

10,000 Steps a Day to Decrease Chronic Disease Risk Factors and Increase Aerobic
Physical Activity Levels Among Capital Regional District Office Workers in Victoria, BC.

by

Kara Delaney
B.A., Western State College of Colorado, 2010

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of

MASTER OF ARTS

in the Department of Exercise Physical Health Education

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Supervisory Committee

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ABSTRACT

The mixed method design examined the impact of a 6-week pedometer based 10,000 moderate-vigorous steps a day employee workplace wellness challenge on aerobic fitness, chronic disease markers, and self-reported physical activity. The study used prompts to both educate and facilitate the intervention. Pre and post-test data analyzed self-report physical activity and sedentary time, sub max aerobic walking levels, and anthropometric measures. Participants logged their step count across the intervention and were challenged to increase their steps throughout. Participants were on average unable to achieve the goal step count and thus no statistically significance was found between pre-post tests. Qualitatively, three themes emerged from discussions with participants about their experiences: awareness of physical activity (PA) levels, demands of both work and family, and the frequency and content of the information given as prompts. The combination of prompts and the pedometer created an awareness of PA levels among participants but failed to fully motivate them to hit their target step count.

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CHAPTER ONE

Introduction

The following chapter presents an outline of the challenges that office workers face in their efforts to meet daily physical activity recommendations. Sedentarism is an area of particular concern in the office, as most employees remain sedentary throughout the day, completing most of their work on at their desk on a computer. In today's knowledge based workforce, sedentary work is more economically valued than active (Engbers, 2007; Haskell, Lee, Pate, Powell, Blair, Macera et al., 2007).

The benefits that physical fitness offer for enhancing the health and wellness are irrefutable regardless of individual characteristics and circumstances. The worksite provides a unique opportunity to reach a large percentage of working adults as the worksite houses over 50% of our population most days of the week (Human Resources & Skills Development Canada, 2011). The workplace provides an opportunity for all employees, regardless of the type of work they perform, to engage in quality physical activity and not just activity as a result of their job such as heavy lifting, walking, manual labour etc. (Ruzic, Heimer, Misigoj-Durakovic, & Matkovic, 2000).

The Alberta Centre for Active Living (2012) defines sedentary behaviour as a low intensity activity, which consumes 1.5 METs of energy or less, such as sitting or lying down. Physical inactivity accounts for an estimated 6% of total health care costs in Canada with approximately 36% of all adult deaths attributed to physical inactivity. Physical inactivity results in increases in osteoporosis, coronary heart disease, stroke, hypertension etc. (Therese & Tudor-Locke, 2004). An increasing amount of research suggests that if individuals participate in 30 min of moderate-vigorous physical activity a

day, but consume much of the remainder of their day sitting, then another risk factor has been developed independent of physical activity (The Alberta Centre for Active Living, 2012). Dunstan, Howard, Healy, & Owen (2012) found that sitting for protracted periods of time can increase an individual's risks of diabetes, heart disease and death significantly. In the literature physical inactivity as a result of sedentary office jobs has been shown to result in increased injury, musculoskeletal disorders, neurotoxicity, immune response, cardiovascular disease and certain types of cancers (Anderson et al., 2009). This is particularly important information for office workers, as these individuals are at risk for having prolonged sedentary periods when they are sitting at their desks.

A major barrier to physical activity participation among Canadian adults is time, as Canadians are working more and participating in less leisure activity (Spinney & Millward, 2010). This is of great importance as leisure time is associated with decreases in both work and life stresses (Spinney & Millward). Because many individuals overschedule themselves with work and family commitments, it is often found that one of the first things to lose priority is personal leisure time. As Spinney and Millward (2010) suggested "Canada's current trend of social and economic development decreases the amount of leisure time available to Canadians, and has serious social policy and public health implications" (p. 342). Research is needed to understand how individuals can maximize their daily time in the workplace to ensure that they meet the basic physical activity guidelines to both maintain and gain health benefits derived from physical activity. Understanding how health behaviours can be changed is pivotal in reducing morbidity, mortality, and health care costs in Canada and can be facilitated through workplace wellness programs (Engbers, 2007; Freak-Poli, Wolfe, Backholer, de Courten,

& Peeters, 2011; Hopkins, Glenn, Cole, McCarthy, & Yancey, 2012; Langille, Berry, Reade, Witcher, Loitz, & Rodgers, 2011).

There is a need to explore public health policy to encourage workplace wellness plans to accommodate and facilitate physical activity in the workplace. Physical activity programs need to be tailored to address both environmental and personal obstacles that hinder employees' engagement. Participation in structured programs such as sports or other team related physical activity challenges have been shown in the literature to be associated with several positive experiences such as social interaction, team building, team/social cohesion, character building and individual and team growth (Dishman, Dejoy, Wilson, & Vandenberg, 2009; Spinney & Millward, 2010).

The workplace provides an ideal environment to support a comprehensive wellness program as it gives employees a core social support unit, accountability, helps to create an increased sense of team dynamics, higher employee job satisfaction while reduced absenteeism, increased productivity, and employee turnover rates for the employers (Merrill, Aldana, Garrett, & Ross, 2011; Middlestadt, Jylana, Geshnizjani, Sullivan, & Arvin, 2011; National Institute for Health & Clinical Excellence, 2008).

Research Rationale

Workplace Wellness programs were created to assist employers in reducing their overall costs associated with absenteeism, workplace injury, and overall employee health (Batt, 2009). Wellness programs give employees and employers a vast amount of information on health, wellness and physical activity and create an environment conducive to keeping employees healthier, happier and more productive. There is an increasing amount of research suggesting that it is not necessarily just how much physical

activity individuals complete in a day, but also how much sitting or sedentary time they partake in that increases the risk of developing obesity, cardiovascular disease, and type 2 diabetes (Chau, van der Ploeg, Dunn, Kurko, & Bauman, 2010; The Alberta Centre for Active Living, 2012; van Uffelen et al., 2010).

Pedometers are a unique way in which individuals can be reminded to take more incidental steps per day in an effort to accumulate a higher activity level throughout the workday. This research study seeks to describe a workplace wellness physical activity intervention in a public government workplace to increase employees' physical activity levels through a 6 week 10,000 or more moderate-vigorous steps a day pedometer based intervention. The target sampled was selected due to an interest presented in the workplace wellness area by the CRD in the fall of 2011. The University of Victoria conducted a wellness survey for the CRD and several areas of interest were found. Major areas of interest included employees wanting to be more physically active (above 60% for both male and female employees), ability to maximize their time to increase physical activity levels, and a large amount of employees were interested in stair use/walking programs across all age categories both male and female as well as lunch and learn sessions. (See Appendix XI).

Purpose

As our society shifts into a largely technologically driven workforce, the amount of time spent sitting is becoming more prevalent and a primary risk factor for chronic diseases. It is of great concern that many Canadians are currently not meeting minimal general physical activity guideline recommendations due to the highly sedentary nature of jobs, in particular office desk jobs. There is a need to investigate a workplace

intervention to increase activity levels among employees in office jobs, where much of the day is spent in front of a computer screen in a seated position. Therefore the purpose of this study is to assess the feasibility and success of a 10,000 moderate-vigorous steps a day pedometer based employee challenge to increase physical activity levels, decrease risk factors for chronic diseases, and increase aerobic levels of employees in a Capital Regional District office workplace in Victoria, BC.

Research questions

1. Will implementing a pedometer based 10,000 or more moderate-vigorous steps a day intervention increase aerobic fitness levels among participating employees?
2. Will a pedometer based 10,000 or more moderate-vigorous steps a day intervention decrease risk factors (resting heart rate, blood pressure, body mass index, hip-waist ratio, and sedentary time) for chronic disease among participating employees?
3. Will a pedometer based 10,000 or more moderate-vigorous steps a day challenge increase self-reported physical activity levels in participating employees?

Hypotheses

1. Taking 10,000 or more moderate-vigorous steps a day will significantly increase an individual's aerobic fitness levels as measured by a six-minute walk test.

2. Taking 10,000 or more moderate-vigorous steps a day will significantly decrease chronic disease risk factors (resting heart rate, blood pressure, body mass index, hip-waist ration, and sedentary time).
3. Taking 10,000 or more moderate-vigorous steps a day will significantly increase an employee's self-reported physical activity levels.

Limitations

1. Limitations of a pre/post design: Impossible to conclude that the intervention was of direct cause of the observed changes.
2. Only applicable to the Victoria region Capital Regional District office workers or other similar worksite environments/climates.
3. Pedometers only capture ambulatory movement.

Assumptions:

1. All participants reported steps accurately.
2. All participants used pedometers correctly.
3. All participants followed study protocol.
4. Employees answered questionnaires honestly and report accurately and precisely on all self-report items.
5. It was assumed that employees would answer questionnaires honestly and report accurately and precisely on all self-report items.
6. Employees had no major lifestyle changes throughout the intervention.

Delimitations

1. Results are applicable to male and female (21-65 years) office place workers in Victoria, BC.

2. Results will be limited to determining relationships between independent and dependent variables not cause and effect.

Operational definitions

1. **Office worker:** Refers to an individual who works in an office building at a desk job for more than three hours in an average day.
2. **Workplace Wellness:** A comprehensive program organized and ran by either the employer or employees targeting lifestyle issues to make healthier choices easier for employees through tools targeting areas such as physical activity, nutrition, stress, safety, injury prevention, etc.
3. **Active:** Individuals who complete a minimum of 150 minutes of physical activity a week.
4. **Moderately Active:** Individuals who complete moderate-vigorous activities for at least 60 min per day, most days of the week.
5. **Highly Active:** Individuals who complete moderate-vigorous physical activity most days of the week >60 min per day.
6. **Prompting:** Refers to an individual's ability to incite or urge someone to do something. In the study prompting will be used to encourage employees to take more steps per day via weekly email messages.
7. **Risk factors:** Resting heart rate, blood pressure, physical inactivity, sedentary time, body mass index, overweight, and obesity.
8. **Moderate-vigorous intensity steps:** Those steps taken at an intensity comparable to brisk walking.

9. **Sedentarism:** Those individuals spending less than 10% of their daily energy in performing moderate or high intensity activity (i.e. brisk walking).

CHAPTER 2

Literature review

The following chapter is divided into five main sub sections and highlights the previous literature on research in the workplace wellness field, in particular with regards to the epidemiology of exercise, workplace wellness, workplace wellness physical activity interventions, exercise adherence in relation to pedometer use, and the reliability/validity of tools used to assess individuals health and wellness in the workplace. Lastly, the field of mixed methods research will be explored.

Epidemiology of exercise

Lack of physical activity and increasing time spent on sedentary behaviours has led Canadians to be at risk of developing an array of chronic diseases. Chronic diseases and illnesses resulting from inactivity include the classification of individuals as overweight or obese, developing coronary artery disease, type 2 diabetes, increased risk of heart attacks, high blood pressure, some types of cancer and cardiovascular disease (Public Health Canada, 2010). Some barriers and causes of increased sedentary time among employees are related to the cost of physical activity, time management, lack of information, and lack of personal motivation to be physically active (Middlestadt et al., 2011; Spinney & Millward, 2010; Van Acker et al., 2011). These are just a few of the issues that are currently increasing the gap between knowledge and translation into practice of physical activity among employed Canadians. Health and wellness behaviours need to be recognized for their relationship to organizational performance in the workplace. The links between physical activity and productivity need to be further reviewed and cost benefit analyses need to be highlighted prior to an organization

deciding to implement a wellness program for their employees. To facilitate a more productive workforce and increase employees' overall positive feelings for their workplace, employers across the country are introducing physical activity programs and health and wellness resources as a part of the daily routine in the workplace (Freak-Poli et al., 2011).

A major chronic disease highlighted in the literature is obesity. Obesity is defined as a body mass index (BMI) of >30 , and is a detrimental disease affecting 18.3% of Canadians 18 years of age and older (Statistics Canada, 2011). Obesity is linked to an array of chronic diseases including cardiovascular disease, high blood pressure, and type-2 diabetes (Freak-Poli, et al., 2011). A study conducted by the Canadian Fitness and Lifestyle Research Institute (CFLRI) (2009) found that in 2007/2008 almost 48% of Canadians 20+ years old were at least moderately active. Moderately active is defined as >1.5 MET-hours-daily—equivalent to at least 30 minutes of moderate-vigorous activity. Moderate-vigorous is defined as walking that is at a comparable intensity to brisk walking (World Health Organization, 2013). The Canadian Health Measures survey found that from 2007-2009 only 15% of Canadians were able to accumulate 150 minutes of moderate-vigorous physical activity (MVPA) per week. Men reported higher levels of activity vs. females with only 35% of Canadian adults hitting the 10,000-steps-per-day target (Colley et al., 2011). This suggests that there is a large discrepancy between the amount of exercise performed among Canadians and what should be performed to gain optimal health benefits that would limit the chance of developing a chronic disease. With over half of the population in Canada not currently meeting the status of moderately active, we can expect to see an increase in chronic diseases as we move forth to 2020.

Colley et al. (2011) also reported that Canadian adults spend on average 9.5 hours sedentary in a typical day—almost 70% of the day. With an increase in chronic diseases, we can anticipate a vast increase in costs that correlate to higher health premiums in the workplace (CFLRI, 2009).

The cost of chronic disease has been documented extensively in the research and is predicted to increase to \$16.9 billion by 2020 (Diabetes Associated of Canada, 2011; Swanberg, Walton, Clouser, & Coomer, 2011). In the literature, the total cost of obesity was estimated to be \$4.3 billion dollars (\$1.8 billion in direct health care costs and \$2.5 billion in indirect costs), with the cost of cardiovascular disease in Canada amounted to \$22.2 billion (Public Health Canada, 2010).

Physical activity plays a critical role in both decreasing and regulating chronic diseases and other health related issues. The rate of diabetes in Canada alone is the third highest among all countries (Public Health Canada, 2012). In 2007, 34.6 million visits (10% of all costs) by Canadians were documented for the management of cardiovascular disease (Public Health Canada, 2012). This is an important fact to know as many of the chronic diseases (cardiovascular disease, some types of cancer, type-2 diabetes, etc.) that Canadians face today are a direct result of the increasingly sedentary lifestyle (Engbers, 2007). A typical full time office worker spends around 40 hrs per week at their desks, giving employers ample time to implement and reap the benefits of a comprehensive wellness program. A suitable self-report test for calculating sedentary time in the workplace and at home is the Adapted Workforce Sitting Questionnaire (AWSQ). It asked respondents to highlight time both at work and at home on the weekends with regards to time allocated from transport, work, watching TV, computer and other leisure

activities. Only one study was found on the use and validity of the AWSQ which was conducted by Chau et al. (2012) which assessed the WSQ as a tool for measuring workers total sitting time by domain. The AWSQ also allows researchers to measure sitting time in multiple domains, whereas the IPAQ measures total sitting time as one broad indicator; the results that Chau et al. (2012) reported support the use of the AWSQ for measuring sitting time in a working population, suggesting its validity through a fair to excellent test-retest ability among a working population with a sufficient criterion validity against accelerometers.

Another risk factor indicator related to physical inactivity was individual's waist-hip ratio. In the literature it is thoroughly documented that men should not exceed a waist-hip ratio of 94 cm while women should remain at or less than 80 cm (ACSM, 2010). Waist girth has been identified as a key marker for cardiovascular disease and can be decreased through participation in physical activity most days of the week (Chan, Ryan, & Tudor-Locke, 2004). Blood pressure has been documented in the literature as an indicator of health and wellness but has not been consistently decreased among individuals in worksite physical activity interventions targeting this variable (van Uffelen et al., 2010). Another indicator of increased cardiovascular ability is a lower resting heart rate. This typically demonstrates that an individual is fit, but in certain cases can be bradycardia and an indicator of diseases such as endocarditis, coronary artery disease, or myocarditis (WebMD, 2012).

Workplace wellness

A meta-analysis conducted by Hutchinson and Wilson (2011) examined the ability of various workplace programs to improve nutrition and physical activity levels of

employees. Randomized controlled trials (RCT's) were found to have a larger effect size vs. control trials, in those programs that emphasized the use of rewards and incentives (Hutchinson & Wilson). The researchers found that those interventions that focused on reinforcing current health behaviours, instead of the motivation to be more physically active, had the largest effect sizes and highest likelihood of long-term success (Hutchinson & Wilson). The meta-analysis was able to highlight that in the workplace wellness field, short term changes can readily occur, but it is not until a short term change translates into a long term maintenance of these behaviour changes that employees will decrease their chances of developing cancer, diabetes, and cardiovascular disease (Hutchinson & Wilson). In the literature it was found that those interventions that targeted one aspect of wellness had the largest effect sizes. For example those studies which targeted merely nutrition or physical activity, or health, had the highest effect sizes (Hutchinson & Wilson). However, another meta-analysis on worksite physical activity and nutrition found that a modest reduction in weight was seen across studies conducted in workplace wellness programs addressing a variety of either nutrition or physical activity or both, suggesting that success has been documented in programs targeting a single behaviour, and in more than one behaviour which contradicts the aforementioned meta-analysis (Anderson et al., 2009; Hutchinson & Wilson). The difference may lie in the authors' definitions and inclusion criteria for selecting the studies as part of the meta-analysis. Hutchinson and Wilson included studies from the previous 10 years that were worksite interventions with a control group addressing health, diet and physical activity as primary outcome measures with adequate statistics. Anderson et al. (2009) did not suggest a time frame and used studies as old as 1983 up until 2004 with much of the other

inclusion criteria remaining the same as used by Hutchinson and Wilson. Anderson et al. (2009) only included studies with a duration of at least 6 months. These small differences in the inclusion status of research articles contribute to the differences seen in overall effect sizes.

The workplace has served in the literature as an ideal place to implement a core social support system to facilitate wellness programs (Dishman et al., 2009; Freak-Poli et al., 2011; Kotarba & Bently, 1988; Morgan et al., 2011; Swanberg et al., 2011). Social manipulations in the workplace have been documented through various interventions including a stepping device, onsite fitness facilities, walking programs, stair climbing initiatives, informative classes, organized exercise classes, stress management courses, preventative risk factor screenings, access to health information through web based portals, smoking cessation programs, healthy nutrition options in the workplace, access to running trails etc. (De Cocker, De Bourdeaudhuij, & Cardon 2010; Kang, Marshall, Barreira, & Lee 2009; McAlpine, Manohar, McCrady, Hensrud, & Levine, 2007; Swanberg et al., 2011; Napolitano et al., 2006; Public Health Ontario, 2011).

Another validated source of motivation to increase exercise levels among individuals in the literature was pedometers. The use of pedometers was well documented to have influenced and encouraged employee participation in physical activity and as a means to decrease weight, and increase VO_2 Max (Public health Ontario, 2011; De Cocker et al., 2010; Dishman et al., 2009; Kang et al., 2009). The literature is inconsistent with regards to what interventions were more successful based on the primary material distributed (pedometers, prompts, incentives, etc.). Main messages were mixed between targeting chronic disease prevention, and weight management to facilitating improved

employee productivity. Although it is well documented that a major effect of physical activity includes regulating and diminishing the chances of accruing chronic diseases, interventions seemed to be more successful when aimed specifically at weight loss rather than at preventing cardiovascular disease or improving general health (Nieuw-Amerongen, Kremers, Vries, & Kok, 2010). Employees as a whole were more attracted to weight loss messages in the literature. Several studies encouraged their participants to get 30 minutes of moderate-vigorous physical activity 5 days a week to increase these health benefits (De Cocker et al., 2010). In the research, there have been no studies that have particularly explored the intensity of step count goals used in workplace wellness interventions. Recent technological changes in the dynamics of basic pedometers have made it possible to now be able to distinguish moderate-vigorous steps from those steps taken at an intensity not suitable for health and wellness benefits.

Workplace wellness programs in the literature struggled what types of information would work best to motivate and enhance employees' level of respect for these programs and to ensure longevity of the program. In the literature there was a gap between types of employment (highly active to those that were highly sedentary) with regards to mixed views on programs and what extra activity employees needed to perform to maintain a healthy body, outside of their current job duties. A meta-analysis conducted by Ruzic, Heimer, Misigoj-Durakovic, and Matkovic (2003) found that those individuals who performed highly active jobs scored higher on the work index than those employees in a sedentary job placement who did not display higher fitness abilities. The study further highlighted that, regardless of job demands, levels of persistent fatigue among employees was regulated and determinant on physical activity levels. The study

found that employees who partook in heavy lifting only showed a significant increase in hand grip strength, but this was not translated to other areas of physical strength or motor functional capacities. Heavy lifting did not translate into an adequate intensity, duration or volume of fitness to see increases in health benefits (Ruzic et al., 2003). Physical activity level was the main determinant of achieving health and wellness benefits among employees. Although chronic fatigue was just one area highlighted in the literature, the major confounding factor attributed to employers deciding to invest and create adequate wellness programs was dictated by the overall ability of these programs to diminish and regulate chronic disease risk factors (Langille et al., 2012).

Workplace Wellness Physical Activity Programs

There are many reasons why individuals of the workforce are unable to complete bare minimum physical activity recommendations. Barriers to physical activity in the workplace included lack of information, time, motivation and space (Bennie et al., 2011; Dorr, 2006, Humpel et al., 2002; McAlpine et al., 2007). These barriers have been addressed in the literature through the use of online resources, information sessions, handbooks, dietary guidelines, website tutorials, group based social support etc. (Morgan et al., 2011; Swanberg et al., 2011). In the literature it was emphasized that accessibility of features, opportunities for activity, weather, safety, and aesthetics were all barriers to physical activity in the workplace (Humpel et al., 2002). Research also demonstrated that per unit time, structured exercise programs had a slightly greater impact vs. unstructured exercise programs (Spinney & Millward, 2010). The literature also highlighted several internal factors that affected the success rate of workplace wellness programs. One internal factor that was noted by employees was their perceived lack of time, which

directly increased sitting time in the workplace (Bennie, Timperio, Crawford, Dunstan, & Salmon, 2011). Understanding how to change employees' perceptions and to encourage time management has been seen in the literature to decrease sedentary time by increasing disturbances in sitting time across the workday, thus facilitating higher incidental physical activity (Bennie et al., 2011). Another internal factor suggested that the members making up the wellness committee could either enhance or inhibit the motivation for employees to participate in wellness programs (Dorr, 2006). A study conducted by Dishman et al. (2009) found that an intervention which involved all tiers of employees, including management from the highest level down to the lowest ranked employees, to have had the most success long term as a result of all individuals being involved in the decision making process. Employees felt that with the management fully involved, they were more likely to participate in workplace physical activity, strive for physical activity team goals, and that it made the acceptance of the wellness program easier and more appealing (Dishman et al.).

An overall comprehensive picture of workplace wellness programs that implemented physical activity intervention was not clearly defined due to the variety of outlets used to address the various barriers and facilitators of physical activity in the workplace. Some researchers examined incentive programs (Schweyer et al., 2011) and others focused on work attendance, job stress, job satisfaction, and healthcare utilization (Conn, Hafdahl, Cooper, Brown, & Lusk, 2009). A study conducted by Chia-Lin (2006) in Taiwan put in place a simple 12-week aerobic based program performed by employees twice a week for 60 minutes each session and was able to record changes in abdominal strength, and employees' endurance. Programs in the literature ranged from simple

methods to those that were more lengthy and complex, ultimately success hinged on the facilitators not necessarily the methods of the interventions. The facilitators included the physical environment, convenience of the location, increases in facilities available for activity, flexible work schedules/practices, incentives, prompts i.e. prompts signalling employees to take the stairs more often (National Institute for Health & Clinical Excellence, 2010). Success of some workplace wellness programs was determined by incentive based programs vs. non-incentive based programs, and individual based programs vs. team programs in the workplace (De Cocker et al., 2008; Dishman, 2009; Engbers, 2007; Freak-Poli et al., 2011; Merrill et al., 2011; Public Health Ontario, 2011). Incentive based programs in the literature ranged from those companies that paid for various aspects of health care, incentive based program and non-incentive based programs. Long-term success of rigorously conducted workplace wellness physical activity programs that used either incentive or non-incentive programs and individual vs. team program approaches has yet to be determined.

Another major limitation of workplace wellness programs relates to participation rates among employees (Langille et al., 2012). Messages that were targeted directly at the employees with individualized health promotion messages increased the potential for employee attitude change and acceptance of workplace wellness programs (Langille et al.). Investigating the influence of personally relevant messages on physical activity participation among employees, the researchers first anticipated that those individuals with a high level of fitness and wellness knowledge would have reacted with a more positive attitude towards the feedback. This notion was not supported. These researchers

(2012) confirmed the notion that “one size does not fit all” as documented earlier in the literature (Batt, 2009, p. 47).

General health messages are useful as a means of motivation for individuals with lower levels of fitness where as more specific and targeted information should be used to reach those individuals with higher levels of fitness. It is important to get employees’ input as the workplace does not house a single type of individual, and varying types and intensities of personal fitness levels exist in the workplace (Langille et al., 2012). The nature of a workplace wellness message is an important factor to calculate, as an organization would want to tailor messages based on the different demographics of their workforce. Understanding varying demographics and knowledge bases will help to ensure a positive attitude and reaction from organizations employees towards wellness physical activity programs to ensure longevity and success from all tiers of employees (Langille et al.).

A primary outcome of worksite wellness programs is to assist employees to create a healthier work-life balance, which in the literature was facilitated through increases in employee physical activity and support from management at all levels (Dishman et al., 2009). Increases in physical activity in the workplace included both personal and team management goals targeting increases in activity through four main dimensions which encompassed the senior management endorsement, joint employee-management steering committees, group and organizational goals through incentives, and environmental prompts (Dishman et al.). Although the success and target areas of workplace wellness programs vary in the literature, effectiveness is not always achieved and several factors are important to consider including environmental prompts, as well as

organizational efforts (Dishman et al.). A major influence of employers deciding to implement programs relates to their desire to decrease the overall costs associated with chronic disease risk factors and to help reduce health benefit claims from their employees.

There is a gap in the literature which suggests a need for more long term interventions and follow up as much of the literature displayed short term interventions (Dishman et al., 2009; Downey & Sharp, 2007; Eves & Webb, 2006; Foster & Hillsdon, 2004; Marcus et al., 2006). Another limitation in the literature was the lack of instruments used to assess worksite environments and perceived environments by employees as an indicator of success of workplace wellness programs (Engbers, 2007).

In Canada, workplace wellness programs are predominantly organized and run by employees and incentives are relatively low or non-existent in most organizations (Downey & Sharp, 2008). The immediate incentive for Canadian employers to implement a comprehensive workplace wellness programs was often to reduce health insurance claims, absenteeism, increase bottom-line profits, and increase productivity, employee morale, decrease accidents, staff turnover rates, and improve attitudes towards the working environment thus leading to enhanced business among organizations (Downey & Sharp, 2008; WalkBC, 2010). Due to the budgetary restrictions on workplace wellness programs in Canada, studies that were conducted used minimalist funding initiatives to gather data in the area. A major confounding factor in the literature was the large amount of studies conducted that relied heavily on self-report measures of physical activity levels (Danna, 1005; Engbers, 2007; Fusilier & Manning, 2005; McEachan, 2011; Thogersen-Ntoumani, 2010). This identified a potential gap in the translation of

information, as self-report measures can be misleading as a reporting mechanism if done incorrectly or not accompanied by objective measurements.

A variety of interventions were discussed in the literature. The most successful types of programs were found to be those that involved physical activity events and activities that occurred in the workplace during work hours (Thogersen-Ntoumani, 2010; add). One successful intervention in the workplace involved lunch hour walking programs (Engbers, 2011; Thogersen-Ntoumani, 2010; Swanberg, 2011). Thogersen-Ntoumani (2010) conducted a 16-week long lunch time walking intervention facilitated through group walks 3-days a week for 30 minutes each, with the challenge to accumulate 60 minutes of walking on the weekends. This intervention had a high success rate and past 10-weeks the employees were able to organize and conduct group walks without guidance, and were able to fully self-facilitate walks. Some studies in the literature involved self-report, while others involved a combination of self-report, objective, and manager reports (Thogersen-Ntoumani). Another issue with many interventions was the overall lack of inclusion of both sedentary and healthy individuals. In the work environment there was a need to engage both populations to ensure a higher adherence rate and overall corporate satisfaction level with the program. The 16-week walking program resulted in faster two-kilometer walk test times by increasing walking speed and average amount of moderate to vigorous physical activity per week (Thogersen-Ntoumlani).

In the literature, walking interventions involved low-moderate levels of physical exertion whereas stair climbing interventions involved moderate to vigorous levels of physical activity. Stair climbing is a readily accessible free source of physical activity

that can be accumulated by any office place worker situated in a building with more than one level. Stair climbing interventions involved a variety of techniques addressing either push or pull methods. Push methods in the literature involved interventions designed to mandate new behaviours, and change overall attitudes towards physical activity such as the skip stop elevator design (Nicoll & Zimring, 2009). The latter researchers investigated an office building that was designed to limit the amount of floors accessed via the skip stop elevator in an attempt to increase employees' stair use. Pull intervention strategies involve a combination of education, activity programs, and environmental interventions to make engaging in voluntary stair use both attractive and routine among employees in their office buildings. Studies that used pull techniques such as the strategic placement of posters on elevators and stairwells with important health messages, as well as changing stair wells to create a more aesthetically pleasing environment through lighting changes, paint, music etc. had high success rates (Eves & Webb, 2006; Nicoll & Zimring, 2009; Kwak et al., 2007; van Nieuw-Amerongen et al., 2009; Seiler & Marti, 2001; Titze et al., 2001). In British Columbia, Canada, BC Hydro estimated that as a company they were able to decrease their annual sick leave costs by 1.2 million dollars as the result of implementing a walking initiative among their employees (WalkBC, 2010). Increasing walking in the workplace is one of the easiest and effective ways a company can add PA to their workplace.

Another study, which encompassed an intervention largely derived from a push method, was a pilot study conducted by Hopkins, Glenn, Cole, McCarthy, and Yancey (2012) that integrated physical activity and nutrition practices into the regular paid workday through means of a push method in the Los Angeles area over a three year

period. The purpose of the study was to assess the quality of the intervention on each organization while highlighting six key themes (site layout, social climate, wellness infrastructure, number and influence of program champions, leadership involvement, site innovation and creativity). The researchers found that there were four levels of adopters within their workplace program: wipe-out, fair adopters, model adopters and poor adopters. The model adopters were able to grasp onto visually appealing displays of physical activity and healthy eating promotional items that were posted on several vacant bulletin boards throughout the facility and routinely updated throughout the intervention period. Those push methods which aided the intervention among the high adopter groups included incentive based wellness competitions for participation in the various events such as logging pedometer steps, PA breaks, and other activities which resulted in prizes, other things included the management taking an active role by mandating 10-15 minute PA breaks during mandatory meetings. Push methods are successful, as they do not rely on employees' motivational levels to accomplish wellness goals, rather they focus on the facilitation of creating an environment where the choice of physical activity over no physical activity is more likely to occur due to environmental cues and shifts. This has recently been labeled as 'architecture-choice', organizing structures and environments in which people make decisions in their environments through the 'nudge factor' (Nicoll & Zimring, 2009).

A major risk factor detailed in the literature concerns overall sitting time independent of physical activity levels (Bennie et al., 2011; Katzmarzyk, 2009). A study conducted by Bennie et al. (2011) analyzed self-reported sitting time in an Australian workplace. The researchers' findings suggested that providing male employees with

support for short physical activity breaks during work hours, and female employees with information on benefits of this behaviour may be useful for reducing workplace sedentary time (Bennie et al.). Regular interruptions in workplace sitting time were documented as an easy way for employees to decrease their chances of developing a chronic disease related to lack of physical activity (Bennie et al., 2011; Katzmarzyk, 2009). In the literature interruptions in the workplace included automated emails prompting short physical activity breaks, and encouraging staff to personally communicate with each other rather than using email/phones (Bennie et al.). The amount of daily sitting time has been positively associated with cardiovascular disease and other chronic diseases with the exception of cancer among men and women, regardless of physical activity levels (Katzmarzyk et al.).

The role of pedometers in adherence to physical activity

In the literature, studies using accelerometers and pedometers found successful analysis of physical activity along with self-report measures (De Cocker, 2010; Kang et al., 2009; Naploitano et al., 2006). Exercise adherence is a major issue in today's society. It is of large importance to ensure that workplace wellness physical activity programs are successful in order for organizations to reap the full benefits of their implementation practices. Dishman et al. (2009) found that the use of environmental cues, goal-setting, and natural social relationships that developed from within the workplace to be successful in creating and sustaining workplace wellness programs. Pedometers are a low cost, easy tool that can be used to contribute to achieving and these facilitating these factors. A meta-analysis of pedometers based physical activity programs found that pedometers increased employees' ambulatory physical activity levels as the researchers documented a

moderate and positive effect ($ES = .68$), showing the feasibility and motivational aspects of pedometers (Kang et al., 2009). In the literature the number of participants in pedometer based interventions varied from very small to robust samples ($N = 7-762$) (Bravata et al., 2011; De Cocker et al., 2009; Freak-Poli et al., 2011; Kang et al., 2009). Pedometers were documented in the literature to have increased step counts upwards of 27% from baseline, showing their feasibility (Freak-Poli et al.). The results of two recent meta-analysis of pedometer suggested that these small devices simply do work and are an effective means of providing a certain level of motivation to take more steps per day and maintain higher levels of physical activity than to that of the control group (Tudor-Locke & Lutes, 2009). The analysis however highlighted the need for further research on what types of goals influence individuals to complete more steps per day, whether they be 10,000 steps per day or merely individual set goals such as to increase your steps per day by 2,000 etc. (Tudor-Locke & Lutes). It has yet to be determined the intensity and the step count goal formula for optimal health benefits.

In conjunction with pedometers, research articles also explored the idea of step count goals. Those interventions which only required individuals to complete step count diaries had the lowest effect sizes of ($ES = .48$) (Kang et al., 2009). Step count goals that were more comprehensive in their methodology such as 10,000 steps a day interventions in conjunction with step count logs, prompting, social support and various other environmental approaches were more effective (De Cocker et al., 2010; Dishman et al., 2009; Thøgersen-Ntoumani, 2010). A popular step count goal found in the literature was the 10,000 step a day initiative (De Cocker et al., 2011; Tully & Cupples, 2011; Van Acker, 2011). Studies varied among their target population from sedentary university

students, healthy and unhealthy employees, to whole community interventions using the 10,000 steps a day initiative. The length of 10,000 steps a day initiatives varied in the literature 4 weeks to 4 months (De Cocker et al., 2010; Dishman et al., 2009; Dustan et al., 2012; Freak-poli et al., 2011; Kang et al., 2009; Therese & Tudor-Locke, 2004; Thogersen-Ntoumani et al., 2010; Van Acker et al., 2011). Despite the recommendation that accumulating 10,000 or more steps per day can specifically reduce the risk of developing chronic disease, there remains no published research that has explored the option of taking 10,000 or more moderate-vigorous steps a day to address the hypothesis..

Although there have been many instances of success with regards to pedometers to increase physical activity, the literature is not conclusive as adherence rates varied. Many studies primarily focused on increasing the step counts of those individuals who were overweight or obese while there needs to be more research done on the ability for pedometers to serve as motivational tools among normal weight individuals with minimal or no signs of risk factors (Conn et al., 2009; Kang et al., 2009; Public Health Ontario, 2011). In the workplace there is often a variety of physical activity levels and fitness backgrounds and there is a need to find methods that will ensure high participation and adherence rates among all individuals to ensure a cohesive successful program is put in place. A study by Vanwormer et al. (2012) analyzed whether baseline physical activity levels were good indicators of workplace walking program participation. Physical activity was not an indicator of walking club participation rates however, the researchers found that older age and those individuals who required more social support to be active were higher predictors of participation. The researchers suggest that when trying to create an all-inclusive workplace-walking group, individuals need to do future research on the

marketing and design of these programs to appeal to all ages and needs of social interaction.

In conjunction with pedometers serving as motivational tools, there needs to be research on the long-term impacts of pedometer-based interventions in the workplace to prevent the onset of chronic diseases (Bravata et al., 2011). In the literature most pedometer-based programs have shown some improvements in physical activity levels, blood pressure, but most were not significant. A study conducted by Bravata et al. (2011) demonstrated improvements in both systolic and diastolic blood pressure along with a substantial improvement in waist circumference among males and females in the workplace. This was one of few studies to have used pedometers on both sedentary and healthy adults, and to have recorded improvements in anthropometric and blood pressure variables (Bravata et al.). Pedometer adherence rates among 10,000 steps a day interventions were mixed in the literature. De Cocker et al. (2010) suggested that the rather low proportion of pedometer users in their intervention (48%) could explain the low proportion of step count increase from baseline to the end of the study with only 31% of individuals reporting the intervention to have helped with overall physical activity increases. However, Tully and Cupples (2011) reported a higher adherence rate and reported changes in blood pressure among hypertensive university students, which supported the 10,000 steps a day intervention initiative. A meta-analysis conducted by Kang et al. (2009) found that the 10,000 steps a day intervention had the highest effect size $ES = (.84)$ among all conditions as pedometers increase individuals motivation and help with goal setting.

A study conducted by Piffaretti and Lenzen (2007) analyzed attrition and reasons of members for dropping out at a Swiss fitness centre. The study concluded that individuals drop out typically due to four main reasons; seasonal drop-out, forced drop-out, health related drop-out, or lastly due to passive continuation, in which an individual is not keen on an exercise regimen or facility. It is important to understand why individuals drop out of fitness related pursuits, whether they be at a facility, or a fitness intervention.

Reliability/validity of tools used in study

Physical activity can be measured through several scales and means. Questionnaires available to assess individuals' physical activity levels include the IPAQ-SF. The content validity of the IPAQ-SF is high as it assesses frequency, intensity, and duration of physical activity as well as sedentary behaviour, and is relevant to a variety of populations and settings (Craig et al., 2003). The IPAQ-short form was created in 1998 as a means to assess the global physical inactivity epidemic, and can be used in many settings, languages, and remains a valid and reliable tool. In 2005, Pacific Rim Wellness conducted a study among 25 pedometers for test-re-test accuracy. The HJ 215 S scored a 4/5 and was found to be an inexpensive highly reliable pedometer that recorded steps with an advanced gravity sensor mechanism within 5% accuracy at both 2 and 4pmh walking tests. The HJ 215 S was also given 9 out of 10 for points for accuracy (Pacific Rim Wellness, 2005). The advanced G-Sensor technology allowed multi-axis detection meaning that the pedometer could sense both vertical movement (up and down), and forward momentum, allowing for more versatile placement on the body, and more accurate step counts vs. basic pedometers.

Only one study was found on the use and validity of the AWSQ which was conducted by Chau et al. (2012) and assessed the AWSQ as a tool for measuring workers' total sitting time by domain. The AWSQ also allows researchers to measure sitting time in multiple domains, whereas the IPAQ measures total sitting time as one broad indicator. The results reported by Chau et al. (2012) support the use of the AWSQ for measuring sitting time in a working population, suggesting its validity through a fair to excellent test-retest ability among a working population with a sufficient criterion validity against accelerometers.

Mixed methods research

Lastly, in an effort for the researcher to gain further insights into the qualitative experience of workplace wellness initiatives, the use of a focus group is suggested. Focus groups are an efficient technique that aids the researchers in gathering information from several participants in one session above and beyond information gathered from a survey (Thomas, Nelson, & Silverman, 2011). Organizing qualitative data in an efficient manner can help to explain inferences made from the quantitative data gathered. Open coding is a means of qualitative analysis used to explore commonalities in focus groups (Elo & Kyngas, 2007). Open coding is the process of documenting common notes and headings seen in the text while reading it to best describe the content (Elo & Kyngas).

The importance of being able to distinguish between themes and categories when analyzing qualitative data is noted in the literature (Morse, 2008). A category is a grouping of similar data placed into an arrangement to describe the characteristics of the categories (Morse). In contrast, a theme is the “basic narrative” about the overall research

process (Morse). Themes are able to tie all of the categories together, by asking the question “what is this about?” (Morse, 2008, p. 727). Categories enable the researcher to identify groups of various topics that come up in qualitative data, while theming emerges from the inductive process of bridging and connecting categories.

Mixed methods research designs are a rapidly developing type of research both practically and conceptually. This type of research design involves both quantitative and qualitative aspects, which helps to capitalize on the strengths of while offsetting the different weakness of each type of method. This allows the researcher to go beyond the single-minded approach of the qualitative or quantitative methods. Mixed-methods research design allows the researcher to better answer research questions by approaching the question from more than one perspective (Creed, Freeman, Robinson, & Woddley, 2004).

Summary

The links between employee productivity, decreased absenteeism, increased physical activity levels and decreased likelihood of developing chronic disease can be traced in the literature as some of the benefits of implementing workplace wellness programs. A variety of programs have been used in the literature from those as simple as single behaviour targeting interventions to those more complex targeting multi-factors of wellness change. Workplace wellness programs are becoming more relevant to both employers trying to facilitate a healthy workforce and employees looking for a healthy work-life balance. It is useful for the employers to understand what motivates employees to participate in workplace wellness physical activity programs in order to maximize the benefits of implementing wellness physical activity programs. A well-rounded workplace

wellness program incorporates both personal and organizational dimensions with regards to one's emotional, mental, physical, social and spiritual wellness (Schweyer, 2011).

Cohesion among employees is a crucial component in the success of workplace wellness programs (Blainey & Walters, 2002; Thorgersen-Ntoumani, 2010; Loughren, Dude, Fox & Kinnaick, 2010; Scherrer, Sheridan, & Sibson, 2010).

It is important that employers identify their organization's main goals when tailoring a workplace wellness program and that they are able to target a single behaviour whether it be nutrition, physical activity, or health behaviours or multiple. It is likely that there will be different environmental influences on different types of activities such as walking vs. team participation activities in various work settings (Humpel et al., 2002). Ultimately an employer needs to understand what their employees are looking for and what program will be best suited for the vast majority of their employees to ensure all tiers of a workforce all included in the physical activity wellness programs.

Although some of the literature used self-report measures and few used objective measures, there is a need to equally explore objective measures in combination with self-report measures to get a true picture of the success of 10,000 steps day intervention . Those studies that used 10,000 step a day interventions reported large effect sizes, demonstrating their usefulness in a variety of settings from the workplace to the school setting to the community level.

The workplace is an ideal environment to facilitate increases in physical activity as most individuals spend over half of their waking hours at work. There is a need to explore this area of research further as there have been mixed findings on the success of past interventions in the workplace (Conn et al., 2009). The purpose of this study was to

examine if the use of a goal based 10,000 moderate-vigorous steps a day pedometer intervention would serve as a successful means to guide Capital Regional District employees in Victoria, British Columbia to stay active in the workplace throughout the day, while encouraging these employees to decrease their sedentary time through increases in accidental physical activity.

CHAPTER THREE

Methodology

Research design

The study was designed to adjust to the parameters of a real world office setting through a community-based research (CBR) orientation. CBR is guided by the core principles of collaboration between the community and the academic expertise to promote co-learning and growth (Roche, 2008). The goal was to accommodate and align with the challenges that employees faced during the workday to meet physical activity guidelines. The study used a group of participants with a range of activity and health levels so as to keep the results as generalizable as possible. The study included pre and post measures of anthropometrics, physiology, demographics, self-reported physical activity and post intervention focus groups. The study is therefore a mixed methods pre/post design.

Recruitment

Recruitment of participants began in September of 2012 after obtaining approval of the University of Victoria Human Research Ethics Committee from one Capital Regional District (CRD) office building in Victoria, British Columbia. The CRD serves 13 municipalities and 3 electoral areas across Vancouver Island, with the urban centre of the CRD located in Victoria. The CRD is responsible for a variety of tasks with regards to parks, planning, and management aspects on Vancouver Island. In an attempt to include all employees regardless of their previous physical activity levels, all physically competent individuals within the Fisgard St. CRD office building were included in the

initial participant recruitment phase. The office was purposely chosen due to an interest expressed by the CRD at this location in the spring of 2012.

The CRD created the Healthy Workplace Wellness Committee in the fall of 2012. This committee was established to create a comprehensive workplace wellness program for CRD employees. This was facilitated through a needs assessment that all employees of the CRD were invited to complete. The initial survey highlighted a few main areas of interest, including increasing physical activity, active commuting, healthy eating and reported that the number one barrier to physical activity was time (to view initial survey see appendix XI). In October of 2012, these employees were invited to participate in this 10,000 moderate-vigorous steps a day study. Employees were randomly assigned to either wait-listed control or intervention groups after they agreed to participate in the study. All of the participants' names were placed in a bucket and were randomly drawn by an individual external to the study and then allocated to either the intervention (A) or wait-list control groups (B). The draw went as follows:

1. External individual draws name 1 and places in-group A
2. External individual draws name 2 and places in-group B
3. External individual draws name 3 and place in-group A
4. Process continues until no names are left in the bucket, and all participants have been assigned to either group A or B.

It was estimated through G*Power (2012) that in order to achieve a moderate effect size of .5, a power at .8 with a correlation of .4, that a sample size of $N = 12$ was required. In order to assure that the best possible results were attained, the study used a control group of the same size from the same office building. An attrition rate of 50%

was estimated to ensure enough participants fully completed the study. To accommodate for this attrition rate, a total of 40 participants ($n = 20$ in each group) ensured that enough data were accumulated over the 6-week period.

The intervention was designed to be a useful tool for both male and female office workers as a way to meet physical activity guidelines while in the workplace. The researcher attempted to attain an equal split of 10 males and 10 females in both the control and the intervention groups with ages ranging from 28-60 years. Pre-test and post-test data collection as well as the 6-week intervention occurred at the Fisgard St. CRD office building. All participants completed an informed consent and were told that they may withdraw from the study without explanation at any time.

There were no exclusions to how much physical activity individuals could complete inside or outside of the workplace as this was encouraged to facilitate an increased step count and increased overall health benefits for the employees. Both the control and the intervention groups received the same baseline measurements (resting heart rate, blood pressure, waist-hip ratio, body mass index, 6-minute walk test, adapted workforce sitting questionnaire, the international physical activity questionnaire, online prompting, demographics information and the informed consent). However, the control group did not receive the 6-week intervention, pedometer and prompting components of the study until post data collection in late January of 2013.

The participants in the intervention group consisted of individuals from the Fisgard St. CRD office building who did not have any experience with a comprehensive workplace wellness program. The control group was created from this same pool of individuals. All participants in the control group received all baseline measures after

signing of the informed consent. The control group did not receive the pedometer until the completion of the 6-week intervention. Pedometers have been shown in the literature to serve as a source of motivation (De Cocker, Bourdeauduij & Cardon, 2009; Kang, Marshall, Barreira, & Lee, 2009) and to control for this, the researcher did not give pedometers to the control group until post completion of the 6-week intervention. The control group was aware when they signed the informed consent that they too would be receiving the full intervention once the study was completed. The control group was told to maintain their current levels of physical activity and to report any drastic changes in nutrition or physical activity levels.

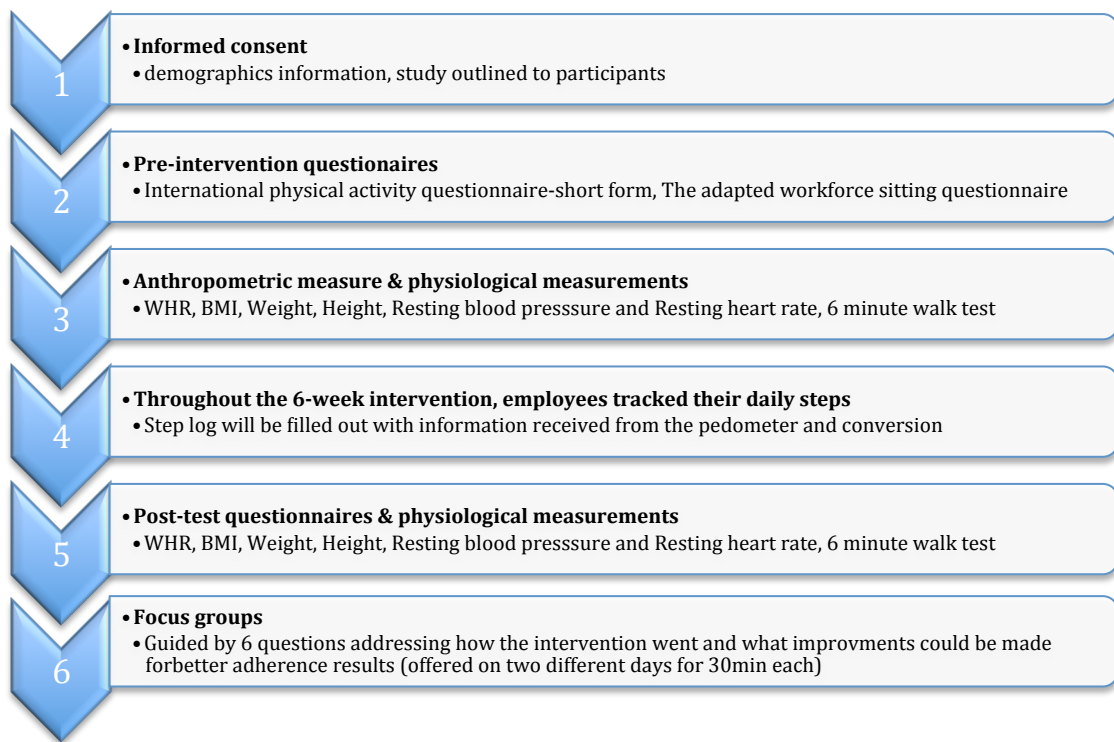
Intervention protocol

Prior to the 6-week intervention, all participants met with the researcher to complete baseline anthropometric and physiological tests and forms. Participants were given all materials and information needed to successfully complete the intervention at this meeting. Participants in the intervention group were briefed on how to reset, record, and shuffle through the various functions on the pedometer. Participants in the intervention group were instructed to check their email every Monday morning for the duration of the intervention to receive and read the newsletter prompts distributed. Following the completion of the 6-week intervention, participants were scheduled an appointment with the researcher to complete post-testing and to ensure their step logs were accurately filled out. Only those pre and post-test measurements of individuals who completed the step log sheets accurately were used in the final analysis. In order for participants' results to be considered for final analysis, participants had to document their steps for the full 6-week period (7 days a week) on the recording sheet provided.

Data collection

The data in the study came from a variety of sources: pre-and post-test questionnaires, anthropometric measures, physiological measurements, self-report step count logs, demographics information, and a post study focus group. Over the course of the 6-week study participants spent 46 hours performing tasks related to the intervention (walking hours, test time, and questionnaires). The order of the data collection was as follows:

Figure 1



Pre/Post test questionnaire

Participants were emailed questionnaires and were asked to complete them prior to meeting with the researcher for baseline testing in October 2012. The forms encompassed the Adapted Workforce Sitting Questionnaire (AWSQ), which addressed employee's

self-reporting sitting time over seven previous days to the test's administration date. It asked respondents to highlight time both at work and at home on the weekends with regards to time allocated from transport, work, watching TV, computer and other leisure activities. The second questionnaire that employees were asked to complete was the International Physical Activity Questionnaire Short Form (IPAQ-SF). This questionnaire was used to assess individual's pre intervention physical activity levels and to compare to their post intervention physical activity levels. The IPAQ-SF has been documented to be as good as other self report measures assessing physical activity levels among individuals aged 18-65; it is a valid and reliable measurement tool which asks respondents to perform a 7-day recall on their physical activity levels (Craig et al., 2003). Those individuals who were unable to complete the questionnaires prior to meeting with the researcher were given the opportunity to complete these forms at the baseline testing office and were given all applicable forms.

Measurement tools

Steps per day were measured through a digital Ultima-104 pedometer that was given to each participant during the baseline tests in October 2012. The Ultima-104 pedometer logged uninterrupted physical activity, total activity since last reset, and time spent in MVPA using G-sensor technology. The unique G-sensor technology is a highly accurate sensor in the pedometer, which allowed participants to place the pedometer in a variety of areas including pockets, backpacks, purses, and lanyards. Although no academic studies had been completed on this exact model of pedometer, many have been conducted with basic pedometers, which only capture vertical momentum (up and down)

and displayed high levels of success for ambulatory movement (Bravata et al., 2013; Schneider et al., 2003; Tudor-Locke & Basset, 2004).

Pre/Post anthropometric and physiological tests

Blood pressure and resting heart rate were measured with an Omron automated blood pressure monitor after the participant had been seated with both feet flat on the floor for five minutes. The left arm was comfortably placed on the table in front of the participants at an angle of 10 to 45 degrees. Two measurements of the participant's blood pressure were taken if the first measurement was outside of the normal range of 120mmHg/80mmHg.

Aerobic fitness test

All participants completed the American Thoracic Society 6-minute walk test (6MWT) both pre and post the 6-week intervention period. The test was used to predict participants' sub-max VO_2 levels, which also served as an indicator of participants' initial fitness levels in conjunction with the IPAQ-SF. VO_2 max refers to an individual's maximum amount of oxygen uptake per minute (Ziogas, Patras, Stergiou, & Georgoulis, 2011). The 6MWT was used as the test of choice as it could be facilitated in minimal space, and only required a 100-ft hallway, no exercise equipment and minimal training to be completed. The objective of the test was for participants to walk as far as possible in the 6-minute time period. The researcher briefed all participants on the testing protocol and provided a walkthrough of the course to ensure they fully understood the test. A warm up period or practice test was not conducted pre test, as this was not suggested in the literature (American Thoracic Society, 2002). To ensure validity and reliability of the tests and to control for other factors such as competition among employees, only one

individual completed the test at a time. The researcher recorded completed laps on a lap sheet counter.

Anthropometric measures

Anthropometric measures; waist-hip ratio (WHR), height, and weight were taken on all participants by the same researcher. This was done to limit inter-tester reliability issues. The validity and reliability of the WHR measurement is well documented in the literature and American College of Sports Medicine (ACSM) protocol was followed to ensure that participants were accurately measured and then classified (see Table 1). The protocol for WHR was to take individual's waist measurement at the narrowest part on the participant's torso, whereas their hip measurement was taken at the widest point on their buttocks. The tape was tight around the individual's body but not constricting. The same measuring tape was used for both pre and post testing dates. Stature was measured in feet and converted to inches. Participant's weight was measured using a Tanita scale; weight was recorded in pounds then converted to kg. All weight conversions were recorded to the nearest 0.1kg. Participant's height and weight were used to calculate pre and post body mass index (BMI).

Figure 2

Classification of Disease Risk Based on Body Mass Index and Waist Circumference

| BMI kg/m ² | Disease Risk Relative to Normal Weight and Waist Circumference | | |
|-----------------------|--|----------------|----------------------------|
| | Men <102cm Women <88cm | | Men >102 cm Women >88cm |
| Underweight | <18.5 | ... | ... |
| Normal | 18.5-24.9 | ... | ... |
| Overweight | 25.0-29.9 | Increased | High |
| Obesity Class | | | |
| I | 30.0-34.9 | High | Very High |
| II | 35.0-39.9 | Very High | Very High |
| III | ≥39.9 | Extremely High | Extremely High |

(ACSM, 2010)

Prompting methods

The 6-week intervention period involved one method of prompting via one weekly email message sent out to all participants in the intervention group each Monday morning. Prompts were created by taking information from the WalkBC toolkit (2010) and other peer reviewed information with regards to ways in which participants could add to their daily step count by making small changes to their daily activities of living in an effort to decrease sedentary time and increase accumulated physical activity. The email prompt consisted of a health and wellness newsletter highlighting how the participants could accrue their 10,000 or more moderate-vigorous steps in a day.

Prompts included a combination of:

- Park your car further away from your destination
- Walk your children to school
- Walk your dog (or a neighbour's dog)
- Take a walk with a friend/co-worker at lunch
- Take the stairs
- Find out what is going on in your community

- Start or join a walking club
- Wear your pedometer even when you are doing housework or gardening at home

The newsletter prompt was created to not only encompass information on how to accumulate and increase employees' moderate-vigorous steps per day, but also to serve as an information guide on how to become healthier employees both at work and at home. The WalkBC (2010) toolkit also served as a means for the researcher to dispense information on nutrition and other health issues of interest to the target CRD population.

The WalkBC (2010) toolkit was created in 2010 to assist individuals with creating walking programs from the ground level up and encompassed an array of resources that were created from material synthesized by ActNowBC (2006), British Columbia Recreation and Parks Association (BCRPA, 2010), and the Heart and Stroke foundation of BC (2010). The WalkBC toolkit was used to assist in this study's intervention as a means to provide valid and reliable tools such as step count log sheets, prompting messages, stretches, pedometer use sheets, as well as many other walking tips which facilitated the study. See Appendix III for WalkBC tools used in the intervention.

Focus group

Post 6-week intervention, participants were asked to participate in one of two 30-minute focus groups to address the success or drawbacks of the current study. Due to a low response rate in the focus groups, the researcher emailed all intervention group participants the focus group guideline questions to gain further insights of the participants' experiences. All participants in the intervention group were invited to come to either focus group to share their insights on the barriers, facilitators, and overall experience of the intervention via email. Qualitative data were gathered from the

intervention group in the winter of 2013 to gain further insights and to understand their experience.

One focus group, one interview and one email interview were used as a means to analyze the in-depth qualitative insight of the participants' overall experience and motivation to participate and adhere to the intervention protocol. The focus group and interview were facilitated through a variety of open-ended questions to better understand the implementation process experienced by CRD employees, and future directions that could be taken as a result. All participants in the focus group fully understood their rights to withdraw from the session at any time without any consequence. The focus group and interview were offered to all participants in the intervention group but participation was voluntary. The meetings lasted for 30 minutes in length and encompassed six primary questions addressing how the intervention went for the participants. When one question lead to another new unthought-of insight, then this information was documented and used to guide the direction of the focus group. Information was used to depict the success rate of the intervention that both aided and helped to build the background for steps needed to sustain the program within the CRD post-completion of the intervention. Both sessions were audio recorded and then transcribed to ensure that all information was accounted for and as a backup, notes were also taken. Strict focus group protocol was used to facilitate both sessions. A generic code number was given to each participant, and the researcher only recorded an individual's code number beside his or her feedback and never wrote down a participant's name. All participants' information remained confidential and all participants were asked to only refer to one another through their assigned numbers to assure anonymity in the documentation process. The low participation rates prompted the

researcher to email the focus group questions to the all participants to encourage further feedback.

Quantitative Analysis

All data was first entered into SPSS statistics and organized into categories prior to the two one-way MANOVA analyses. Due to the high number of dependent variables, two one-way MANOVA's were used. Data was grouped into two categories; physiological and anthropometric measures, and the self-report measures. A one-way MANOVA compares multivariate means of several groups, using the variance and covariance between the variables to test the significance of the mean difference (Howell, 2011). An independent samples t-test was used to analyze the performance test, the 6-minute walk test. A repeated measures t-test takes participants measures both pre-test and post test, effectively using each participant as their own control (Howell, 2011).

Qualitative Analysis

Once all feedback was received and transcribed, the researcher sifted through the data to find any common categories. The data were then analyzed through open coding. Open coding is the process of reading through a selection and writing down as many headings and notes to describe all aspects of the research to make sense of the content (Elo & Kyngas, 2007). Common categories were then grouped together and then analyzed to find overlaying major themes. Three major themes were brought to light from the data. The major themes were then analyzed and compared to current research on other workplace wellness programs that found similar themes or categories.

CHAPTER 4

Results

This chapter presents the results of the study. It is divided up into four main sections addressing the demographics, adherence to the intervention, focus group and interview insights, and lastly the summary of results.

Demographics

The intervention and control participants' demographics can be found in Table 1 and Table 2. The gender breakdown among participants was 62.5% females and 37.5% males ranging from 28- 60 years of age. The participants were drawn from a sample of volunteers at the Fisgard St. CRD office building located in downtown Victoria, BC in the fall of 2012. Employees came from a variety of job responsibilities within the CRD but primarily consisted of office work. Jobs within the CRD range from the departments of environmental sustainability, parks and community services, integrated water services, corporate services, planning and protective services, and executive services. Roles within these departments included management positions, geographic information systems (GIS) technologists, administrative positions, environmental officers, controlling wastewaters, coordinators, regional and strategic planning, and human resource departments. Most positions were primarily sedentary desk jobs while certain individuals found themselves in the field 25-50% of the time and at the desk the other 50-75% of the time depending on their roles.

Data analyses

Data was entered into Excel and analyzed using SPSS Statistics Software 21. All pre and post-test descriptives were examined to ensure all data were within the normal or expected ranges. Data were placed into stem and leaf plots to compare and contrast pre and post data measures as well as to find and analyze any outliers.

Due to the number of dependent variables measured, two MANOVA-one way analyses on both control and intervention groups were performed. The first MANOVA tested for differences between pre and post-test anthropometric measures (body mass index (BMI), weight, waist-hip ratio (WHR), resting mean arterial pressure (RMAP), and resting heart rate (RHR). The second MANOVA grouped the pre and post-test questionnaires on sedentary time of non-work days, sedentary time on work days, moderate physical activity, and vigorous physical activity. A t-test was used to determine if there were differences in an individual's predicted sub-max VO_2 levels between the pre and post-intervention testing dates. Significance for all statistics was set at $p < 0.05$.

Adherence

Twenty individuals were originally recruited to participate in each of the intervention and control groups. Eighteen began the 6-week intervention and a dropout rate of 12% was calculated from this group as a result of either stopping the study completely or inaccurately completing the step count sheets in the intervention group. The study started with 39 participants and completed with 32. Both the control and intervention groups each finished with 16 participants respectively.

Within the control group two individuals were highly active above normal ranges for vigorous physical activity and above other colleagues in this study (>210 min vigorous

PA). Of these, one individual was a highly trained endurance athlete and the other engaged in a significant amount of equestrian training, both modes of training have a cardiovascular benefit. These individuals were not excluded from the study, as the primary purpose was to find a cohesive program that would increase all individuals' physical activity time in the workplace and limit sedentary time as much as possible. Within the intervention group, there were no individuals who stood out above the normal ranges for current physical activity levels.

Table 1

Intervention Group Demographics

| Baseline | n | Age (yrs) | Weight (kg) | WHR | BMI | MAP |
|----------|----|--------------|----------------|------|------|-----|
| Female | 11 | 47 | 71.3 | 0.79 | 25.9 | 86 |
| Male | 5 | 38 | 87.6 | 0.89 | 27.7 | 92 |

Note: WHR=waist-hip ratio; BMI=body mass index; MAP= mean arterial pressure

Table 2

Control Group Demographics

| Baseline | n | Age (yrs) | Weight (kg) | WHR | BMI | MAP |
|----------|---|--------------|----------------|--------|--------|-----|
| Female | 9 | 47 | 80.6 | 0.7722 | 28.144 | 88 |
| Male | 7 | 38 | 83.3 | 0.8614 | 25.929 | 92 |

Note: WHR=waist-hip ratio; BMI=body mass index; MAP= mean arterial pressure

Table 3

Moderate & Vigorous Physical Activity (AVG-hrs-week) Across Time

| | Intervention (n=16) | | Control (n=16) | |
|----------|----------------------------|----------------------------|----------------------------|-----------------------------|
| | Baseline | Post | Baseline | Post |
| Vigorous | 51.25 ^{+/-} 51.62 | 52.81 ^{+/-} 45.16 | 60.94 ^{+/-} 73.58 | 72.14 ^{+/-} 115.41 |
| Moderate | 70.63 ^{+/-} 67.2 | 31.88 ^{+/-} 43.23 | 60.63 ^{+/-} 76.26 | 81.5 ^{+/-} 96.03 |

Note. Moderate and vigorous physical activity measured by the IPAQ-short form (AVG hrs*week)

The pre test measures were compared and contrasted to the post-test results. No significance was found in either the physiological or self-report measures at the statistical level.

Table 4

Chronic Disease Markers for the Intervention and Control Groups (N=16/group)

| | Intervention (n=16) | | Control (n=16) | |
|-------------|---------------------------|---------------------------|---------------------------|---------------------------|
| | Baseline | Post | Baseline | Post |
| Weight (kg) | 76.4 ^{+/-} 39.67 | 72.2 ^{+/-} 39.43 | 81.7 ^{+/-} 37.12 | 82 ^{+/-} 38.14 |
| BMI | 26.54 ^{+/-} 4.20 | 26.4 ^{+/-} 4.08 | 27.15 ^{+/-} 5.62 | 27.20 ^{+/-} 5.68 |
| WHR | .83 ^{+/-} .10 | .81 ^{+/-} .07 | .81 ^{+/-} .07 | .81 ^{+/-} .07 |
| MAP (mmHg) | 88 ^{+/-} 7 | 88 ^{+/-} 8 | 89 ^{+/-} 8 | 90 ^{+/-} 10 |
| RHR (bpm) | 69 ^{+/-} 11 | 68 ^{+/-} 8 | 65 ^{+/-} 20 | 64 ^{+/-} 17 |

Females who completed the study in the intervention group totalled 61% of participants while the male participants accounted for the remaining 38%. The average age was 47 and 39 years respectively for female and male participants. Male participants in the intervention group had an average BMI score of 1.85 higher than those individuals in the control group. Both groups' means were above the normal recommended BMI healthy level recommended by the Center for Disease and Control Centers (2012). In particular the mean BMI indicated that at baseline the CRD participants were in the overweight category range (25-29.9). Female participants in the intervention group on the other hand had a lower baseline BMI score than those females in the control group by 2.14. Both the intervention and control groups average WHR were well within the normal range at baseline [female (<0.86) male (<0.95)] (ACSM, 2011). Both intervention and control groups fell into the normal range for MAP (70-110mmHg). Resting heart rates were also well within the normal ranges (60-80bpm).

No significant differences were found within or between the groups on self-reported sedentary time as indicated on the adapted workforce-sitting questionnaire.

Table 5
Sedentary time (hrs) at work during a 5 day work week

| | Intervention (n=16) | | Control (n=16) | |
|-------|---------------------------|--------------------------|---------------------------|---------------------------|
| (hrs) | Baseline | Post | Baseline | Post |
| | 44.17 ^{+/-} 16.3 | 42.3 ^{+/-} 12.6 | 49.19 ^{+/-} 14.2 | 43.48 ^{+/-} 9.48 |

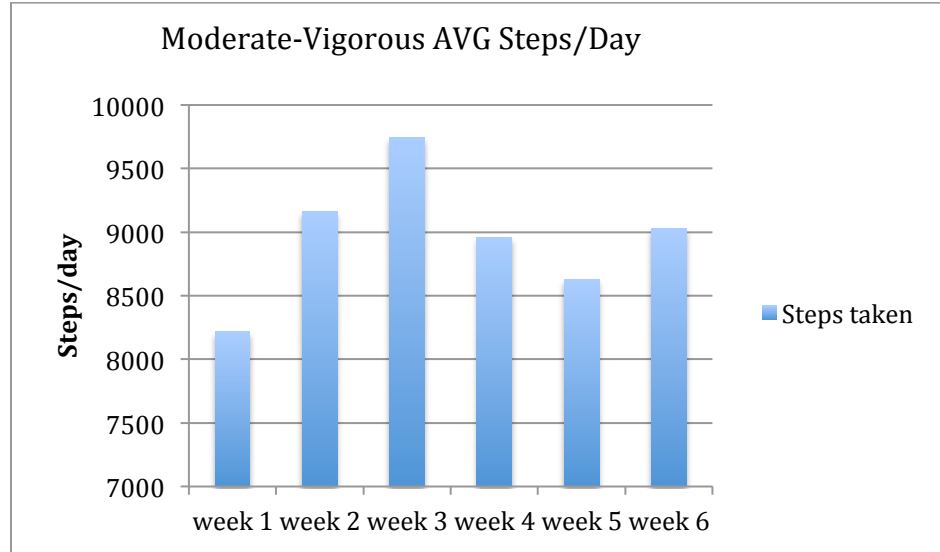
Table 6
Sedentary time (hrs) during 2 day weekends

| | Intervention (n=16) | | Control (n=16) | |
|-------|---------------------------|------------------------|---------------------------|---------------------------|
| (hrs) | Baseline | Post | Baseline | Post |
| | 15.23 ^{+/-} 6.14 | 12.65 ^{+/-} 7 | 13.38 ^{+/-} 7.45 | 12.52 ^{+/-} 3.48 |

Moderate-Vigorous AVG Steps/Day

On an average weekly basis the intervention group did not reach the 10,000 or more moderate-vigorous steps per day recommended by the researcher regardless of the weekly prompts sent out (Figure 3).

Figure 3



Pedometers given to the participants calculated both moderate and vigorous steps taken per day and total time spent at the moderate-vigorous physical activity level per day in minutes. A linear increase in average steps from weeks one to week three is shown in Graph 1. Week three saw the highest average steps per day taken by participants in the intervention group completing 9702 AVG moderate-vigorous steps. The lowest AVG steps per day occurred in week one which recorded 8257 moderate-vigorous steps. The standard deviation of AVG steps in week one recorded at 2271 steps and rose to 2532 steps for week three.

The control group saw a change in distance they walked in the 6-minute walk test from pre-post test but this was not statistically significant (566m-578.67m). The intervention group did not experience any change in distance covered in the 6-minute testing period.

Focus group and interview results

One focus group and one interview (n = 3) were held to encourage study participants to share their thoughts and insights of the intervention. Only participants in the intervention group were asked to attend. One employee beyond those who attended the focus groups and interview sent in feedback via email to the researcher [participant 4]. Participants were asked how the prompting method aided in the overall experience, usefulness, feasibility, engagement, difficulty levels, and longevity of the intervention. The three major themes that arose from the focus groups, interview data, and email data were the idea of the pedometer and prompting as stimuli, tailoring of health information, and the issue of work-life balance.

The frequency of the prompts being sent out and the immediate feedback seen on the pedometers were both facilitators to the participants' step count and overall experience. Participants found the direct feedback of the pedometers to be highly motivating and served as a good reminder to increase steps, however, the frequency of the prompts being sent out via the newsletter could not be determined, as this was not directly measured. Participants had mixed reviews on prompting usefulness, as some found it to be extremely useful and to have served as a great reminder to get more physical activity at work, while others found it as not a useful tool for them personally. When asked if it changed how they typically viewed being physically active at work one participant stated that

Yes. I realized that simply having a bike ride in coupled with afternoon yoga wasn't good enough. I have stepped up my physical activity throughout the day more, and have swapped the biking for walking commutes when possible (I drop

my daughter off to daycare every 2nd week, so those weeks are more challenging to walk) [participant 4].

On the other hand, participants 1 and 3 felt like it did not change the way they viewed being physically active during the day. Participant 2 shared that it may not have increased their physical activity but it “Shed more of a light, I really do sit a lot during the day.” It was apparent that almost all participants had difficulty in attaining the target of 10,000 steps a day. This was attributed to a lack of time and motivation. Participants did not indicate specifically that the six week duration of the intervention was an issue affecting their motivation. However when the researcher asked the participants if they would be more motivated by smaller goals such as walk to the top of the Eiffel tower, walk to San Francisco, walk to Duncan and back etc. than simply accomplishing the same 10,000 or more steps per day goal, participant 1 responded “Yes, we had a step program similar to that one before and I liked that set up more than trying for the same goal each day” [participant 1].

Others just did not take to the program regardless of the prompts and lost motivation relatively early in the intervention. When asked by the researcher “Do you think there would be a better way to help you to reach the 10,000 steps, such as creating a walking group or an organized lunch hour walking group that went out every lunch, would that motivate you to get more steps?” Participant 3 replied “No because I need a whole hour to get out and get lunch. But this walking doesn’t add up to 10,000 in a day.”

Participants were asked if they would continue to use the pedometer post the intervention period, one participant noted

It was a good break not having to wear it or remember it, but for me it's more of a - if I'm wearing it I'm going to get off the bus stop a stop early to get a few more steps in, if I'm not wearing it, I'm not going to get off the bus early, getting that direct feedback was a great motivator. There's nothing to accomplish if I'm not wearing it [participant 2].

Regardless of the pedometers being a motivator or not, participants still did not feel confident that their workplace would be able to facilitate a full workplace wellness program and were more hesitant to fully buy into the step program because they did not see a future for it. The second major theme identified from the focus group and interviews was the idea of tailoring a message or prompt to fit the target population of interest. Some participants' found the prompts (weekly newsletter) to be extremely useful, while others found the prompts contained information that was already common knowledge one participant noted the newsletters were,

Motivating at the beginning, but less useful near the end...for the most part, the info is simple-use stairs, go for walks, take breaks etc. [participant 4].

Regardless of the information given to the participants in the study, they still struggled to find time to be physically active and often let this barrier dictate how active their workday was. The prompts were unable to fully translate knowledge needed to get participants to surpass their barriers to physical activity in the workplace. Participant 3 expressed, "There was a time when I used to deliberately go out and walk around the square during my coffee break, but now I am on the 5th floor and it takes too long to get up and get around. Half the time now I work through the coffee break, it takes too long to get down and outside."

The last theme to be identified was the idea of finding the ideal work-life balance to encourage physical activity among participants. Participants reported high difficulty trying to find that ideal ratio of work-life balance to facilitate basic physical activity. All participants in the focus group felt that to reach 10,000 or more moderate-vigorous steps in a day's work hours to be unfeasible. The quote by participant 1 captured their sentiment: "Not during, but including the rest of the day it is definitely feasible" [participant 1]. Research has recorded much of the same results, recording difficulty in individuals finding balance between work and home life (Spinney & Millward, 2010). Participants' expressed difficulties to attain step counts on the weekends but found the workweek to be much easier. One individual noticed that during the workweek, their physical activity levels were quite high, however on the weekends this individual struggled to meet minimum guidelines. Individuals also voiced their struggles with time management and lacking the ability to fit all the steps in during the day.

I would probably not even wear the pedometer during the week as a standard work week I get enough walking in, however I would continue to wear it on the weekends as that is where it has been highlighted that my physical activity (step count) is lacking [participant 1].

Prompting ideas were already there it was more just the application needed more, had more family things going on, less time for physical activity on the weekends [participant 1].

When asked what the hardest part of the intervention was, participants highlighted the struggles they faced with finding balance and time in a full schedule. Participant 4

noted, “Trying to achieve 10K when I’m already over-scheduled with sit down events e.g., meetings or driving” [participant 4].

Participants in the focus group/interview were eager to see if this would be the corner stone to a more comprehensive wellness program being put in place within the CRD. Participant 1 noted “There is a health and wellness committee so that is a start in the right direction.” Others were more suspect about program expansion: “I think that the talk of the mentality is there, but the walk for this environment is not, unless you have a supervisor/manager that is in/that is for it then, no, I don’t personally feel this organization is walking the talk” [participant 2]. Participant 2 was frustrated as to the exact state of the current health and wellness program within the CRD, “Some of us have been using rooms to do lunch time workouts and we are getting no support or help so it’s hard to feel like this is going to happen since the support is just not here yet (doing it for over two years, not getting support).”

Summary

Participants may not have seen statistical significance in the results of the study but they did gained an awareness of their current physical activity levels and the challenges their workday poses on their ability to meet basic physical activity guidelines.

I found that just depending on the day, because the job I do, whether or not I could even get up or not. Quieter days I could get up more whereas busy days. It did change the breaks and the lunch hours for me, not so much the regular hours at the desk [participant 1].

This could be due to the largely diverse background of participants and job demands. Although all participants worked for the same company, as was stated in the previous chapter, there was a large variety of job demands and backgrounds of the participants. CRD jobs ranged from environmental sustainability, parks and community services, integrated water services, corporate services, planning and protective services, and executive services which in turn consist of primarily office work but with some employees reporting field work and site visits as well. Along with job type, individuals also had a wide variety of initial fitness levels, ranging from highly trained to unfit with BMI's supporting these ranges. It is clear that a 'one prompt fits all' strategy fails to address diverse needs, and thus a newsletter with a variety of information was created to pique the interest level of all participants. Three main categories were addressed in each newsletter with several sub facts to appeal to a variety of health and fitness knowledge levels. One participant noted "for the most part the info [was] simple – use stairs, go for walks, take breaks etc." but with regards to the longevity and benefit of the study lasting in this workplace that they " would imagine so, but it will require follow-up and repeats yearly to keep people up on their active-ness. I'd be curious to see how many have improved their mobility for the long term" [participant 4].

To see the full-transcribed version of the focus groups see Appendix X.

CHAPTER IV

DISCUSSION & CONCLUSION

The primary purpose of the research study was to find out if taking 10,000 or more moderate-vigorous steps a day would lead to increased aerobic fitness, decreased chronic disease risk factors, and to determine if this step count goal would be associated with increased self-reported physical activity levels among Capital Regional District office workers in Victoria, BC. This chapter analyzes the three main research questions and highlights three major themes derived from the qualitative analysis to explore the results. The three major themes include the pedometer and prompting as stimuli, tailoring of health information and work-life balance. Implications for practice in community-based research; limitations and future research options are also offered.

As stated earlier, the intervention group received the pedometers and the prompts for the six-week period after completing baseline questionnaires, anthropometric measures and physiological tests. The control group completed all of the baseline measurements but did not receive the pedometer or the prompts until after the study was completed in the winter of 2013. It was hypothesized that taking 10,000 or more moderate-vigorous steps per day would result in increased aerobic fitness, decreased indicators for chronic disease risk factors and increased self-report physical activity levels.

The results of the study did not support the research hypotheses. Although no statistically significant changes were seen to support the research questions, there were several benefits derived from the intervention, as participants received a variety of health and wellness information. Additionally, participants were taking over an average of 8,000 steps per day, which is in the ‘somewhat active’ range as defined by Tudor-Locke and

Bassett (2004). This range has been associated with maintaining and providing positive health benefits. Although a small sample size was used, it was encouraging to see that on average, individuals were reaching a healthy activity level as indicated by their accumulated daily step count. This was seen in other studies on individuals accumulating 10,000 or more steps per day such as the meta-analysis conducted by Bravata et al. (2007) who found that participants on average increased their physical activity levels from baseline by 2,000 steps/ day or approximately 1 mile through the use of a pedometer based intervention. It is important that employers understand how many steps/day is enough to avoid sedentarism; a key predictor of developing chronic disease risk factors. The research was able to determine that 8,000 steps a day was enough to maintain a 'somewhat active' range while < 5,000 steps per day was indicative of being sedentary and therefore being at a higher risk of developing chronic disease risk factors. Employers should encourage those individuals who take < 5,000 steps a day to get a pedometer and increase their step count by 2,000 steps per week until 10,000 or more steps per day is reached and maintained.

Post-six week intervention period, a few participants in the control group with higher baseline testing scores stated at their post-test data collection appointment that they found the awareness they gained from the initial consultation to have piqued their interest to become more physically fit. In December of 2012, a few control participants reported back to the researcher that they increased their physical activity levels after consulting their doctors further on how to control their blood pressure and also reported increases in aerobic exercise and weight training. Not all participants in the control group were motivated to develop a healthier lifestyle; some participants' stated during their post

testing appointment that their health habits remained unchanged. These few participants in the control group stated they wanted to wait until they received the full intervention in late January of 2013 to fully uptake changes in the health and wellness.

Workplace wellness programs can be beneficial to a variety of companies. Keeping employees fit, happy, and healthy is important to all employers regardless of job type. It has been shown in the literature that a variety of workforces have had a high level of success with employee retention, productivity, decreased absenteeism, reduced health care costs, lower stress levels etc. as a result of workplace wellness programs across North America (Batt, 2009; Chia-Lin, 2006; Dishman et al., 2009; Johnson & Johnson Corporation, 2009). The objective of the current study was to limit sedentary time and increase the potential for physical activity among CRD office workers in Victoria, BC through the use of a step count goal. The goal was facilitated through pedometers and a health and wellness newsletters. Regardless of what employers may know about workplace wellness programs, it is essential that employers understand how motivation affects participation among employees in a workplace wellness program, whether motivation be driven by internal or external factors such as pedometers, incentives, etc. (Kang et al., 2009; Merrill et al., 2011). Originally a high level of interest was present among participants, however, interest level was not maintained and total step count reflected this decline by the end of the 6-week intervention.

The first research question examined whether accumulating 10,000 or more moderate-vigorous steps a day would significantly increase employees' aerobic fitness levels. Individuals in the study did not hit the goal of 10,000 or more moderate-vigorous steps a day on average any-week throughout the 6-week intervention. No significant

changes were seen across the six-week time period in participants' aerobic fitness levels. Individual's aerobic fitness levels were analyzed via their performance test (the 6-min walk test) and their self-reported physical activity measure, the IPAQ-SF. From these two measures, no statistical significance was found. If the participants consistently reached the step count goal they would have met the Canadian Society for Exercise Physiologists (CSEP) guidelines to accumulate 150 min or more of moderate-vigorous physical activity a week, which in the literature has been shown to significantly impact cardiovascular and health indicators (Gibbs & Cartwright, 2010). Because participants did not meet the target of 10,000 steps per day it cannot be determined from the results of this study if accumulating 10,000 or more moderate-vigorous steps a day leads to increased aerobic fitness levels.

After analyzing the average weekly step counts, it was found that individuals, on average, gradually increased their step count until week three, then a slight drop off was recorded each week until the sixth week. The highest average weekly step count, recorded in week 3, showed that the participants were on average 250 steps away from the target goal of 10,000 steps. Motivation to attain the goal was facilitated through a prompt (newsletter) given out every Monday morning. Qualitatively participants stated that they felt the intervention was useful but not necessarily new or overly motivating: "Motivating at the beginning, but less useful near the end...for the most part the info is simple – use stairs, go for walks, take breaks etc." [participant 4].

The second research question addressed whether or not taking 10,000 or more moderate-vigorous steps a day would significantly decrease chronic disease risk factors (RMAP, RBP, BMI, WHR, and sedentary time). On average, participants lost 0.5kg in

the intervention group, with slight decreases among the other chronic disease risk factor indicators. Workplace wellness programs have had success in implementing pedometers based programs and encouraged employees to take 10,000 or more steps per day (Gibbs & Cartwright, 2010). However, no study has directly examined how taking 10,000 or more moderate-vigorous steps per day would affect health and wellness indicators.

Typically, a program that takes place over a time frame of 6-12 weeks yields physiological changes (Impellizzeri, Rampinini, & Marcora, 2005).

In the current study, the six-week time frame did not prove to be a long enough intervention to yield those same physiological changes documented in other research (Chan et al., 2008; Dishman et al., 2009; Public health Ontario, 2011, Kwak et al., 2010; Van Acker et al., 2011). It must be noted that the participants did not fully adhere to intervention guidelines and step count goals, so the intervention was not entirely taken up as intended.

Lastly, the third research question addressed whether or not 10,000 or more moderate-vigorous steps a day would significantly increase an employee's self-reported physical activity levels. No individual significantly increased self-reported physical activity levels from baseline. Individuals may not have accurately recorded or may have misinterpreted questions on the IPAQ-SF questionnaire, which may have influenced responses on the self-report items. In future research, it would be of interest to see what baseline step counts were for the week prior to the study to determine if step counts changed as a result of the intervention. Having both these comparative data would give a better insight as to how physical activity patterns accurately changed over time rather than relying on self-report.

Three major themes were hypothesized to explain step counts achieved by participants as informed by the focus group, email and interview data. The three major themes were the pedometer and prompting as stimuli, tailoring of health information and work-life balance

The first major theme was surrounding the idea of the stimulus. Stimulus referred to the frequency of the intervention's newsletter being sent out to the participants, and the direct feedback that the pedometers gave the participants. From the current research study, it is clear that the frequency of the prompts did not return the desired result of an increase step count of 10,000 or more moderate-vigorous steps per day. Perhaps prompting, as the form of stimulus of behaviour change, was too infrequent to yield the results needed to achieve statistically significant changes in physical activity levels. However, all of the participants reported that the pedometers were very useful in providing direct feedback of how many steps and in turn how much physical activity they had partook in that day. Although the information in the newsletters were purposively designed to be relatively basic to encourage readership among a variety of participants, a more sequenced nature to the sophistication of information provided may have served to sustain participants' motivation as they progressed through the intervention. Participants noted that the newsletter contained information they perceived at best as good and useful, and at worst "not un-useful information" (participant 4). Despite participants noting that some of the information was not new to them, the prompts nonetheless served as "a good reminder" (participant 1). It is possible that this combination of too infrequent dissemination and uniformity of content failed to engage participants' interest beyond the initial three weeks. Tailoring health promotion information has been identified as critical

to stimulating and sustaining behaviour change and this is best accomplished by involving participants in crafting the prompts, or at the very least piloting messages prior to dissemination (Shohet & Renaud, 2006).

The second major theme encompassed the idea of tailoring the intervention primary message and stimulus to fit the needs of the participants to ensure the desired outcome of an increased moderate-vigorous step count occurred. Participants reported being highly motivated at the outset of the study, but motivation began to deteriorate after three weeks. A study conducted by Hopkins et al. (2012) implemented a workplace wellness program that used Program Champions (PC) or “peer leaders” selected from the individual worksites to make decisions, engage in leadership roles, and implement physical activity programs with employees. Those sites that had higher success rates in adhering to interventions had consistent PC’s running programs and addressing concerns vs. those programs that lacked in effectiveness that rotated between PC’s (Hopkins et al.). Much like the current study, Hopkins et al. (2010) found that to have a successful workplace wellness program and implementation, work sites needed to encourage PC’s from a variety of levels from the top down including management etc. Hopkins et al. (2010) found that when the researchers were unable to engage middle managers in the implementation process, the program suffered as employees displayed resistance and intervention efforts were derailed. In the case of the current study, no individuals took on any sort of leadership role to help facilitate the intervention. The prompts and instructions were delivered to the participants via email and it was up to the participants to decide how they would act on the information. A study conducted by Webb and Eves (2007) found that posters encouraging stair climbing among employees that were more targeted

towards health consequences had a higher success rate vs. those containing general health information messages. Future research is needed on the type of electronic messages sent out to participants between those messages that incorporate general descriptors vs. health consequences of taking 10,000 or more moderate-vigorous steps per day.

Lastly, the theme of work-life balance arose as a primary concern of the participants in the intervention group. Participants were unable to hit the 10,000 or moderate-vigorous steps per day consistently on workdays despite their intentions to increase their step count. In reality, the inability to accumulate 10,000 steps reflected their work schedules and workloads. For those participants who had more field work, they found the step count to be easier to attain, whereas those employees restricted to their desks and pressured by deadlines found it hard to get up and move around during the day. Supporting other workplace wellness research policies and procedures to accommodate employees' efforts to be more active are needed to support long-term behaviour change (Spinney & Millward, 2010; Hopkins et al., 2012; Scherrer et al., 2010). All of the participants who took part in the focus groups, interview, and email responses reported difficulties balancing work, family, and physical activity. This was a primary barrier for participants trying to hit the 10,000 or more moderate-vigorous steps per day. The barrier of work-life balance with physical activity has been documented in previous research (Dishman, 2009, Spinney & Millward, 2010). Spinney & Millward (2010) found that lack of time was the highest reported barrier to regular sports and physical activity participation in Canada. The researchers (2010) found that time was the highest reported reason to physical activity participation above cost. The environmental scan on workplace health in Canada (2009) found that the theme of work-life balance and

perceptions of work as a determinant of health were one of the top five areas of research in Canadian Universities and by the government of Canada (Health Canada, 2009).

Work-life balance is an area that needs more research to fully understand all of the determinants and barriers to physical activity, as this is an area that many Canadians struggle with, including those participants from the CRD in Victoria, BC.

The intervention was able to create a sense of awareness as to participants' current levels of PA. Increased awareness was facilitated through the completion of self-report items and the translation of that knowledge to the PA guidelines highlighted in the weekly newsletter. Participants also anecdotally reported to the researcher on becoming more aware of health and wellness concepts. In particular, the knowledge was facilitated through information in the weekly newsletter. This information included awareness of risk factors for chronic diseases, ways to increase PA at work, walkable areas in Victoria, how to track steps per day, stretches, how many steps are enough to yield health benefits, the concept of active transportation, learning to balance physical activity with work, and understanding how to overcome barriers to walking.

It is clear that the pedometer did serve as a motivator to the participants to increase their step counts, which has been documented in other studies (Bravata et al., 2007; Chan et al., 2010; Dishman et al., 2009; Freak-Poli et al., 2011). The current project used pedometers as an impetus and incentive to track steps throughout the 6 week period. However it is also clear that this failed to successfully motivate participants to hit the target goal of 10,000 or more moderate-vigorous steps per day. It is also important to explore participant's motivation to become a part of workplace wellness programs. Previous research has found that those programs that offer incentives achieved higher

retention rates and effect sizes than those that do not offer employees incentives (Bravata et al. 2011; Merrill et al., 2011; Public Health Ontario, 2011; Schweyer, 2011). Incentives in previous workplace wellness research involved a combination of cash redeemable reward points, gift cards, t-shirts, water bottles, days of paid leave, eligibility to enter draws, time off etc. (Bravata et al., 2011; Merrill et al., 2011; Public Health Ontario, 2011; Schweyer, 2011). No incentives were given out to the participants in the current study aside from the pedometers. Having a structured incentives plan that coincided with step count could have aided and sustained the participants' motivation levels and their adherence to the step count goal.

Lastly, perhaps adding another layer to employees' workday may explain why participants either did not adhere to the prompts or dismissed reading them altogether. Prompts were sent out Monday morning to encourage an increased step count throughout the week. Although prompts were very straightforward so as to avoid confusion and encourage readership, it may be that not every participant in the intervention group read, accepted and acted on the knowledge disseminated through these prompts. Employees were prompted to create lunch hour walking groups, perform workouts together, utilize each other as support systems etc. and none of this information was translated into practice. It is likely that participants may have needed more direction and support in the initial weeks to assist them in getting started rather than giving them complete control and power to determine how they adopted the information from the prompts into practice. Some participants thought the information was too simple, while some thought they could have used more information and more direction. It seems that there was mixed consistency on what information participants wanted.

Recommendation & future research

The current study had several strengths but also highlighted several limitations. Strengths included the direct influence on a workforce within the community in Victoria, BC, the ability to create a sense of awareness of current physical activity levels, sedentary time, and time management issues. Other strengths of the study included its portability, low cost and low-tech user-friendly nature. These strengths enable this intervention the feasibility to take place in any office building. Companies could easily in house train individuals to assist with all of the anthropometric and physiological measurements used in the current study. The limitations of the study included the number of participants, the time frame of the study, and participants difficult in following the intervention protocol. Those participants who struggled with the intervention protocol were typically those individuals who had limited time.

Studies have found that employees' largest barriers to physical activity in the workplace included not having enough time, the programs only being offered at work, or that the information was boring or inappropriate information for the level of knowledge of the employees' (Middlestadt, 2011). The current study was able to create a program that could be completed both at work and at home as it encouraged limiting sedentary time throughout the day. Some participants found that the level of information of the prompts was too straightforward and common knowledge. Future studies should look at both the type of information and the frequency of the prompts being relayed to participants. It is possible that the information was at the right level for certain individuals and was not intriguing enough for other participants. Had the prompts

occurred more frequently it may have encouraged participants to hit their target 10,000 or more moderate-vigorous steps in a day each week.

It is clear that there is a no “one solution” fits all when it comes to workplace wellness programs. With the diversity of each workforce being unique to that community, it is important that future research addresses this by understanding each individual, and groups of individuals in the workplace. Future research should encompass a longer-term intervention with more prompts to better understand how the frequency of the prompt plays into participants motivation to be more active. Future researchers should also examine the use of multiple prompting methods using current technology (smartphones, tablets, etc.) to encourage adherence and participation among all employees’.

Workplace wellness programs are pivotal to reducing morbidity, mortality, and health care costs (Anderson et al., 2009; Engbers, 2007; Freak-Poli et al., 2011; Hutchinson & Wilson, 2011; Schweyer, 2011). Batt (2012) found that some workplace wellness programs may be more generic while other may be more specific, and that future research should look at this success of these programs and tailor them to create the best possible ratio between generic and tailored messages. It is clear from the current research study, that the frequency of the prompts is an area that requires more research to determine the correct intensity and frequency of the stimulus delivered to the participants. Other studies found that when using a direct nudge or a push technique that participants conformed to the behaviour at a higher rate (Nicoll & Zimring, 2009). The current study attempted to create a program that was not overbearing so as to push employees away from participating but to create an inviting environment that encouraged participants to create self-run programs. Future research should investigate how much control should be

given to employees to creating, organizing, and implementing workplace wellness programs. Other areas of interest concern the cohesion among participants. The current study did not measure the cohesion among participants in this workplace prior to the implementation of the study. It could be of interest to see if you have a group of individuals who are highly cohesive if this would translate into a higher participation and adherence rate to a workplace wellness programs. It is also important and recommended that future studies conduct longer (8 and 12 week) 10,000+ pedometer interventions. These interventions should involve mid-way check in points, to encourage participation, evaluate current progress, and make any changes to ensure step count goals are maintained throughout the intervention period.

Future studies should look at the rate at which the prompt is given out to achieve the highest level of motivation and adherence to the intervention guidelines. A meta-analysis conducted by Webb, Joseph, Michie and Yardley (2010) found three characteristics that influenced Internet based interventions. The three characteristics included the theoretical basis of the intervention, the behaviour change technique, and lastly, the mode of delivery. The meta-analysis found that the use of a theory in particular Social Cognitive Theory, Transtheoretical theory, or the theory of Planned Behaviour/ Reasoned Action were used more frequently and associated with larger effect sizes. Those studies that encompassed more behaviour change techniques also had higher effect sizes. Two techniques with the highest success rates included stress management and general communication skills training. Lastly, with regards to the mode of delivery, email, SMS, and access to an advisor lead to the best uptake of behaviour change among participants (Webb et al., 2010).

The intervention was able to pique the interest of the participants and create a buzz within the workplace. It is clear however in this workplace that there is a demand for a more comprehensive workplace wellness program as participants stated that “some of us have been using rooms to do lunch time workouts and we are getting no support or help ... [we have been] doing it for over 2 years, [and] not getting support.” The primary goal of community-based research is to combine participation, action, and research through education, action, and the ability to affect social change within a community (Minkler, 2005). The current study has highlighted the importance of engaging employees and management in the design and implementation of comprehensive workplace wellness programs. As discussed in chapter 3, the initial planning stages (e.g., establishment of a committee, needs assessment) of a workplace wellness program had been completed, and the results from this study supported the need to implement programs with support and encouragement from management down, throughout the workplace. Future studies should identify a individual or a group on individuals to be the wellness leaders among the office building. These leaders should encompass individuals from all job levels to encourage participation and encouragement among all tiers of employment. These individuals should have the ability to not only motivate other employees, but disseminate information at multiple levels (print, web, text, etc.) to the workplace.

It is also important that future research in the area of workplace wellness programs further explores the concept of health literacy. It would be interesting to assess employees' health literacy levels before implementing an intervention, and tailoring the information to those scores. The Health Activity Literacy Scale (HALS) could be of use

to assess health literacy in terms of health promotion, health protection, disease prevention, health care and maintenance, and systems navigation (Nutbeam, 2008).

The concept of health literacy applied to physical activity prompts may further our understanding of how to best communicate health information. Health literacy is the ability to access, understand, evaluate and communicate health information to promote or maintain health (Nutbeam, 2000; Rootman & Wharf-Higgins, 2007; World Health Organization, 2009). This is of particular concern as in 2007 55% percent of working age Canadians fell below level 3 on the health literacy scale (Rootman & Wharf-Higgins, 2007). Level 3 suggests that these individuals can read well enough to get along day to day, but are unable to read complex reading material. Prompts reduced the need for participants to access information, but their comprehension and skills to critically apply the information to their own lives may have restricted their uptake of the intervention, and was not measured in this study, so remains unknown. A study conducted in Norway that used messages to prompt uneducated females to increase their exercise to be stressful, threatening, not relevant and de-motivating (Iversen & Kraft, 2006). Rootman and Wharf-Higgins (2007) suggested individuals use more non-written information, invite relatives and friends to participate in physical activity, and use the work place community to help create a greater uptake of health information among colleagues.

Community based research is an area that is growing in the academic world today. It is of extreme importance as this form of research enables the academic and community world to come together and solve problems that are relevant to communities where research is taking place. The current research study was able to add to the literature on CBR by highlighting those areas from the study that worked (translating health and

wellness information, creating awareness among employees on current health and wellness), and identifying barriers to participating and attaining step counts at an interval and intensity high enough to gain health benefits.

Summary of results

The 10,000 moderate-vigorous steps a day program was designed to assist CRD office workers in Victoria, BC to decrease their sedentary time, increase their physical activity levels and decrease their chances of developing chronic disease risk factors. The effectiveness of this intervention at multiple levels (quantitative and qualitative) was examined. The results included gains in the right direction both physiologically and self-report but were not statistically significant. Adherence to the program was high although no participant was able to and hit the recommended target of 10,000 or more moderate-vigorous steps a day consistently over the 6-week period.

Post intervention focus groups showed both positive and negative reactions to the 10,000 moderate-vigorous steps a day program. Newsletter prompts and the pedometers were highlighted as a good reminder for three out of the four participants in the focus group. A deeper understanding of participant's experience of the study was voiced throughout the two 30-minute focus groups. One of the four participants did not take to the intervention at all but believed it was helpful and useful to other participants. A greater understanding of the community in which the CRD functions within was gained from these insights. Participants wanted more support from the top down, management team, more resources, knowledge translation sessions, measurement tools such as steps being translated to a distance (more smaller goals), but noted a gained awareness of their current physical activity and wellness levels. One participant noted that "Trying to

achieve 10k when I'm over-scheduled with sit down events e.g. meetings or driving” [participant 4] to be the hardest days to reach the quota. Time management and scheduling were high indicators as to whether or not an individual would reach their step count goal. Individuals who were very busy checking outdoor or other CRD workplace sites had an easier time increasing their steps per day vs. those who were confined to their computer or in meetings. Only 25% of the intervention group gave further insights via the focus groups held. It is still unknown how the program affected and motivated 75% of the employees from the intervention group. The study suggested that this workplace did not fully take up all of the information and tools used in the pedometer-based program. However, the current study adds to the literature on workplace wellness programs in Canada and the results should help to guide future researchers in this area to address the weaknesses and further the insights on knowledge and implementation of wellness in office buildings today.

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Appendix A

Appendix 1. Workforce Sitting Questionnaire (WSQ)

(Adapted from Marshall et al 2010) [21]

During the last 7 days, please estimate how much time you usually spend SITTING in each of the following activities on a WORKING day and a NON-WORKING day: (please write your answers in the spaces provided)

| | WORKING day | | NON-WORKING day | |
|--|----------------|---------|--------------------|---------|
| | Hours | Minutes | Hours | Minutes |
| a. For TRANSPORT (e.g. in car, bus, train, etc) | _____ | _____ | _____ | _____ |
| b. At WORK (e.g. sitting at a desk or using a computer) | _____ | _____ | _____ | _____ |
| c. Watching TV | _____ | _____ | _____ | _____ |
| d. Using a computer at home (e.g. email, games, information, chatting) | _____ | _____ | _____ | _____ |
| e. Other leisure activities (e.g. socialising, movies etc, but NOT including TV or computer use) | _____ | _____ | _____ | _____ |

Additional item required to calculate average total sitting time:

During the last 7 days, how many days were you at work? _____ days

Appendix B

The international physical activity questionnaire short form

4

- 1a. During the last 7 days, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling,?

Think about *only* those physical activities that you did for at least 10 minutes at a time.

_____ days per week ⇨

or

none

- 1b. How much time in total did you usually spend on one of those days doing vigorous physical activities?

_____ hours _____ minutes

- 2a. Again, think *only* about those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

_____ days per week ⇨

or

none

- 2b. How much time in total did you usually spend on one of those days doing moderate physical activities?

_____ hours _____ minutes

- 3a. During the last 7 days, on how many days did you **walk** for at least 10 minutes at a time? This includes walking at work and at home, walking to travel from place to place, and any other walking that you did solely for recreation, sport, exercise or leisure.

_____ days per week ⇨

or

none

- 3b. How much time in total did you usually spend walking on one of those days?

_____ hours _____ minutes

The last question is about the time you spent **sitting** on weekdays while at work, at home, while doing course work and during leisure time. This includes time spent sitting at a desk, visiting friends, reading traveling on a bus or sitting or lying down to watch television.

4. During the last 7 days, how much time in total did you usually spend *sitting* on a week day?

_____ hours _____ minutes

This is the end of questionnaire, thank you for participating.

Appendix III

RESOURCE for Step by Step: A Workplace Walking Resource

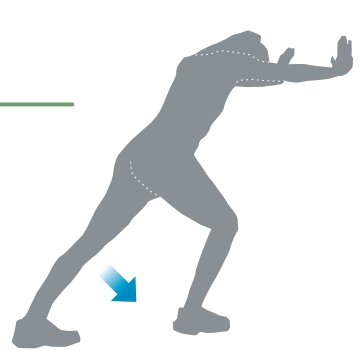
NOW YOU'RE WALKING

Getting Your Body Ready—Warm Up for Walking

It's easy. Before doing the following stretches, warm up the muscle groups by simply moving the muscle groups around, such as walking at a slower than normal pace for five to 10 minutes. Warmed muscles are much more easily stretched than cold muscles and the muscle that is used is more pliable and has more ability to be stretched. Hold each stretch with easy tension, on both sides, for a count of 20, no bouncing.

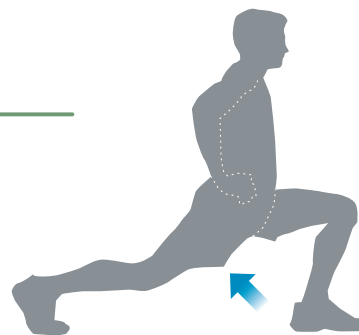
Standing Gastrocnemius Stretch

- Standing in a walking position with one leg stretched straight behind you and the other leg bent in front of you.
- Using a wall or chair for support, lean forwards and down until you feel the stretch in the upper part of your back calf.
- Make sure that both feet are pointing straight ahead and that your heels stay on the floor the whole time.



Hip Flexor Stretch

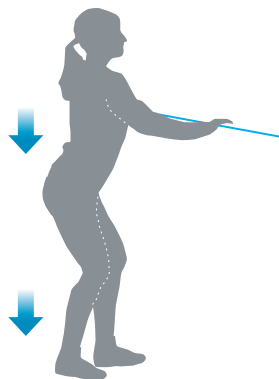
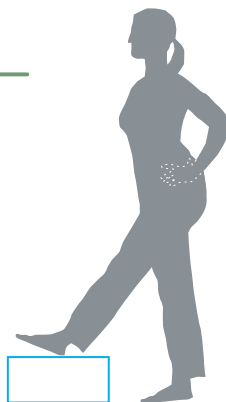
- Stand in a stride standing position.
- Put both hands on your front knee while keeping the back knee straight.
- Push your pelvis forward keeping your back straight.
- The stretch should be felt in front of the hip and slightly down the front of the thigh.



(NOW YOU'RE WALKING: Getting your Body Ready—Warm Up for Walking continued)

Standing Hamstring Stretch

- Place one heel on a low step or bench and, keeping your knee and back straight, bend your upper body forwards from your hips.
- You should feel the stretch behind your knee.

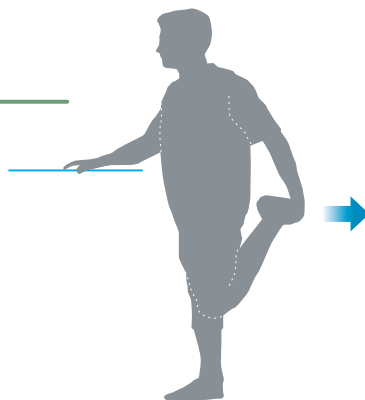


Standing Achilles Tendon Stretch

- Standing with one leg slightly behind the other, push your heels down while bending your knees.

Standing Quadriceps Stretch

- Hold onto something for support with one hand and grab your ankle with the other hand.
- Pull your ankle towards your bottom, then try to straighten your knee while resisting with your hand and allowing no movement.
- Then pull your ankle toward your bottom again.



Credit: Your Toolkit to Walking for Transport, Health and Recreation. Retrieved from www.heartfoundation.com.au

RESOURCE for Step by Step: A Workplace Walking Resource

NOW YOU'RE WALKING



Pedometers—Making Every Step Count!

This information sheet includes information on: what a pedometer is, how it works, do's and don'ts, tips on how to use and wear a pedometer, what to look for in a pedometer, advantages and limitations of pedometers.

A simple way to work out how briskly you should walk is to aim to walk "fast without overexertion". Anyone should be able to hold a conversation while walking – this is the 'talk test'.

What is a Pedometer and How Does it Work?

A pedometer is a pager (or matchbook) sized device worn on your belt that records the number of steps you take based on your body's movement. A pedometer is a great way to measure your current activity level and to motivate you towards a higher level of activity. Some pedometers are analog devices that simply measure steps. Some are fancier digital models that track the distance you walk and the calories you burn. Keep in mind that the calorie counters are less accurate and more expensive¹.

When worn properly, the pedometer records each step you take by measuring each time your hip moves up and down. Pedometers are nearly always more accurate recording fast walking than slow walking.² There are a few different mechanisms which enable pedometers to count your steps. The most common is the hairspring pedometer, which is generally considered to be somewhat less reliable and long lasting than the more expensive coil spring pedometer. Another type of mechanism is the magnetic reed proximity switch (MPPS) which seems to be quite dependent on its design and the quality of its manufacturing. Finally, there is the accelerometer type of mechanism, which tends to be the most sensitive and expensive³. Your pedometer works whether you are running, walking or climbing the stairs, but remember, it counts the number of steps you take and not the intensity of the steps.

How Many Steps Do You Need Per Day?⁴

| | |
|--|--|
| For long term health and reduced chronic disease risk: | 10,000 steps a day |
| For successful, sustained weight loss: | 12,000 to 15,000 steps a day |
| To build aerobic fitness: | 3,000 or more of your daily steps should be done briskly (e.g. fast paced) |

Where is the Best Place to Wear a Pedometer?

To get the most accurate reading, place the unit on your waistband as close as possible to the top point of the hipbone and ensure that it is vertical. The pedometer must remain upright to record correctly, not tilted forward, backward or side-to-side. It will not record properly when open, so keep the pedometer closed – unless you are checking your steps. Also, make sure that it is secure, because if it shifts at all during your walk, it won't give an accurate reading. The pedometer should come with a clip, a security strap to ensure that it stays on, and a protective cover to prevent damage and accidentally resetting the buttons.

¹ Martin Collis (2005). Speakwell.WELL: Newsletter for Wellness, 7(3). Retrieved from: www.speakwell.com/well/2005autumn/pedometer.php

² Alberta Centre for Active Living (2003). Wellspring, 14(2).

³ Ibid

⁴ Government of Ontario, Active 2010 (2005). Using Your Pedometer.

(NOW YOU'RE WALKING: Pedometers—Making Every Step Count! continued)

The best way to find out if your pedometer is well positioned is to put your pedometer on, press reset and then take a quick 20 steps while you count your steps. If the pedometer is not reading between 19 and 21 steps, try placing it in a different position along your waist (between your navel and your hip) until you find the place that is best for you, again keeping in mind that it should be worn as close as possible to the top point of the hipbone.

The rattling sound you hear in the pedometer does not mean it is broken. It is the suspended lever arm which moves when you do and counts your steps. The up and down motion opens and closes an electrical circuit. When your foot strikes the ground, the lever arm makes an electrical contact and this is recorded as a step.

Which Pedometer is Right for You?

The type of pedometer you buy is totally up to you. Most large sports or electronic stores carry pedometers. The simplest and least expensive pedometers display the steps and/or distance you cover and this is all you really need to keep track of. This number helps you to set goals to monitor and increase your physical activity level.⁵ Be sure to wear your pedometer all day in order to make sure all of your steps count.

Pedometers are relatively simple to operate and inexpensive, ranging from about \$15 to \$75, with an average cost of \$25. Pedometer price is not always a good indicator of quality. A pedometer that is accurate, reliable and easy to use makes the whole experience more enjoyable. Shop around, as the same brand of pedometer can be marketed under different names and sold through various distributors.

The pedometer uses a small watch type battery. These batteries are designed to last a long time, at least an average of one to two years. Make sure when you buy your pedometer that it is easy to replace the battery.

Advantages of a Pedometer

Pedometers are simple to operate. They give people immediate feedback about how many steps they have taken during the day, making it possible to track them and set goals to monitor and increase physical activity. The pedometer is small and lightweight, and virtually everyone (children, adults, people with disabilities, etc.) can wear them.⁶

Limitations of a Pedometer

Despite the obvious benefits of pedometers, they also have some limitations. The main concern is that they do not measure the intensity of physical activity (how hard), or the duration (how long). Pedometers may also underestimate the number of steps taken during high intensity activities and may not be as accurate for people who do a fair amount of bending and/or who have excessive abdominal fat, as the pedometer may move away from the person's body.⁷

Using the Pedometer for Motivation

Use the Pedometer Log to help you keep track of your steps. Use it for the first week with your pedometer to establish a baseline for future comparison.

That is, go about your normal daily routine while wearing your pedometer but don't change your activity pattern. After you see how many steps you accumulate in a day, you can determine if you need to be more active. Set a goal that you can reach, for example, an additional 200 steps per day, or add 20% more steps per day. When you have achieved this new level of activity, you can set a new goal for yourself, eventually working up to 10,000 steps per day.

Dos and Don'ts for Pedometers⁸

Do:

- Remember to wear it daily
- Purchase a pedometer that is comfortable and easy to use
- Purchase a pedometer with a protective cover to avoid resetting the device mid walk
- Change the battery as soon as you notice the digital display fading
- Keep the pedometer vertical to get the most accurate readings

Don't

- Get the pedometer wet – no swimming with it on!
- Drop or crush your pedometer – this could break the crystal inside
- Shake the pedometer as it will alter the step count
- Put a pedometer in your pocket, as it cannot stay vertical, therefore, will not accurately count your steps

⁵ Steps Count Inc. (2005). Retrieved from www.stepscount.com

^{6,7} Alberta Centre for Active Living (2003). *Wellspring*, 14(2), pp.2.

⁸ Government of Ontario, *Active 2010* (2005). *Using Your Pedometer*.

Pedometer Walking Log

Walking is one of the easiest and safest ways to become more physically active! Use this log to help keep you on track and set goals for walking. Simply record your steps in each box after using a pedometer.

| WEEK | MON Steps/Min | TUE Steps/Min | WED Steps/Min | THU Steps/Min | FRI Steps/Min | SAT Steps/Min | SUN Steps/Min |
|------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |

Appendix C



Recruitment email:

To whom it may concern:

The following email is being sent out to you seeking your interest to participate in a University of Victoria Master's level thesis research project. The researcher is interested in conducting a study in two CRD office buildings in an attempt to help CRD employees increase their daily-accumulated physical activity bouts. The intervention will take place over the course of 6-weeks and all participants will receive a pedometer to track their daily step count. Individuals will be briefed on pedometer use, walking protocol, and will be asked to complete aerobic baseline testing via the 6-minute walk test, a questionnaire addressing accumulated sitting time in a day, a questionnaire addressing individuals current level of accumulated physical activity, a demographics table with regards to age, sex, any injuries or issues that may impede participation in the program, and anthropometric and physiological measurements (Body mass index, hip-waist ratio, height, weight, blood pressure, and resting heart rate). Post completion of the 6 week study 2 focus groups will take place to further inquire and understand how the went for the participants. Focus groups will be audio recorded to ensure that all information is accounted for and accurately documented. Any further questions and inquiries may be sent directly to the research.

Kind regards,

Kara Delaney
delaneyk@uvic.ca

Appendix D



Demographics And Baseline Information

Gender _____ Male/Female _____

Age _____

Year in Company _____

Please list any injuries that may impair participation in physical activity in current study .

Signature _____

Date _____

Witness _____

Date _____

Appendix E



Focus group questions:

“10,000 steps a day to decrease chronic disease risk factors, and increase aerobic physical activity levels among CRD workers in Victoria, BC”

1. Overall did you find the intervention to be feasible during the workday?
2. Did it change how you viewed being physically active during the workday?
3. Do you think that the feasibility of the intervention could be maintained within your workplace?
4. What was the hardest part of the intervention?
5. Did you find the prompting methods such as emails, and reminders from the researcher to be motivating? Distracting? Not useful?
6. Do you feel as though your organization has benefited from this intervention?

Appendix F

Participant Consent Form**“10,000 steps a day to decrease chronic disease risk factors, and increase aerobic physical activity levels among CRD workers in Victoria, BC.”**

You are being invited to participate in a study entitled “10,000 steps a day to decrease chronic disease risk factors, and increase aerobic physical activity levels among CRD workers in Victoria, BC.” that is being conducted by Kara Delaney, Dr Lynneth Stuart-Hill, and Dr Joan Wharf Higgins. Dr Lynneth Stuart-Hill and Dr Joan Wharf Higgins are both professors in the School of EPHE, and can be contacted at lstuhill@uvic.ca and jwharfhi@uvic.ca, respectively. Kara Delaney is a graduate student in the School of Exercise Science, Physical and Health Education (EPHE) at the University of Victoria, and you may contact her if you have any questions at (250) 812-6163 or delaneyk@uvic.ca.

The purpose of this study is to examine the physiological responses and overall feasibility of a 10,000 steps a day pedometer based workplace wellness intervention within the Capital Regional District in Victoria, BC. . If you agree to voluntarily participate in this research, your participation will include the monitoring of several variables during the 6-week intervention period as well as the week prior and post intervention. The variables being measured include, height, weight, resting heart rate, waist-hip ratio, blood pressure, sub maximal consumption (SubMax VO₂), steps accumulated per day, amount of time spent sedentary in the workplace (sitting time).

Throughout testing, participants will log their daily step count on a tracking sheet. Submax VO₂ will be measured in the worksite via the 6 minute walk test, where participants will walk through a course that is 100ft in length and make as many laps as possible in the allotted 6 minute time frame. Blood pressure will be measured using a blood pressure cuff, sphygmomanometer, and stethoscope. Heart rate will be measured by the researcher prior to the blood pressure being taken. Sitting time will be measured via the workforce sitting questionnaire. Height and weight will be measured via a calibrated scale by the researcher at the same time of day both pre and posttest to limit variability.

We anticipate that your participation in the study pose no increased risk to the participant above and beyond that of which is already present in the workplace. Walking is a great form of low impact physical activity that many individuals can benefit from. Those individuals who cannot accumulate steps per day will be excluded from the study, as the locomotion produced by the lower body when walking is crucial to ensure accurate step counts are taken.

By participating in this research, you will benefit by contributing to the knowledge of the implementation of workplace wellness physical activity programs, particularly the role of accumulated bouts of physical activity and step count goals in the workplace.

Participation in this research must be completely voluntary. You may withdraw from the study at any time without any consequences. If you do withdraw from the study, your data will not be used in any data analysis and will be destroyed.

Due to the nature of this research, your anonymity during data collection cannot be protected because others in the training group will know you are participating in the study and the training simulations will be taking place in areas accessible to the public. Your anonymity will be protected by assigning a number to your data so that following data collection, your data will only be identified by that number. Your confidentiality and the confidentiality of the data will be protected by storing your coded data on a password protected computer, to which access is limited to the principal researcher. All data will be presented as group averages and individual results will not be given.

It is anticipated that the results of this study will be shared with others through presentations to the Capital Regional District, during scholarly meetings, and through submission to peer-reviewed research publications.

In addition to being able to contact the researchers at the phone numbers listed above, you may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Associate Vice-President Research at the University of Victoria (250-472-4545) or ovprhe@uvic.ca

Your signature below indicates that you understand the above conditions of participation in this study and that you have had the opportunity to have your questions answered by the researcher.

Name of Participant

Signature

Date

Appendix G

6MWT Patient Sheet

The following elements should be present on the 6MWT worksheet and report: Lap
counter: _____ Patient name:

_____ Patient ID# _____ Walk # _____ Tech ID: _____
Date: _____

Gender: M F Age: _____ Race: _____ Height: _____ ft _____ in, _____ meters Weight: _____
lbs, _____ kg Blood pressure: _____ / _____ Medications taken before the test (dose and
time): _____

Supplemental oxygen during the test: No Baseline

Yes, flow _____ L/min, type _____ End of Test

____: _____ (Borg scale) _____ (Borg scale) _____ %

Time Heart Rate Dyspnea Fatigue SpO₂

____: _____ _____ _____ _____ %

Stopped or paused before 6 minutes? No Other symptoms at end of exercise:
angina Number of laps: _____ (60 meters) final partial lap: _____ meters Total
distance walked in 6 minutes: _____ meters Predicted distance: _____ meters Percent
predicted: _____ % Tech comments:

Interpretation (including comparison with a preintervention 6MWD):

Appendix H



Week 1: Getting started on your step count

Hello CRD employee's and welcome to week one of six of the 10,000 steps a day research project

In this first week of your program, our main goal is to orient you to your new program, orient you to your surroundings (walkable grounds), and to your pedometer (your new best fitness friend). In this newsletter you will find an array of resources including a walkability questionnaire, pre and post physical

activity stretches, your pedometer log book, as well as ways in which you can increase your daily step count around the office!

How walkable is your work location?

Read up on how to get a walking club started, and how to determine the best places to do it!
Page 2

Flexibility: Do's &

A great way to complement any physical activity program is to increase the opportunities for flexibility.

Page 3

Pedometer log book

So now that you have your pedometer, how do you work it? Track it? And interpret it?

Page 5

How walkable is your work area?



When starting up any sort of walking program in a workplace, you may want to sit down with a group of colleagues and

create a walking group. A walking group will serve to create a cohesive group of individuals all working towards the same goal: To increase your steps per day via walking and disrupt the typical sedentary nature of the office desk job. Over your next lunch hour, find a group of colleagues and go through the walkability questionnaire to determine how walkable your neighborhood is around your work place. Once this fact has

been distinguished, designate one individual to be the walking group leader of the week. This role should fluctuate so as to not overwork or pressure any one individual into the position. Remember have fun with it! Physical activity is a great way to get up and moving from your cubicle throughout the day!

So how are you going to go about increasing your step count this week? Every 20 minutes get up from your desk and walk out to the nearest water fountain and fill up your water bottle. Not only will you be decreasing your sedentary time, but will also increase your hydration!



Benefits of flexibility

Flexibility is often one aspect of our health and wellness that get's overlooked. It is the one aspect that keeps us moving longer as we age, and allows the body to gain significant increases in strength, as the body will be able to increase its range of motion, therefore increase the amount of muscle fibers recruited during both strength and cardiovascular exercises. The American College of Sports Medicine recommends that individuals complete a minimum of 2 to 3 days each week, most effective when the

muscle is warm, perfect time would be after a lunch hour walk! Hold stretching for 20-30 seconds and repeat 2 to 4 times for the best results. The following stretches found at the end of this newsletter are great to perform both before and after walking!



Not a big walker?

If you enjoy other activities and would prefer to use those tallies towards your step count goal, please refer to the following conversion chart

Visit the following this webpage to find a variety of activities and their step conversions so that you can accurately document your activity level!

<http://www.takesteps.univerahealthcare.com/stepChartPop.jsp>

Take a moment and go through the questionnaire located on page 2 of this newsletter to determine the walkability of your work location, this can be useful to highlight potential walking locations during the working hours!

How Walkable is the Area Around Your Workplace?

Getting Started

Pick a place to walk around your workplace. Read over the checklist before you go, and as you walk note the locations of things you would like to change. At the end of your walk, give an overall rating to each question. Then add up the numbers to see how you rated your walk.

RATING SCALE

- 1 **AWFUL**
- 2 **QUITE A FEW PROBLEMS**
- 3 **SOME PROBLEMS**
- 4 **GOOD**
- 5 **VERY GOOD**
- 6 **EXCELLENT**

Location of Your Walk

From: _____

To: _____

Overall Rating (circle one number)

1. Did you have room to walk?

1 2 3 4 5 6

- Yes Some problems (see below)
- Sidewalks/walkways started and stopped
- Sidewalks/walkways were broken or cracked
- Sidewalks/walkways were blocked with poles, signs, shrubbery, dumpsters, etc.
- No sidewalks/walkways, paths, or shoulders
- Too much traffic (vehicles or pedestrians)
- Something else? _____
- Locations of Problems _____

2. Was it easy to cross streets?

1 2 3 4 5 6

- Yes Some problems (see below)
- Road was too wide
- Traffic signals made us wait too long or did not give us enough time to cross
- Needed striped crosswalks or traffic signals
- Parked cars blocked our view of traffic
- Trees or plants blocked our view of traffic
- Needed curb ramps or ramps needed repair
- Something else? _____
- Locations of Problems _____

(NOW YOU'RE WALKING: How Walkable is the Area Around Your Workplace continued)

Overall Rating (circle one number)

1 2 3 4 5 6

3. Did drivers behave well?

Yes Some problems (see below)

Drivers:

Backed out of driveways without looking

Did not yield to people crossing the street

Turned into people crossing the street

Sped up to make it through traffic lights or drove through red lights

Something else? _____

Locations of Problems _____

4. Was it easy to follow safety rules? Could you....

1 2 3 4 5 6

Yes Some problems (see below)

Could not cross at crosswalks or see and be seen by drivers

Could not walk on sidewalks or shoulders facing traffic where there were no sidewalks/walkways

Something else? _____

Locations of Problems _____

5. Was your walk pleasant and safe?

1 2 3 4 5 6

Yes Some problems (see below)

Needed more grass, flowers or trees

Scary dogs

Scary people

Not well lit

Dirty, lots of litter or trash

Something else? _____

Locations of Problems _____

How does your walk stack up?

Add up your ratings and decide _____

SCORING

26-30 Celebrate! You have a great area for walking.

21-25 Celebrate a little. Your area for walking is pretty good.

16-20 Okay, but it needs work.

11-15 It needs lots of work. You deserve better.

5-10 It's a disaster area, don't walk here.

RESOURCE for Step by Step: A Workplace Walking Resource

NOW YOU'RE WALKING

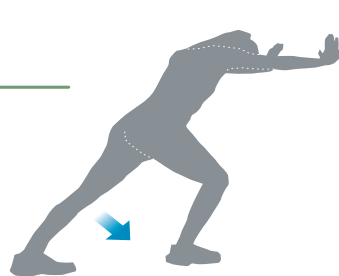


Getting Your Body Ready—Warm Up for Walking

It's easy. Before doing the following stretches, warm up the muscle groups by simply moving the muscle groups around, such as walking at a slower than normal pace for five to 10 minutes. Warmed muscles are much more easily stretched than cold muscles and the muscle that is used is more pliable and has more ability to be stretched. Hold each stretch with easy tension, on both sides, for a count of 20, no bouncing.

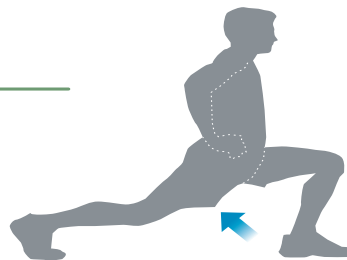
Standing Gastrocnemius Stretch

- Standing in a walking position with one leg stretched straight behind you and the other leg bent in front of you.
- Using a wall or chair for support, lean forwards and down until you feel the stretch in the upper part of your back calf.
- Make sure that both feet are pointing straight ahead and that your heels stay on the floor the whole time.



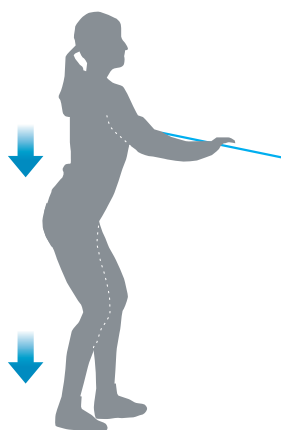
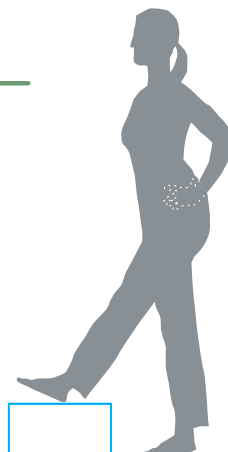
Hip Flexor Stretch

- Stand in a stride standing position.
- Put both hands on your front knee while keeping the back knee straight.
- Push your pelvis forward keeping your back straight.
- The stretch should be felt in front of the hip and slightly down the front of the thigh.



Standing Hamstring Stretch

- Place one heel on a low step or bench and, keeping your knee and back straight, bend your upper body forwards from your hips.
- You should feel the stretch behind your knee.

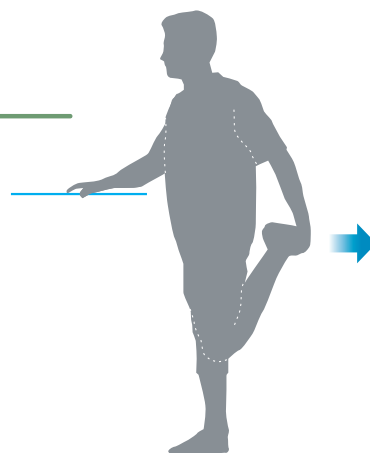


Standing Achilles Tendon Stretch

- Standing with one leg slightly behind the other, push your heels down while bending your knees.

Standing Quadriceps Stretch

- Hold onto something for support with one hand and grab your ankle with the other hand.
- Pull your ankle towards your bottom, then try to straighten your knee while resisting with your hand and allowing no movement.
- Then pull your ankle towards your bottom again.



Pedometer Walking Log

Walking is one of the easiest and safest ways to become more physically active! Use this log to help keep you on track and set goals for walking. Simply record your steps in each box after using a pedometer.

| Weeks | MON Steps | TUE Steps | WED Steps | THU Steps | FRI Steps | SAT Steps | SUN Steps |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |

Use the above Pedometer log to track your steps per day over the course of the next 6 weeks. Remember, keep it fun, get active with colleagues, and encourage one another to take more steps each day over the next 6-weeks!

“It is no longer enough to consider whether an individual engages in adequate amounts of weekly exercise,” said Garber, who is an associate professor of movement sciences at the Teachers College of Columbia University. “We also need to determine how much time a person spends in sedentary pursuits, like watching television or working on a computer. Health-and-fitness professionals must be concerned with these activities as well.” (ACSM, 2012)

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CRD Healthy Workplace Wellness Program Week 2

10,000 steps a day to decrease chronic disease risk factors and increase aerobic levels



Hello CRD employees and welcome to week 2 of ramping up your step count. This week we will focus in on 5 quick and easy ways you can add to your step count. We will also highlight the benefits of various step ranges as well as the question of how much walking is actually enough to see health and wellness gains. I know you worked hard in week one by creating your walking groups, lunch hour

walking times, started tracking your steps per day in your log book, and lastly that you are now stretching both before and after walking! Great start, and keep up the good work! Victoria is a beautiful city to live in, so take advantage of it as much as you can by active commuting via walking and biking whenever possible!

5 ways to increase your step count without straining your work.

Page 2

More steps, more benefits?

Page 2-3

How much walking is enough?

Page 3-4



- Walking is free and can be done almost anywhere.
- Walking is a form of exercise which is within the physical capabilities of many people .
- Walking may be a more realistic challenge than other more vigorous forms of exercise.
- Walking can be integrated into people's lifestyles relatively easily.
- The level of impact is low and strain on the feet and joints is minimized thus making the risk of injury very low.

5 ways to increase your step count

1. Park farther away- apply this rule not only to work parking, but when you are out shopping, not only will you increase your step count, but you will lessen the chances of another vehicle parking besides yours—therefore lessening the chances of you car getting damaged—**BONUS!**
2. Take the stairs-it's 'easy-peasy' considering the Fisgard building has one of the most attractive and walkable staircases in Victoria.
3. Start or join a walking club-if you haven't already created one in the CRD now is your chance to do so. Every week try a different route around downtown Victoria.
4. Wear your pedometer even when you are gardening or doing household tasks.
5. Get up and move every 20 minutes from your desk chair! A total of 3 disturbances per hour with 24 disturbances in your sedentary time throughout you 8-hour shift! How easy is that to do!

More Steps, more benefits?

When it comes to physical activity, the age-old question always arises, well how much is enough? In today's society, we know you are a busy working individual with a family life and other priorities, so that's why we have come up with a process of accumulating bouts of physical activity throughout your workday to gain recommended physical activity levels for health and wellness benefits. The

chart below depicts how many steps a day will lead to long term health and reduced chronic diseases risk factors, to achieve successful, sustained weight loss, and lastly to build upon your aerobic fitness level. Aerobic fitness refers to an individual ability to body's ability to increase consumption of oxygen to the lungs, heart, and other body tissues.

Are you looking for health benefits, weight loss, or to build upon your aerobic fitness level?

How much walking is enough?

A typical Canadian should strive to gain around 3-4 days a week of 60 minutes of cardiovascular training with 2-3 days a week of strength training (weight bearing exercises). Walking is a no cost exercise that can be performed in an array of locations at one's own time convenience—no gym memberships required.

Dos and Don'ts for Pedometers⁸

Do:

- Remember to wear it daily
- Purchase a pedometer that is comfortable and easy to use
- Purchase a pedometer with a protective cover to avoid resetting the device mid walk
- Change the battery as soon as you notice the digital display fading
- Keep the pedometer vertical to get the most accurate readings

Don't

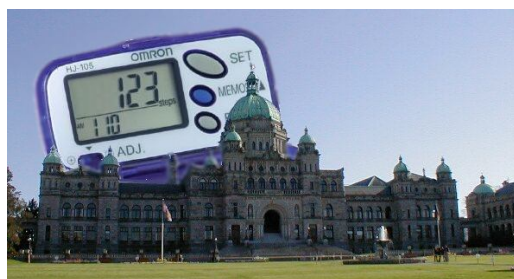
- Get the pedometer wet – no swimming with it on!
- Drop or crush your pedometer – this could break the crystal inside
- Shake the pedometer as it will alter the step count
- Put a pedometer in your pocket, as it cannot stay vertical, therefore, will not accurately count your steps

How Many Steps Do You Need Per Day?⁴

| | |
|--|--|
| For long term health and reduced chronic disease risk: | 10,000 steps a day |
| For successful, sustained weight loss: | 12,000 to 15,000 steps a day |
| To build aerobic fitness: | 3,000 or more of your daily steps should be done briskly (e.g. fast paced) |

TIP! Week 2 to 3

Take the highest step count from week one and make that your daily goal for the next two weeks, or make it your daily goal three times per week for week two, then each day for week three. For example, if your steps varied from 800 to 2,000 steps per day in the first week, make your new daily goal 2,000 steps. You can increase gradually to build up your steps to the new goal.



How Much Walking is Enough?

Although this varies somewhat by age and fitness level, walking at a brisk pace, 4 to 7 days per week, for at least 30 minutes (30 to 60 minutes is best), is the widely accepted prescription. While continuous walking is optimal, several short bouts of exercise (i.e. 10 minute sessions) at varied times throughout the day is also widely accepted for achieving health benefits.

Being physically active is very safe for most people. Some people, however, should check with their doctor before they start becoming more physically active. The Health Screening Questionnaire found in the Resource Section of this toolkit can be used to determine if walking is for you. The questionnaire is designed for people between the ages of 15 and 69.

A simple way to work out how briskly you should walk is to aim to walk "fast without overexertion". Anyone should be able to hold a conversation while walking – this is the 'talk test'.

A few things to note before you get started:

- Walk with your chin up and your shoulders held down and back, rather than rounded and forward. Think tall.
- Walk so that the heel of your foot touches the ground first, then roll your weight forward to the ball of your foot.
- Walk with your toes pointed forward.
- Swing your arms naturally as you walk, and do not allow your arms to cross the centerline of your body.

It is important to invest in a good pair of walking shoes. Look for the following in your walking shoes:

- Shoes that fit snugly on your feet.
- Have a well cushioned heel.
- Have good arch support.
- Have adequate toe room.
- Have flexible slip-resistant soles.

There are a number of walking routines available, you will find a Walkabout routine below.

CRD Healthy Workplace Wellness 10,000 steps a day challenge

Fall 2012

Last few reminders!

October

- Canada's Healthy Workplace Month
- Sponsor physical activities focusing on exercise and back safety
- Contact the Worker's Compensation Board for information on back care at work
- Promote frequent stretch breaks
- Plan a special theme day to celebrate



According to a study conducted by the University of Leicester and in association with Loughborough University, those who sit for long periods have a two-fold increase in their risk of diabetes, heart disease and death. Importantly, associations were independent of the amount of moderate-to-vigorous physical activity undertaken, suggesting that even if an individual meets typical physical activity guidelines, their health may still be compromised if they sit for long periods of time throughout the day (2012).

The simple take home message is that you need to get up and get moving throughout the day if you want to avoid chronic disease risk factors associated with increased sedentary time.

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CRD Healthy Workplace Wellness Program Week 3
 10,000 Steps a day to decrease chronic disease risk factors



Week 3 Let's keep the momentum going
CRD!

Last week you learned how to increase your step count without straining your work schedule. You learned the steps needed to increase health benefits and in turn how much walking is enough for an individual to gain health benefits. This week we will add to that list by addressing barriers to walking, benefits of

walking, and the do's and don'ts of pedometers to keep you consistent with your personal tracking. Keep in mind that the pedometers you have track moderate to vigorous steps, as this intensity level is associated with increased health benefits. So add a little pace to those

Overcoming barriers to walking

Pages 2-3

Benefits of increased physical activity through walking

Page 4

Sample walking routes

Page 5

steps and ramp up your step count. This week, whenever possible, try to limit your walking time on concrete surfaces, choosing trails or even asphalt to limit the amount of joint strain and to maximize your potential to achieve your 10,000 or more moderate to vigorous steps a day this week!

Choose Your Walking Surface Wisely

Asphalt is the surface on which most walkers log the most miles. While not the softest surface, asphalt is a little easier on your joints than concrete. Try to walk on the most level part of the road or pathway. Cambered or uneven roads will lead to imbalance and possible injury. Be alert when walking on grass and dirt trails. Look out for things like hard-to-see bumps, holes, sprinklers, and tree roots.

Overcoming barriers to walking for the everyday office worker

Ever find yourself going back and forth on when you will fit physical activity into your day? This is a typical scenario that many Canadians deal with on a daily basis. Imagine if you started walking every time you started to think about doing physical activity... you'd be well over your recommended 10,000 steps faster than you could have ever anticipated or thought about! Check out the next page for a more in depth analysis of how to overcome barriers ranging from lack of time, resources, motivation, fear of injury etc. There is a solution for every barrier; it's all about appraisal of a situation, implementation of a program, and time management!



Suggestions for Overcoming Physical Activity Barriers

Lack of time

- Identify available time slots.
- Monitor your daily activities for one week. Identify at least three 30-minute time slots you could use for physical activity.
- Add physical activity to your daily routine. For example, walk to work or to shop, walk the dog, park farther away from your destination, etc.
- Make time for physical activity. For example, walk during your lunch hour, or take walking breaks instead of coffee breaks.

Social influence

- Explain your interest in physical activity to friends and family. Ask them to support your efforts.
- Invite friends and family members to exercise with you. Plan social activities involving exercise.
- Develop new friendships with physically active people. Join a group, such as a walking club.

Lack of energy

- Schedule physical activity for times in the day or week when you feel energetic.
- Convince yourself that if you give it a chance, physical activity will increase your energy level; then, try it.

Lack of motivation

- Plan ahead. Make physical activity a regular part of your daily or weekly schedule and write it on your calendar. Invite a friend to exercise with you on a regular basis and write it on both your calendars.
- Join a walking club.

Fear of Injury

- Learn how to warm up and cool down to prevent injury.
- Learn how to walk appropriately considering your age, fitness level, skill level, and health status.

Lack of skill

- Select activities requiring no new skills, such as walking or climbing stairs.
- Walk with friends who are at the same fitness level as you are.
- Find a friend who is willing to learn new things with you.
- Take one of the walking workshops to learn new things.

Lack of resources

- Walking requires minimal resources. Choose a walking route near you so you don't have to drive or take public transport to get walking.
- Your walking gear does not have to be fancy. Don't worry about all the walking accessories.

Weather conditions

- Develop a set of walking options that you can do regardless of weather—stairs, mall walking, wet weather gear and/or walk on a treadmill.

Travel

- Walk the halls and climb the stairs in hotels.
- Stay in places with walking routes near by.
- Join the YMCA or YWCA (ask about reciprocal membership agreement).
- Visit the local shopping mall and walk for half an hour or more.

Family obligations

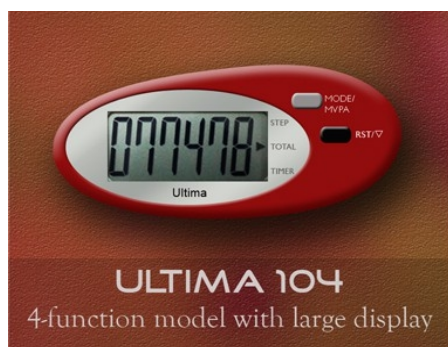
- Trade babysitting time with a friend, neighbour, or family member who also has small children.
- Go for a walk with the kids. You can spend time together and still get your exercise.
- Hire a babysitter and look at the cost as a worth-while investment in your physical and mental health.
- Try to exercise when the kids are not around (e.g., during school hours or their nap time).

Source: Centre for Disease Control and Prevention (CDC): *Physical Activity for Everyone: Making Physical Activity Part of Your Life: Overcoming Barriers to Physical Activity*. Retrieved from: <http://www.cdc.gov/nccdphp/dnpa/physical/life/overcome.htm>

Benefits of walking

Increasing physical activity through walking is associated with many health benefits including:

- Reducing the risk of coronary heart disease.
- Lowering blood pressure.
- Reducing high cholesterol.
- Reducing body fat.
- Enhancing mental wellbeing.
- Increasing bone density.
- Reducing the risk of cancer of the colon.
- Helping to control body weight.
- Helping osteoarthritis.
- Helping to increase flexibility and co-ordination.
- Helping you relax and sleep better.
- Lowering stress levels.



How can physical activity help to both regulate stress and cholesterol levels?

Stress levels: Physical activity and stress go hand in hand. With that being said as one increases their physical activity levels, they typically see a significant decrease in their stress levels. This occurs as physical activities enables the body to pump up endorphin levels which in turn helps to better mediate your mood levels. Physical activity can also help serve as a way to calm the mind and relax the body. Bottom line: Take a deep breath over your lunch hour and get moving (walk, swim, bike, run).

Cholesterol: Cholesterol is a waxy, fat-like substance that your body needs. But, when you have too much in your blood, it can build up on the walls of your arteries, which can lead to heart disease and stroke. There are two kinds of cholesterol, high-density lipoprotein (HDL) or “good” cholesterol. There is also low-density lipoprotein (LDL) cholesterol or “bad” cholesterol. Use the guide below to understand what numbers you should aim for. Physical activity in combination with a clean diet helps individuals to maintain high HDL levels and low LDL levels.

| Total Cholesterol Level | Category |
|-------------------------|--|
| Less than 200 mg/dL | Desirable level that puts you at lower risk for coronary heart disease. A cholesterol level of 200 mg/dL or higher raises your risk. |
| 200 to 239 mg/dL | Borderline high |
| 240 mg/dL and above | High blood cholesterol. A person with this level has more than twice the risk of coronary heart disease as someone whose cholesterol is below 200 mg/dL. |

CRD Healthy Workplace Wellness 10,000 steps a day challenge

Fall 2012



This weekend get outside and get your moderate to vigorous physical activity around one of the beautiful parks in the Victoria area.

Beaver & Elk lake = ~ 10km
Thetis lake (both lakes) = ~ 6 km
Mount Doug= ~6km
Dallas Road = ~8km

Remember, last week we gave you a great link so that you can easily convert both your other modes of physical activity to steps per day. This way you will keep your pedometer dry and fully functioning when you are out for your weekly swim!

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CRD Healthy Workplace Wellness Program Week 4

10,000 steps a day to decrease chronic disease risk factors



Welcome to week 4: You are over the half waypoint!

Hello and welcome to week 4. Last week you learned how to overcome barriers to walking, the benefits of increased physical activity through walking, and the do's and don'ts of your pedometer. We are going to

progress your knowledge further by adding to that knowledge base and addressing the benefits of stair use, what your BMI tells you about your health and the benefits of active vs. passive transportation.

Let's take a look at those stairs

We will highlight benefits, techniques and a sample stair workout.

Page 2

BMI/Waist-Hip Ratio...What does it all mean?

Take a look at the BMI scale and see what improvements you can make.

Page 4

The beauty of active transportation

How can you make your day more active vs. passive?

Page 5

Step facts and tips

1. The average person's stride length is approximately 2.5 feet long. That means it takes just over 2,000 steps to walk one mile, and 10,000 steps is close to 5 miles.
2. Take a walk with your spouse, child, or friend.
3. Walk the dog.
4. Use the stairs instead of the elevator.
5. Park farther from the store.
6. Better yet, walk to the store.
7. Get up to change the channel.
8. Window shop.
9. Plan a walking meeting.
10. Walk over to visit a neighbour.
11. Get outside to walk around the garden or do a little weeding.

Take a flight! Let's break down the numbers.

- Using the stairs burns twice as many calories as walking.
- Regular stair users have greater leg strength and aerobic capacity than non-climbers.
- Taking the stairs is often faster than waiting for the elevator.
- Two flights of stairs climbed per day can lead to a 2.7 kg (5.9 lbs.) weight loss over one year.
- Six flights a day can lead to an 8.2 kg (18 lbs.) weight loss over one year.
- Stair climbing can increase bone density and help prevent osteoporosis.
- Increase your life expectancy: A Swiss study recently concluded that regular stair climbing leads to a 15% decrease in the risk of dying prematurely.
- Stair climbing is a helpful weight loss or management activity, and can also reduce blood pressure and cholesterol.
- In one minute, a 150-pound person burns approximately 10 calories walking up stairs, and only 1.5 calories riding an elevator.
- Walking up the stairs burns almost 5 times more calories than riding an elevator.





Crank it up a level: Stair climbing 101

Here are a few tips on how to make the staircase your new go to partner in crime

The previous page served as a means to highlight all of the benefits that you can accrue merely by adding the stairs, an active way to reach your desk everyday vs. the more passive way, the elevator. In comparison to walking on a level grade, when using the stairs, your gluteus maximus and quadriceps are activated at a much higher rate. More muscle activation=more calories burned!

Safety is always a concern in the workplace, so make sure that before you start adding stair climbing to your daily routine that you are aware of the best technique to do so. Use the following tips to help you out. Be aware of the height and depth of the stair, keep hands clear of unnecessary items and make sure you are

close to one or both of the handrails just in case you lose your balance or trip on a step on your way up or down the stairs in your office building. Before you sit back down at your desk, make sure you stretch out your quadriceps, gluts, and calves as these muscles groups exerted quit a bit of work to get you up to your desk today! Going up, use your strong leg, maintain good posture, going down lead with your weak leg, and ensure that your entire foot is on the step. Going one step at a time is recommended and it is encouraged that when first beginning, that you take breaks as needed. When going up or back down the stairs, avoid excessive leaning or pulling on hand rails, keeping you shoulder blades back and body in the upright position to encourage a balance of

muscles being utilized. Once you have a good feel for using the stairs, why not take your lunch hour workouts to the stairs. Here is a sample workout that will help bolster your results and

increase your step count in minimal time!

Stair day workout



To begin your workout, always start with a warm up. Casually walk up and down 2 flights of stairs 2 times at a moderate pace to assist in getting your heart rate up and blood flowing to your muscles.

- *Run up 2-3 flights of stairs as fast as you can.
- *Slowly jog or walk down trying to let your heart rate recover (take deep breaths and keep your chest cavity open, arms relaxed at your sides).
- *Perform this 5-10 times to help build up your anaerobic speed, and cardiovascular ability.
- *Always remember to cool down.

*Slowly walk up and down 2 flights of stairs at a low intensity, and remember to use the stretches provided in the previous newsletter!

Body Mass Index

What we know, how we apply it, and how we move forward

Body Mass Index (BMI) is a simple scale of an individual's weight and height. This scale is used across the World to risk stratify individual's health level as it associates them to being underweight, normal weight, overweight, and obese. As individuals become more fit, their BMI will decrease. There are many online resources that you can use

to check your personal BMI. Try <http://www.exrx.net/Calculators/BMI.html> Then compare your results to the scale below to complete weekly check in's to hold yourself accountable to maintaining a normal BMI for your age and gender. If you would like a more in depth analysis ask at your local gym for a free consultation to check out your body fat %.

BMI Key

| | |
|--------------|--------------------------|
| < 18.5 | Underweight |
| 18.5 to 24.9 | Healthy |
| 25 to 29.9 | Overweight * |
| 30 to 34.9 | Grade 1 obesity |
| 35 to 39.9 | Grade 2 obesity |
| >40 | Grade 3 (morbid obesity) |

Active Transportation

- Living in Victoria BC, you are in one of the most conducive environments to take part in active transportation. Active transportation refers to any form of human-powered transportation – walking, cycling, using a wheelchair, and in-line skating or skateboarding. There are many ways to engage in active transportation, whether it is walking to the bus stop, or cycling to school/work. Here are a few tips to help you become more active in your transportation.
 - Think twice about using your car for every trip.
 - Could you walk or use your bike instead?
 - Dust off your bicycle and cycle to work when the weather permits.
 - Trade in your dress shoes for running shoes, strap on a backpack and walk all, or part of, the way to work/school.
 - Instead of driving your kids to the park, why not walk or make it a family outing on your bikes?



Walk more, walk faster

- Stair climbing programs can improve the amount of 'good cholesterol' in the blood - HDL concentrations (Wallace and Neill, 2000)
- Daily living activities like climbing the stairs significantly contribute to the 30 minutes of physical activity we all need... everyday.
- Using the stairs burns twice as many calories as walking.
- Regular stair users have greater leg strength and aerobic capacity than non-climbers.
- Great alternative for those individuals who find barriers to exercise including lack of time, money, lack of suitable facilities and weather and embarrassment.
- The faster you climb those stairs the fast you get to your destination.



Still having an issue finding others to walk with? Check out the following link to create a CRD specific walking group or to find one in the Victoria area.
www.meetup.com

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CRD Healthy Workplace Wellness Program Week 5

10,000 steps a day to decrease chronic disease risk factors



Welcome to week 5: Only one more week to go!

What's your average step count? Calculate yours and try to beat it each day this week.

Last week you cranked your step count up and added some intensity by stepping your way to a healthier you by using the stairs. This week I'll show you where your sedentary time is coming from, how to decrease it and then how to compliment your fitness increases through some simple tactics on how to prepare your day

to have healthy meals and snacks all day long. Nutrition can be one of the biggest pit-falls in any fitness regimen. After this week you will never have an excuse for prolonged sedentary time no matter what situation you find yourself in.

Where is all of your sedentary time coming from?

Page 2

Tips to decrease sedentary time.

Pages 2-3

Healthy eating 101.

Pages 3-5

Tips to decrease your sitting time at home

1. Get off the couch and walk around the house during commercial breaks.
2. Do household chores, such as folding clothes, washing dishes, and ironing, while watching TV.
3. Stand to read the morning newspaper.
4. Move around the house when checking text messages and email on your mobile phone.

Where is all of your sedentary time coming from?

With the arrival of the electronic age, it is no surprise that Canadians spend more time then ever sitting in a day. This large shift of increased sedentary time at work, home and for travel has lead Canadians to be at an increased risk of developing an array of chronic diseases and health problems including poor nutrition, obesity, insulin resistance, diabetes, and increased risks of developing coronary heart disease. In the research it has been found that those adults who spend less than 2hrs a day watching TV had a lower chance of

developing cardiovascular disease, the same can be said about the revers—those adults who spent more time in front of the TV in a day had a higher chance of developing cardiovascular disease.

Tips to decrease your sitting time at work

1. Stand and take a break from your computer every 30 minutes.
2. Take breaks in sitting time in long meetings.
3. Stand to greet a visitor to your workplace.
4. Stand during phone calls.
5. Drink more water--going to a water cooler or fountain will break up sitting time!
6. Use a height adjustable desk so you can sit or stand.
7. Move your bin away from your desk so you have to get up to put garbage in it.
8. Eat your lunch away from your desk.



Tips to decrease your sitting time while travelling

1. Leave your car at home and take public transport so you walk to and from stops/stations.
2. Walk or cycle at least part way to your destination.
3. Park your car further away from your destination and walk the rest of the way.
4. Plan regular breaks during long car trips.
5. On public transport, stand and offer your seat to a person who really needs it.
6. Get on/off public transport one stop/station earlier. (The Heart Foundation, 2012)

There are many ways in which adults can sit for long periods throughout the day. A typical day might include sitting:

1. To eat breakfast.
2. To drive to work at your desk at work.
3. To drive home.
4. To eat dinner during the evening.
5. To do things such as watch television, use a computer and socialize.

How does nutrition play a role in your workweek?

Eating healthy is 1/3 of your battle when it comes to staying healthy longer. Check out the following link for information from SportsMedBC (2008). On how to create a healthy grocery list to keep you fuelled all work week long by ensuring you get the adequate amount of necessary nutrients from your diet.

[http://walkbc.ca/sites/default/files/walkbc/Nutrition Action Plan.pdf](http://walkbc.ca/sites/default/files/walkbc/Nutrition%20Action%20Plan.pdf)



Get Started - Shopping List

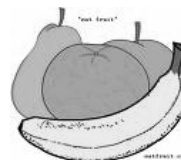
Fruits

Apples

Bananas

Oranges

Frozen: blueberries, strawberries



Vegetables

Lettuce or mixed greens

Spinach

Onions

Tomatoes

Cucumber

Zucchini

Carrots

Broccoli

Sweet potatoes

Egg & Dairy

12- fat free yogurt

Milk, Skim, 1% or 2% milk (fat free soy milk)

Eggs 1 carton

Cheese low fat (less than 18% milk fat)

Cottage cheese, fat free or 1%



Continued...

**Breads & Grains**

Whole wheat tortillas
 Whole wheat bread
 Whole wheat pitas
 Cold Cereal (Raisin Bran, Kashi..)

Hot Cereal (Oatmeal, Red river
 Basmati or brown rice
 Whole wheat pasta

Meat

Skinless boneless chicken breast
 Lean ground turkey
 Extra lean ground beef
 Fresh fish fillets
 Canned tuna
 Canned salmon
 Deli sliced ham or turkey

**Canned & Condiments**

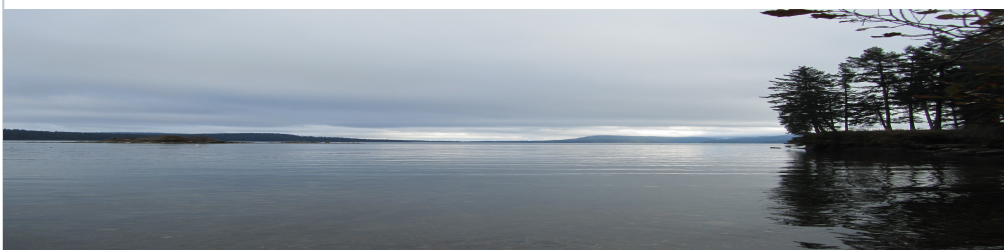
Peanut butter, light all-natural
 100% fruit jam
 Canned garbanzo beans
 Canned black beans
 Canned lentils
 Bouillon cubes
 Almonds
 Pumpkin seeds
 Soy sauce
 Salsa



© SportMed BC 2008

Keep moving, eat healthy, limit sedentary behaviours and be healthy

Create a healthy workplace today, tomorrow, for your career.



Research has shown that a healthy diet and good nutrition can:

- Promote weight management and reduce the risk of obesity.
- Reduce the risk of developing high cholesterol, or reduce cholesterol in those who already have high cholesterol.
- Reduce the risk of developing Type 2 diabetes.
- Reduce the risk of developing high blood pressure or reduce blood pressure in those who already have high blood pressure.

Week 4 to 5

It is now time to increase your daily steps. Start with a 500 step increase per day in week four and increase that by another 500 by week five. If you walked 2,000 steps in weeks two and three, you should be walking approximately 3,000 steps per day in week five.

December

HEALTHY HOLIDAYS

- Hold a "Gift of Christmas" carolling and walking tour to gather toys and food for needy families
- Stage 'The Twelve Days of Fitness' with walking activities to get people through the holiday season
- Hold annual incentive awards and recognition events
- Make December the official mall walking month – indoor exercise and window shopping for holiday presents

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CRD Healthy Workplace Wellness Program Week 6

10,000 steps a day to decrease chronic disease risk factors



Welcome to week 6: The final week-time to max out that step count!

It's been 5-weeks since your pedometer journey began and I'd like to wrap it up on a high note! Last week you learned how to identify where you were spending all of your sedentary time and some quick tips to help limit that time, lastly you learned some great tips on how to fuel your body with the healthy nutrients needed to get yourself through the work week. This week we are wrapping things

up but ensuring you fully understand how to keep the momentum going and stay healthy and fit at work ensuring you get your 10,000 or more moderate-vigorous steps in a day by addressing your log book, physical activity maintenance, and how to progress your fitness over time.

Wrap it up! Log book

Last final notes on your tracking sheets.

Page 2

Physical Activity

It improves the quality of your life and work.

Page 3

Where to progress?

How are you going to keep challenging your physical activity levels?

Page 5

Wrap it up; Log book



Today starts the final week of logging your moderate-vigorous steps. Hopefully you have enjoyed the pedometer and have seen daily increases in your step count. Just to make sure you have accurately documented your steps, just quickly review your logbook and ensure you have added any extra activity you may have done that your pedometer could not track (i.e. biking, swimming, Pilates etc.). As you move forward into the New Year, try keeping a weekly total of how many steps you take. On every Sunday, for the month of January, write down how many steps you take each week, and try to maintain to

beat that score each week. This will help propel you forward towards your new years fitness goals. A log book is a great way to help keep you accountable for how much physical activity you get in each week, if you don't like wearing around a pedometer, try tracking how many minutes of uninterrupted physical activity you get in each week for the month of January. Remember it's all about limiting your sedentary time, so the more opportunities that you give yourself to move around the healthier you will be in the long run.

Side note!

According to The American College of Sports Medicine, you should not wear flip-flops for walking long distances. Wearing them for distances can be harmful to your feet and legs because they lack the support that good running shoes offer.

Understanding your behaviours

Physical activity is a behaviour, and behaviours are driven by various motivations whether they be internal or external. Finding a way to be driven internally to participate in physical activity is the only real way to ensure a successful program is both up taken and longevity is assured. Find out what activities provide you with a sense of joy,

enthusiasm, and satisfaction. Those types of physical activity are the ones that will provide you with lifelong fulfilment and increased quality of life.

Living in Victoria, BC, we know that we can't always walk outside, or that maybe its not as pleasurable of a time to walk outside in comparison to the warmer dryer summer months. This winter, why not find an indoor facility such as a

- mall
- school gyms
- church gyms
- an indoor track
- or other buildings

for your walking group to walk in. Meet with the owner/manager of the facility and discuss mutually beneficial ways to partner. For example, you may ask the indoor track manager to donate use of the facility and in return you would promote the indoor track in your marketing materials. This could also work for the mall and other buildings.

You may want to seek buildings with stairs and organize a "Once A Week Indoor Hike" up and down the stairs.

What do you do in your community when you can't walk outside?



Blogs

A blog is a very popular form of website where you can communicate online with your colleagues on an ongoing basis. Because content can be easily changed and added, a blog makes it easy for you to keep the information about your event or program current. A blog also allows potential participants at your workplace to communicate with you. Visit www.blogspot.com, or www.wordpress.com for free and easy instructions on how to create your own blog. A few things to note:

- A blog needs to be updated and added to regularly to stay dynamic and relevant. Think of it as an ongoing, real time conversation.
- Put your blog or website address in all the promotional materials that you send out to increase traffic to your website and to promote your event/program. Make sure it is functioning and up to date or don't print it!
- Google similar websites to find users that are already interested in becoming more physically active and suggest that they visit your website.
- Start building an email database for future events.

• Create an email newsletter or include your event/program information in your workplace email newsletter.

- Promote your event by uploading photos of previous events so people know what to expect.
- Include your contact information so people know how to reach you for more information.
- Post a schedule of upcoming or related events or programs.
- Encourage goal-setting, offer solutions to common barriers that people will face during the work week, and suggest strategies for increasing step counts.
- Include related information about the benefits of and opportunities for walking such as: "Active Is" tips for getting moving - like encouraging employees to walk to co-workers' offices instead of e-mailing or phoning.
- Highlight free or inexpensive resources in your community, including walking and trail maps.
- Remind people that Active is Fun – tell them about the fun they'll have at your event/program.
- Remind people that Active is Healthy – more energy means quality time with family, especially children!

A great way to keep your office engaged and active is through the use of social media. Use a variety of sources from Twitter, Facebook, online blogs, newsletters or even weekly wellness emails to keep fitness a top priority in your office building.



Think you have covered a lot of ground the past 5-weeks? Good thing our colleagues at WalkBC have an updated interactive map that will keep you exploring your beautiful province year long as the seasons change. Choose your route based on difficulty level from easy-hard trails. Check out this link to explore over 15 trails in the Victoria area.

<http://walkbc.ca/map>



STAND UP, SIT LESS, MOVE MORE, MORE OFTEN

60% of Canadian adults spend their entire workday seated, and 56% are classified as "Physically inactive".

Recent research shows that the number of steps per day taken was significantly and inversely associated with hypertension, cancer, stroke, depressive symptoms, health related quality of life, and pulse rate (Lee et al., 2012).

Too much sitting time—A health hazard? Prolonged sitting time linked to cardio-metabolic health indicates that even in physically active adults, concurrent reductions in the amount of time spent sitting is likely to confer health benefits (Dunstan, Howard, Healy, Owen, 2012).

Even among non-exercising people, accumulating number of steps appears to be related to fewer health problems and should be promoted as an accessible form of exercise, especially for those who lack the time or ability to engage in physical activity of at least moderate intensity (Lee et al., 2012).



What sedentary really means: Muscular inactivity—take more steps a day because you want to, for your health, for your wellness, and for your overall quality of life

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Appendix I

Focus Group # 1

Interviewer

“Overall did you find the intervention to be feasible during the workday?”

Participant 1

“For me it was more remembering to do it, I typically walk a fair bit anyways, but I also found myself getting stuck at my computer for longer periods of time than the intervention recommended.”

“It did not change my lunch hour activities at all, but towards the end of the intervention realizing that my weekends were my weak point, I found it pushed me to get more steps and be more active on the weekend, where as my activity at work stayed consistent.”

Participant 2

*“I found that just depending on the day, because the job I do, whether or not I could even get up or not. Quieter days I could get up more where as busy days
It did change the breaks and the lunch hours for me, not so much the regular hours at the desk.”*

Interviewer

“Did it change how you viewed being physically active during the workday?”

Participant 1

“Not really.”

Participant 2

“Shed more of a light, I really do sit a lot during the day.”

Interviewer

“Do you think that the feasibility of the intervention to take 10,000 or more moderate to vigorous steps could be maintained within your workplace during the work hours?”

Participant 1

“Not during, but including the rest of the day it is definitely feasible.”

Participant 2

“During the hours—not feasible.”

Interviewer

“What was the hardest part of the intervention?”

Participant 1

“For me just remembering to not get just stuck staring at a computer and get up every 20 min to 30min to stretch the eyes and legs”

“For me the weekends were less of an active time, and it did not make me seek more activity on the weekends”

“Prompting ideas were already there, it was more just the application needed more, had more family things going on, less time for physical activity on the weekends”

Participant 2

“For me, on the way home looking at the counter walking home from the bus, being like I ain’t going to make it today, then being like I could go for another walk today, but then just not having the motivation to do it. Realizing that something in me that I needed to make it”

Interviewer

“Did you ever make that extra walk to complete the step count?”

Participant 2

“Depending on the night yes”

Interviewer

“Did you find the prompting was motivational, distraction, useful, useless?”

Participant 1

“I thought it was good, the idea of equating steps to other activities and talking about the benefits of the steps, reminding was good”

“It was fun to see how much I walked in a day”

Participant 2

“It was not negative in any way shape or form, more of a voice in my head—gotta do it, served its purpose as a reminder (wearing the pedometer) when I forgot it one day I didn’t really care I was like oh well doesn’t matter how many steps I take, but having it on gave me that extra reminder”

Participant 1

“It’s a great reminder”

Interviewer

“Will you continue to wear the pedometer post intervention period?”

Participant 2

“It was a good break not having to wear it or remember it, but for me its more of a

if I'm wearing it I'm going to get off the bus stop a stop early to get a few more steps in, if I'm not wearing it, I'm not going to get off the bus early, getting that direct feedback was a great motivator. There's nothing to accomplish if I'm not wearing it."

Participants 1

"I would probably not even wear the pedometer during the week as a standard work week I get enough walking in, however I would continue to wear it on the weekends as that is where it has been highlighted that my physical activity (steps count) is lacking."

Interviewer

"Do you feel like this intervention was enlightening like it will help your organization to keep or implement something like this, to encourage employees to get more steps per day, to increase their health at work?"

Participant 1

"There is a health and wellness committee so that is a start in the right direction."

Participant 2

"I think that the talk of the mentality is there, but the walk for this environment is not, unless you have a supervisor/manager that is in/that is for it then no, I don't personally feel this organization is walking the talk."

"Some of us have been using rooms to do lunch time workouts and we are getting no support or help so its hard to feel like this is going to happen since the support is just not here yet (doing it for over 2 years, not getting support)."

Participant 2

“Having the pedometer made me more aware to think about to make a more conscious effort to do thing not sitting.”

“Doing a core workout I got frustrated because I didn’t see any steps showing.”

Participant 2

“Future studies an avg. step length so that people can convert their walking to a distance.”

Interviewer

“Would you be more motivated by accomplishing smaller goals so like walk to the top of the Eiffel tower or Seattle to San Francisco, walk the island etc. vs. take 10,000 or more moderate to vigorous steps a day to decrease chronic disease risk factors?”

Participant 1

“Yes we had a step program similar to that before and I liked that set up more then trying for the same goal each day.”

Focus Group #2

Interviewer

“Did you find the intervention to be feasible during just the workday hours?”

Participants 3

“NO.”

Interviewer

“Feasible to get during the day including those hours outside the workplace?”

Participant 3

“Its Feasible...”

Interviewer

“Did it change how you viewed being physically active during the workday?”

“Through the use of the prompts, pedometer etc.?”

Participant 3

“Not really?”

Interviewer

“Did you find that you kept the same physical activity patterns during the workday? Did you get up more during the workday and walk around, or after work maybe increase how far you were walking? Before after or during the lunch hour during the 6-week period?”

Participant 3

“No increases, maybe I thought to myself I would take the stairs a little more, but I say that to myself everyday.”

Interviewer

“Do you think that the feasibility of this study could be maintained during the workday in this workplace, for example having some sort of initiative to take 10,000 or more moderate to vigorous steps a day would be useful to this workplace?”

Participant 3

“I think so, generally from other people around me I’d say ya. Some people were really enthusiastic about getting their step count up.”

Interviewer

“Do you think that having a workplace wellness program is useful in this workplace to help employees to take more steps through more organized health endeavours during the workday before after or during the workday?”

Participant 3

“Yes.”

Interviewer

“What was the hardest part of this intervention to take 10,000 or more moderate to vigorous steps, the pedometer, motivation etc.?”

Participant 3

“I forgot to take the sheet home, I’d always be like tonight I will bring that sheet home. I had used a pedometer at work before, and even if I walked home after work I wouldn’t get up to 10,000 steps. I used the pedometer The 1st day to the end of the first week, I just

quite because I didn't once get up to 10,000 and I didn't once change what I did, so I gave up."

"After the end of it, I was re-reading it on the sheet and I misread the directions regardless of what you originally told me, so the daily goal was getting messed up. But overall the number goal didn't really do anything for me, and the newsletter, I already knew all of that stuff its more the application so I just stopped tracking all together."

Interviewer

"Do you think there would be a better way to help you to reach the 10,000 steps, such as creating a walking group or an organized lunch hour walking group that went out every lunch, would that motivate you to get more steps?"

Participant 3

"No because I need a whole hour to get out and get lunch. But this walking doesn't add up to 10,000 in a day."

"There was a time when I used to deliberately go out and walk around the square during my coffee break, but now I am on the 5th floor and it takes too long to get up and get around. Half the time now I work through the coffee break, it takes to long to get down and outside."

Interviewer

"Do you think its ok to be working through coffee breaks? Do you think its important to get up from your desk and move around every 20 to 30 minutes?"

Participant 3

“I have a desk that goes up and down so I will often end up working from my desk standing.”

“This job that I have now, I do walk around a lot more then in my previous position where I was totally stuck on the computer all the time. More things to shuffle from one room to another so I get up and walk around.”

Interviewer

“How many hours do you usually spend in the standing vs. sitting position?”

Participant 3

“When I am busy its easier to have it up at least a couple hours at least, sometimes its just better. I read a study to that said it’s easier to get a lot of more work done while standing, and it keeps me more alert.”

Email feedback

Participant 4

1. Overall did you find the intervention to be feasible during the workday?

I did for the most part, however it required a conscious effort to get out of the building and walk. I couldn't meet my quota simply by doing a few runs up and down the stairs. My job requires inspections, so as long as I was scheduling walk-able inspections downtown, I was ok. Walking instead of riding my bike (2.5km each way) also made it do-able.

2. Did it change how you viewed being physically active during the workday?

Yes. I realized that simply having a bike ride in coupled with afternoon yoga wasn't good enough. I have stepped up my physical activity throughout the day more, and have swapped the biking for walking commutes when possible (I drop my daughter off to daycare every 2nd week, so those weeks are more challenging to walk)

3. Do you think that the feasibility of the intervention could be maintained within your workplace?

Yes.

4. What was the hardest part of the intervention?

Trying to achieve 10K when I'm over-scheduled with sit-down events e.g., meetings or driving.

5. Did you find the prompting methods such as emails, and reminders from the researcher to be motivating? Distracting? Not useful?

All of the above. Motivating at the beginning, but less useful near the end...for the most part the info is simple – use stairs, go for walks, take breaks etc.

6. Do you feel as though your organization has benefited from this intervention?

I would imagine so, but it will require follow-up and repeats yearly to keep people up on their active-ness. I'd be curious to see how many have improved their mobility for the long term.

Appendix F

INITIAL CRD SURVEY RESULTS

Question 5 f). Which of the following CRD Corporate activities (department challenges) might you be interested in as part of a workplace wellness initiative?

Responses to this question are organized in three ways: according to gender (Table 5), service area (Table 6), and overall counts (Figure 16). With few exceptions, respondents identified healthy eating as their first preference for corporate/departmental challenges, closely followed by active commuting. Departmental or team based challenges can serve to motivate and mobilize employee energies: Research demonstrates that employees who participated in team-based program over 10 weeks maintained moderate weight and behaviour changes one year later (Thorndike et al., 2012).

Table 5. Responses by Gender

| | Female (n = 101) | Male (n = 69) | Total |
|------------------|------------------|---------------|-------|
| Active commuting | 44 | 32 | 76 |
| Healthy eating | 70 | 37 | 107 |
| Weight loss | 44 | 11 | 55 |
| Volunteering | 37 | 19 | 56 |

Question 3. What if anything would you like to do to improve/maintain your health?

Overall, most employees (65%) perceive that engaging in more physical activity would benefit their health. This is followed by drinking more water and getting more or better sleep, achieving or maintaining a healthy body weight and eating more healthfully. Women indicated significantly more often than men the following improvements: Achieve or maintain a healthy body weight; learn to cope better with worry, nerves or stress; and eat healthier and be more physically active. Issues that did not concern most employees were related to caffeine consumption, blood pressure levels, or smoking. Becoming involved in community-wide events was not as palatable as an individual activity, but was somewhat more favourably perceived if it took the form of a departmental challenge (see page 22). Tables 1 and 2 on pages 9-11 further delineate responses by gender and age, and service location respectively.

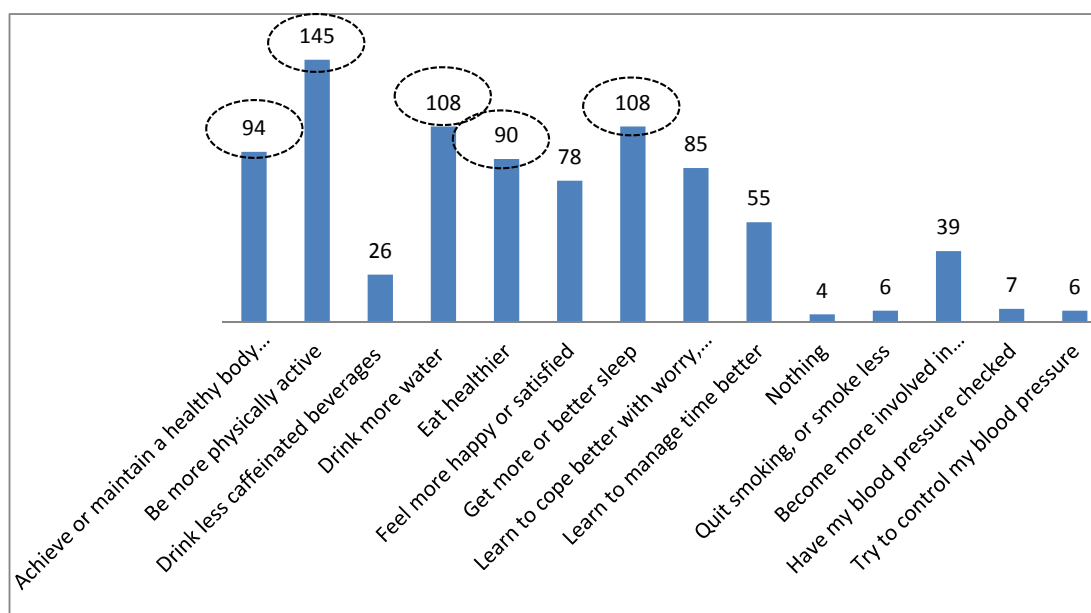


Figure 3.