The ENCOURAGEing Workplaces Project:

The Addition of a Fitness Based Health Risk Assessment to a Physical Activity Counseling Intervention

By

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Abstract

There has been a large growth in workplace wellness initiatives; however, use of fitness based health risk assessments (fHRAs) remains largely unexplored. I hypothesized that adding an fHRA to a physical activity counseling intervention (PAC+HRA) would greater increase physical activity levels compared to physical activity counseling alone (PAC). A 4 month, two-group quasi-experimental design was used to test this hypothesis.

Over time, there was an increase in total, moderate to vigorous, and moderate physical activity ≥10-minute bouts. Self-Efficacy for Exercise increased and symptoms of depression decreased. Subgroup analysis of the PAC+HRA group found a significant improvement in overall fitness levels. Participants progressed to more advanced stages of change. In conclusion, PAC+HRA did not increase physical activity levels more than PAC. This is likely due to the characteristics of the counseling, fHRA, and outcome measurements.

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Chapter 1: Introduction

Physical activity is defined as any bodily movement produced by the skeletal muscles that results in energy expenditure [1]. This includes movements ranging from activities of daily living, to vigorous, planned exercise. Physical activity is required to sustain life; however, the amount of physical activity achieved depends on personal choice and varies greatly between individuals [1]. Maintaining a physically active lifestyle is an important aspect in one's wellbeing. Greater physical activity levels have been associated with better physical health status and increased quality of life [2–4]. The current Canadian guideline for physical activity recommends adults ages 18 – 64 perform muscle and bone strengthening activities two days per week and achieve 150 minutes of moderate to vigorous physical activity a week in bouts of ten minutes or more to receive health benefits [5]. More physical activity is recommended for greater health benefits [5]. However, data from the Canadian Health Measures Survey from 2007 – 2009 report only 15% of Canadian adults are meeting those guidelines [6]. Furthermore, the average Canadian spends 9.5 hours per day (69% of waking hours) sedentary [6], where sedentary behaviour can be defined as any waking activity performed in a sitting or reclined posture with an energy expenditure of ≤ 1.5 metabolic equivalents (METs) [7]. This is concerning, as both inactivity and prolonged sedentary time are associated with poor health outcomes. For example, physical inactivity increases the risk of developing chronic conditions such as type 2 diabetes, heart disease, stroke, hypertension, and some cancers [8]. For every additional hour to total sedentary time per day, blood insulin levels increase by 3% [9]. Higher blood insulin levels are indicative of insulin resistance, which is associated with type II diabetes, cardiovascular disease, and other adverse health outcomes [10,11]. These negative lifestyle patterns are costly to the Canadian economy. Inactivity was estimated to have cost the Canadian health care system $2.4 billion in 2009 alone

[12]. Additionally, the top 1% of 'high cost users' in the health care system (i.e. the 1% of the population that the health care system spends the most money on) were found to be largely inactive [13]. This top 1% alone was estimated to have cost the Canadian health care system $15 billion from 2003-2008 [13].

Such high costs at the personal and economical level has peaked interest in finding ways to reduce inactivity levels and sedentary time. The workplace is a unique setting to promote physical activity, as sixty percent of Canadians are in the workforce and spend the majority of their time at work [14]. Cost analyses have found that for every dollar spent on workplace wellness programs, medical costs fall by $3.27 and absenteeism costs fall by $2.73 [15]. This suggests benefits for both the health care system and employers. Despite this, there is a lack of evidence on the best practice for implementing and carrying out workplace wellness programs [16], especially those targeted to increase levels of physical activity [17]. Health risk assessments or screenings are commonly used in wellness programs to encourage healthy living [18], and evidence shows these assessments are most effective when paired with other interventions [19]. While this appears promising, potential biases in reported effects and low physical activity thresholds in studies using physical activity as an outcome make it difficult to accurately determine if health risk assessments can change employee physical activity enough to accrue health benefits [17,19]. Fitness levels and injury risk were not included as potential health risk factors in any of these studies [19]. In fact, little research has examined the effectiveness of a physical fitness based health risk assessment in adult populations. The literature reports positive results in children and youth, where fitness tests paired with positive feedback increased motivation for physical activity [20]. Therefore, it is likely a fitness based health risk assessment paired with tailored feedback will be effective in the workplace as well. The purpose of this

study was to determine if the addition of a fitness based health risk assessment to a physical activity counseling intervention in the workplace can elicit greater increases in participant physical activity levels compared to physical activity counseling alone. I hypothesized that individuals receiving a fitness based health risk assessment as well as physical activity counseling would have greater increases in physical activity levels compared to individuals receiving only physical activity counseling. Knowledge gained from this study will inform future research and provide insight on better ways to promote physical activity in the workplace.

Chapter 2: Review of the Literature

2.1 Physical Activity

There is a large body of evidence demonstrating the benefits of physical activity and detriments of inactivity. In a study examining the effects of physical activity and air pollution on mortality in older urban residents, a significant inverse association was found between participation in sport, cycling, and gardening with total, cardiovascular, and diabetes mortality [21]. This association was not modified by exposure to traffic-related air pollution [21]. Similar results were reported in a 12-year multicentre prospective cohort study examining overall and abdominal adiposity modifications on the association between physical activity and all-cause mortality in European men and women [22]. Physical activity was found to be inversely associated with all cause mortality at all levels of overall and abdominal adiposity [22]. Those who were moderately inactive had a 16-30% lower hazards ratio for all cause mortality compared to those who were completely inactive, suggesting even small increases in physical activity can reduce mortality risk [22]. Furthermore, a meta-analysis on physical activity and mortality reported a dose response curve, where those who engaged in higher intensities of physical activity levels saw a greater reduction in mortality risk [23]. Li and colleagues [24] suggested the mortality risk of being inactive is equivalent to a 40 mmHg and 20 mmHg increase in resting systolic and diastolic blood pressure, respectively. High resting blood pressure is the number one risk factor for stroke and a major risk factor for cardiovascular disease [25]. An increase of 40 mmHg in systolic and 20 mmHg in diastolic blood pressure is clinically significant, as it moves an individual from the low risk category (120/80 mmHg) to high risk category (140+/90 mmHg) [25]. This applied to both hypertensive and non-hypertensive individuals [24] and gives applicable meaning to the risks of being inactive.

Chronic diseases can be defined as diseases of long duration and slow progression [26]; however, there are other factors of chronic diseases that give further depth and understanding to their nature. Chronic diseases often begin slowly, develop gradually over time, and can be attributed to numerous causes [26,27]. Furthermore, they usually share common risk factors and require ongoing actions to manage the disease long term [26]. Conditions classified as chronic diseases include diabetes, heart disease, kidney disease, asthma, hypertension, and cancer [26]. In Canada, three out of five people over the age of twenty live with at least one chronic disease and four out of five people are at risk [28]. With increasing treatment costs and longer life expectancy, numerous research studies have begun exploring ways to reduce and manage chronic disease [29–31]. These studies have found that physical activity plays an integral role in the prevention and attenuation of chronic diseases.

In 2011, heart disease was the second most common cause of death in Canada [32], and in 2015, the number one cause of death globally [33]. Heart disease is often referred to as conditions affecting the heart and its function [34], whereas cardiovascular disease refers to conditions affecting the heart, blood vessels, or pericardium [33]. Both conditions are highly related and share common risk factors, such as high blood pressure and glucose, raised blood lipids, obesity, smoking, and inactivity [33,34]. Some risk factors for heart and cardiovascular disease are not modifiable; however, many can be managed. Physical activity plays a major role in controlling disease risk factors, incidence, and mortality. Meta-analyses of randomized controlled trials in children and adults report reduced waist circumference, blood pressure, and blood triglycerides with increased levels of physical activity [35,36]. All of these measures are considered risk factors for cardiovascular and heart disease [25,33]. In a large population based study, greater frequencies of physical activity resulted in 26-45% and 16-23% lower odds of

peripheral artery disease and carotid artery stenosis, respectively [37]. Greater frequencies were associated with lower odds [37]. Similarly, a meta-analysis of prospective cohort studies found a dose response relationship between levels of physical activity and coronary heart disease incidence [38]. Those who self reported engaging in 150 minutes/week of moderate intensity leisure time activity had a 14% risk reduction for coronary heart disease compared to those who reported no leisure time physical activity [38], and risk reductions increased with higher amounts of physical activity [38]. Even low intensity physical activity has been shown to be beneficial in studies that used cardiovascular and heart disease mortality as an outcome. Increased levels of walking was associated with a 23-35%, 20-31%, 19-58% risk reduction in cardiovascular disease, ischemic heart disease, and heart failure mortality, respectively [39]. Furthermore, a 15 year prospective study found recreational physical activity to be an independent predictor of cardiovascular and coronary heart disease mortality [40], where those in the high physical activity category were 35% less likely to experience cardiovascular mortality than those in the low physical activity category [40]. Meta-analyses of cohort and case control studies examining the impact of physical activity on stroke, cardiovascular, and all cause mortality found a 27-35% risk reduction for those who participated in higher levels of physical activity [29,31]. Studies with self reported physical activity reported lower risk reductions than studies using objective measures [29]. Physical activity continues to be beneficial even after onset of cardiovascular or heart disease. In patients with coronary artery disease who underwent percutaneous transluminal coronary angioplasty or coronary stenting, participating in an exercise program for 6 months significantly reduced adverse event occurrence and hospital readmission rates for four years after the intervention [41]. Meta analyses have found cardiac rehabilitation programs to reduce overall mortality and cardiovascular mortality by 25% after 3 years [42]. Mechanisms

responsible for the positive effects of physical activity on cardiovascular and heart disease include improvements in major cardiovascular risk factors, diastolic function, endothelial function, and inflammatory status [43].

Physical activity and exercise are effective in the prevention and control of type 2 diabetes as well. Type 2 diabetes is a condition where the body is unable to use the insulin it produces and is mainly the result of excess body weight and inactivity [44,45]. Diabetes is a growing concern, and the World Health Organization predicted it would be the 7th leading cause of death in 2030 [44]. Aerobic training in sedentary overweight or obese children improved fitness and demonstrated dose-response benefits for insulin resistance and visceral adiposity, regardless of sex or weight [46]. In lean and obese adolescents, aerobic training increased both peripheral and hepatic insulin sensitivity by 35-59% and 19-25%, respectively [47]. Moreover, 12 weeks of aerobic training in overweight and obese girls improved insulin sensitivity without any changes in body weight and percent body fat, suggesting physical activity reduces metabolic abnormalities associated with obesity in children independent of weight loss [48]. Favorable results have been demonstrated with resistance training as well [49]. For instance, resistance training significantly improved insulin sensitivity 27-45% in overweight and obese adolescent males [50,51]. Even light physical activity has been shown to significantly decrease insulin resistance, low-density lipoprotein cholesterol, and reduce visceral fat compared to controls in physically inactive individuals at high risk of type 2 diabetes [52]. A meta-analysis examining exercise's effect on insulin resistance in youth found exercise to be effective to both prevent and treat type 2 diabetes by reducing insulin resistance, regardless of age, sex, and ethnicity [53]. In fact, just 8 weeks of aerobic training in diabetic women significantly reduced insulin resistance, fasting glucose, and plasma insulin levels [54].

Epidemiology studies suggest higher levels of physical activity are associated with lower incidences of cancer. For example, a meta-analysis on physical activity and colon cancer found a 24% risk reduction when comparing most active individuals to least active individuals [55]. Significant risk reductions were also found for those with higher occupational and leisure physical activity levels [55]. Studies examining physical activity and breast cancer found risk was reduced by 25% in most active individuals compared to least active individuals, with a dose response effect of decreased risk with increased physical activity [56]. Similarly, a modest protective association between sufficient physical activity and gastric cancer was found in a meta-analysis of prospective cohort studies [57]. However, this association was weaker in smokers when compared to non-smokers [57]. A systematic review and meta-analysis conducted by Speck et al. [58] on controlled physical activity trials in cancer survivors found physical activity beneficial both during and after cancer treatment for various types of cancer including colon, breast, lung, prostate, stomach, and leukemia. In fact, physical activity during treatment significantly improved aerobic fitness, upper and lower body strength, body weight, body fat percentage, and functional quality of life [58]. Physical activity post treatment significantly improved the characteristics listed above as well as breast cancer specific concerns, confusion, fatigue, and general symptoms and side effects [58]. Similar results were found in a longitudinal study examining the association of physical activity before and after breast cancer diagnosis and mortality [59]. Women who were more physically active pre diagnosis had lower all cause and breast cancer mortality, and women who were more physically active post diagnosis had lower all cause and breast cancer mortality rates, even if the women were inactive before diagnosis [59]. Therefore, higher levels of physical activity are an important aspect to prevent and regulate cancer.

The World Health Organization considers mental and social wellbeing to be key components of health [60]. There is a well established relationship between physical activity and psychological and social health, where an increase in physical activity is associated with greater psychosocial well being. For example, a meta-analysis on tai chi and psychological health reported tai chi interventions to have beneficial effects on depression, anxiety, stress management, and other psychological measures for various populations [61]. Increased levels of walking and total physical activity in women with depressive symptoms was associated with higher health related quality of life [62], and participating in community based exercise programs improved mental wellbeing and readiness to disclose mental health problems [63]. Moreover, a meta-analysis of meta-analyses (i.e. meta-meta analysis) examining the effects physical activity on depression and anxiety levels in non-clinical populations found significant medium (standard mean difference = -0.5) and small (standard mean difference = -0.38) decreases in depressive and anxiety symptoms, respectively [64]. Across clinical populations, physical activity has also shown to be beneficial for mental health and wellbeing. Increased physical activity and exercise in colorectal and breast cancer survivors was associated with higher quality of life, lower depression, and greater mental health [65,66]; however, Thraen-Borowski et al. [66] suggested these associations are partially mediated by social participation. Physical activity interventions among chronically ill populations significantly improved quality of life, although a greater effect size was observed for pre-post comparison studies (0.27) compared to two group comparison studies (0.11) [67]. In older populations, both a walking and a strength and flexibility intervention increased health related quality of life and global quality of life [68]. Furthermore, a systematic review and meta-analysis in adults with neurological disorders (i.e. Alzheimer disease, multiple sclerosis, Parkinson disease, and brain/spine injury) found an overall effect

size of 0.28 (p<0.01) favoring a reduction in depressive symptoms after an exercise intervention [69]. Interventions that met physical activity guidelines had an effect size of 0.38, while those that did not had an effect size of 0.19 [69], suggesting meeting the physical activity guidelines improves depressive symptoms to a greater extent [69]. In those with diagnosed mental illnesses, a systematic review and meta-analysis found physical activity had a large effect on reducing depressive and schizophrenic symptoms (standard mean difference = 0.80 and 1.0, respectively) [70]. However, a different systematic review and meta analysis found no significant effect of exercise on anxiety and depressive symptoms or quality of life in individuals with serious mental illness, suggesting the benefits of exercise do not always extend to all cases [71].

2.2 Musculoskeletal Fitness

Fitness is an important aspect of life and predicts mortality risk as well as physical independence later in life [72,73]. Fitness can be broken down into specific components involving the function of different systems in the body. In health research, two of the most commonly cited types of fitness in the literature are cardiorespiratory fitness and musculoskeletal fitness. Cardiorespiratory fitness involves the function of the cardiovascular and respiratory systems and is characterized by the body's ability to consume oxygen [74]. It has been well established in the literature that cardiorespiratory fitness is a significant and independent predictor of mortality [75]. However, the importance of musculoskeletal fitness in health is becoming increasingly apparent [76]. Musculoskeletal fitness involves the function of the muscular and skeletal systems and is characterized by the body's range of motion and ability to create force to overcome resistance [77]. For the purpose of this review, we will focus on musculoskeletal fitness and its role in health.

Musculoskeletal fitness plays an important role in chronic disease and mortality risk,

although whether this can be attributed to overall musculoskeletal fitness or specific aspects has yet to be elucidated. Amoung adolescent men, overall muscular strength was associated with metabolic risk independent of cardiorespiratory fitness [78]. Furthermore, a 30-year prospective cohort study found those with high muscular strength had decreased risk of cardiovascular events (Hazard Ratio: 0.88, 95% CI: 0.77-0.99) while those with low muscular strength had increased risk of cardiovascular mortality (Hazard Ratio: 1.31, 95% CI: 1.02-1.67) even after adjusting for smoking, alcohol consumption, BMI, cardiorespiratory fitness, and socioeconomic status [79]. Similar results have been seen in other populations such as overweight adults, postmenopausal women, and hypertensive men, where higher levels of muscular fitness appears to improve physical functioning and be protective against all cause mortality and systematic inflammation [76,80–82]. However, it should be noted that not all studies used the same tests or muscle groups to determine musculoskeletal fitness.

Musculoskeletal fitness is a critical aspect in injury prevention. A musculoskeletal fitness intervention given to office workers in Portugal significantly decreased perceptions of chronic pain in the posterior head and neck, upper and lower back, right wrist and back of the legs [83], suggesting lower chronic injury risk and severity. Additionally, a review by Andrew Hunt discusses the importance of muscular fitness and how lower levels can lead to various injuries such as anterior cruciate ligament sprains, overuse, and rotator cuff injuries [84]. He addresses the etiology of chronic musculoskeletal conditions such as low back pain, osteoarthritis, and osteoporosis and how muscular fitness contributes to prevention and attenuation of these injuries [84]. Participating in more resistance based exercise is related to an increased chance of musculoskeletal injuries [85–87]. However, these injuries are often minor, and those who exercise are half as likely to obtain non-exercise related injuries compared to those who do not exercise

[85,87]. As such, increased levels of fitness obtained through greater amounts of physical activity and exercise are related to lower chronic and acute injury occurrence in numerous populations.

2.3 Workplace Wellness Programs

With the countless benefits of physical activity, there has been growing interest in creating effective physical activity promotion. Research examining the effects of workplace wellness programs has been promising. Various types of interventions have been used, including exercise and activity, counseling/support interventions, health messages and information, and health risk assessments [17,19]. Providing employees with exercise classes or access to a gym can increase physical activity levels, improve strength and flexibility, and reduce pain and blood pressure [88–91]. For example, implementing a resistance training intervention among bus drivers significantly reduced systolic and diastolic blood pressure, increased muscular endurance and strength, and reduced absenteeism rates when compared to controls [89]. A community based intervention provided for small to medium sized enterprises saw improvements in muscular pain, flexibility, and endurance and cardiovascular factors such as weight, BMI, blood pressure, and resting heart rate [88]. Other factors, such as quality of life and psychological variables have shown significant improvements as well [92]. Interventions focused on promoting health and/or providing support through counseling also report positive outcomes on employee wellbeing. Benefits include greater physical activity levels, healthier eating habits, greater dietary self-efficacy, lower stress and depression, and lower chronic disease risk [93–101]. These interventions are usually longer in length, and follow up studies suggest benefits last up to one year after the intervention is completed [96].

Certain initiatives produce more benefits than other. Personal counseling appears to be more effective than health promotion alone [95,99]. In fact, a comparison study found that personal

coaching combined with a web-based intervention produced twice the number of positive outcomes and participants were twice as likely to use the intervention than a web-based intervention combined with printed health promotion materials [97]. A meta-analysis examining the use of different theoretical frameworks in worksite health promotion found cognitive behavioral (i.e. changing the way an individual thinks to subsequently help change his or her behaviour) and motivational approaches to yield the largest effect size [102]. Furthermore, targeting multiple health behaviours may reduce the effectiveness of the intervention. A meta analysis of workplace interventions by Hutchinson and Wilson [102] noted that effect sizes were larger for interventions focusing on only one health behaviour. Conn et al.'s [103] meta analysis also noted greater improvements in physical activity were seen when it was the only targeted behaviour, although it should be noted this was done in patients with chronic illness rather than in the workplace setting.

While these results show the potential of workplace wellness programs, evidence is far from conclusive. Not all studies report favorable results. For example, Gazmararian et al. [90] reported participants who received a gym membership only (not accompanied with support or education) did not participate in more physical activity compared to controls, and low levels of attendance in Tsai et al.'s [88] study resulted in insignificant changes in all cardiovascular risk factors. Even when significant changes are found, they are often partnered with small effect sizes [104]; it is unclear if such small changes are enough to meet public health goals or produce health benefits [104]. Moreover, in workplace interventions focusing on increasing physical activity, physical activity levels are often measured using self-report [90,91,97,105,106]. As individuals often over estimate physical activity when using self-report [107], this may further reduce health benefits assumed to accompany the changes reported in the studies. Multiple

systematic reviews and meta analysis have reported large amounts of heterogeneity in the methods, outcomes reported, and quality of studies published on workplace wellness [17,104,108–111], making it difficult to elicit any concrete conclusions. For example, Rongen et al.'s [110] meta-analysis found a small overall effect size for workplace health promotions (0.24), and noted studies of poor methodological quality saw a 2.9-fold higher effect size than studies of high quality[110]. Overall, more high quality studies are needed to fully elucidate the benefits of workplace wellness programs.

In addition to affecting participant health, research suggests employee wellness programs are beneficial for employers as well. Workplace wellness studies incorporating multi-level involvement show reduced absenteeism, increased job satisfaction, greater organization commitment, and improved employee effectiveness [93,98]. Decreased health risk has been associated with an improvement in productivity, whereas increased health risk is associated with a loss in productivity [112]. Moreover, increased health and fitness of employees results in less health insurance costs and lower injury rates at the workplace [113]. As noted previously, cost analyses have found that for every dollar spent on workplace wellness programs, medical costs fall by $3.27 and absenteeism costs fall by $2.73 [15]. Individual studies investigating wellness programs in smaller workplaces estimated savings of $10.17 per percent-point reduction in low density lipoprotein cholesterol and $454.23 per point reduction in coronary heart disease risk [114]. However, not all studies agree with these results. For example, studies with higher methodological quality see smaller financial returns, with randomized controlled studies experiencing the least financial benefit [115]. Furthermore, a randomized controlled long-term internet-delivered health promotion program had little effect on physical activity levels and diet and little financial benefit for the employer [116]. Diminished benefits may be partially due to

participation bias or lack of adherence from employees [116]. Non-participants of employee wellness initiative tend to be older, have lower self efficacy and less education, and tend to view their age, perceived lack of fitness, and perceived lack of health as barriers to regular physical activity [117]. That datum suggests those who would benefit most from wellness programs are those who participate least. Mixed methods analyses found general feedback during workplace wellness programs ineffective in changing attitudes towards physical activity and proposed more individualized approaches be used to produce a change in attitude and physical activity behaviour [118]. Use of well-implemented and effective studies is essential to ensure cost effectiveness. However, without definitive evidence on the effect of workplace wellness programs on employee health and productivity, it is difficult to accurately determine the cost benefit for employers.

2.4 Health Risk Assessments

It is important to find a program that is both effective and can be adapted to numerous settings. Health risk assessments (HRAs) are used to determine an individual's risk of developing a condition or accruing an injury, and when combined with feedback, demonstrate potential in the workplace [19,119–121]. For the sake of this review, HRAs will be defined as a process comprised of three components: 1) collecting information about an individual's health behaviours or health indicators, 2) translating the information into an individual risk score or categorical description of risk status, and 3) providing feedback to participants about their overall risk or about their specific risk behaviours [19]. HRAs are one of the most often offered components of a workplace wellness program [18], possibly because they can be done at a low initial cost. A study exploring the decision-making process behind implementing a wellness program in small to medium sized businesses found employers rely heavily on health insurers

for health promotion programs and depend more on company success related factors such as employee productivity, recruitment, and retention than humanitarian motives [122]. Therefore, finding a program with low initial costs would increase the likelihood of small to midsized business implementing a wellness program. Combining HRAs with other initiatives is more effective [120,121]; however, HRAs alone can change health behaviours for the better [97,121]. Web or computer based HRAs are cost and time effective for the employer and can significantly improve dietary habits, physical activity, waist circumference, and depression levels [95,97]. Questionnaire based HRAs are relatively easy to administer, and HRAs with physiological measurements such as blood pressure, body mass index, and waist circumference are inexpensive and can be done in a timely manner. Because HRAs present themselves as an adaptable and convenient method to promote health in the workplace, it is important to understand what health behaviours or factors they can change and if that change is enough to produce relevant health benefits.

The majority of HRAs implemented in the workplace have focused on chronic disease risk through biometric screening, although some have assessed risk by determining health behaviours through questionnaires [19]. Cardiovascular HRAs administered by either a health professional or questionnaire reduced blood pressure, total cholesterol, body mass index, and Framingham risk score in employees [95,97,101,123,124]. Furthermore, an increase in other healthy behaviours such as fruit and vegetable consumption, exercise, and regular physician visits were also reported [95,97,123,125]. Other types of HRAs have comparable results. For example, employees who received results from a blood cholesterol test significantly decreased blood cholesterol and saturated fat intake by 4.8% and 7.4%, respectively after 16-20 weeks [126].

Physical activity is commonly used as a predictor of health risk; however, it is less

frequently used as an outcome variable. In a systematic review of HRAs in the workplace, the majority of studies examining physical activity reported greater levels accrued by participants post intervention [19]. While this appears positive, different measurements and thresholds used to evaluate changes in physical activity made it difficult to determine if any overall effect of HRAs on physical activity levels exists [19]. Furthermore, the changes that were seen in physical activity may not have been enough to produce meaningful health benefits [19]. Evidently, more research is needed to determine if HRAs are able to produce relevant increases in employee physical activity levels.

A fitness-based HRA (fHRA) is a specific type of HRA that uses an individual's fitness levels to determine his or her risk. Despite the frequent use of HRAs in the workplace, few studies have implemented fHRAs. Given the importance of fitness in predicting cardiovascular disease risk and preventing injuries, increasing employee fitness levels would appear beneficial for employees and employers. Therefore, in addition to determining the effect of HRAs on physical activity levels, more research is needed on the use of fHRAs in the workplace. Fitness tests paired with positive feedback increased intrinsic motivation to participate in physical activity in children and youth [20], suggesting a fHRA in the workplace could increase employee physical activity levels. Numerous tests are available that could be used in a fHRA, such as aerobic (sub maximal and maximal) and musculoskeletal fitness tests [127–130]. Aerobic submaximal tests estimate VO_{2max} by monitoring various physiological processes and seeing how they respond to a set amount of aerobic stress [128]. Based on the response, VO_{2max} can be calculated. Submaximal tests are not as rigorous as maximal, but they present a convenient and viable alternative. Furthermore, many tests have shown high correlations between predicted VO_{2max} values and measured VO_{2max} [128]. In contrast, maximal tests directly measure oxygen

consumption and subjects continue to exert themselves until a plateau in VO_2 is seen [128]. Maximal tests are considered the gold standard for determining an individual's VO_{2max}; however, they face a number of limitations. If the subject is unable to attain a true VO_{2max} before fatiguing or if they are limited by musculoskeletal impairments or other problems, the test is invalid [128].

Tests to assess musculoskeletal fitness are often comprised of several different movements to assess different qualities in different muscle groups. Tests such as the ALPHA health related fitness test battery for children and adolescents [129] and the health related fitness-test battery for middle ages adults [130] have been developed for specific populations, while tests such as the Canadian Society of Exercise Physiology (CSEP) musculoskeletal test are appropriate for numerous age ranges and mean values are provided for each age range. Within these tests, movements such as push-ups, vertical and standing broad jumps, one leg squats, and back extensions are performed to determine muscle strength, endurance, and power. Certain tests also provide predictors of functional limitations and independence later in life [131–133].

2.5 Transtheoretical Model of Behaviour Change

The Transtheoretical model of behaviour change (TTM) is a model that identifies the readiness of an individual to adopt a new behaviour or discontinue an old one by using different processes of change as they move through the different stages [134,135]. It was developed by James O. Prochaska and is based on therapy literature and data from self changers [134]. It consists of six different stages [134,136]:

a) precontemplation, where an individual has no intention to change his or her behaviour in the foreseeable future;
b) contemplation, where an individual has not changed his or her behaviour, but is thinking

about changing it within the next 6 months;

c) preparation, where an individual has begun making small changes in behaviour;
d) action, where an individual has changed behaviour, but only recently (within the last 6 months);
e) maintenance, where an individual maintains the changed behaviour and has been doing so for longer than 6 months; and
f) relapse, where an individual had previously changed behaviour, but has failed to maintain it within the past 6 months.

As individuals move through these stages, different processes of change can be applied, such as conscious raising, self-liberation, social liberation, self-reevaluation, environmental reevaluation, counter conditioning, stimulus control, reinforcement management, dramatic relief and helping relationships [134,137]. Based on the stage of change, certain processes are more frequently used to progress an individual to the next stage [134,137]. For example, in smokers, few processes are used in the pre contemplation stage; conscious raising is emphasized in the contemplation stage; self-reevaluation is emphasized in the contemplation and action stages; self liberation, helping relationships, and reinforcement management are emphasized in the action stage; and counterconditioning and stimulus control are used most in the action and maintenance stages [134].

Evidence suggests interventions based on TTM are effective when initiating participation in physical activity [137,138]. For instance, a randomized controlled design in sedentary young adults found receiving information based on their stage of change significantly improved stage of change and participation in physical activity compared to controls [139]. Valid and reliable tools for measuring stage of change have been developed for the context of physical activity

and exercise [138], although a systematic review and meta-analysis both reported more research is needed to refine the current tools in use [136,138]. Various stage of change measures have demonstrated concurrent and construct validity, but only in select situations, such as regular moderate exercise in an overweight population [140]. Nevertheless, TTM provides a valuable means to facilitate behaviour change, given that appropriate tools are chosen.

Chapter 3: Methods

3.1 Statement of the Problem

Increasing physical activity is clearly beneficial for one's health [22]. However, 85% of Canadian adults are not participating in enough physical activity to receive health benefits [6]. Previous research has demonstrated that health risk assessments in the workplace can improve health measures [19], but few studies have looked at physical activity as an outcome measure [19]. Physical activity and fitness levels are important factors in chronic disease and injury prevention [23,30,141,142], and as such, an improvement in both would be beneficial for both the employee and the employer. Having individuals understand their health risk and giving them the tools to change their health behaviour may facilitate health behaviour change. Therefore, I hypothesized that the addition of an fHRA with personalized feedback to a physical activity counseling program would elicit a greater increase in employee physical activity compared to physical activity counseling alone. This was tested using a two-group repeated measures quasi-experimental design.

3.2 Ethics

The University of Manitoba Education/Nursing Research Ethics Board and the St. Boniface Hospital Research Review Committee approved the study protocol.

3.3 Project Site and Kinesiologist integration

The project took place at the St. Boniface General Hospital in Winnipeg, MB, Canada. Currently, the hospital employs approximately 4,100 individuals with a variety of different occupation streams included housekeeping, health care provider, technician, and administration. Before implementing the project, a kinesiologist was integrated into the workplace to support project implementation. This was done to help create management support at the organization

level, as this had been shown to improve the effectiveness of health promotion [98]. Specifically, the kinesiologist worked with the hospital Occupational Health and Safety Department Manager, the Atrium Manager, Musculoskeletal Injury Prevention Program Coordinator, the Director of Corporate Affairs and Communications, and the Positive Steps Committee, which is a committee of managers who help spread health promotion information to employees working in the various units. Once these relationships were formed, these individuals were involved in the development and implementation of the project.

3.4 Recruitment Strategy and Participants

Participants were recruited via announcements in the weekly staff emails, paystubs, newsletters (electronic and print), and posters hung around the hospital containing information about the study and contact information. In the time before the study was launched, a booth was set up in the atrium of the hospital during peak hours to inform employees about the study and give out contact information if interest was shown. As part of a different study, a hospital wide questionnaire regarding job demands and satisfaction was distributed online, where at the end, individuals were asked if they were willing to be contacted for future research studies. Those who answered 'yes' were asked if they would like to participate in this study as well. Inclusion criteria included those employed at the St. Boniface Hospital and willing to participate. Based on results from the Physical Activity Readiness Questionnaire for Everyone (PAR-Q+) [143,144], those who were unable to safely complete testing protocols and those who had contraindications to physical activity, such as an untreated chronic joint pain were excluded.

We recruited male and female participants ages 25-62 from various departments within the hospital. Seventeen individuals contacted study staff after hearing about the study through staff announcements or advertisement posters and 61 individuals indicated they would like to be

contacted on the hospital wide questionnaire. Of those individuals, 48 were recruited into the study. All participants provided informed consent and completed a PAR-Q+ at baseline to ensure that it was safe for them to participate in physical activity. Participants who only attended the first meeting with the kinesiologist were considered dropouts, and those who attended multiple meetings but did not complete to the end of the study were considered voluntary withdraws. Forty-one participants completed the study, 5 dropped out, and 2 were voluntary withdraws.

3.5 Intervention

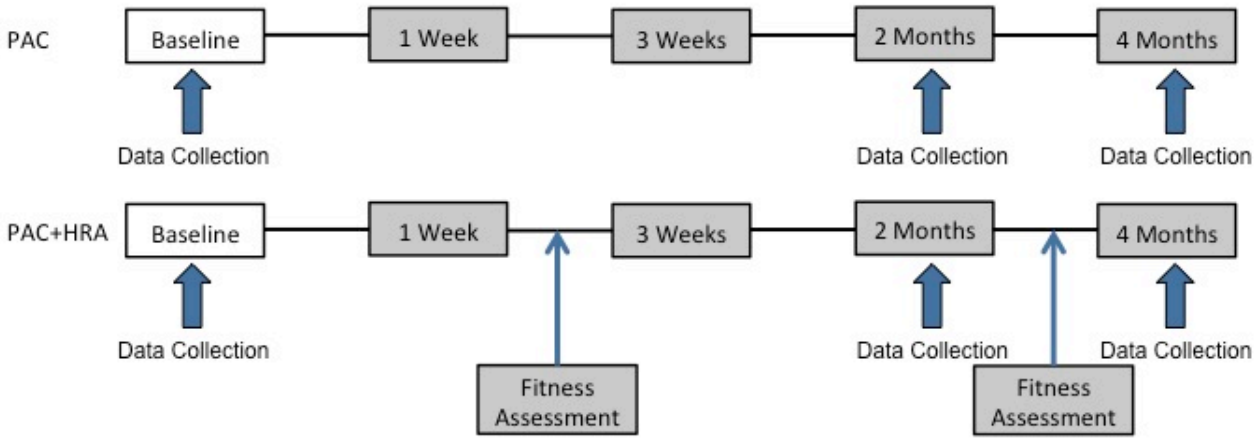
Once enrolled in the study, participants met with the kinesiologist to receive physical activity counseling at four time points: 1-week, 3-weeks, 2-months, and 4-months into the study. This schedule was created to give participants more support when they were in the early stages of adopting a more physically active lifestyle and less support as they became more independent and were able to create physical activity action plans on their own. These four meetings were participant driven (i.e. tailored to the specific needs and interests of the participant), and focused on addressing barriers to physical activity and giving participants the skills they needed to develop their own activity plans. The kinesiologist also worked with the participant to connect them with pre-existing physical activity programs in the community and/or make use of resources that were already available to the individual and the workplace. Use of pre-existing programs and resources allowed the kinesiologist to create a flexible program within the workplace while reducing initial investment costs from the employer. Once initiated into the counseling intervention, participants were given the option to enroll in another intervention involving an fHRA. Those who declined the fHRA formed the physical activity counseling (PAC) group, and those who agreed to participate formed the physical activity

counseling + fHRA (PAC+HRA) group. Allowing participants to choose their group helps ensure better adherence, as research shows giving participants a choice between different types of behaviour interventions increases participation rate and levels [145].

Participants in the PAC+HRA group attended two additional separate meetings with the research staff. During the first meeting, the kinesiologist, who is also a CSEP Certified Exercise Physiologist (CEP), administered the musculoskeletal fitness test according to CSEP guidelines. The musculoskeletal fitness test uses six valid, and reliable measures including grip strength, push ups, sit and reach, vertical jump, back extension, and one leg stance to determine overall musculoskeletal health and matches the obtained scores to a health benefit rating. Based on the test scores, the CEP provided feedback and an exercise prescription to participants tailored to improving their musculoskeletal fitness. This feedback contextualized their scores to their job duties and recommend areas of improvement along with strategies to target these areas. Potential areas of increased injury risk were identified and discussed with participants. Furthermore, feedback was adjusted to suit participants' interests and understanding of exercise protocols. This feedback was rooted in the Transtheoretical Model of Behaviour Change [134]. For example, participants in the action stage received feedback focusing on changing their current routines to target weaker areas while continuing to improve overall health. Participants in the contemplation stage received feedback focusing on how their scores influence their injury risk and how adapting a more active lifestyle could reduce their risk of musculoskeletal injuries. Thus, personalized feedback addressed each individual's stage of readiness in order to more effectively progress them to more advanced stages of change. Additional online resources were also provided to encourage individuals to improve their fitness. The fHRA, feedback, and online resources worked together to support employees on several levels. This created a

multidimensional intervention aimed at increasing physical activity and fitness levels. Follow up measures were taken two months later, where participants completed the same musculoskeletal fitness test to see if any improvements were made.

Figure 1. Project Timeline.
This timeline represents all research meetings and kinesiologist sessions that each participant completed for each group. Shaded boxes indicate a meeting with the kinesiologist.



3.6 Outcome Measures and Data collection

Data was collected at 3 different time points: baseline, 2 months, and 4 months. The primary outcome was a change in physical activity levels measured by accelerometry. Accelerometers provided an objective and robust record of physical activity [146,147] and data suggest at least 4 days with at least 10 hours of wear time are required to estimate habitual physical activity [148]. Therefore, participants were given an Actical accelerometer to wear at the right hip for 7 days at each data collection point. Specifically, this study looked at the amount of total, moderate to vigorous, vigorous, moderate, and light physical activity and sedentary time accrued sporadically ($TPA_{Sporadic}$, $MVPA_{Sporadic}$, $VPA_{Sporadic}$, $MPA_{Sporadic}$, $LPA_{Sporadic,}$ and $Sed_{Sporadic}$, respectively) and in bouts of ten minutes or more (TPA_{10Mins}, $MVPA_{10Mins}$,

VPA_{10Mins}, MPA_{10Mins}, LPA_{10Mins}, and Sed_{10Mins}, respectively). Intensity cut points were determined based on those used in the 2007-2009 Canadian Health Measures Survey [149] (see Table 1). These cut points have been validated for individuals ages 18 and older; however, we used 30 second epochs rather than 1 minute epochs. Physical activity and sedentary time accrued sporadically was defined as any 30 second epoch that met the required intensity cut point. A ten minute bout was determined as 20 consecutive epochs where at least 18 met the required intensity cut off (i.e. 9 out of 10 minutes). $TPA_{Sporadic}$ and TPA_{10Mins} were defined as the sum of $LPA_{Sporadic}$ and $MVPA_{sporadic}$ and LPA_{10Mins} and $MVPA_{10Mins}$, respectively. Data was processed using Kinesoft software to determine the total number of minutes accumulated sporadically and in ≥10 minute bouts for the different intensities at each data collection. Only activity recorded on valid days (at least 10 hours wear time) was included.

All physical activity variables ($TPA_{Sporadic}$, $MVPA_{Sporadic}$, $VPA_{Sporadic}$, $MPA_{Sporadic}$, $LPA_{Sporadic,}$ TPA_{10Mins}, $MVPA_{10Mins}$, VPA_{10Mins}, MPA_{10Mins}, and LPA_{10Mins}) were standardized for wear time. This was done using the method developed by Katapally and Muhajarine [150], which has been shown to reduce biases due to different wear times (See Appendix D for examples). In summary, each participant's total number of unstandardized minutes was divided by his or her total wear time in hours for all valid days. This estimated the average number of minutes of physical activity accumulated in one hour. The calculated value was then multiplied by total 'controlled' wear time, where total 'controlled' wear time was the product of the number of valid days worn (case specific) and 10 hours. Ten hours was used because it was the minimum number of hours required for a valid day. The final value indicated the amount of physical activity accumulated over all valid days if the participant wore the accelerometer for 10 hours on each day; therefore, total standardized minutes. Total standardized minutes for each

participant was then divided by the number of valid days worn and multiplied by 7 to calculate minutes per week. Sedentary time ($Sed_{Sporadic}$ and Sed_{10Mins}) was standardized using the same process described for physical activity. Total standardized minutes for each participant was divided by the number of valid days to calculate minutes per day, and then divided by 60 to calculate average number of hours per day.

Table 1. Intensity Cut Points for Accelerometers (activity counts/30s)

Intensity	Cut Point
Sedentary	< 50
Light	50 to < 767.5
Moderate	767.5 to < 1981
Vigorous	≥ 1981
Moderate to Vigorous	≥ 767.5

Cut points determined as number of activity counts per 30 second epoch.

Secondary client outcome measures were determined with a questionnaire and assessed changes in a variety of parameters that are likely to change as an individual becomes more physically active. The following was assessed:

1) physical activity self-efficacy (SEE), which is defined as a person's perception of how likely it is they will successfully incorporate physical activity into their daily routine, was assessed using the *Self-Efficacy for Exercise survey*. This parameter has been shown to predict physical activity behaviour [151];
2) stage of change (SOC), which is a parameter based on Prochaska's Transtheoretical model where individuals go through six stages of behaviour modification as they seek to change their behaviour [152], was assessed using the *Stages of Change Questionnaire*. The value of using this survey will be to determine if the intervention supports physical activity behaviour change [153];
3) changes in mental health were assessed using the Patient Health Questionnaire-9, which

derives a severity score for symptoms of depression [154]. This tool has previously been used to identify physical inactivity as a risk factor associated with depression amongst cardiac surgery patients in Manitoba [155,156].

These data provided novel information regarding a range of client outcomes, including changes in self-efficacy, attitude, motivation, self-definition and mental health.

Additionally, pre- and post-test fitness scores were compared for those in the PAC+HRA group. This helped determine if the current intervention could increase musculoskeletal fitness levels as well as physical activity levels. The musculoskeletal fitness assessment used addresses muscular strength, endurance, flexibility, power, and balance. While some measurements, such as the sit and reach component, only assess certain muscle groups, these measures target areas where the measure is most relevant. For example, hamstring and lower back flexibility are indicative of lower back health, and reduced flexibility of the lower body is associated with adverse functional outcomes that may lead to a loss of independence [131]. Other critical measurements include vertical jump and grip strength, which assess muscle power and upper body strength, respectively and are important predictors on functional capacity and independent living as one ages [132,133].

3.7 Statistical Analysis

3.7.1 Primary Outcomes

A mixed ANCOVA (one between and one within subject factor) was used to assess changes between groups and over time in $TPA_{Sporadic}$, $MVPA_{Sporadic}$, $MPA_{Sporadic}$, $LPA_{Sporadic}$, and $Sed_{Sporadic}$. Originally, age and gender were proposed as covariates, since physical activity levels tend to decline with age and males are commonly more active then females [6]. However, only two males were present in the analysis, therefore this covariate was omitted. Gym

membership, where those who had a gym membership at baseline were defined as gym members and those who did not have a gym membership at baseline were defined as non-gym members, was later added as a covariate. When significant differences were found, a post hoc analysis using paired t-tests with the Holm-Bonferroni adjustment [157] was used. This approach was recommended by a statistician.

Before analysis, all sporadic physical activity variables ($TPA_{Sporadic}$, $MVPA_{Sporadic}$, $VPA_{Sporadic}$, $MPA_{Sporadic}$, $LPA_{Sporadic}$, and $Sed_{Sporadic}$) were tested to ensure they did not violate any assumptions of the ANCOVA. Specifically, we tested for normal distribution and significant outliers. A statistician examined the histograms and raw data scores of variables that significantly departed from normal distributions (determined by the Shaprio-Wilk test) to assess if an ANCOVA was still appropriate. ANCOVAs and ANOVAs are generally very robust to type I errors even when there is a departure from normality [158]; therefore, unless the deviation from normality is extreme, an ANOVA and ANCOVA can still be run without major concerns. Extreme outliers were only present in $VPA_{sporadic}$ physical activity. Because this variable is already accounted for in $MVPA_{sporadic}$ and $TPA_{sporadic}$, it was excluded from the analysis without major loss of data. Missing data were handled using the carry over method. Voluntary withdraws were included in the final analysis and data from their last visit was carried over for the duration of the study.

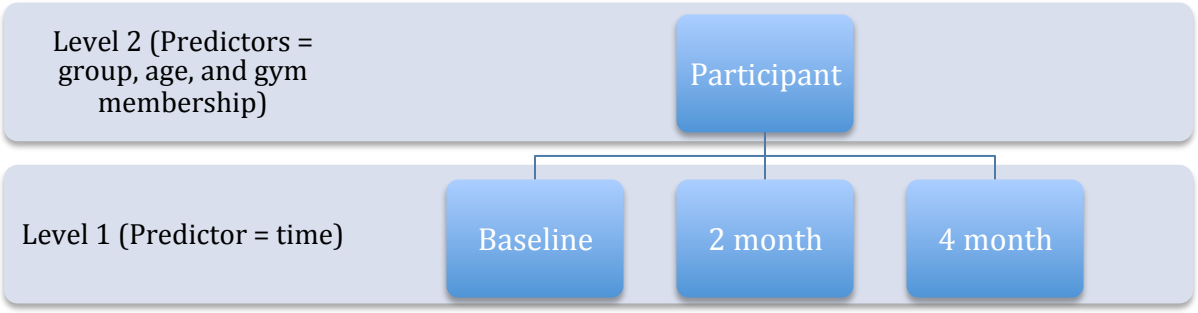
The assumptions of homogeneity of variance (equal between group variance) and sphericity (equal within group variance) were tested when the analysis was run using Levene's test for homogeneity of variances and Mauchly's sphericity test, respectively. Homogeneity of variance was met for all variables. When sphericity was violated, a multivariate, rather than univariate, AN(C)OVA was used. Both univariate and multivariate AN(C)OVAs perform the

same test; however, the underlying mechanisms used to complete the test are different [158]. Univariate AN(C)OVAs are simpler, but assume sphericity of the data; multivariate AN(C)OVAs are more complicated but do not rely on sphericity [158]. Therefore, results from the univariate test were used by default, unless sphericity was violated.

Changes in TPA_{10Mins}, $MVPA_{10Mins}$, VPA_{10Mins}, MPA_{10Mins}, LPA_{10Mins}, and Sed_{10Mins} were assessed with a multilevel model regression analysis. This was done to address the severe departure from normal distributions seen in these variables. Multilevel model regression (MLM) is different from standard ordinary least squares regression as it does not assume independence of observations, an assumption that is violated when working with grouped data or repeated measures [159]. Because MLM is made to handle grouped data, it is considered a suitable alternative to a mixed ANCOVA [159,160].

A 2-level model was used where level 1 consisted of each individual time point and level 2 consisted of the individuals. Time (baseline, 2 months, 4 months) was a level 1 predictor and was treated as a continuous variable (1, 2, 3). Age and group were level 2 predictors and also treated as continuous variables. Gym membership was later added as a level 2 predictor.

Figure 2. Setup of Mulitlevel Model for Physical Activity in Bouts of 10 Minutes or More. Variables include TPA_{10Mins}, $MVPA_{10Mins}$, VPA_{10Mins}, MPA_{10Mins}, LPA_{10Mins}, and Sed_{10Mins}



Main effects and interaction effects were analyzed using 3 steps. First, a main effects model was analyzed where no interactions were included. All predictors were included as fixed effects. Second, interactions were created between time and group, time and gym membership,

and group and gym membership and added to the model. Age was still included as a predictor, but not included in any interactions. Lastly, a final interaction between time, group, and gym membership was created and added to the model.

3.7.2 Secondary outcomes

Mixed ANOVAs were used to determine between and within group differences for Self Efficacy for Exercise (SEE) score and symptoms of depression measured with the Patient Health Questionnaire 9 (PHQ9). All assumptions were tested as previously described to ensure the ANOVA was not violated. No violations were present. When significant differences were found, a post hoc analysis using paired t-tests with the Holm-Bonferroni adjustment [157] was used. Change in fitness levels for those in the PAC+HRA group were tested used a paired t-test ($p<0.05$).

Chapter 4: Results

4.1 Baseline Characteristics

Baseline characteristics (Table 1) were collected from study participants during the first meeting with the research staff. Participant demographics, including age, gender, and BMI did not differ between PAC and PAC+HRA. There was no difference in occupation type between both groups, where occupation type was self-reported by participants as either "mostly sedentary" or "not mostly sedentary". No significant differences were observed between the two groups for demographics, occupation type, $TPA_{Sporadic}$, $MVPA_{Sporadic}$, $Sed_{Sporadic}$, TPA_{10Mins}, $MVPA_{10Mins}$, and Sed_{10Mins}.

Table 2. Comparison of Baseline Characteristics between PAC and PAC+HRA

	PAC	PAC+HRA	p-value
Demographics			
Age (years)	47 ± 2	51 ± 2	0.304
Gender (% male per group)	1 (5%)	1 (6%)	0.822
BMI (kg/m^2)	28.2 ± 1.4	29.6 ± 1.4	0.500
Occupation type			
Sedentary (% per group)	13 (59%)	12 (75%)	0.321
Physical Activity Levels			
$TPA_{Sporadic}$ (mins/week)	989 ± 50	864 ± 80	0.171
$MVPA_{Sporadic}$ (mins/week)	159 ± 15	162 ± 22	0.900
$Sed_{Sporadic}$ (hrs/day)	7.6 ± 0.1	7.9 ± 0.2	0.171
TPA_{10Mins} (mins/week)	61 ± 12	72 ±12	0.533
$MVPA_{10Mins}$ (mins/week)	38 ± 12	37 ± 11	0.952
Sed_{10Mins} (hrs/day)	5.1 ± 0.2	5.4 ± 0.3	0.410

Continuous variables expressed as mean ± standard error. Physical activity values unadjusted. Categorical variables expressed in frequencies (percentage of group). PAC n=22; PAC+HRA n=16. BMI, body mass index; $TPA_{Sporadic}$, total sporadic physical activity; $MVPA_{Sporadic}$, moderate to vigorous intensity sporadic physical activity; $Sed_{Sporadic}$, sporadic sedentary time; TPA_{10Min}, total physical activity in bouts of 10 minutes or more; $MVPA_{10Mins}$, moderate to vigorous intensity physical activity in bouts of 10 minutes or more; Sed_{10Mins}, sedentary time in bouts of 10 minutes or more.

4.2 Primary Outcomes

4.2.1 Sporadic Physical Activity

The initial ANCOVA analysis did not identify significant differences for any of the physical activity variables. Gym membership was added as a covariate as well; however, there were still no significant effects.

Table 3. Sporadic Physical Activity for PAC and PAC+HRA

	Baseline	2 month	4 month
$TPA_{Sporadic}$ (mins/week)			
PAC	985 ± 60	998 ± 58	1035 ± 70
PAC+HRA	870 ± 71	908 ± 68	888 ± 82
$MVPA_{Sporadic}$ (mins/week)			
PAC	158 ± 17	163 ± 16	172 ± 23
PAC+HRA	163 ± 20	169 ± 19	186 ± 28
$MPA_{Sporadic}$ (mins/week)			
PAC	135 ± 15	141 ± 14	146 ± 18
PAC+HRA	138 ± 17	151 ± 17	154 ± 21
$LPA_{Sporadic}$ (mins/week)			
PAC	827 ± 52	835 ± 51	861 ± 56
PAC+HRA	708 ± 62	739 ± 59	702 ± 65
$Sed_{Sporadic}$ (hrs/day)			
PAC	7.6 ± 0.1	7.6 ± 0.1	7.1 ± 0.3
PAC+HRA	7.9 ± 0.2	7.8 ± 0.2	7.9 ± 0.3
Wear Time (hrs/week)			
PAC	78.5 ± 5.0	78.9 ± 4.7	79.3 ± 5.5
PAC+HRA	73.0 ± 6.1	77.5 ± 6.6	74.6 ± 5.7

Values are means ± standard error. Physical activity values adjusted for age and gym membership. Wear time is total number of hours worn on valid days. PAC n=22; PAC+HRA n=16. $TPA_{Sporadic}$, total sporadic physical activity; $MVPA_{Sporadic}$, moderate to vigorous intensity sporadic physical activity; $MPA_{Sporadic}$, Moderate intensity sporadic physical activity; $LPA_{sporadic}$, Light intensity sporadic physical activity; $Sed_{Sporadic}$, sporadic sedentary time.

4.2.2 Physical activity in bouts of 10 minutes or more

For the main effects model, time was a significant predictor for TPA_{10Mins}, MPA_{10Mins}, and $MVPA_{10Mins}$, (p=0.003, 0.031, and 0.022, respectively). Results are shown in tables 4, 5, and 6. With each subsequent data collection, TPA_{10Mins}, MPA_{10Mins}, and $MVPA_{10Mins}$ increased by 16, 7, and 9 min/week, respectively. Neither age nor group was a significant predictor for any of the physical activity variables or sedentary time. Time was also found to be a significant predictor of LPA_{10Mins}; however, in the first level interactions model (Table 7), the time by gym membership interaction was found to be a significant predictor for LPA_{10Mins} (β=21, p=0.002). This indicates the effect of time depends on whether or not a participant had a gym membership at baseline. The positive value of this interaction suggests that those with gym memberships saw a greater increase in light physical activity across time compared to those without gym memberships. No other significant predictors were found for LPA_{10Mins}. No significant interactions were found for TPA_{10Mins}, $MVPA_{10Mins}$, VPA_{10Mins}, MPA_{10Mins}, or Sed_{10Mins} in the first level interaction model.

Table 4. Multilevel Model Main Effects Results for TPA_{10Mins}

Random Effects

Level	Effect	Parameter Estimate	Standard Error	*p*-value	95% Confidence Interval *Lower*	*Upper*
1 Time	Residual	2073.9	323.0	**<0.001**	1509.1	2850.2
2 Subject	Intercept	2554.6	754.8	**0.001**	1433.5	4552.4

Fixed Effects

Level	Parameter Estimate	Standard Error	*p*-value	95% Confidence Interval *Lower*	*Upper*
Intercept	77.6	9.2	**<0.001**	58.9	96.3
Time	15.9	5.2	**0.003**	5.5	26.3
Age	-0.2	0.9	0.825	-2.0	1.6
Group	0.6	19.0	0.974	-37.8	39.1
Gym	6.1	20.0	0.761	-34.2	46.4

Values in minutes per week; significant values bolded. Time was only significant predictor for TPA_{10Mins}, where there was an estimated increase of 15.9 minutes/week between each time point (i.e. between baseline and 2 months and 2 months and 4 months).

Table 5. Multilevel Model Main Effects Results for MPA_{10Mins}

Random Effects

Level	Effect	Parameter Estimate	Standard Error	*p*-value	95% Confidence Interval *Lower*	*Upper*
1 Time	Residual	828.2	134.0	**<0.001**	602.6	1138.2
2 Subject	Intercept	589.6	203.6	**0.004**	399.7	1160.0

Fixed Effects

Level	Parameter Estimate	Standard Error	*p*-value	95% Confidence Interval *Lower*	*Upper*
Intercept	22.2	4.7	**<0.001**	12.1	31.9
Time	7.3	3.3	**0.031**	0.7	13.8
Age	0.0	0.5	0.999	-0.9	0.9
Group	1.1	9.8	0.908	-18.7	21.0
Gym	0.1	10.3	0.990	-20.7	20.9

Values in minutes per week; significant values bolded. Time was only significant predictor for MPA_{10Mins}, where there was an estimated increase of 7.3 minutes/week between each time point (i.e. between baseline and 2 months and 2 months and 4 months).

Table 6. Multilevel Model Main Effects Results for $MVPA_{10Mins}$

Random Effects

Level	Effect	Parameter Estimate	Standard Error	*p*-value	95% Confidence Interval *Lower*	*Upper*
1 Time	Residual	1214.1	197.0	**<0.001**	883.5	1668.6
2 Subject	Intercept	2290.6	621.8	**<0.001**	1345.5	3899.7

Fixed Effects

Level	Parameter Estimate	Standard Error	*p*-value	95% Confidence Interval *Lower*	*Upper*
Intercept	45.9	8.4	**<0.001**	28.2	62.9
Time	9.3	4.0	**0.022**	1.4	17.2
Age	0.1	0.8	0.933	-1.6	1.7
Group	-0.9	17.3	0.959	-36.0	34.1
Gym	5.9	18.1	0.746	-30.8	42.7

Values in minutes per week; significant values bolded. Time was only significant predictor for $MVPA_{10Mins}$, where there was an estimated increase of 9.3 minutes/week between each time point (i.e. between baseline and 2 months and 2 months and 4 months).

Table 7. Multilevel Model Interaction Results for LPA_{10Mins}

Random Effects

Level	Effect	Parameter Estimate	Standard Error	*p*-value	95% Confidence Interval *Lower*	95% Confidence Interval *Upper*
1 Time	Residual	701.2	113.7	**<0.001**	510.2	963.6
2 Subject	Intercept	138.0	93.3	0.139	36.7	519.4

Fixed Effects

Level	Parameter Estimate	Standard Error	*p*-value	95% Confidence Interval *Lower*	95% Confidence Interval *Upper*
Intercept	31.7	3.1	**<0.001**	25.4	38.1
Time	6.5	3.0	**0.035**	0.5	12.6
Age	-0.3	0.3	0.375	-0.9	0.3
Group	1.5	6.4	0.814	-11.5	14.5
Gym	0.2	6.7	0.979	-13.4	13.8
Time*Group	-10.0	6.1	0.110	-22.2	2.3
Time*Gym	21.0	6.5	**0.002**	7.9	34.0
Group*Gym	4.7	13.7	0.734	-23.0	32.3

Values in minutes per week; significant values bolded. Time was a significant predictor of LPA_{10Mins}. However, Time*Gym was also significant predictor for LPA_{10Mins} and indicated there was an estimated increase of 21.0 minutes/week between each time point (i.e. between baseline and 2 months and 2 months and 4 months) for those with gym memberships.

For the final model with the interaction between Group, Time and Gym, this interaction was nearing significance for TPA_{10Mins} and $MVPA_{10Mins}$ (β=41 and 30, p=0.066 and 0.078, respectively; data not shown). This suggests that for both TPA_{10Mins} and $MVPA_{10Mins}$, those in the PAC+HRA group that had a gym membership at baseline tended to increase their TPA_{10Mins} and $MVPA_{10Mins}$ over time (data not shown).

4.3 Secondary Outcomes

4.3.1 Self-Efficacy for Exercise

For SEE, a main effect was found for time (p=0.034) (Figure 4); however, post hoc analysis found no significant differences between time points using the Holm-Bonferroni

correction. No group or interaction effects were identified. No simple effects were found. This suggests that overall, the intervention significantly improved self-efficacy for exercise score regardless of the type of intervention (PAC or PAC+HRA).

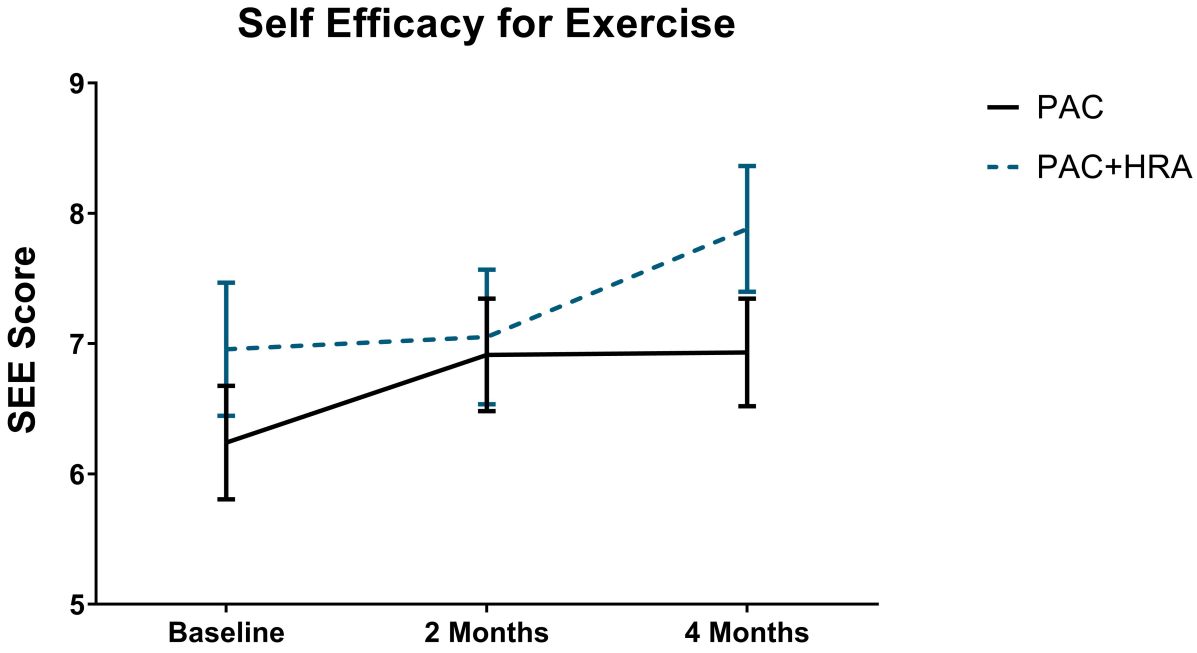
A correlation analysis was performed to see if there was a positive relationship between change in SEE (i.e. calculated as 4 month score – baseline score) and change in all physical activity variables (4 month score – baseline score). No significant correlations were found (Data not shown).

Table 8. Questionnaire data for PAC and PAC+HRA

	Baseline	2 month	4 month
SEE			
PAC	6.2 ± 0.4	6.9 ± 0.4	6.9 ± 0.4
PAC+HRA	6.9 ± 0.5	7.1 ± 0.5	7.9 ± 0.5
PHQ-9			
PAC	6.1 ± 0.9	4.1 ± 0.6	2.9 ± 0.6
PAC+HRA	4.6 ± 1.1	4.2 ± 1.1	3.2 ± 0.8
SOC			
PAC	10 (45%)	12 (56%)	14 (64%)
PAC+HRA	8 (50%)	10 (63%)	12 (75%)

SEE and PHQ-9 values are means ± standard error; SOC is number of participants in action or maintenance stage (Percent of group). PAC n=22; PAC+HRA n=16. SEE, Self Efficacy for Exercise; PHQ-9, Patient Health Questionnaire – 9; SOC, Stage of change.

Figure 3. Change in SEE over time for PAC and PAC+HRA.
Values are mean ± standard error; PAC n=22; PAC+HRA n=16.



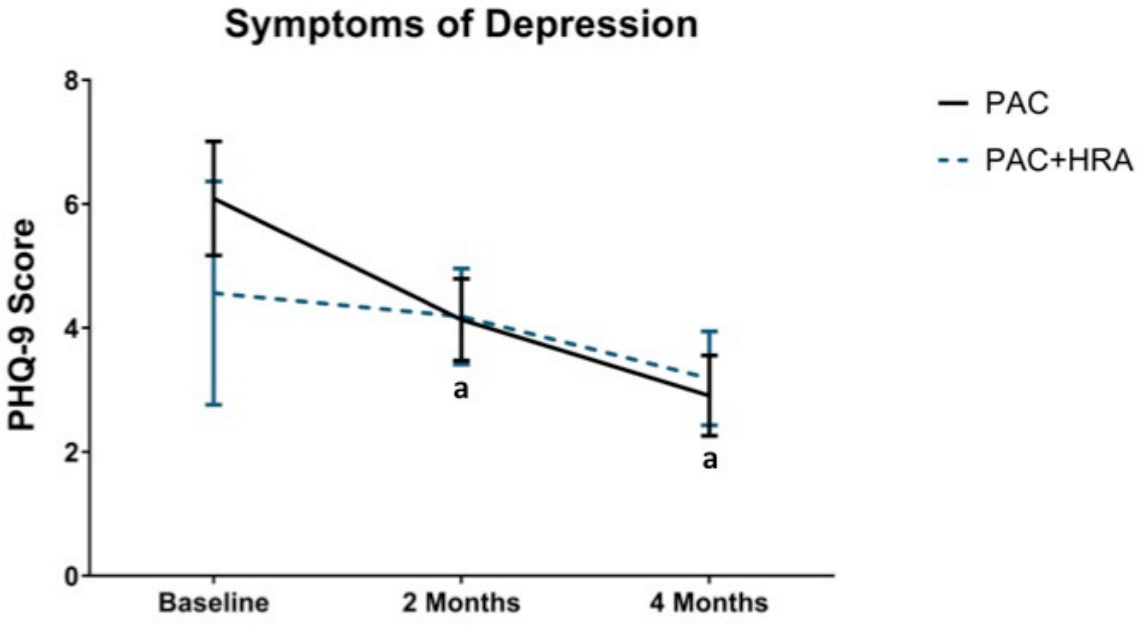
4.3.2 Patient Health Questionnaire – 9

PHQ9 score was treated as a continuous variable. ANOVA analysis found a main effect of time (p=0.0013); however, upon investigation of the simple effects, a significant simple effect of time was found for the PAC (p=0.005) group, but not PAC+HRA (p=0.398), suggesting that the main effect of time can be mainly attributed to changes seen in the PAC group. A post hoc analysis of the main effect of time found significant differences between all three time points (Baseline vs. 2 months, p=0.03; Baseline vs. 4 month, p=0.009; 2 months vs. 4 months, p=0.03), where PHQ9 score decreased from 5.3 to 4.2 to 3. From a clinical perspective, this is equivalent to a decrease from minimal symptoms of depression to no symptoms of depression.

Post hoc analysis of the simple effect of time in the PAC group found significant differences between baseline and 2 (p=0.006) and 4 months (p=0.006), but no significant differences between 2 months and 4 months (p=0.059). This indicates there was a significant

decrease in symptoms of depression from minimal to no symptoms near the beginning of the intervention for those in the PAC group.

Figure 4. Change in PHQ-9 over time for PAC and PAC+HRA.
Values are mean ± standard error; PAC n=22; PAC+HRA n=16.; a, different from baseline ($p<0.05$)

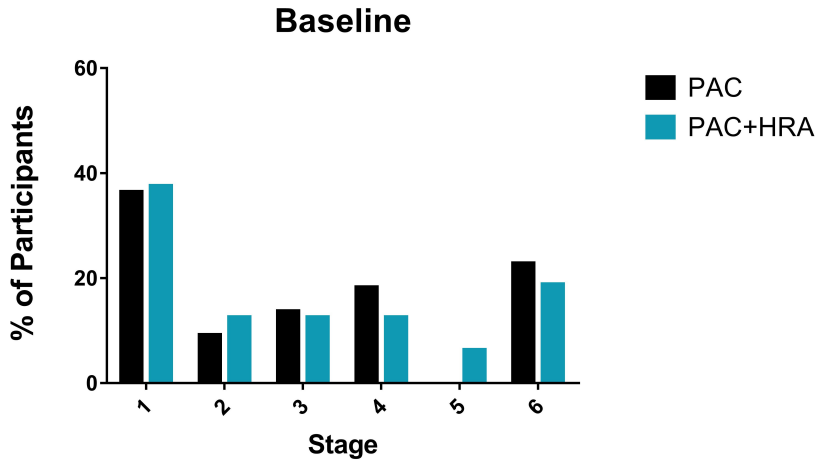


4.3.3 Stage of Change

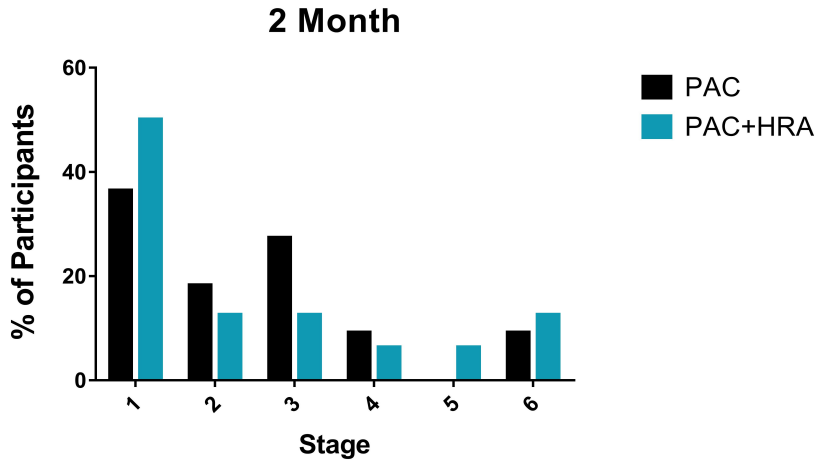
For Stage of Change, we assessed what percentage of individuals were in each group in the action and maintenance stage (Figure 6). At baseline, 45% and 50% of individuals were in these stages in the PAC and PAC+HRA group, respectively. At two months, this increased to 56% and 63%. At four months, 64% and 75% were in the action and maintenance stages for PAC and PAC+HRA, respectively.

Figure 5. SOC at baseline, 2 months, and 4 months for PAC and PAC+HRA.
Values in percent of group; PAC n=22; PAC+HRA n=16.; 1, maintenance; 2, action; 3, preparation; 4, contemplation; 5, precontemplation; 6, relapse

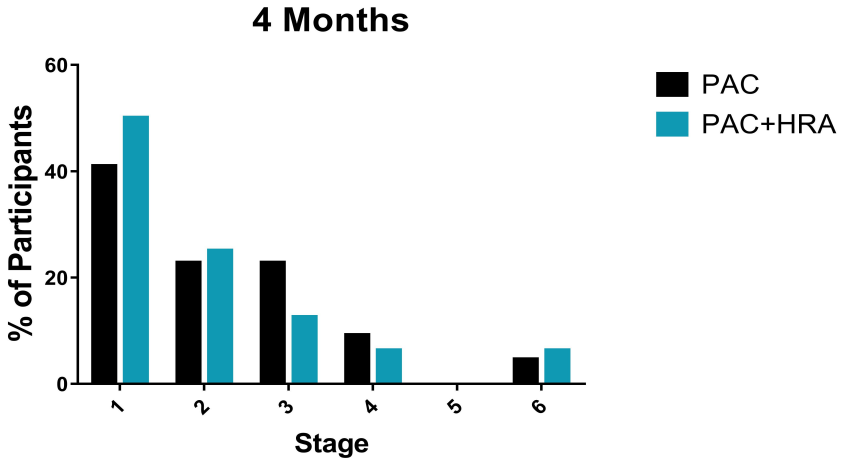
A



B



C



4.3.4 Fitness Scores

A paired t-test found a significant increase in overall musculoskeletal fitness scores for those in the PAC+HRA group (18.2 vs. 21.7, $p<0.001$). Improvements were seen in all individual tests; however, only significant improvements were seen in push ups (3.0 vs. 4.0, $p=0.003$) and sit & reach (2.6 vs. 3.4, $p=0.012$). These data are on Table 8. How would improvements in pushups and sit and reach versus the other fitness tests affect job performance or injury risk?

Table 9. Baseline and Follow-up Fitness Scores for PAC+HRA

	Baseline	**Follow-up**	**p-value**
Overall Score	18.2 ± 0.9	21.7 ± 0.8	**<0.001**
Fitness Test			
Grip Strength	4.3 ± 0.2	4.7 ± 0.1	0.082
Push ups	3.0 ± 0.4	4.0 ± 0.3	**0.003**
Leg Power	3.7 ± 0.3	4.1 ± 0.3	0.054
Balance	1.6 ± 0.1	1.9 ± 0.1	0.082
Trunk Endurance	3.2 ± 0.3	3.9 ± 0.3	0.055
Sit & Reach	2.6 ± 0.4	3.4 ± 0.3	**0.012**

Values expressed as mean ± standard error. Categorical scores for grip strength, push ups, leg power, trunk endurance, and sit & reach scored as poor, 1; fair, 2; good, 3; very good, 4; excellent, 5. Balance scored as below average, 1; above average, 2. Overall score calculated as sum of all test scores.

Chapter 5: Discussion

Currently, the Canadian Physical Activity Guidelines recommends adults ages 18-64 engage in 150 minutes of moderate to vigorous intensity physical activity in bouts of 10 minutes or more per week as well as at least 2 days of resistance training to receive health benefits [5]. Few Canadian adults actually meet these guidelines [6], costing the Canadian health care system over $2 billion annually [12]. Numerous studies have looked at using the workplace as a means to promote health, as it is beneficial for the employee and employer and can be easily distributed to a widespread audience. However, there is still limited evidence on what methods most effectively promote healthy behaviours in the workplace, especially physical activity participation [16,17]. I hypothesized that the addition of an fHRA to a physical activity counseling intervention would elicit greater increases in physical activity compare to physical activity counseling alone. Our study showed that a kinesiologist delivered physical activity counseling intervention could increase TPA_{10Mins}, $MVPA_{10Mins}$, and MPA_{10Mins} within 4 months. LPA_{10Mins} also increased; however, this was dependant on gym membership at baseline. Participants in our study reported greater self-efficacy for exercise and lower symptoms of depression as the intervention progressed. At the end of the study, both groups had a higher percentage of individuals in the action/maintenance stage of change and those in the PAC+HRA group had higher overall fitness scores. We demonstrated that significant increases in physical activity and improvements in functional musculoskeletal fitness can be observed within 4 months of physical activity counseling. Furthermore, we found that the addition of an fHRA to physical activity counseling does not have an additional effect on physical activity levels measured via accelerometry when compared to physical activity counseling alone. This has not previously been shown in the literature.

5.1 The Addition of the fHRA

There is a large amount of heterogeneity in workplace wellness research, making it hard to determine their full effect. This is a problem for employers, as many desire more information showing which programs produce the most benefits [122]. We addressed this by comparing changes in physical activity levels between those who received an fHRA in addition to physical activity counseling to those who received physical activity counseling alone. In our study, no additional benefit of the fHRA was found when measuring physical activity levels via accelerometry. This was not what we had hypothesized based on previous research. Previous research has shown that standard non-fitness HRAs can be effective alone [19], but are most effective when combined with other interventions such as counseling [19,119,161]. This would imply counseling and HRAs have their own individual effect that can be summed when both interventions are used together. However, our data suggest the improvements are primarily due to the counseling itself rather than a combined effect of the counseling and HRA.

It is imperative to keep in mind the type of counseling, the type of HRA, and the outcomes measured to fully understand why no group effect was observed in our study. Previous studies combining HRAs and counseling have primarily focused on the HRA with the counseling component being a supplement to the HRA [19,116,119,126]. The counseling received was usually based on initial HRA results [19,116,119,126]. Outcome measures were often the results from a second follow-up HRA and/or questionnaires asking about changes in health behaviour [19,116,119,126,161]. In contrast, our study focused on counseling as the primary component with the fHRA being a supplement to the counseling. Given the nature of the counseling intervention, the information and feedback provided in the fHRA may have been redundant. In our current study, the type of physical activity recommended to participants depended on resources

available, interest, and current goals. This was done to improve the effectiveness of the program, as personalized and tailored counseling has been shown to improve the effectiveness of the intervention [120,162]. Therefore, if a participant wanted to improve strength and only had access to free weights at home, they would receive a free weight based strength exercise program. The majority of participants in the PAC group (73%) received either resources or recommendation regarding strength training, similar to the feedback given to participants in the PAC+HRA. This likely contributed to the lack of group effect.

The main outcome in our study was physical activity measured with accelerometers. This was a novel contribution to the literature, as previous research looking at the effect of HRAs on physical activity has often used self-report [19,97,121,161,163]. However, use of accelerometers also limited our ability to measure certain types of physical activity that may have been important contributors to a group effect. Accelerometers measure physical activity by sensing changes in acceleration common to human movement [164]. Motions that do not produce these changes in acceleration, such as some forms of resistance training and biking, are not optimally captured as physical activity by accelerometers [147]. Because our fHRA focused on musculoskeletal fitness and recommended resistance training to improve scores, higher volumes of resistance training would not have been captured with the accelerometers. Those in the PAC+HRA group improved fitness scores indicating they followed the kinesiologist's recommendations and participated in more resistance based physical activity. However, since this outcome was not measured for the PAC group, it is impossible to say if this was a result of the physical activity counseling or the HRA.

Few HRAs have used physical activity as an outcome measure, and even fewer have looked at the effect of an fHRA in the workplace. Our study demonstrates that an fHRA paired

with physical activity counseling in the workplace can significantly improve musculoskeletal fitness scores and increase TPA_{10Mins}, $MVPA_{10Mins}$, and MPA_{10Mins} measured via accelerometry. Furthermore, we also showed that adding an fHRA to participant based physical activity counseling does not produce greater increases in physical activity measured with accelerometers. Higher levels of muscular strength are associated with improved job performance[165] and a maintained work ability index [166,167]. Specifically, the changes observed in push ups and sit and reach scores in our study could be equated to a 1.79 and 1.93-fold improvement in work ability, respectively [168].

5.2 Effect of the Intervention on Physical Activity in Bouts of Ten Minutes or More

The current Canadian physical activity guidelines suggests individuals ages 18-64 participate in 150 minutes of moderate to vigorous physical activity in bouts of 10 minutes or more [5]. Therefore, we conducted an analysis looking at physical activity accrued in 10 minute bouts or more. For both groups, there was increased participation in TPA_{10Mins}, $MVPA_{10Mins}$, and MPA_{10Mins} over time. Additionally, there was a significant interaction between LPA_{10Mins} and gym membership at baseline, indicating those who had a gym membership had a significant increase in LPA_{10Mins}. The increase in TPA_{10Mins}, $MVPA_{10Mins}$, and MPA_{10Mins} indicates participants were engaging in more exercise-like or planned physical activity. Additionally, the interaction observed between LPA_{10Mins} and gym membership may represent physical activity that occurred during resistance training at the gym, such as warm up, cool down, walking between weight machines, or body weight resistance training (i.e. push ups and squats). The total increase in TPA_{10Mins} and $MVPA_{10Mins}$ from baseline to 4 months was approximately 32 and 18 minutes per week, respectively. Research shows most health benefits are seen when moving from no activity to low – moderate amounts of physical activity [178]. A meta analysis

found that going from no activity to participating in 2.5 hours of moderate activity per week would equate to a 19% risk reduction in mortality [178]. Participants in this study only reached an average of 97 minutes per week of TPA_{10Mins} at four months compared to an average of 65 minutes per week of TPA_{10Mins} at baseline; however, the increase that did occur could still elicit health benefits. The change in physical activity (20-30 minutes per week) indicates participants were engaging in at least one more exercise session per week than at baseline; this increase of one exercise session per week could decrease stroke risk by up to 17% [31,179].

Numerous research studies have shown physical activity counseling interventions in the workplace can improve physical activity, exercise, and cardiovascular fitness levels [17,106,180–182]. However, not all studies agree [17,161,183], and there has been a call for higher quality studies to replicate the positive findings of workplace wellness programs previously shown [17,183]. Our study showed that when using objective measures of physical activity rather than self report, physical activity counseling in the workplace can increase exercise participation. This is an important addition to the literature. Many studies showing improvements in physical activity or exercise behaviours are based on self report [17,181–183], which often overestimates physical activity levels [107]. Studies using physical activity counseling in other settings have increased physical activity levels by approximately 30 minutes per week [106], similar to our study. It is unclear if the changes in physical activity due to workplace interventions can be maintained long term [96]. Therefore, a follow up analysis is being done with our cohort to determine if the improvement seen here are still present 8 months after the intervention.

5.3 Self-Efficacy for Exercise

Self-efficacy for exercise is an important aspect in initiating and creating long-term changes in physical activity levels. For example, a study done in 970 female nurses found that

self-efficacy for exercise significantly predicted exercise participation [184]. Women going through cardiac rehabilitation who had lower self-efficacy scores high a significantly higher probability of remaining physically inactive 12 months after completing cardiac rehabilitation [185]. We found a significant improvement in self-efficacy for exercise score among all participants. One of the purposes of the intervention was to help participants overcome barriers and improve self-efficacy as a means of increasing physical activity. The data show the intervention was successful in doing so. Other physical activity interventions in the workplace have also produced increases in self-efficacy. For example, a systematic review and meta-analysis found that physical activity interventions have an overall significant effect on self-efficacy [186]. These improvements in self-efficacy are often accompanied by an increase in physical activity levels [93,187]. In our study, the increase in self-efficacy for exercise was accompanied with an increase in TPA_{10Mins}, $MVPA_{10Mins}$, and MPA_{10Mins}; however, there were no significant correlations found when a correlation analysis was run between change in self efficacy (i.e. 4 month value – baseline value) and change in TPA_{10Mins}, $MVPA_{10Mins}$, and MPA_{10Mins} (i.e. 4 month value – baseline value). This was an unexpected finding, as previous research has shown a strong relationship between self-efficacy and physical activity participation [188–190]. It is possible that the limited sample size in our study did not allow for the detection of significant correlations.

5.4 Symptoms of depression

Symptoms of depression were measured using the Patient Health Questionnaire-9 [156]. This questionnaire uses nine questions to classify an individual as having none, minimal, mild, moderate, or severe symptoms of depression and has been used to identify physical inactivity as a risk factor associated with depression amongst cardiac surgery patients in Manitoba [155,156].

There was a significant decline in symptoms of depression; however, examination of the simple effects showed this decline was mainly due to changes in the PAC group. It has been well established that there is a strong relationship between physical activity and depression in non-clinical populations, where those who engage in more physical activity report fewer symptoms of depression [64]. In our study, participants went from having minimal symptoms of depression to no symptoms of depression. Reasons for the significant decrease in the PAC but not the PAC+HRA group are unclear. Those in the PAC+HRA did have a lower mean score at 4 months compared to baseline, suggesting some improvements were present. Lack of significance in the PAC+HRA could be due to a lower group mean at baseline, which could contribute to a "floor effect". The large standard error in the PAC+HRA group could have also contributed to the lack of significance.

5.5 Stage of Change

Stage of change was assessed using the Stages of Change Questionnaire based on Prochaska's Transtheoretical model (TTM) [134,152]. The counseling individuals received was base on their current stage and worked towards advancing them to a more progressive stage. With both groups, a greater proportion of individuals reported being in the action/maintenance stage at 4 months compared to baseline. Various meta-analyses have found workplace interventions are more effective when based on an underlying theory [102,104,110]. TTM is has been used previously within the workplace setting with success. For example, a nine month physical activity counseling intervention in the workplace has a significant effect on total physical activity and sporting activities [99,191]; the counseling received was based on TTM [99,191]. Our study confirms that using TTM as an underlying theory can elicit changes in physical activity behaviour. Furthermore, progressing to a more advanced stage could be indicative of

sustained behaviour change.

5.6 Limitations

It is important to acknowledge the limitations in this study. First, the measures we used to assess physical activity were not able to capture resistance training in both groups. Therefore, any group differences in resistance training could not be identified. Future research should combine activity logs with accelerometers to ensure both aerobic and resistance training are captured in the outcomes. Other health outcomes were also not measured during the study. For example, 50% of the participants indicated weight loss as one of their goals in their first meeting with the kinesiologist. To meet this goal, the kinesiologist also provided counseling for nutrition and referrals to nutritional experts. Additionally, there was a focus on shifting participants' mindsets to try to be healthier, rather than to lose weight. Neither body weight nor eating habits were tracked throughout the intervention. Research shows focusing on only one health behaviour elicits greater behavioural change compared to targeting multiple behaviours [102,104]. As such, we chose not to assess these outcomes (e.g. weight and nutrition) because we wanted the main focus to be on physical activity. This limitation could be addressed by having the kinesiologist and participant go over initial goals and progress on the last meeting and record what goals were met and/or changed. This would keep the focus mainly on physical activity while still providing a rough assessment on other changes in health.

Another limitation is the overlap between the PAC and fHRA. The fHRA provided specific information regarding participants' musculoskeletal fitness and its role in work related injury risk, which was not done in the PAC. However, most of the information provided to improve musculoskeletal fitness in the fHRA was also given in the PAC. We chose to tailor the PAC to each participant to maximize the effect of the intervention [120,162]. However, this minimized any

group effect that could have been present. To address this, the kinesiologist could have focused more on aerobic training in the physical activity counseling and resistance training in the fHRA. However, this may have reduced the effectiveness of the PAC by having a less tailored approach.

The cut points used in this study were based on 30 second epochs; ten minute bouts required 20 consecutive epochs where at least 18 met the required intensity cut off (i.e. 9 out of 10 minutes). In contrast, the Canadian Health Measures Survey [6] used 60 second epochs and ten minute bouts required 8 out of 10 consecutive epochs to meet the required intensity cut off (i.e. 8 out of 10 minutes). As a result, the bout intensity requirements used in this study were more stringent than those used in the Canadian Health Measures Survey [6]. Therefore, the results from this study may have reported lower physical activity levels in bouts of 10 minutes or more, and should be compared to the results of the Canadian Health Measures Survey [6] with caution.

Participants were able to choose what group they were in, which may have caused some inherent differences between the two groups. For example, those who did not enjoy aerobic training may have been more inclined to join the PAC+HRA. We allowed choice to improve adherence to the intervention, as providing individuals with a choice can provide better adherence and improve effectiveness of the study [145]. However, without using a randomized study design, we cannot say the results seen were solely due to the intervention and not heavily influenced by characteristics of the participants.

Another limitation is the lack of a control only group. The main purpose of the study was to compare the two intervention types; the PAC group served as a control to the PAC+HRA. However, we cannot say the changes observed would not have occurred in the absence of an intervention. Incorporating a control only group would help strengthen the results found in this

study and improve study quality.

5.7 Conclusions

Our study showed that the addition of an fHRA to personalized physical activity counseling does not further improve physical activity measured by accelerometry. However, an fHRA administered in the workplace can improve musculoskeletal fitness scores and potentially reduce the risk of injury in the workplace. It is unclear if these improvements in musculoskeletal fitness would be seen with physical activity counseling alone. This is an important addition to the literature, as previous research suggests the combination of counseling and a HRA is most effective. Our data show physical activity counseling alone may be able to produce the same amount of health benefits as an fHRA. Furthermore, we were able to objectively report an increase in musculoskeletal fitness in the workplace, which few studies have done to date. Finally, our data report that physical activity counseling alone or in combination with an fHRA can increase TPA_{10Mins}, $MVPA_{10Mins}$, and MPA_{10Mins} over a 4 month period.

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Appendices

Appendix A: Patient Informed Consent for Counseling Intervention

ENCOURAGEing workplace and employee wellness programs to help more Manitobans to become physically active

Principal Investigator: Todd Duhamel, PhD
Faculty of Kinesiology and Recreation Management, University of Manitoba
Institute of Cardiovascular Sciences St. Boniface General Hospital Research Centre
R4012 – 351 Tache Ave, Winnipeg, MB, Canada, R2H 2A6

Co-investigators:
Alex Edye-Mazowita, Andrew Stammers, Scott Kehler

You are being asked to participate in a research study. Please take your time to review this consent form and discuss any questions you may have with the study staff. You may take your time to make your decision about participating in this study and you may discuss it with your friends, family or (if applicable) your doctor before you make your decision. This consent form may contain words that you do not understand. Please ask the study staff to explain any words or information you do not clearly understand.

Purpose of the Study

Eighty-five percent of Canadian adults do not meet the recommended 150 minutes per week of moderate-vigorous physical activity for health benefits. This statistic is troubling because inactivity increases the risk of developing chronic conditions, such as diabetes, heart disease, stroke, and some cancers. Given this knowledge, it is essential to develop strategies to help Canadians adopt and sustain a more physically active lifestyle.

The workplace is one environment that could offer physical activity promotion programs to support people to adopt a more physically active lifestyle. Evidence shows that the best way to help employees become more active is to support them in a variety of different ways. Examples based on research include physical activity counseling and support programs, available exercise programs in the workplace, creating automated, tailored health promotion messages, and increasing access to health information resources.

Therefore, the ENCOURAGEing Workplaces project seeks to determine and develop a system to create a workplace wellness model that can be adapted and scaled to any workplace. The interventional aspect of this project will integrate a kinesiologist into existing workplaces in order to enhance the prescription of physical activity as a health intervention. The research intervention will provide you an opportunity to meet with the kinesiologist on at least 3 separate occasions (approximately 1 hour per meeting) to receive physical activity counseling. The purpose of the kinesiologist-led intervention is to help you to overcome the barriers that have prevented you from being active in the past and to teach you the skills needed to develop your own physical activity action plan. The kinesiologist will also refer individuals to the newly developed workplace physical activity initiative or to existing physical activity opportunities in their local neighbourhoods. The kinesiologist is also part of the research team.

_____
Participant initials

Study Procedures

As an employee at of one of our study sites where we will be incorporating a workplace wellness initiative, we are interested in investigating your change in levels of physical activity as the program is implemented. If you choose to participate in the study, you will be asked to meet with a kinesiologist and other research staff at six times over a 12 month period. These meetings will take approximately 1 hour of your time and are outlined below:

Meeting 1:

The purpose of this meeting is to meet with research staff to discuss the project and to have any of your questions answered. If you decide to participate in the research, you will be asked to complete a series of surveys and wear and wear an accelerometer for a period of 7 days. The research assistant will provide you with the device at this initial meeting. An accelerometer measures the amount and intensity of physical activity that you complete on a daily basis. Given the small size and placement of the accelerometer at belt level, you will be able to participate in your normal daily routine without alteration. It is important to note that the monitor will only measure the amount of physical activity that you accumulate and does not store personal information. Therefore, your privacy will not be adversely affected by wearing the unit. In addition to wearing the accelerometer, you will be asked to complete a series of questionnaires designed to evaluate a variety of parameters that are likely to change as you become more active. This meeting should take approximately 1 hour of your time.

Meeting 2:

The purpose of this meeting is to enable you to meet with the kinesiologist to discuss your current physical activity levels and interests. This meeting will take place approximately 7 days after your previous meeting with the research assistant. The kinesiologist will use physical activity counselling approaches, such as motivational interviewing, to help you to identify new ways to be physically active or to address the barriers that have prevented you from being more physically active.

Meeting 3:

The purpose of this meeting is to again enable you to interact with the kinesiologist. This meeting will take place approximately 2 weeks into the project. This meeting should take approximately 1 hour of your time.

Meeting 4:

The purpose of this meeting is to again enable you to interact with the kinesiologist. This meeting will take place approximately 2 months into the workplace wellness initiative. You will also be provided with an accelerometer by the research assistant and asked to wear the device for a period of 7 days. In addition to wearing the accelerometer, you will be asked to complete a series of questionnaires designed to measure parameters that may change as you become more active. This meeting should take approximately 1 hour of your time.

_____

Participant initials

Meeting 5:

The purpose of this meeting is to again enable you to interact with the kinesiologist and will take place approximately 4 months into the project. Once again, you will be provided with an accelerometer by the research assistant and asked to wear the device for a period of 7 days. In addition to wearing the accelerometer, you will be asked to complete a series of questionnaires designed to evaluate a variety of parameters that are likely to change as you become more active. This meeting should take approximately 1 hour of your time.

Meeting 6:

The purpose of this meeting is to collect research data. This meeting will take place approximately 1 year into the workplace wellness initiative. Once again, you will be provided with an accelerometer by the research assistant and asked to wear the device for a period of 7 days. In addition to wearing the accelerometer, you will be asked to complete a series of questionnaires designed to evaluate a variety of parameters that are likely to change as you become more active. This meeting should take approximately 1 hour of your time.

Risks

There is a large amount of evidence demonstrating that the health benefits of physical activity exceed the injury-related risks of physical activity. The risk associated with the physical activity measurements do not exceed the risk that a person experiences on a daily basis while they are physically active (e.g. while they run and exercise).

There is minimal risk associated with your participation in this study. You are free to withdraw from participation in the study at any time upon request.

Benefits

Individuals that participate in the study will benefit from the project because they will be provided with specific and detailed information regarding the amount and intensity of physical activity that each client completes in his/her daily life. This information is not currently available to individuals in a workplace setting. Even so, it must be indicated that the client's health status may or may not be influenced by their participation in the study.

The research team may benefit from this study by gaining new information describing the effectiveness of the kinesiologist-led-intervention. This information may then be utilized to guide the development of new workplace wellness programs.

Confidentiality

All data materials will be treated as confidential material. All members of the research team (Dr. Todd Duhamel, Alex Edye-Mazowita, Andrew Stammers and Scott Kehler) who will have access to the data have signed a pledge of confidentiality indicating they will not share any information from study. Research files will be labeled using a unique participant code and will not contain the participant's name, or any other identifying information. The only people who will have access to the master list are Dr. Todd Duhamel, Alex Edye-Mazowita, Andrew Stammers and Scott Kehler.

_____

Participant initials

Participant codes and identifying information will be kept in a separate file and in a locked filing cabinet in Dr. Duhamel's secure office at the University of Manitoba (MBC 317). Dr. Duhamel is the only person with a key to the filing cabinet that will contain the master list. Despite efforts to keep your personal information confidential, absolute confidentiality cannot be guaranteed. Your personal information may be disclosed if required by law. If any of your research records need to be copied, information that may reveal personal identifiers will be removed. The University of Manitoba Education and Nursing Research Ethics Board and St. Boniface Hospital may review research-related records for quality assurance purposes.

Information gathered in this research study may be published or presented in a report to inform employers about the outcomes of the study. The report may also be published in a peer-reviewed academic journal. However, your name and other identifying information will not be used or revealed in the report or other publications. Medical records that contain your identity will be treated as confidential in accordance with the Personal Health Information Act of Manitoba.

After the completion of the study, research data will be kept for a maximum of 7 years and then destroyed. Hard copy data will be shredded and disposed of by confidential waste procedures, in accordance with PHIA. Audio and video data recordings will be physically destroyed. Electronic data will be deleted and the computer hard drive will be reformatted.

Costs

There is no cost to participate in this study.

Payment for participation

You will not be paid for you participation in this study.

Voluntary Participation/Withdrawal From the Study

Your decision to take part in this study is voluntary. You may refuse to participate or you may withdraw from the study at any time. Your decision to not participate or to withdraw from the study will not affect your status as an employee at your workplace.

Questions

You are free to ask any questions that you may have about your rights as a research participant. If any questions come up during or after the study, contact Dr. Todd Duhamel at (204) 235-3589 or by email at tduhamel@sbrc.ca.

The Education/Nursing Research Ethics Board at the University of Manitoba has approved this research. The University of Manitoba Research Ethics Board(s) and representative of the University of Manitoba Research Quality Management / Assurance office may also require access to your research records for safety and quality assurance purposes. If you have any concerns or complaints about this project you may contact the Human Ethics Coordinator at 204-474-7122, or e-mail margaret_bowman@umanitoba.ca.

_____

Participant initials

Do not sign this consent form unless you have had a chance to ask questions and have received satisfactory answers to all of your questions.

Consent

I have read this information/consent form. I have had the opportunity to discuss this research study with Dr. Todd Duhamel and/or his research staff (Alex Edye-Mazowita, Andrew Stammers or Scott Kehler). I have had my questions answered by them in a language I understand. This risks and benefits have been explained to me. I believe that I have not been unduly influenced by any study team member to participate in the research study by any statements or implied statements. Any relationship (such as employer, supervisor, or family member) I may have with the study team has not affected my decision to participate. I understand that I will be given a copy of this consent form after signing it. I understand that my participation in this study is voluntary and that I may choose to withdraw at any time. I freely agree to participate in this research study.

I understand that information regarding my personal identity will be kept confidential, but that confidentiality is not guaranteed. By signing this consent form, I have not waived any of the legal rights that I have as a participant in a research study.

I agree to be contacted for future follow-up in relation to this study – YES____ NO____

Participant signature: _____ Date: _____
(day/month/year)

Participant printed name: _____ Time: _____

I confirm that I have explained the purpose, duration, etc. of this study, as well as any potential risks and benefits, to the subject whose name and signature appears above. I confirm that I believe that the subject has understood and has knowingly given their consent to participate by his/her personally dated signature.

Signature: _____ Date/Time: _____

Printed Name of above: _____ Study Role: _____

ALL SIGNATORIES MUST DATE THEIR OWN SIGNATURE.

I would like to receive a summary report of my personal data resulting from the study _____ (Yes/No)

I would like to receive a summary report of the overall study findings _____ (Yes/No)

Participant signature: _____ Date: _____
(day/month/year)

Participant printed name: _____ Time: _____

Please send me a copy of these reports by:

_____ email to the following email account:

_____

_____ post mail to the following address:

Address: _____

City: _____

Postal Code: _____

Appendix B: Patient Informed Consent for fHRA

ENCOURAGEing workplace and employee wellness programs to help more Manitobans to become physically active

Principal Investigator: Todd Duhamel, PhD
Faculty of Kinesiology and Recreation Management, University of Manitoba
317 Max Bell Centre, Winnipeg, MB R3T 2N2 | 204-235-3589

Co-investigators:
Alex Edye-Mazowita, Andrew Stammers, Scott Kehler (University of Manitoba)
Institute of Cardiovascular Sciences, St. Boniface General Hospital Research Centre
R4012 – 351 Tache Ave, Winnipeg, MB, Canada, R2H 2A6 | 204-235-3589

You are being asked to participate in a research study. Please take your time to review this consent form and discuss any questions you may have with the study staff. You may take your time to make your decision about participating in this study and you may discuss it with your friends, family or (if applicable) your doctor before you make your decision. This consent form may contain words that you do not understand. Please ask the study staff to explain any words or information you do not clearly understand.

Purpose of the Study

Eighty-five percent of Canadian adults do not meet the recommended 150 minutes per week of moderate-vigorous physical activity for health benefits. This statistic is troubling because inactivity increases the risk of developing chronic conditions, such as diabetes, heart disease, stroke, and some cancers. Given this knowledge, it is essential to develop strategies to help Canadians adopt and sustain a more physically active lifestyle.

The workplace is one environment that could offer physical activity promotion programs to support people to adopt a more physically active lifestyle. Evidence shows that the best way to help employees become more active is to support them in a variety of different ways. Examples based on research include physical activity counseling and support programs, available exercise programs in the workplace, creating automated, tailored health promotion messages, and increasing access to health information resources.

The ENCOURAGEing Workplaces project seeks to determine and develop a system to create a workplace wellness model that can be adapted and scaled to any workplace. The novel aspect of this project will provide a musculoskeletal fitness assessment followed by exercise prescription with a goal of increasing physical activity time and reducing musculoskeletal injuries. As a participant, you will also have an option to meet with the kinesiologist on at least 3 separate occasions (30-60 minutes each session) for additional physical activity counseling if you would like more support to overcome the barriers that have prevented you from being active in the past. The kinesiologist will also refer individuals to the newly developed workplace physical activity initiative or to existing physical activity opportunities in their local neighbourhoods. The kinesiologist is also part of the research team.

_____
Participant initials

Study Procedures

As an employee at our study site where we will be incorporating a workplace wellness initiative, we are interested in investigating your change in levels of physical activity as the program is implemented. If you choose to participate in the study, you will be asked to meet with study staff at two separate time points over an approximately two month period. These meetings will take approximately 1 hour of your time and are outlined below:

Meeting 1:

This meeting will take place immediately prior to your musculoskeletal fitness assessment. As part of the research, you may be required to wear an accelerometer for a period of 7 days. The research assistant will provide you with the device at this initial meeting. An accelerometer measures the amount and intensity of physical activity that you complete on a daily basis. Given the small size and placement of the accelerometer at belt level, you will be able to participate in your normal daily routine without alteration. It is important to note that the monitor will only measure the amount of physical activity that you accumulate and does not store personal information. Therefore, your privacy will not be adversely affected by wearing the unit. In addition to wearing the accelerometer, you will be asked to complete a Physical Activity Readiness questionnaire designed to evaluate your motivation to be physically active. This meeting should take approximately 30 minutes of your time.

After completing the consent process, you will undergo a musculoskeletal fitness evaluation using protocols from the Canadian Society of Exercise Physiology. Based on the results of this evaluation, the kinesiologist may prescribe exercises for you.

Meeting 2:

This meeting will take place approximately 2 months into the workplace wellness initiative. Once again, you may be provided with an accelerometer by the research assistant and asked to wear the device for a period of 7 days. In addition to wearing the accelerometer, you will be asked to complete a questionnaire designed to evaluation your motivation for physical activity. You will again undergo the Canadian Society of Exercise Physiology musculoskeletal fitness testing protocols. This meeting should take approximately 1 hour of your time.

Risks

There is a large amount of evidence demonstrating that the health benefits of physical activity exceed the injury-related risks of physical activity. The risk associated with the physical activity measurements do not exceed the risk that a person experiences on a daily basis while they are physically active (e.g. while they run and exercise).

There is minimal risk associated with your participation in this study. You are free to withdraw from participation in the study at any time upon request.

_____

Participant initials

Benefits

Individuals that participate in the study will benefit from the project because they will be provided with specific and detailed information regarding the amount and intensity of physical activity that each client completes in his/her daily life. This information is not currently available to individuals in a workplace setting.

The research team may benefit from this study by gaining new information describing the effectiveness of the kinesiologist-led-intervention. This information may then be utilized to guide the development of new workplace wellness programs.

Confidentiality

All data materials will be treated as confidential material. Principal Investigator Dr. Todd Duhamel and co-investigators Alex Edye-Mazowita, Andrew Stammers and Scott Kehler who will have access to the data have signed a pledge of confidentiality indicating they will not share any information from study. Research files will be labeled using a unique participant code and will not contain the participant's name, or any other identifying information. The only people who will have access to the master list are Dr. Todd Duhamel, Alex Edye-Mazowita, Andrew Stammers and Scott Kehler. Participant codes and identifying information will be kept in a separate file and in a locked filing cabinet in Dr. Duhamel's secure office at the University of Manitoba (MBC 317). Dr. Duhamel is the only person with a key to the filing cabinet that will contain the master list. Despite efforts to keep your personal information confidential, absolute confidentiality cannot be guaranteed. Your personal information may be disclosed if required by law. If any of your research records need to be copied, information that may reveal personal identifiers will be removed.

Information gathered in this research study may be published or presented in a report to inform employers about the outcomes of the study. The report may also be published in a peer-reviewed academic journal. However, your name and other identifying information will not be used or revealed in the report or other publications.

The University of Manitoba Education and Nursing Research Ethics Board may review research-related records for quality assurance purposes. After the completion of the study, research data will be kept for a maximum of 7 years and then destroyed. Hard copy data will be shredded and disposed of by confidential waste procedures, in accordance with PHIA. Electronic data will be deleted and the computer hard drive will be reformatted.

Costs

There is no cost to participate in this study.

Payment for participation

You will not be paid for you participation in this study.

_____

Participant initials

Voluntary Participation/Withdrawal From the Study

Your decision to take part in this study is voluntary. You may refuse to participate or you may withdraw from the study at any time by notifying any member of the research team using the phone and email contacts listed above, or in person during your meetings. Your decision to not participate or to withdraw from the study will not affect your status as an employee at your workplace. Your data will be disposed of in accordance with PHIA as described above.

Questions

You are free to ask any questions that you may have about your rights as a research participant. If any questions come up during or after the study, contact Dr. Todd Duhamel at (204) 235-3589 or by email at todd.duhamel@umanitoba.ca.

The Education/Nursing Research Ethics Board at the University of Manitoba has approved this research. The University of Manitoba Research Ethics Board(s) and representative of the University of Manitoba Research Quality Management / Assurance office may also require access to your research records for safety and quality assurance purposes. If you have any concerns or complaints about this project you may contact the Human Ethics Coordinator at 204-474-7122, or e-mail margaret.bowman@umanitoba.ca.

_____

Participant initials

Do not sign this consent form unless you have had a chance to ask questions and have received satisfactory answers to all of your questions.

Consent

I have read this information/consent form. I have had the opportunity to discuss this research study with Dr. Todd Duhamel and/or his research staff (Alex Edye-Mazowita, Andrew Stammers or Scott Kehler). I have had my questions answered by them in a language I understand. This risks and benefits have been explained to me. I believe that I have not been unduly influenced by any study team member to participate in the research study by any statements or implied statements. Any relationship (such as employer, supervisor, or family member) I may have with the study team has not affected my decision to participate. I understand that I will be given a copy of this consent form after signing it. I understand that my participation in this study is voluntary and that I may choose to withdraw at any time. I freely agree to participate in this research study.

I understand that information regarding my personal identity will be kept confidential, but that confidentiality is not guaranteed. By signing this consent form, I have not waived any of the legal rights that I have as a participant in a research study.

Participant signature: _____ Date: _____
(day/month/year)

Participant printed name: _____ Time: _____

I confirm that I have explained the purpose, duration, etc. of this study, as well as any potential risks and benefits, to the subject whose name and signature appears above. I confirm that I believe that the subject has understood and has knowingly given their consent to participate by his/her personally dated signature.

Signature of researcher: _____ Date/Time: _____

Printed Name of above: _____ Study Role: _____

ALL SIGNATORIES MUST DATE THEIR OWN SIGNATURE.

Findings and future study participation request form:

____ I would like to receive a summary report of the overall study findings

____ I agree to be contacted for future invitations to participate in workplace wellness research studies

Participant signature: _____ Date: _____
(day/month/year)

Participant printed name: _____ Time: _____

Contact information:

Email to the following account

_____

Post mail to the following address

Address: _____

City: _____

Postal code: _____

Appendix C: Physical Activity Readiness Questionnaire Plus

CSEP approved Sept 12 2011 version

PAR-Q+

The Physical Activity Readiness Questionnaire for Everyone

Regular physical activity is fun and healthy, and more people should become more physically active every day of the week. Being more physically active is very safe for MOST people. This questionnaire will tell you whether it is necessary for you to seek further advice from your doctor OR a qualified exercise professional before becoming more physically active.

SECTION 1 - GENERAL HEALTH

	Please read the 7 questions below carefully and answer each one honestly: check YES or NO.	YES	NO
1.	Has your doctor ever said that you have a heart condition OR high blood pressure?	☐	☐
2.	Do you feel pain in your chest at rest, during your daily activities of living, OR when you do physical activity?	☐	☐
3.	Do you lose balance because of dizziness OR have you lost consciousness in the last 12 months? Please answer NO if your dizziness was associated with over-breathing (including during vigorous exercise).	☐	☐
4.	Have you ever been diagnosed with another chronic medical condition (other than heart disease or high blood pressure)?	☐	☐
5.	Are you currently taking prescribed medications for a chronic medical condition?	☐	☐
6.	Do you have a bone or joint problem that could be made worse by becoming more physically active? Please answer NO if you had a joint problem in the past, but it does not limit your current ability to be physically active. For example, knee, ankle, shoulder or other.	☐	☐
7.	Has your doctor ever said that you should only do medically supervised physical activity?	☐	☐

If you answered NO to all of the questions above, you are cleared for physical activity.

Go to Section 3 to sign the form. You do not need to complete Section 2.

- Start becoming much more physically active – start slowly and build up gradually.
- Follow the Canadian Physical Activity Guidelines for your age (www.csep.ca/guidelines).
- You may take part in a health and fitness appraisal.
- If you have any further questions, contact a qualified exercise professional such as a CSEP Certified Exercise Physiologist® (CSEP-CEP) or CSEP Certified Personal Trainer® (CSEP-CPT).
- If you are over the age of 45 yrs. and NOT accustomed to regular vigorous physical activity, please consult a qualified exercise professional (CSEP-CEP) before engaging in maximal effort exercise.

If you answered YES to one or more of the questions above, please GO TO SECTION 2.

Delay becoming more active if:

- You are not feeling well because of a temporary illness such as a cold or fever – wait until you feel better
- You are pregnant – talk to your health care practitioner, your physician, a qualified exercise professional, and/or complete the PARmed-X for Pregnancy before becoming more physically active OR
- Your health changes – please answer the questions on Section 2 of this document and/or talk to your doctor or qualified exercise professional (CSEP-CEP or CSEP-CPT) before continuing with any physical activity programme.

CSEP | SCPE THE GOLD STANDARD IN EXERCISE SCIENCE AND PERSONAL TRAINING

SECTION 2 - CHRONIC MEDICAL CONDITIONS

Please read the questions below carefully and answer each one honestly: check YES or NO.			YES	NO
1.	Do you have Arthritis, Osteoporosis, or Back Problems?		☐ If yes, answer questions 1a-1c	☐ If no, go to question 2
	1a.	Do you have difficulty controlling your condition with medications or other physician-prescribed therapies? (Answer NO if you are not currently taking medications or other treatments)	☐	☐
	1b.	Do you have joint problems causing pain, a recent fracture or fracture caused by osteoporosis or cancer, displaced vertebra (e.g., spondylolisthesis), and/ or spondylolysis/pars defect (a crack in the bony ring on the back of the spinal column)?	☐	☐
	1c.	Have you had steroid injections or taken steroid tablets regularly for more than 3 months?	☐	☐
2.	Do you have Cancer of any kind?		☐ If yes, answer questions 2a-2b	☐ If no, go to question 3
	2a.	Does your cancer diagnosis include any of the following types: lung/bronchogenic, multiple myeloma (cancer of plasma cells), head, and neck?	☐	☐
	2b.	Are you currently receiving cancer therapy (such as chemotherapy or radiotherapy)?	☐	☐
3.	Do you have Heart Disease or Cardiovascular Disease? This includes Coronary Artery Disease, High Blood Pressure, Heart Failure, Diagnosed Abnormality of Heart Rhythm		☐ If yes, answer questions 3a-3e	☐ If no, go to question 4
	3a.	Do you have difficulty controlling your condition with medications or other physician-prescribed therapies? (Answer NO if you are not currently taking medications or other treatments)	☐	☐
	3b.	Do you have an irregular heart beat that requires medical management? (e.g. atrial brillation, premature ventricular contraction)	☐	☐
	3c.	Do you have chronic heart failure?	☐	☐
	3d.	Do you have a resting blood pressure equal to or greater than 160/90 mmHg with or without medication? (Answer YES if you do not know your resting blood pressure)	☐	☐
	3e.	Do you have diagnosed coronary artery (cardiovascular) disease and have not participated in regular physical activity in the last 2 months?	☐	☐
4.	Do you have any Metabolic Conditions? This includes Type 1 Diabetes, Type 2 Diabetes, Pre-Diabetes		☐ If yes, answer questions 4a-4c	☐ If no, go to question 5
	4a.	Is your blood sugar often above 13.0 mmol/L? (Answer YES if you are not sure)	☐	☐
	4b.	Do you have any signs or symptoms of diabetes complications such as heart or vascular disease and/or complications affecting your eyes, kidneys, and the sensation in your toes and feet?	☐	☐
	4c.	Do you have other metabolic conditions (such as thyroid disorders, pregnancy-related diabetes, chronic kidney disease, liver problems)?	☐	☐
5.	Do you have any Mental Health Problems or Learning Difficulties? This includes Alzheimer's, Dementia, Depression, Anxiety Disorder, Eating Disorder, Psychotic Disorder, Intellectual Disability, Down Syndrome)		☐ If yes, answer questions 5a-5b	☐ If no, go to question 6
	5a.	Do you have difficulty controlling your condition with medications or other physician-prescribed therapies? (Answer NO if you are not currently taking medications or other treatments)	☐	☐
	5b.	Do you also have back problems affecting nerves or muscles?	☐	☐

Please read the questions below carefully and answer each one honestly: check YES or NO.			YES	NO
6.	Do you have a Respiratory Disease? This includes Chronic Obstructive Pulmonary Disease, Asthma, Pulmonary High Blood Pressure		☐ If yes, answer questions 6a-6d	☐ If no, go to question 7
	6a.	Do you have difficulty controlling your condition with medications or other physician-prescribed therapies? (Answer NO if you are not currently taking medications or other treatments)	☐	☐
	6b.	Has your doctor ever said your blood oxygen level is low at rest or during exercise and/or that you require supplemental oxygen therapy?	☐	☐
	6c.	If asthmatic, do you currently have symptoms of chest tightness, wheezing, laboured breathing, consistent cough (more than 2 days/week), or have you used your rescue medication more than twice in the last week?	☐	☐
	6d.	Has your doctor ever said you have high blood pressure in the blood vessels of your lungs?	☐	☐
7.	Do you have a Spinal Cord Injury? This includes Tetraplegia and Paraplegia		☐ If yes, answer questions 7a-7c	☐ If no, go to question 8
	7a.	Do you have difficulty controlling your condition with medications or other physician-prescribed therapies? (Answer NO if you are not currently taking medications or other treatments)	☐	☐
	7b.	Do you commonly exhibit low resting blood pressure significant enough to cause dizziness, light-headedness, and/or fainting?	☐	☐
	7c.	Has your physician indicated that you exhibit sudden bouts of high blood pressure (known as Autonomic Dysreflexia)?	☐	☐
8.	Have you had a Stroke? This includes Transient Ischemic Attack (TIA) or Cerebrovascular Event		☐ If yes, answer questions 8a-c	☐ If no, go to question 9
	8a.	Do you have difficulty controlling your condition with medications or other physician-prescribed therapies? (Answer NO if you are not currently taking medications or other treatments)	☐	☐
	8b.	Do you have any impairment in walking or mobility?	☐	☐
	8c.	Have you experienced a stroke or impairment in nerves or muscles in the past 6 months?	☐	☐
9.	Do you have any other medical condition not listed above or do you live with two chronic conditions?		☐ If yes, answer questions 9a-c	☐ If no, read the advice on page 4
	9a.	Have you experienced a blackout, fainted, or lost consciousness as a result of a head injury within the last 12 months OR have you had a diagnosed concussion within the last 12 months?	☐	☐
	9b.	Do you have a medical condition that is not listed (such as epilepsy, neurological conditions, kidney problems)?	☐	☐
	9c.	Do you currently live with two chronic conditions?	☐	☐

Please proceed to Page 4 for recommendations for your current medical condition and sign this document.

PAR-Q+

If you answered NO to all of the follow-up questions about your medical condition, you are ready to become more physically active:

- It is advised that you consult a qualified exercise professional (e.g., a CSEP-CEP or CSEP-CPT) to help you develop a safe and effective physical activity plan to meet your health needs.
- You are encouraged to start slowly and build up gradually – 20-60 min. of low- to moderate-intensity exercise, 3-5 days per week including aerobic and muscle strengthening exercises.
- As you progress, you should aim to accumulate 150 minutes or more of moderate-intensity physical activity per week.
- If you are over the age of 45 yrs. and NOT accustomed to regular vigorous physical activity, please consult a qualified exercise professional (CSEP-CEP) before engaging in maximal effort exercise.

If you answered YES to one or more of the follow-up questions about your medical condition:

- You should seek further information from a licensed health care professional before becoming more physically active or engaging in a fitness appraisal and/or visit a or qualified exercise professional (CSEP-CEP) for further information.

Delay becoming more active if:

- You are not feeling well because of a temporary illness such as a cold or fever – wait until you feel better
- You are pregnant - talk to your health care practitioner, your physician, a qualified exercise profesional, and/or complete the PARmed-X for Pregnancy before becoming more physically active OR
- Your health changes - please talk to your doctor or qualified exercise professional (CSEP-CEP) before continuing with any physical activity programme.

SECTION 3 - DECLARATION

- You are encouraged to photocopy the PAR-Q+. You must use the entire questionnaire and NO changes are permitted.
- The Canadian Society for Exercise Physiology, the PAR-Q+ Collaboration, and their agents assume no liability for persons who undertake physical activity. If in doubt after completing the questionnaire, consult your doctor prior to physical activity.
- If you are less than the legal age required for consent or require the assent of a care provider, your parent, guardian or care provider must also sign this form.
- Please read and sign the declaration below:

I, the undersigned, have read, understood to my full satisfaction and completed this questionnaire. I acknowledge that this physical activity clearance is valid for a maximum of 12 months from the date it is completed and becomes invalid if my condition changes. I also acknowledge that a Trustee (such as my employer, community/fitness centre, health care provider, or other designate) may retain a copy of this form for their records. In these instances, the Trustee will be required to adhere to local, national, and international guidelines regarding the storage of personal health information ensuring that they maintain the privacy of the information and do not misuse or wrongfully disclose such information.

NAME _____ DATE _____

SIGNATURE _____ WITNESS _____

SIGNATURE OF PARENT/GUARDIAN/CARE PROVIDER _____

For more information, please contact:
Canadian Society for Exercise Physiology
www.csep.ca

KEY REFERENCES
1. Jamnik VJ, Warburton DER, Makarski J, McKenzie DC, Shephard RJ, Stone J, and Gledhill N. Enhancing the eectiveness of clearance for physical activity participation; background and overall process. APNM 36(S1):S3-S13, 2011.
2. Warburton DER, Gledhill N, Jamnik VK, Bredin SSD, McKenzie DC, Stone J, Charlesworth S, and Shephard RJ. Evidence-based risk assessment and recommendations for physical activity clearance; Consensus Document. APNM 36(S1):S266-s298, 2011.

The PAR-Q+ was created using the evidence-based AGREE process (1) by the PAR-Q+Collaboration chaired by Dr. Darren E. R. Warburton with Dr. Norman Gledhill, Dr. Veronica Jamnik, and Dr. Donald C. McKenzie (2). Production of this document has been made possible through financial contributions from the Public Health Agency of Canada and the BC Ministry of Health Services. The views expressed herein do not necessarily represent the views of the Public Health Agency of Canada or BC Ministry of Health Services.

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CSEP approved Sept 12 2011 version

Source: Physical Activity Readiness Questionnaire (PAR-Q) © 2002. Used with permission from the Canadian Society for Exercise Physiology, www.csep.ca.

Appendix D: Wear Time Standardization Example

Physical activity variables:

Participant 1 has a total of 150 $MVPA_{Sporadic}$ at baseline. At the baseline data collection, she/he wore the accelerometer for 5 valid days and accumulated a total of 60 hours of wear time. To standardize $MVPA_{Sporadic}$, we first divide total number of minutes (150) by total wear time in hours (60). Therefore:

150 $MVPA_{Sporadic}$ minutes/60 hours = 2.5 $MVPA_{Sporadic}$ minutes/hour

This value is then multiplied by controlled wear time, where controlled wear time is 10 hours multiplied by 5, since the participant wore the accelerometer for 5 valid days. Therefore:

5*10 hours=50 hours
2.5 $MVPA_{Sporadic}$ minutes/hour*50 hours = 125 $MVPA_{Sporadic}$ minutes

125 $MVPA_{Sporadic}$ minutes is the total standardized time. To estimate how many minutes the participant would accumulate had they worn the accelerometer for a week, the total standardized time is divided by the number of days worn to estimate total number of minutes per day, then multiplied by 7 for minutes per week. Therefore:

125 $MVPA_{Sporadic}$ minutes/5 days = 25 $MVPA_{Sporadic}$ minutes/day
25 $MVPA_{Sporadic}$ minutes/day*7days = 175 $MVPA_{Sporadic}$ minutes/week

Therefore, the participant accumulated 175 $MVPA_{Sporadic}$ minutes/week (standardized).

Sedentary time:

Participant 2 has a total of 1,560 $Sed_{Sporadic}$ minutes at baseline. At the baseline data collection, she/he wore the accelerometer for 4 valid days and accumulated a total of 52 hours of wear time. To standardize $Sed_{Sporadic}$, we first divide total number of minutes (1,560) by total wear time in hours (52). Therefore:

1,560 $Sed_{Sporadic}$ minutes/52 hours = 30 $Sed_{Sporadic}$ minutes/hour

This value is then multiplied by controlled wear time, where controlled wear time is 10 multiplied by 4, since the participant wore the accelerometer for 4 valid days. Therefore:

4*10 hours=40 hours
30 $Sed_{Sporadic}$ minutes/hour*40 hours = 1,200 $Sed_{Sporadic}$ minutes

1,200 $Sed_{Sporadic}$ minutes is the total standardized time. To estimate the number of hours per day, total standardized time would be divided by 60 and divided by the number of days worn.

Therefore:

1200 $Sed_{Sporadic}$ minutes/60 mins = 20 hours
20 hours/4 days = 5 hours/day

Therefore, the participant accumulated 5 hours/day of $Sed_{Sporadic}$ time (standardized).

Appendix E: Self-Efficacy and Stage of Change Questionnaire

Self-Efficacy for Exercise Survey

How confident are you right now that you could exercise three times per week for 20 minutes if:

(1 = least confident, 10 = most confident)

1. The weather was bothering you?	1	2	3	4	5	6	7	8	9	10
2. You were bored by the program or activity?	1	2	3	4	5	6	7	8	9	10
3. You felt pain when exercising?	1	2	3	4	5	6	7	8	9	10
4. You had to exercise alone?	1	2	3	4	5	6	7	8	9	10
5. You did not enjoy it?	1	2	3	4	5	6	7	8	9	10
6. You were too busy with other activities?	1	2	3	4	5	6	7	8	9	10
7. You felt tired?	1	2	3	4	5	6	7	8	9	10
8. You felt stressed?	1	2	3	4	5	6	7	8	9	10
9. You felt depressed?	1	2	3	4	5	6	7	8	9	10

Stages of Change Questionnaire

Which sentence represents your current status:

- ☐ I exercise regularly and have done so for longer than 6 months.
- ☐ I exercise regularly but have done so for less than 6 months.
- ☐ I currently exercise but not regularly.
- ☐ I currently do not exercise but I have been thinking about starting exercise in the next 6 months.
- ☐ I currently don't exercise and I do not intend to start in the next 6 months.
- ☐ I have done physical activity regularly in the past but I am not doing so currently.

Appendix F: Patient Health Questionnaire-9

PATIENT HEALTH QUESTIONNAIRE-9 (PHQ-9)

Over the last 2 weeks, how often have you been bothered by any of the following problems? *(Use "✔" to indicate your answer)*	**Not at all**	**Several days**	**More than half the days**	**Nearly every day**
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

FOR OFFICE CODING 0 + _____ + _____ + _____

=Total Score: _____

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all	**Somewhat difficult**	**Very difficult**	**Extremely difficult**
☐	☐	☐	☐

Appendix G: Example Score Sheet for fHRA

Health Risk Assessment: Musculoskeletal fitness appraisal

Congratulations on completing this health risk assessment. We hope that these results help inspire you to set personal goals on your way to a healthy body with less risk for musculoskeletal injuries.

Please visit the Musculoskeletal Injury Prevention Program (MIPP) intranet page at http://intranet.sbgh.mb.ca/DeptOHS/ to read or print resources showing you how to improve in each area. Most of these instructions be done at home or at a gym – you'll have the most success going to a location that motivates you and makes you feel comfortable.

This health risk assessment is conducted by a kinesiologist from ENCOURAGEing Workplaces, a research project which seeks to develop an effective system with which to create a comprehensive workplace wellness model that can be adapted and scaled to any workplace based on the workplace size and input from management and employees. We are using this health risk assessment in a workplace setting to determine whether working-age adults can be motivated to increase their physical activity levels after undergoing a fitness test, as other age groups have shown. We measure this through the short questionnaire you filled out prior to doing the fitness test.

The double-sided sheet you're reading right now is not used for research – your scores were written down so you could see your progress, and we used your name as an identifier so that you didn't need to worry about keeping your scoresheet for months!

Also remember that the Staff n' Motion Fitness Centre has several exercise circuits permanently posted, and free orientation sessions are available (schedule is posted in Fitness Centre).

This project is approved by University of Manitoba Education/Nursing Research Ethics Board. If you have any concerns or complaints about this project, you may contact the Human Ethics Coordinator (HEC) at 204-474-7122 or email: margaret.bowman@umanitoba.ca

Date:	Name:	PAR-Q+ completed

Test	Initial Score / Rating	Follow-up Score / Rating	Applicability
Grip Strength	Poor Fair Good Very good Excellent Next rating:	Poor Fair Good Very good Excellent Next rating:	High grip strength can help overcome ergonomic difficulties in everyday work – lifting an object with slippery handles, or handles which seem too large or small. High grip strength is also associated with decreased risk of repetitive strain injury.
Push-ups	Poor Fair Good Very good Excellent Next rating:	Poor Fair Good Very good Excellent Next rating:	Push-ups are a measure of muscular endurance in the chest, shoulders and arms. Muscular endurance is important in the performance of basic tasks such as lifting an object above waist height or pushing an object.
Sit and Reach	Poor Fair Good Very good Excellent Next rating:	Poor Fair Good Very good Excellent Next rating:	Tightness in the hamstrings and lower back is an indicator of current poor back health. Inflexibility may contribute to several functional limitations including reduced hip mobility, slower walking speed, and increased risk of lower back injury.
Vertical Jump	Poor Fair Good Very good Excellent Next rating:	Poor Fair Good Very good Excellent Next rating:	This test measures peak leg power. Power has important implications for functional capacity and independent living as one ages, and for athletic performance in active individuals.
Back Extension	Poor Fair Good Very good Excellent Next rating:	Poor Fair Good Very good Excellent Next rating:	Evidence suggests that good trunk endurance may help to prevent lower back pain. Improving your trunk endurance may also improve posture – a strong but modifiable risk factor for repetitive strain injury and other musculoskeletal injuries.
One-leg Stance	Below mean values Above mean values Next rating:	Below mean values Above mean values Next rating:	This test requires static balance, leg strength, and integration of visual and inner ear signals and receptors in the muscles and joints. Research has shown a direct link between lower levels of balance and risk of falls and fractures among older adults.

Waist circumference

Appendix H: Summary of Participant Meetings with Kinesiologist

Legend:
CEP Sessions: Green: Attended, Red: Missed

Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
1	36	PAC	F	36.3	Admin Assistant	-Does walking -Has done commercial weight loss programs -No resistance training -Does not eat particularly well	-Weight loss -Motivation -Feel better	-Time -Motivation -Energy -Not confident eating healthily -Not confident weight training	1	N/A	Interval training on treadmill worksheet	Started exercise group classes week before CSEP visit	-Husband started gym recently -2 Active and supportive sisters -Has treadmill, dumbbells, and resistance bands at home
									2				
									3	-Tied back by "all or nothing" attitude -Feels guilty when does not exercise -Does not know what to eat	Home strength and Cardio hand out	-Husband's activity has been motivating -started "Fit Family Fridays" with sisters	-Open to seeing dietician -Looking into apps for gym tracking -Discussed negative emotions associated with exercise and how to how to reduce
									4		Pantry list of healthy foods that can be used to make 15 minute meals	-Started exercise group in Lorette -Feeling much better about self and exercise	

Legend:
CEP Sessions: Green: Attended, Red: Missed

Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
2	50	PAC+ HRA	F	39.7	Housekeeping Supervisor	-Walks daily - Previously golfed -Swims in summer -Has low back injury -low thyroid; takes iodine	-Increase Knowledge -Strengthen: General -Strength: Core -Feel better	-Not confident in gym environment	1	N/A	Session mostly spent discussing participant to plan intervention appropriately	N/A	Husband does not do structured activity Wants to use hospital gym or somewhere close to home Decided in session to start at home and graduate to gym Has yoga mat and 5lb weights
									2	N/A	Hand out for core and general strength	N/A	Went through exercise routine in gym. Seemed enthusiastic
									3		Feedback from HRA given verbally Handouts to target weak areas defined by the HRA	Bought gym membership	
									4		Feedback from follow-up HRA given	Strength scores improved	

Legend:
CEP Sessions: Green: Attended, Red: Missed

Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
3	58	PAC	M	28.9	Nurse (Mostly sedentary work)	-Does walking -Goes to gym -Had personal trainer in past -Has chronic knee pain	-Increase knowledge -Keep health into retirement	-None reported	1	N/A	Handout with treadmill program and strength training using minimal equipment	N/A	-home equipment includes: universal gym, stationary bike, free weights, elliptical, and stability ball - Walk with dog daily
									2	N/A	Handout explaining how to progress own home exercise program	N/A	-going to create own exercise plans before next meeting to discuss then
									3				
									4			Had been doing a lot of outdoor winter activities since last meeting	

Legend:
CEP Sessions: Green: Attended, Red: Missed

Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
5	48	PAC	F	21	Business Manager	-Does walking, goes to gym, does yoga -Currently exercises daily	-General health -increase employees health	-Time	1	N/A	-Handout for general strength exercises either at gym or at home	N/A	-Has 2 teens at home - Likes 30 of exercise – does not like classes at hospital since they are too long (45 mins)
									2	Has chronic pain in neck and shoulder – some upper body strength exercises aggravate it.	Handout for stretch breaks and yoga at desk for participant and employees	Managed to stay active during the holidays	-wants to know how to get staff more active and she is responsible for providing access to health resources
									3				
									4	Stopped doing yoga		Participated regularly in winter activities since last meeting Started using active transport	

Legend:
CEP Sessions: Green: Attended, Red: Missed

Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
6	55	PAC + HRA	F	24.3	Nurse	-Recently diagnosed with Lupus; lost strength -High cholesterol -Previously physically active -Cortisone for chronic shoulder pain -Has plantar Faciitis	-Weight Loss -General Health - Strengthen: General -Reduce medication -Feel better	-Health	1	N/A	-Handout for general strength exercises at gym	N/A	-Husband also nurse, but not active. Ahs 4 children -Has free weights, universal gym, and stability ball at home
									2		None		-Went over routine in handout in gym to see likes/dislikes -Verbally discussed cardio intensity
									3	Has some sciatica Not walking for health anymore, but doing other activities	Showed new resistance training exercises. Was given handouts for HRA results at HRA meeting	Shoulder feeling better Still doing jogging	-Wants to do half marathon but unsure about sciatica – willing to see physio about it
									4			Had HRA follow up – Improvements seen	

Legend:
CEP Sessions: Green: Attended, Red: Missed

Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
10	54	PAC	F	23.3	Nurse	-Has shoulder tendonitis -Previously had breast cancer – still on some medication -Does yoga (more mental focus than physical) -used to swim -Rides bike in summer	-Strengthen: Upper body -Improve flexibility/ posture -Resume activity after relapse	-None reported	1	N/A	None	N/A	-walks a lot with dog -Husband is a runner -has exercise ball, weights, and resistance bands at home
									2		-Basic stretching exercises -Strength and flexibility hand out		
									3		None	Wants to start running	Showed incline shoulder press, bench row, pigeon stretch, and calf raise exercise in gym
									4		None		

Legend:
CEP Sessions: Green: Attended, Red: Missed

Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
11	25	PAC	F	28.2	Nurse/ Masters student	-Previously quite active – less so now	-Weight Loss -Strengthen: General -Increase Variety -Feel better -Look better	-Bored with routine	1	N/A	None	N/A	-Binge exercises; goes regularly for a bit, then stops for months
									2		-Strength training handout with some interval training options		Went through handout in gym with participant
									3		-Strength training handout with modifications to previous handout	Swimming more often Weight down slightly, but looking much better	
									4		None		

Legend:
CEP Sessions: Green: Attended, Red: Missed

Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
12	46	PAC	F	21	Nurse	-Has rotator cuff injury in shoulder -Bad knee -previous neck injury-still sometimes sore -Does active transport	-General health -Resume after relapse -Feel better	-None reported	1	N/A	None	N/A	-Dislikes running >15 mins
									2		-Bodyweight, fullbody circuit - Strength training with machines in gym		-Talked about importance of cardio and how to get it in since she does like prolonged running -Went over exercises in gym
									3				
									4		None	Regular with exercise. Regularly biking and walking. Some jogging (but bugs knee)	Discussed cues to do activity in day Worked on setting short term goals as long term was not resulting in progress

Legend:
CEP Sessions: Green: Attended, Red: Missed

Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
15	41	PAC + HRA	M	33.5	Server Administrator	-Already pretty active -Has shoulder tendonitis -Significant muscle imbalance	-Weight Loss -General Health -Increase knowledge -Strengthen: General -Eat better	-None reported	1	N/A	None	N/A	-Feels low energy during workouts – recommended light snack 1 hour pre activity. Also likely dehydrated
									2		None	Started taking fiber supplement Feels more energy during workout – paying more attention to hydration	Will log onto my fitness pal to log food for one week. Will discuss at next meeting
									3	Not consistent lately – almost went 2 weeks without working out	None	Tried boot camp with friend (3 sessions)	Calories good, but 50% coming from supper. Suggested changing portions to modify Talked about pros and cons of crossfit
									4		Handout for strength training to target weaker areas identified by HRA	Started crossfit – really enjoying it	

Legend:
CEP Sessions: Green: Attended, Red: Missed

Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
16	35	PAC + HRA	F	23	Graphic Designer	-Very active – teaches group fitness classes -Chronic ache in hip and trapezius; physio did not help -Thoracic inflexibility	-Increase knowledge -Strengthen: General -Improve performance -Reduce fatigue	-Low energy	1	N/A	Sport Specific physios	N/A	-Wants to participate in more consistent light activity (reduce sedentary time) -Wants resources to help AV department move more
									2		-Yoga at desk hand out		Assessed thoracic inflexibility Assessed 1 RM – adjusted weight for training Discussed unloading, periodization for heavy lifting
									3		Handout for strength training from HRA	Reassessed 1 RM - increased	
									4		None	Follow up HRA showed improvements	

Legend:
CEP Sessions: Green: Attended, Red: Missed

Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
17	27	PAC	F	23.6	Nurse	-Active, but has been more so in the past	-Weight Loss -General health -Strengthen: General -Reduce fatigue -Feel better -Look better -Improve self confidence	-Energy -Not confident weight training	1	N/A	None	N/A	-Has free weights at home -No long term goals for motivation -Recommended more carb based snacks before workout rather than protein
									2		-Recommended your shape 2012 (Zumba program for xbox)	Would like to run 10K and do more pushups	Talked about healthy snacks to eat and My Fitness Pal -Went over burpees and kettlebell exercises
									3	Getting bored of Xbox programs	Referred to: Running Room events, Nike+ Running club, ProAggressive bootcamp, and Winnipeg Rec Leagues	Enjoying running and looking for something to focus more on that.	Possibly look into marathon relay team
									4		None	Good progress	

Legend:
CEP Sessions: Green: Attended, Red: Missed

Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
19	52	PAC	F	30.4	Clinical Instructo r	-Does some activity, used to be more active	-Weight Loss -General health -Flexibility and posture	-Motivation	1	N/A	Triathlon information Ski lessons	N/A	-Active with spouse -Previously had personal trainer -Free weights and treadmill at home -Problem is social eating/drinking
									2		-Duathlon races in Birds Hill	Would like to run 10K and do more pushups	Set long term goal for sprinting, biking and running – set starting point to try from
									3	Hard to keep up motivation; "All I could do was work and go home"	None	Has 4 scheduled workouts – started yoga Tried corss country skiing – liked it Tried dragon boat – liked it	Eating: Portion size biggest problem Blood glucose levels creeping up
									4		None	Outside a lot. Generally much more active	

Legend:
CEP Sessions: Green: Attended, Red: Missed

Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
20	52	PAC + HRA	F	29.1	Registration Clerk	-Already somewhat active -Arthritis in Hip -High blood pressure	-General Health -Increase knowledge -Keep health through retirement -Lower blodd pressure	-Bored with routine	1	N/A	None	N/A	-Has treadmill, free weights, and stationary bike -Likes short routines
									2		-Nearby Aquacize classes and yoga classes -Resistance training handout -Interval training handout		Discussed potential stretches for flexibility
									3		Handout for strength exercises based on the HRA	Started taking walking and taking yoga regularly	
									4		None	Follow up HRA indicated improvements	

Legend:
CEP Sessions: Green: Attended, Red: Missed

Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
21	28	PAC	F	25.2	Nurse	-Active in past, less active now -Previous lower back injury -Has shin splints	-Increase knowledge -Eat better -Set goals -Reduce fatigue	-Time -Energy -Not confident eating healthily	1	N/A	Resources from dieticians regarding healthy snacking	N/A	-Bands at home
									2		Allrecipes.com	Working on chin ups – coming along	Evaluated core strength and ankle flexibility
									3		Tibialis anterior strengthening exercises Gym memberships in the area	Progressing well – able to do chin-ups. Overall things going well. Wants gym membership	
									4				

Legend:
CEP Sessions: Green: Attended, Red: Missed

Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
22	61	PAC + HRA	F	27.4	Nurse (Mostly sedentary)	-Previously active -2 herniated discs -Sciatica -Bad knee	-Weight loss -General health -Strengthen before knee replacement	-MSK condition -Not confident weight training -Not confident cardio training	1	N/A	None	N/A	-Has yoga blocks and strap -Suggested My Fitness Pal for food tracking
									2		-Lower body strength and flexibility handout		-Went through handout with participant
									3		-Same previous handout with altered repetitions		Talked about movements to avoid aggravating bad knee
									4		None	Improvements seen in follow up with HRA	

Legend:
CEP Sessions: Green: Attended, Red: Missed

Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
23	57	PAC + HRA	F	38.6	Nurse	-Previously active, not currently	-Weight Loss -General health -Increase knowledge -Strengthen: General	-Not confident in gym environment -Not confident weight training -Not confident cardio training -Not confident stretching	1	N/A	None	N/A	-Supportive husband and 2 active daughters
									2		-Strength and Cardio handout -Activity tracking sheet		Determined max HR to set HR training zones
									3		-Handout for resistance training based on HRA	Training going well so far – regularly active now	
									4		None	Follow up HRA showed improvements	

Legend:
CEP Sessions: Green: Attended, Red: Missed

Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
25	62	PAC	F	26.2	Nurse	-Previously more active, but less so now -Transverse myelitis -Torn meniscus in knee -arthritis	-General health -Strengthen: Lower body -Walk without pain -Feel better	-Energy	1	N/A	None	N/A	-Active husband -Has friend she goes to Wellness Centre with - Has treadmill, free weights, and elliptical at home
									2			Can now straighten knee fully	Had arthroscopy on bad knee Starting physio next week
									3				
									4				

Legend:
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Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
27	39	PAC + HRA	F	25.1	Technician	-Not active previously	-Weight loss -Eat better -Look better -Self confidence	-Not confident in gym environment -Not confident eating healthily -Not confident weight training	1	N/A	-Track activity apps and fitbits	N/A	-Supportive husband
									2		-Handout of resistance training in gym -Referral to badminton drop in -Referral to running room group -Schedule for group classes at St. B		- Went through guided workout in gym
									3		-Hand out of resistance exercises based on HRA	Bought gym membership at St. B	
									4		None	Follow up on HRA show improvements. Exercising in gym regularly	

Legend:
CEP Sessions: Green: Attended, Red: Missed

Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
28	53	PAC	F	32.2	Diagnostic Imaging	-Tried activities in past – nothing stuck -Shoulder problems -SI joint pain -Bad knee -Plantar faciitis	-General health -Obtain regular PA -Reduce medication	-MSK condition -Fear of injury	1	N/A	None	Has plan to go to aquacize class with other participant	-Husband active – plays pickle ball -Enjoys biking Suggested using iPad on treadmill at home to entertain during workout
									2	Aquacize class a little late – going to try morning class instead	River path for biking		
									3				
									4		Hand out for resistance exercises at the gym		

Legend:
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Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
29	61	PAC + HRA	F	30.8	Nurse (Mostly Sedentary)	-Recently gained 30 lbs -Used to talk a lot, but heel is a barrier -Plantar faciitis	-Weight loss -General health -Increase knowledge	-MSK condition -Not confident in gym environment -Not confident weight training	1	N/A	Sports physiotherapists for heel	N/A	
									2		Handouts for resistance exercises based on HRA		
									3		Training manual for TRX bands	Follow up HRA indicated improvements Started attending group zumba classes	
									4			Reported that overall has learned a lot from intervention and feels more confident and knowledgeable exercising	

Legend:
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Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
30	58	PAC + HRA	F	33.3	Education	-Nodules on fingers -Tennis elbow -Arthritis in R hand -Medical knee collapse - Does some physical activity Has shoulder rotator cuff injury	-Weight loss -General health -Strengthen before knee replacement -Increase knowledge	-MSK conditions	1	N/A	None	N/A	-Spends less time on her food, more on others' -Walks dog regularly
									2		Handout for full body resistance training	Started weight watchers – down 7 lbs	Talked about building routine for tennis elbow
									3		Handouts for resistance exercises based on HRA	Started going to group classes at St.B gym – goes on treadmill after Under 160 lbs – has not been in yeart	
									4	Physical activity levels down – but just had knee surgery			-Final meeting delayed due to double knee replacement

Legend:
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Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
31	30	PAC + HRA	F	23	Dietician	-Post partum and seasonal depression -Used to be very active, but less so after kids	-Increase knowledge -Strengthen: General -Improve performance		1	N/A	None	N/A	-Has rower and kettlebells at home -has dog that she walks frequently
									2		Handout for tracking exercise Referral to CrossFit gym Places to find doorframe chinup bars		Went through 20 minute routine with participant in gym – mostly consisted of resistance training
									3		Handouts for resistance exercises based on HRA		
									4			Follow up HRA shows improvements Started attending group fitness classes at St. B. Also started martial arts training	-Final meeting delayed due to double knee replacement

Legend:
CEP Sessions: Green: Attended, Red: Missed

Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
32	58	PAC + HRA	F	23.6	Nurse (Mostly sedentary)	-Previous eating disorder -Active history – careful not to over exercise	-General health -Strengthen: Upper body -Stress relief -Reduce medication -Lower blood pressure	-None reported	1	N/A	None	N/A	-Has free weights, bands, and universal gym at home
									2		Handouts for resistance exercises based on HRA		
									3		Handout for strengthening with stability ball and freeweights		Went through exercises with participant
									4			Follow up HRA shows improvements	

Legend:
CEP Sessions: Green: Attended, Red: Missed

Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
33	51	PAC + HRA	F	29.8	Technician	-Self diagnosed depression -has been gaining weight and has low energy levels	-Weight loss -General health -Feel better	-None reported	1	N/A	None	N/A	-Husband former body builder
									2		Handouts for resistance exercises based on HRA Aquacize at the Y My Fitness Pal		Talked about the importance of splitting sedentary time. Discussed some cardio exercises to lay a base for interval training
									3				
									4		Hand out for body weight resistance exercises	Follow up HRA shows improvements	

Legend:
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Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
34	34	PAC	F	48.8	Unit Clerk	-Previous lower back injury -used to do cardio all the time	-Weight loss -General health -Strengthen: Core -Stress relief	-Time -Motivation -Caring for family member -Energy	1	N/A	None	N/A	-Has tubing at home -Primary care give for son with disabilities
									2		Handout for strengthening using body weight and free weights		Went through routine with participant in gym
									3	Is "forcing" strength training aggravating back Find it is hard to do routine with son – also does not find it interesting			Talked about other ways to fit physical activity into schedule What about the previous routine was boring?
									4			Started doing zumba classes – really enjoying it.	

Legend:
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Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
35	41	PAC	F	27.4	Nurse (mostly sedentary)	-Previous lower back injury -Epicondylitis in elbow -Plantar faciitis -Tendonitis in hands -Active history	-Weight loss -Obtain regular PA -Reduce risk of injury	-Time -MSK condition	1	N/A	None	N/A	-Has dog that walks all the time -Treadmill at home
									2		Cross country skiing resources (where to go, where to by/rent equipment)	Started using Gillian Michaels home work outs	Recommended walking on treadmill when watching TV to reduce sedentary time
									3				
									4		Handout of resistance training to do with gym equipment Handout of resistance training to do with body weight at home		

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Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
36	60	PAC + HRA	F	24.2	Diagnostic Imaging	-Previously active -Bad knee	-General health -Increase knowledge -Strengthen: Core -Strengthen: Upper body -Obtain regular PA -Reduce sedentary time	-Time -Caring for family member -Not confident in gym environment	1	N/A	None	N/A	-Worked out with sister in the past -Supportive husband
									2	Having issues with menopause and finding it is affecting weight and ability to exercise (low energy)	Handout for resistance training based on HRA		Talked about the role both nutrition and exercise have to play in weight loss – how do they work together.
									3		Handout for different resistance exercises with gym equipment	HRA follow up shows improvements	
									4	Enjoying workout videos but finds they can get repetitive after a while	Handout of ways to stay motivated with workouts at home – what other places can you find work out DVDs to switch up the routine Handout of resistance training to do with body weight at home		

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Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
37	46	PAC	F	22.7	Obstetrics	-Some physical activity in past -Previous lower back injury -Shoulder injury -Previous ankle sprains	-General health -Increase knowledge -Strengthen: Core -Strengthen: Upper body -Reduce fatigue -Reduce risk of injury	-Energy -Lack of knowledge -Cost -Not confident in gym environment	1	N/A	None	N/A	-Has free weights, stationary bike, and stability ball at home
									2		Handout for at home strength training using free weights and body weight		Went through workout with participant
									3	Wants to have a bit more variety	Update on resistance training at home – more exercises	Enjoying workouts at home	
									4	Had medical emergency with dad – now primary care giver. Time is a big issue	None		

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Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
38	54	PAC	F	26.6	Human rescources	-Some activity in past but not much	-General health -Increase knowledge -Strengthen: General -Increase variety -Self-Confidence	-Lack of knowledge -Not confident in gym environment	1	N/A	None	N/A	-Has free weights, access to pool, and pilates reformer at home
									2		Handout for resistance training with machine and body weight exercises Exercise log		Went through workout with participant
									3	Wants to have a bit more variety		Progressing well	Brought TRX to gym to go through previous hand out and find different variations
									4		None		

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Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
39	65	PAC	F	26	Doctor	- Overweight most of life – lost weight over past 10 years -Currently active -Previously used commercial weight loss programs	-General health -Increase knowledge -Improve performance -Increase variety -Self-Confidence	-None reported	1	N/A	None	N/A	-Has free weights, treadmill, universal gym, stationary bike, and stability ball at home -supportive husband
									2		My Fitness Pal LoseIt.com		Recommended taking stairs more often and reduce sedentary time on admin days
									3				
									4		None	Been going to ProAggresive boot camps. Really enjoying them so far	

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Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
41	45	PAC	F	28.2	Unit assistant	-Herniated discs in back -Previous knee surgeries -Previous quite active but strained Achilles	-Weight loss -General health -Be good role model -Strengthen: Upper body -Reduce risk of injury -Increase variety -Feel better -Look better	-Fear of injury -Not confident eating healthily -Not confident weight training	1	N/A	None	N/A	-Has free weights and elliptical at home
									2		Handout for free weight and body weight resistance training at home – also consisted of cardio intervals		Went through exercises with participant in gym
									3				Talked about diet and how to spread calories out throughout day
									4	Fell on concrete – concussion, sprained wrist, ankle injury. Was told by doctor to decrease exercise for a while	None	Until fall, participant reports being able to consistently exercise and feels more confident about ability and physical activity knowledge	

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Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
42	48	PAC	F	31.6	Technician	-Previous lower back injury -Sarcoidosis -Knee problems	-Weight loss -Strengthen: Upper body -Reduce fatigue -Increase variety -Feel better -Look better	-Energy -MSK condition -No confident in gym environment	1	N/A	Aquacize classes nearby home	N/A	-Has Treadmill, free weights, boxing bag, universal gym, stationary bike, and stability Husband works out
									2		Yoga programs in area Handout with resistance training at home		Went through exercises with participant in gym
									3	Still finding it hard to work out consistently	Handout with resistance training at home – updated to reflect progress Where to buy TRX		
									4		None		

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Client Information									CEP Session Information				
Participant #	**Age**	**Group**	**Gender**	**BMI**	**Job**	**Health History**	**Health Goals**	**Barriers**	**CEP Session**	**Follow-up (Negative Outcomes)**	**Referral /Resources Given**	**Outcome (Positive Outcomes)**	**Other Notes**
43	52	PAC + HRA	F	30.2	Technician	-Previous lower back injury -Knee problems -Currently does a lot of walking	-Strengthen: Upper body -Reduce risk of injury -Feel better	-MSK condition -Fear of injury -Not confident weight training -Not confident cardio training	1	N/A		N/A	-Supportive spouse -Universal gym at home
									2		Hand out for resistance training at gym and at home		Went through exercises with participant in gym
									3				
									4		None	Started exercise classes at hospital gym	

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Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
45	51	PAC + HRA	F	32	Clinical Assistant	-Not very active previously	-Weight loss -Increase knowledge -Eat better -Reduce medication -Lower blood pressure	-Time -Lack of knowledge -Not confident in gym, eating healthily, weight training, cardio, or stretching	1	N/A	Handouts for resistance training based on HRA	N/A	-Treadmill and vibration plate at home
									2		Hand out for resistance training at gym Where to find portion control plates	Bought St. B membership	Went through exercises with participant in gym Determined max HR for cardio training
									3				
									4	HRA follow up did not show any improvements	None		

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Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
46	50	PAC	F	24.3	Nurse	-Previously had Hogdkin's Lymphoma -Weight watcher previously	-Weight loss -Obtain regular PA -Feel better -Self confidence	-Fear of injury	1	N/A	None	N/A	
									2		None		Went to gym with participant and talked about different equipment, what it used for, how to use it, etc. (Like orientation session)
									3		None	Bought St. B membership	
									4		None	Enjoying gym so far Bought new runners	Gave participant modifications to exercises she was not a fan of

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Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
50	61	PAC	F	19.4	Staff educator	-Knee problems -Somewhat active previously	-Keep health into retirement -Obtain regular physical activity -Increase variety -Improve flexibility and posture	-MSK condition -Not confident weight training	1	N/A	None	N/A	
									2		Referred to yoga programs in the community Handout of resistance exercises in gym		Went through exercises with participant
									3				
									4		None	Regularly doing yoga – enjoying it so far Started doing exercise classes at hospital gym	

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Client Information									CEP Session Information				
Participant #	Age	Group	Gender	BMI	Job	Health History	Health Goals	Barriers	CEP Session	Follow-up (Negative Outcomes)	Referral /Resources Given	Outcome (Positive Outcomes)	Other Notes
51	52	PAC	F	28.3	Lab technician	-Not previously active	-General health -Reduce fatigue -Feel better	-Time -Caring for another family member	1	N/A	None	N/A	-Has husband and daughter -Does not think she can exercise alone
									2		Different gym memberships – rate and locations		Talked about diet Set goal to get heart rate up 2x per day for 10 mins
									3	Husband does not want to buy gym memberships in summer – says they can walk but he walks much slower than her	Handout for basic body weight resistance training		Talked about previous running – encouraged to add jogging intervals to get back into it Found HR zone on treadmill
									4		None	Walking regularly	

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Participant #	**Age**	**Group**	**Gender**	**BMI**	**Job**	**Health History**	**Health Goals**	**Barriers**	**CEP Session**	**Follow-up (Negative Outcomes)**	**Referral /Resources Given**	**Outcome (Positive Outcomes)**	**Other Notes**
52	54	PAC	F	40.3	Lab technician	-Active in 20's -has bad knees -has hypothyroidism	-Weight loss -Reduce fatigue -Eating healthy -Strengthen: Core	-Energy -Time	1	N/A	None	N/A	-Work a lot of overtime -Taking iodine through naturopath
									2		My Fitness Pal TRX training		Talked about diet Set goal to get heart rate up 2x per day for 10 mins
									3		Portion control plates Women's outdoor adventure group Resistance training handout for basic bodyweight exercises		Determined HR training zones Suggested walking during the day
									4		None	Thyroid issues seem to have been sorted out. Thinks will be easier to participate in physical activity going forward	