 30 minutes or more of moderate intensity physical activity before the pedometer challenge (ex. brisk walking, gardening, recreational cycling)?				
	0 days per week	19	7.9%	242
	1-2 days per week	69	28.5%	
	3 days per week	53	21.9%	
	4-5 days per week	67	27.7%	
	6-7 days per week	34	14.0%	
How many days did you typically participate in 30 minutes or more of moderate intensity physical activity during the pedometer challenge - June 1 through July 26 (ex. brisk walking, gardening, recreational cycling)?				
	0 days per week	2	0.8%	243
	1-2 days per week	18	7.4%	
	3 days per week	37	15.2%	
	4-5 days per week	99	40.7%	
	6-7 days per week	87	35.8%	

Question	Response option	Response value	Response %	N for question
At the end of the 8 week pedometer challenge, which statement would best describe your change, if any, in level of physical activity?				
	There was an increase in the number of days per week that I was physically active.	42	17.3%	243
	There was an increase in the amount of time per day that I was physically active.	60	24.7%	
	There was an increase in both the number of days AND amount of time per day that I was physically active.	95	39.1%	
	No change in amount of physical activity	45	18.5%	
	Decrease in amount of physical activity	1	0.4%	
If your level of physical activity increased between the beginning and end of the program, what is the likelihood that you will continue to remain active at the current level?				
	Very Likely	93	42.9%	217
	Likely	112	51.6%	
	Not Likely	2	0.9%	
	Not Sure	10	4.6%	

Question	Response option	Response value	Response %	N for question
Do you feel an improvement in your overall health as a result of the program?				
	Yes	134	55.6%	241
	No	48	19.9%	
	Not Sure	59	24.5%	
Do you feel that the pedometer challenge had an effect on your stress level?				
	Yes, it decreased my stress level	86	39.8%	216
	Yes, It increased my stress level	4	1.9%	
	No, it had no impact on my stress level	108	50.0%	
	Not sure	18	8.3%	
Did you notice an improvement in office morale or work environment after the program began?				
	Yes, I noticed an improvement in office morale and work environment	77	32.1%	240
	Yes, I noticed an improvement in office morale only	49	20.4%	
	Yes, I noticed an improvement in work environment only	7	2.9%	
	No, I did not notice an improvement in office morale or work environment	54	22.5%	
	Not sure	53	22.1%	

Question	Response option	Response value	Response %	N for question
Did you notice a change in the level of physical activity of your family as a result of your participation in the program?				
	Yes	65	26.7%	243
	No	88	36.2%	

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