EVALUATION OF A PILOT WORKPLACE HEALTH PROMOTION INTERVENTION TARGETING EMPLOYEES’ HEALTH BEHAVIOURS: THE MOTIV8 WORKPLACE SERIES

by

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Abstract

Background: The workplace provides a setting to offer health promotion interventions to a large proportion of adults. Given the high rates of obesity and chronic disease among this population, it is of public health importance to provide and evaluate these interventions.

Objectives: The purpose of this study was to pilot an evaluation of the Motiv8 Workplace Series (MWS) using the RE-AIM framework. The objectives of this study were 1) to provide measures of adoption, reach, and implementation of the MWS, 2) to provide estimates of the effectiveness of the MWS in changing physical activity and healthy eating behaviours, and in changing theoretical variables from the social cognitive theory and the health action process approach, and 3) to use the data to investigate the role of theoretical variables as mediators in changing these health behaviours.

Methods: This pilot study used a quasi-experimental, non-equivalent control group design. The study population consisted of employees aged 18 and older, living in Kingston and surrounding area. The study investigated 1) the participation rate and representativeness of participating workplaces (adoption), 2) the participation rate and representativeness of employees participating in the MWS (reach), 3) the extent to which the MWS was implemented as intended (implementation), and 4) the impact of the MWS on participants through measures of behavioural outcomes (effectiveness). A questionnaire was administered at baseline and 1-week follow-up.

Results: Objective 1. The participation rate was low among workplaces. Participating and non-participating workplaces were similar with respect to all characteristics except
past public health programming. There was also a low rate of participation among employees. Participants did not appear to be representative of all workplace employees.  

Objective 2. There was a significant difference in healthy eating (p<.05), but no significant difference in physical activity (p>.05) between participants in the intervention and comparison groups at follow-up.  

Objective 3. There was evidence for action planning as a partial mediator of the relationship between the intervention and healthy eating.  

Conclusions: The preliminary findings from this evaluation suggest that the MWS had moderately low reach and adoption, good program implementation, and was effective at changing eating behaviour among employed adults.
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<th>Description</th>
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<tbody>
<tr>
<td>CCO</td>
<td>Cancer Care Ontario</td>
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<tr>
<td>FVS</td>
<td>Fruit and Vegetable Screener</td>
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<td>HAPA</td>
<td>Health Action Process Approach</td>
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<td>IPAQ</td>
<td>International Physical Activity Questionnaire</td>
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<tr>
<td>KFL&amp;A</td>
<td>Kingston, Frontenac, and Lennox &amp; Addington</td>
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<td>MWS</td>
<td>Motiv8 Workplace Series</td>
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<tr>
<td>SCT</td>
<td>Social Cognitive Theory</td>
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<td>WHC</td>
<td>Workplace Health Champion</td>
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Chapter 1

Introduction

In the past 25 years, obesity rates associated with physical inactivity and unhealthy eating have increased for almost every age group of adults (Statistics Canada, 2005a). According to the 2007 Canadian Community Health Survey, 32% of Canadians are overweight and a further 16% are obese (Statistics Canada, 2008). Considerable evidence indicates that overweight and obesity are associated with an increased risk of morbidity and mortality from a number of chronic conditions that include type 2 diabetes, coronary heart disease, ischemic stroke, osteoarthritis, and certain forms of cancer (Billington et al., 2000; Pi-Sunyer, 1991). Therefore, it is of considerable public health importance to improve physical activity and healthy eating behaviours; this has the potential to improve health, reduce the risk of chronic disease, overweight, and obesity, and reduce health care costs.

The highest rates of obesity are reported among individuals aged 45 to 64 (Statistics Canada, 2008). The workplace provides access to a large segment of this population and can be considered a key channel for the delivery of health promotion interventions. Furthermore, workplaces can provide opportunities for continual access to the employed population. Although positive results are often reported from workplace health promotion interventions, researchers and practitioners still question their overall impact, whether they are reaching the intended users, and if research findings can be translated to practice (Bull, Gillette, Glasgow, & Estabrooks, 2003).
In response to the high levels of chronic disease and obesity in Canada, an accredited local public health agency, Kingston, Frontenac and Lennox & Addington (KFL&A) Public Health, has developed Motiv8. Motiv8 is a new initiative that aims to reverse the increase in chronic disease and obesity and improve the overall health of residents in the KFL&A area through the promotion of eight evidence-based behaviours related to physical activity and healthy eating. Motiv8 messages, based on the eight lifestyle behaviours, are 1) eat a healthy breakfast every day, 2) re-think your snack, 3) be active every day, 4) choose water, 5) enjoy more fruit and vegetables, 6) make meals at home, 7) breastfeed your baby, and 8) watch less TV. Because the workforce is one of the target groups of Motiv8 messaging, KFL&A Public Health has developed and wishes to evaluate a workplace health promotion intervention, the Motiv8 Workplace Series (MWS).

RE-AIM Framework

This study uses the RE-AIM framework with reference to the social cognitive theory (SCT) and the health action process approach (HAPA) to conduct a pilot evaluation of the effect of the MWS on employees’ health behaviours. The RE-AIM framework is important for evaluating the impact of public health interventions and provides information on the external validity of the findings which is needed to translate research into practice (Bull et al., 2003). In addition, this framework has been useful for determining if interventions delivered in real-world conditions (effectiveness trials) may be translated to larger scale interventions implemented on whole systems such as cities or provinces, and the public health impact of these larger scale interventions (Estabrooks & Gyurcsik, 2003).
Social Cognitive Theory and Health Action Process Approach

Given the importance of developing effective interventions aimed at improving physical activity and healthy eating behaviours, much research has been conducted to try to understand potential mechanisms of health behaviour change among adults (Bauman, Sallis, Dzewaltowski, & Owen, 2002; Lewis, Marcus, Pate, & Dunn, 2002; Shaikh, Yaroch, Nebeling, Yeh, & Resnicow, 2008). The SCT is one of the most frequently applied theories of health behaviour. It outlines a number of theoretical variables that are often used as predictors of health behaviour change and incorporated into health promotion interventions (Bandura, 2004). In a review of the application of SCT variables to predict health behaviours, researchers found that self-efficacy, outcome expectations and expectancies, and self-regulation were positively associated with physical activity and healthy eating behaviours (Luszczynska & Schwarzer, 2005). However, other research indicates that more evidence is needed on the role of these variables in changing physical activity and healthy eating behaviours (Lewis et al., 2002; Shaikh et al., 2008). The MWS is roughly based on theoretical variables from the SCT which include self-efficacy, self-regulation, and outcome expectancy value. Outcome expectancy value is a combined effect of two closely related variables, outcome expectations and expectancies.

The HAPA is another social-cognition model used in understanding change in health behaviours and pays particular attention to self-regulation while also sharing several other predictors with the SCT, including self-efficacy and outcome expectancies (Schwarzer, 2001). Although the HAPA is mentioned less frequently than the SCT in public health research, it postulates that self-regulation mediates the relationship between
an intervention and behaviour change through self-regulating variables including action planning, coping planning and action control (Sniehotta et al., 2005).

The purpose of this study is to assess the potential of the MWS to enhance physical activity and healthy eating behaviours of the employees who take part. It is hypothesized that employees who complete the MWS will increase their level of physical activity and improve eating behaviours. It is also hypothesized that the MWS will produce increases in self-efficacy, self-regulation (i.e., action planning, coping planning and action control), and outcome expectancy value and that these increases will mediate changes in physical activity and healthy eating behaviours.

This study provides information needed prior to conducting a full scale evaluation of the effects of a workplace health promotion intervention. It provides indicators of the feasibility of implementing the MWS, as well as estimates of project outcomes. Using the RE-AIM framework (reach, effectiveness, adoption, implementation and maintenance), this study determines 1) the percentage and representativeness of participant compared to non-participant workplaces (adoption), 2) the percentage and representativeness of employees who choose or choose not to participate (reach), 3) the extent to which various elements of the program are implemented as intended (implementation), and 4) the impact of the intervention on participants who attend the program through measures of behavioural outcomes (effectiveness). Maintenance is beyond the scope of this study because the suggested time needed for follow-up (6 months – 1 year) is beyond that feasible for a Master’s project. It is important to note that Glasgow, Vogt, and Boles (1999) state that it may not be necessary to assess all components of the RE-AIM framework in all studies.
Study Objectives

The objectives of this study are:

Objective 1: To provide measures of adoption, reach and implementation of the MWS.

Objective 2: To provide estimates of the effectiveness of the MWS in changing physical activity and healthy eating behaviours, and in changing theoretical variables associated with the SCT and HAPA.

Objective 3: To use the data to investigate the role of theoretical variables as mediators in changing physical activity and healthy eating behaviours.

Research questions that relate to objective 2 of this study are:

Primary research questions

Research question 1: Does the MWS increase total MET-minutes per week (including walking, moderate physical activity, and vigorous physical activity) among participants in the intervention group?

Research question 2: Does the MWS increase total daily servings of fruit and vegetables among participants in the intervention group?

Secondary research questions

Research question 3: Does the MWS increase physical activity self-efficacy scores among participants in the intervention group?

Research question 4: Does the MWS increase physical activity self-regulation scores among participants in the intervention group?

Research question 5: Does the MWS increase physical activity outcome expectancy value scores among participants in the intervention group?
Research question 6: Does the MWS increase healthy eating self-efficacy scores among participants in the intervention group?

Research question 7: Does the MWS increase healthy eating self-regulation scores among participants in the intervention group?

Research question 8: Does the MWS increase healthy eating outcome expectancy scores among participants in the intervention group?
Chapter 2

Literature Review

Introduction

This chapter provides a review of selected literature outlining the extent of chronic disease among adults, risk factors for chronic disease, particularly obesity, physical inactivity and unhealthy eating, and the workplace as a setting for health promotion interventions. Furthermore, the review discusses interventions that have been implemented in the workplace to improve employees’ health behaviours, the effectiveness of workplace health promotion interventions, the importance of evaluation, and the use of the RE-AIM framework and theoretical variables from the SCT and HAPA to guide program evaluation.

Chronic Disease in Canada

A major global public health problem is the increasing prevalence of chronic diseases. The World Health Organization predicts that nearly 47% of the global burden of disease and approximately 35 million deaths per year can be attributed to chronic diseases such as type 2 diabetes, cardiovascular disease, and certain types of cancer (World Health Organization, 2004; World Health Organization, 2005b). Although the incidence of chronic disease in developing countries is growing, the prevalence remains highest in developed countries such as Canada and the United States (World Health Organization, 2005b). In Canada, the World Health Organization estimates that 89% of all deaths are related to chronic disease (World Health Organization, 2005a). Premature death and disability caused by chronic disease among the Canadian population are
increasingly overwhelming the country’s health care system. The direct costs of chronic
disease (e.g. hospital care, specialized treatment, prescription drugs, and physician care)
combined with indirect costs (e.g. the economic input lost due to premature death and
short-term and long-term disability) are very high. Cardiovascular diseases, for example,
are estimated to account for $20.6 billion in direct and indirect costs, and cancer is
responsible for an estimated $17.9 billion per year (Patra et al., 2007). These data
highlight the magnitude of the burden of chronic disease. The high human and monetary
costs have led to an increased focus on strategies that both prevent and control chronic
disease.

**Obesity as an Intermediate Risk Factor for Chronic Disease among Adults**

The majority of cases of chronic disease are largely preventable by modifying
common risk factors such as unhealthy diet, physical inactivity and smoking, and
intermediate risk factors such as overweight and obesity (Roberts & Barnard, 2005;
World Health Organization, 2005b). Chronic diseases found to be associated with
overweight and obesity include type 2 diabetes, coronary heart disease, ischemic stroke,
osteoarthritis, and colon cancer (Billington et al., 2000; Pi-Sunyer, 1991).

Classification of overweight and obesity is typically based on body mass index
(BMI), a measure of an individual’s weight in relation to height (kg/m²). BMI is
classified into six categories, each with a different risk of developing health problems.
The categories include a BMI of less than 18.5 (underweight), 18.5 to 24.9 (normal
weight), 25.0 to 29.9 (overweight), and 30.0 or greater (obese). In the overweight and
obese categories there is an increased risk and high risk of developing health
consequences, respectively. Obesity is further broken down into three categories, Class I
(BMI 30.0 to 34.9), Class II (BMI 35.0 to 39.9), and Class III (BMI 40 and above) with increasing health risks. In recent years, there has been an increase in all three Classes, especially in Class II and Class III (Tjepkema, 2009). In Canada, the rates of obesity have increased for almost every age group of adults (Statistics Canada, 2008). According to the 2004 Canadian Community Health Survey, 36.1% of Canadian adults (aged 18 years and over) were considered overweight and an additional 23.1% obese. Of those who were obese, 66.1% were Class I, 22.2% were Class II, and 11.7% were Class III (Statistics Canada, 2006a).

At the simplest level, researchers state that obesity occurs when daily energy intake exceeds energy expenditure over an extended period of time (Hill & Peters, 1998). Energy intake refers to consumption of calories during eating and energy expenditure refers to energy use for functions of daily living and physical activity. Therefore, obesity rates are associated with physical inactivity and unhealthy eating (Statistics Canada, 2008) and the potential health benefits of improving physical activity and eating behaviours among Canadians are of considerable public health importance.

Prevalence and Consequence of Physical Inactivity in Canada

Canada’s Physical Activity Guide for Healthy Active Living recommends that adults aged 20-55 accumulate 60 minutes of daily physical activity or 30 minutes of moderate or vigorous exercise on at least 4 days a week (Health Canada, 1998). These recommendations are consistent with most international physical activity guidelines (Warburton, Katzmarzyk, Rhodes, & Shephard, 2007).

Regular physical activity is associated with a reduction in all-cause mortality and enhanced health benefits. Researchers have determined that if Canadians followed
recommendations from Canada’s Physical Activity Guide, approximately 33% of deaths related to coronary heart disease, 25% of deaths related to stroke and osteoporosis, 20% of deaths related to colon cancer, hypertension, and type 2 diabetes, and 14% of deaths related to breast cancer could be prevented (Warburton et al., 2007).

Physical inactivity has been defined as a daily energy expenditure of <1.5 kcal/kg/day (Liu, Wade, Faught, & Hay, 2008; Warburton et al., 2007). Results from the 2004-2005 Canadian Community Health Survey Cycle 2.2 show that over 50% of adults are considered physically inactive (Liu et al., 2008). Furthermore, Lui and colleagues (2008) found that physical inactivity among males (56%) and females (58%) was associated with lower education, smoking, country of birth outside of Canada, and being aged 46-59.9 years. Findings from the 2000-2001 Canadian Community Health Survey show similar results for physical inactivity among adults, with 53.2% of males and 57.1% of females being inactive (daily energy expenditure <1.5 kcal/kg/day) (Chen & Mao, 2006). Furthermore, Chen and Mao (2006) found that the prevalence of physical inactivity increased directly with BMI in males and females.

In response to the low levels of physical activity, Health Canada’s Pan-Canadian Healthy Living Strategy committed to increasing by 20% the proportion of Canadians who participate in regular physical activity by 2015 (Health Canada, 2005). Physical activity was defined as 30 minutes a day of moderate to vigorous activity. Similarly, in 2003, the federal, provincial, and territorial governments called for a 10% increase in physical activity levels in all provinces and territories by 2010 (Federal and Provincial/Territorial Ministers Responsible for Sport, 2003). In order to reach these targets, it is
evident that there needs to be a focus on interventions that promote physical activity among adults.

**Prevalence and Consequence of Unhealthy Eating in Canada**

Canada’s Food Guide contains recommendations for the number of servings from each of the four food groups that should be consumed by each age group (Health Canada, 2007). For females, aged 19-50, 7-8 servings of fruit and vegetables, 6-7 servings of grain products, 2 servings of milk and alternatives, and 2 servings of meat and alternatives are recommended. For males, aged 19-50, 8-10 servings of fruit and vegetables, 8 servings of grain products, 2 servings of milk and alternatives, and 3 servings of meat and alternatives are recommended. The scientific evidence shows that diets high in fiber from vegetables, fruits and whole grains, which are naturally low in fat and contain many essential vitamins and minerals, are associated with the prevention of obesity and chronic diseases (Hill et al., 1998; Roberts et al., 2005).

Many studies have focused on the role of fruit and vegetable intake in chronic disease. A review reported a strong protective effect of fruit and vegetable intake for stroke and a weaker protective effect for coronary heart disease (Ness & Powles, 1997). A more recent study by Bazzano and colleagues (2002) used data from the American National Health and Nutrition Examination Survey Epidemiological Follow-up Study, a prospective cohort study of 14,407 adults aged 25-74 years, to examine the association between fruit and vegetable intake and cardiovascular disease. The study showed an inverse relationship between fruit and vegetable intake and the risk of cardiovascular disease and all-cause mortality, in the U.S. general population (Bazzano et al., 2002). Another study found that consumption of fruit and green leafy vegetables was associated
with a lower risk of type 2 diabetes in a prospective cohort of women (Bazzano, Li, Joshipura, & Hu, 2008).

A cross-sectional study by researchers showed that higher intakes of fruit and vegetables were associated with a reduced risk of the metabolic syndrome (Esmaillzadeh et al., 2006). The International Diabetes Federation defines metabolic syndrome as a constellation of metabolic risk factors including a waist circumference equal or greater than 94 cm for males and 80 cm in females and two or more of the following risk factors: serum triacylglycerol greater than 150mg/dL, HDL-cholesterol less than 40 mg/dL in males and 50mg/dL in females, blood pressure greater than 130/85 mm Hg, and fasting plasma glucose greater than 100 mg/dL (Alberti, Zimmet, & Shaw, 2005). Furthermore, the metabolic syndrome is associated with an increased risk of mortality, particularly from cardiovascular disease (Alberti et al., 2005). From these studies, it is evident that fruit and vegetable intake has an important role to play in the prevention of chronic disease. Therefore, promoting the consumption of fruit and vegetables is important in lifestyle interventions aimed at reducing the prevalence of chronic disease and obesity.

The minimum recommended intake of fruit and vegetables needed to reduce the risk of chronic disease is five servings per day (Heimendinger, Van Duyn, Chapelsky, Foerster, & Stables, 1996; Hung et al., 2004). Findings from the Canadian Community Health Survey show that approximately half of Canadian adults do not meet the five-serving threshold (Garriguet, 2004). Among individuals aged 14-50, males are significantly less likely than females to consume five servings per day (Garriguet, 2004). Furthermore, the results indicate that the average for adults is 5.2 servings of vegetables
and fruits, which is still below Canada’s Food Guide recommendations of 7-8 servings for females and 8-10 servings for males. It is evident that Canadian adults are not getting enough fruit and vegetables. In response to this issue, the Pan-Canadian Healthy Living Strategy set the goal of increasing by 20% the proportion of Canadians who make healthy food choices by 2015 as measured by the Canadian Community Health Survey and Statistics Canada (Health Canada, 2005). Furthermore, the Pan-Canadian Healthy Living Strategy stated that healthy food choices will be measured in part by the consumption of fruit and vegetables in accordance with the recommendations put forth by Canada’s Food Guide. This is also in line with the dietary recommendations in the WHO Global Strategy on Diet, Physical Activity and Health (World Health Organization, 2004).

**Rationale for the Workplace as a Setting for Health Promotion Interventions**

The 2006 Canadian Census showed that 62.4% of adults aged 15 years and older are employed (Statistics Canada, 2009). Furthermore, Canadian adults spend approximately one third of their day in a workplace environment doing paid work or activities related to paid work (Statistics Canada, 2005b). Therefore, the workplace provides a setting in which a large number of adults can be reached by efforts to encourage healthy behaviours.

In addition to providing access to a large number of people, workplaces provide several further advantages as a setting for health promotion interventions. First, the workplace has potential for higher participation rates than non-workplace environments, especially when the program is during paid working hours (Cahill, Moher, & Lancaster, 2008). Second, the programs are usually provided on-site so employees are not required
to travel, which can also improve participation rates (Cahill et al., 2008). Third, there is likely a low level of attrition as the working population is relatively stable (Harden, Peersman, Oliver, Mauthner, & Oakley, 1999). Lastly, there are already established channels of communication, which can make it easier to promote and implement programs (Harden et al., 1999).

Using the workplace as a setting for health promotion interventions is also advantageous for employers. There is evidence that workplace health promotion is associated with higher employee morale and job satisfaction, reductions in employee absenteeism, increased employee health, increased productivity, and improved organizational effectiveness (Goetzel & Ozminkowski, 2008; Parks & Steelman, 2008). These factors should provide a rationale for employers to invest in workplace health promotion.

**Description of Health Promotion Interventions in the Workplace**

Workplace health promotion interventions mainly focus on physical activity, healthy eating, or a combination of health behaviours such as physical activity, healthy eating, tobacco cessation and cancer screening. The Task Force of Community Preventive Services recommends interventions that include both physical activity and healthy eating strategies to control overweight and obesity in a workplace setting (Katz et al., 2005).

Most researchers agree that the most effective health promotion interventions are those with a multifaceted approach (Harden et al., 1999; Sahay, Ashbury, Roberts, & Rootman, 2006; Wetter et al., 2001). It is clear that in order to achieve improvements in health behaviours such as physical activity and healthy eating among employees, multi-
level interventions are needed that target social and physical determinants of health at the individual, organizational, and environmental levels (Wetter et al., 2001). A review by Peersman, Harden, and Oliver (1998), classified workplace health promotion interventions into three categories: awareness programs, lifestyle change programs, and supportive environment programs, with interventions involving a combination of all three categories having the most effective results.

Both awareness and lifestyle change programs are individual-level interventions. Awareness programs refer to interventions that attempt to increase awareness about a specific health topic in order to change employees’ health behaviours. This can be done using posters, health screening, and educational classes. Lifestyle change programs refer to interventions that use strategies such as skills training, self-help, or worksite counseling aimed directly at changing employees’ health behaviours. Supportive environment programs refer to interventions aimed at reducing barriers or increasing opportunities for healthy choices within the workplace. This can be done using environmental modifications such as providing more healthy options, making healthy choices more accessible and changing policies to support healthy choices.

Previous reviews on physical activity interventions in a workplace setting have reported mixed results. One systematic review concluded that workplace physical activity interventions have only a small, non-significant effect on physical activity (Dishman, Oldenburg, O’Neal, & Shephard, 1998). A meta-analysis of workplace physical activity interventions reported similar findings (Conn, Hafdahl, Cooper, Brown, & Lusk, 2009). The majority of studies included in these reviews were based on
individual-level physical activity interventions, although some studies had an environmental-level component as well.

Dishman and colleagues (1998) recommended that future studies on physical activity interventions be based on theories of behaviour change, describe interventions by specifying the presumed mechanisms for behaviour change and the outcome measures used in evaluating their effectiveness, use an equivalent comparison group matched with the intervention group on relevant characteristics when randomization is not possible, use validated measures of physical activity, and assess follow-up measures of physical activity after the intervention is completed in order to overcome the shortcomings of previous studies.

The results from studies designed to increase adult fruit and vegetable intake are more promising than those for physical activity. For example, a review of 11 workplace interventions found an increase of between 0.13 and 0.7 servings of fruit and vegetables per day. Most of the interventions included individual- and environmental-level components (Pomerleau, Lock, Knai, & Mckee, 2005). A disadvantage of these studies is that they do not determine the contribution of each component separately. Some researchers suggest that the effectiveness of individual- and environmental-level components should first be examined separately and then be combined to see if there is an added value of a comprehensive approach and to determine if one component is more effective at changing behaviour than another (Matson-Koffman, Brownstein, Neiner, & Greaney, 2005; Muller-Riemenschneider, Reinhold, Nocon, & Willich, 2008).
Importance of Evaluating Health Promotion Interventions

Evaluations are an important component of health promotion interventions. The literature identifies a number of reasons for conducting program evaluations. First, program evaluations can help health promotion practitioners judge the success and impact of a program by determining if it has reached its objectives (Nutbeam, 1998). Second, the results of evaluations can be used by managers or other public health professionals to support decision-making about how to allocate resources and improve programs (Nutbeam, 1998). Third, evaluations can be used to inform policy and show funders and community representatives if the intervention is worth sustained investment (Glasgow, Vogt, & Boles, 1999). Lastly, researchers can use evaluations as a tool to obtain evidence needed to improve knowledge and understanding of health behaviour change (Baranowski, Cerin, & Baranowski, 2009).

The significance of program evaluations is also stated in the Ontario Public Health Standards. This document was published in 2008 by the Ministry of Health and Long Term Care and outlines the requirements for public health programs and services (Ministry of Health and Long Term Care, 2008). A foundational standard underlies all program standards and protocols. This standard recommends that all programs and services be informed by evidence that results from population health assessment, surveillance, research, and program evaluation. Specifically, the document states that information from program evaluation is, “needed to support the establishment of new programs and services (needs assessment); assess whether evidence-informed programs are carried out with the necessary reach, intensity, and duration (process evaluation); or document the effectiveness and efficiency of programs and services (outcome...
evaluation)” (p.17). Furthermore, the document states that program evaluations should be conducted when new interventions are developed and implemented and should help explain the relationships between program inputs, activities, outputs, and outcomes.

**Evaluation Framework: The RE-AIM Framework**

Glasgow and Emmons (2007) recommend evaluations that address a number of different types of evidence that are needed to implement interventions in applied settings. The types of evidence they suggest include theoretical or mechanism data, feasibility/implementation evidence, contextual information, intended and unintended outcome evidence, internal and external validity evidence, adoption and sustainability evidence, and efficacy/outcome data. The majority of studies evaluating workplace health promotion programs are efficacy studies and focus on reporting behavioural outcomes (Bull et al., 2003).

Efficacy studies have been described as the study of an intervention delivered under optimum conditions (Flay, 1986). Furthermore, efficacy studies are usually randomized controlled trials that occur in one setting to reduce variability and are implemented by research staff closely following specific protocol (Glasgow, Lichtenstein, & Marcus, 2003). A major strength of efficacy studies is that they focus on internal validity, meaning that the results of the study are not likely due to bias or confounding. Participants in efficacy studies are generally homogenous, highly motivated, and have no health complications (Glasgow et al., 2003). Thus, a drawback of efficacy studies is that the impact of the intervention on behaviour change may not be generalizable; thus, these studies have a low degree of external validity. Furthermore, with a primary focus on efficacy, it is hard to determine if interventions can be translated to practice.
In comparison, effectiveness studies determine the impact of an intervention delivered under “real-world” conditions (Rabin, Brownson, Haire-Joshu, Kreuter, & Weaver, 2008). Effectiveness studies are usually less controlled studies, such as quasi-experimental designed studies, that allow for implementation and participation of the intervention to vary among a broadly defined population (Glasgow et al., 2003). An advantage of effectiveness studies is that they focus on the external validity, or the generalizability, of the findings. However, they are generally less controlled than efficacy studies so internal validity might be an issue.

Glasgow and colleagues (2003) state that both efficacy and effectiveness studies are needed to advance the current quality of research and health promotion knowledge base. Given that previous research is dominated mainly by efficacy studies, Glasgow and colleagues (1999) argue that to increase the translation of research findings into practice, effectiveness studies are needed. Most studies also lack information on criteria needed for wide adoption of interventions which includes whether interventions are implemented according to how they were designed and if they are reaching priority populations (Bull et al., 2003). For instance, if an intervention is effective at changing health behaviour but is not reaching the intended users then it might not have a significant public health effect.

In response to these issues, a workgroup developed the RE-AIM framework to evaluate and enhance the reach and dissemination of health promotion interventions. The workgroup includes researchers from Kansas State University, Virginia Tech, University of Colorado, and the Robert Wood Johnson Foundation. The RE-AIM framework provides a systematic way for researchers, practitioners, and policy makers to evaluate health behavior interventions (Bull et al., 2003). Furthermore, Glasgow et al. (1999) state
that RE-AIM provides a framework for identifying programs that work in real-world settings and determining programs that are worth sustained investment.

RE-AIM consists of five components: reach, effectiveness, adoption, implementation, and maintenance. Reach refers to the percentage and representativeness of the participants who are willing to participate in an intervention among those who are eligible. Effectiveness refers to the impact of an intervention on behavioural outcomes (e.g. physical activity) and theoretical variables (e.g. self-efficacy). Adoption refers to the participation rate among eligible settings and the representativeness of the settings that are willing to undertake the intervention. Implementation refers to the extent that the components of the intervention are delivered as planned and the intended protocol is followed. Maintenance refers to the extent to which the participants of the intervention maintain behavioural outcomes over the long-term. By addressing each component, RE-AIM places emphasis on the internal and external validity of the study (Bull et al., 2003). The next section will outline the extent to which evaluations of workplace health promotion programs present relevant data for the process-related components of the RE-AIM framework: adoption, reach, and implementation, and then discuss the outcome-related component, effectiveness, to determine gaps in the literature.

Glasgow and colleagues (1999) state that adoption, reach, and implementation are vital in evaluating programs intended for wide-scale distribution. Information on participation and representativeness at both the workplace- and employee-level, and implementation at the individual- and program-level are rarely reported in studies. It is unclear if this information is usually determined but not reported, or if many studies lack this information all together.
Adoption.

There has generally been a lack of information in the literature on the participation of workplaces in health promotion programs. Bull and colleagues (2003) reviewed 24 studies, with only six studies (25%) including information on the proportion of workplaces participating and no studies including information on the representativeness of participating workplaces among those eligible.

Low participation rates among workplaces appear to be common in studies that have included this information. Reviews have reported participation rates ranging from 9% to 55% among eligible workplaces (Bull et al., 2003; Glasgow, Mccaul, & Fisher, 1993; Kwak, Kremers, van Baak, & Brug, 2006). One study discussed the challenge of recruiting workplaces to participate in interventions when there is a randomized study design and suggested that workplace health promotion evaluations use a quasi-experimental study design (Kwak et al., 2007). Researchers state that the main problem with low adoption among workplace health promotion programs is it reduces the number of employees that have access to the programs (Linnan, Sorensen, Colditz, Klar, & Emmons, 2001).

Although studies usually report characteristics of workplaces that participate in health promotion programs, generally no information is given on workplaces that do not participate in the programs (Bull et al., 2003). Therefore, there is no way to tell if the workplaces that participate are representative of all workplaces contacted.

Of workplaces that do participate in health promotion programs, larger workplaces have been found to implement a greater number of health promotion programs than have smaller workplaces (Fielding & Piserchia, 1989). Possible
explanations for this finding are that larger workplaces may be more likely to have personnel, benefits and health staff dedicated to implementing health promotion activities (Fielding et al., 1989). Other studies have also provided evidence that workplaces that are smaller in size, defined as fewer than 50 employees, and workplaces that support types of industry such as agriculture, mining, construction, and retail are not as likely to offer health promotion programs to their employees (Linnan et al., 2001). The most common types of workplaces reported to participate in workplace health promotion programs are education or health services, government, and manufacturing (Conn et al., 2009). The most cited reason for workplaces not choosing to participate in workplace health promotion interventions were lack of time and resources (Kwak et al., 2006).

**Reach.**

There has also been little reporting of employee participation rates and the representativeness of employees participating in workplace health promotion programs. In response to this problem, some researchers have called for information on the characteristics of participating and non-participating employees and detailed information on recruitment to be reported (Benedict & Arterburn, 2008). Furthermore, Bull and colleagues (2003) recommend that at the employee-level, studies should include information on the percentage of eligible employees who were included and excluded from the study, and how representative the participating employees were of the entire workforce.

Employee participation rates have varied widely in studies that have reported them. For instance, in a recent systematic review, participation levels ranged from 10% to 64% (Robroek, van Lenthe, van Empelen, & Burdorf, 2009). This included
participation in educational or counseling programs as well as other multi-component programs. Furthermore, in a review of twenty-four workplace health promotion programs, participation rates among employees were found to range from 8% to 97% (Bull et al., 2003). There is some evidence that smaller workplaces have higher rates of employee participation (Glasgow et al., 1993). In addition, high rates of participation have been found when incentives are given and when programs focus on multiple behaviours and components (Robroek et al., 2009).

Most studies discuss participant characteristics and inclusion criteria. A review of studies showed that employees who participate are more likely to be female (except for fitness programs, in which men have slightly higher participation), older, white-collar workers, and the healthiest in the workplace (Glasgow et al., 2003). For instance, an evaluation of a worksite chronic disease prevention program determined that approximately 86% of participants were female with the largest group having at least a college degree (>40%) (Aldana et al., 2005). Another review determined that female employees had higher participation rates than males, but there was inconsistent evidence for other demographic, and health- and work-related characteristics (Robroek et al., 2009). It should be noted that most studies lack information on characteristics of employees who do not participate in workplace health promotion programs. Therefore, it is difficult to determine whether an intervention can be generalized to other populations of employees.

**Implementation.**

Glasgow and colleagues (1999) state that implementation, or process evaluation, can be measured at both the individual and program-level. At the individual level,
implementation refers to participant “adherence” in regards to completing tasks, attending educational sessions, and following through other intervention components (Glasgow et al., 1999). At the program-level, implementation refers to how closely the intervention was delivered as intended (Glasgow et al., 1999). Examples of program-level measures of implementation include staff members reporting on how many class hours were taught, calculating the percentage of process objectives obtained, and determining if all staff members implemented the intervention in the same way (Bull et al., 2003; Glasgow et al., 1999).

It appears that most studies do not report either individual-level or program-level measures of implementation. In a review by Bull et al. (2003), the researchers found that only three of the 24 studies reported how closely the intervention was implemented according to protocol. Information on implementation usually included the percentage of process objectives achieved. For instance, in one study researchers reported that 97% of process objectives were delivered over the intervention period (Emmons, Linnan, Shadel, Marcus, & Abrams, 1999). The information was based on data from project staff who delivered the intervention. The evaluation included 15 process objectives that were based on factors such as the type of activities implemented, the materials distributed, the time and resources expended. However, the authors stated that some intervention activities were underreported (Sorensen et al., 1996).

In another study, implementation was defined in terms of the extent that instructors implemented key elements of a falls prevention program and the extent that participants adhered to the program (Li et al., 2008). Adherence was determined as the attainment of class attendance of 75% or higher, over 12-weeks. The authors determined
that the major elements of the program, class requirements and class materials, were implemented successfully although the methods used to measure these elements were not reported. From these examples, it is evident that measures of individual and program-level implementation vary according to the study context.

**Effectiveness.**

Almost all studies evaluating the impact of workplace health promotion programs report change in the primary outcomes of interest such as health behaviours. A review by Bull et al. (2003) determined that 16 of the 24 studies reviewed reported behavioural outcomes such as physical activity and healthy eating. Although it is widely acknowledged that the effect of an intervention on the primary outcomes of interest is important, it is only part of the picture needed to translate research into practice (Glasgow & Emmons, 2007). For example, the Work, Weight, Wellness Program is a 2-year group randomized clinical trial conducted in 31 hotels with 11,559 employees (Williams et al., 2007). The multi-level intervention consisted of an awareness component, a weight management group, and environmental supports that target employees’ diet, physical activity, and weight management. The primary outcome of interest was change in BMI, physical activity, and diet among employees. By only focusing on the primary intended outcomes, this evaluation failed to provide evidence of external validity data, feasibility, adoption and sustainability that would be needed to translate research into practice (Glasgow et al., 2007). It has not yet been reported whether the intervention changed the behavioural outcomes among hotel employees participating in the intervention.
Maintenance.

Similar to implementation, maintenance also operates at the individual and program-level. At the individual level, maintenance refers to individual behaviour change being sustained over time (Glasgow et al., 2003). For example, if an individual increases their number of servings of fruit and vegetables after an intervention, will this change be maintained over the long-term? At the program-level, maintenance refers to the extent that the workplace health promotion program becomes institutionalized, or part of the workplace (Glasgow et al., 1999). This means the health promotion program becomes routinely offered and part of the everyday culture and norms.

Most researchers agree that the long-term effects on outcomes should be measured at 6 or more months following an intervention (Bull et al., 2003; Dzewaltowski, Estabrooks, & Glasgow, 2004). However, Glasgow and colleagues (1999) suggest that 2 years or longer is needed to measure maintenance. Given the length of time suggested for follow-up, maintenance is generally poorly reported in studies. In a review of 119 studies using the RE-AIM framework, researchers found that maintenance was among the least measured components and was included in only 2% of the studies (Dzewaltowski et al., 2004).

Theoretical Frameworks of Behaviour Change

Many researchers recognize the importance of understanding the mechanisms of physical activity and healthy eating behaviour change in order to develop the most effective interventions (Bauman et al., 2002; Lewis et al., 2002; Shaikh et al., 2008). A mediator is thought to shed light on the mechanism through which a program exerts its effects on health behaviours (Bauman, Sallis, Dzewaltowski, & Owen, 2002). Bauman
and colleagues (2002) refer to a mediator as a variable that is necessary to complete the causal pathway between exposure to an intervention and change in health behaviours. Moreover, there may be a single mediator, or a series of mediators in the cause and effect pathway. Researchers hypothesize that mediators are theoretical variables from key theories of behaviour change such as the SCT and the HAPA (Bauman et al., 2002; Van Osch et al., 2009). In previous studies, self-efficacy, self-regulation, and outcome expectations and expectancies have been commonly identified as possibly mediating the relationship between a healthy promotion intervention and physical activity (Hortz & Petosa, 2008; Lewis et al., 2002; Lubans & Sylva, 2009) and healthy eating behaviour (Anderson, Winett, & Wojcik, 2007; Shaikh et al., 2008).

**Social cognitive theory.**

The SCT is one of the most frequently applied theories of health behaviour. It is founded on a reciprocal interaction between an individual’s behaviour, personal and cognitive factors (e.g. self-efficacy), and environmental factors. This is called triadic reciprocity (Bandura, 2004). Underlying the person, the behaviour, and the environment are a number of SCT variables. The SCT variables include self-efficacy, self-regulation, and outcome expectancies (Baranowski, Perry, & Parcel, 2004). Self-efficacy refers to a person’s perception of his or her ability to overcome barriers to performing a behaviour (Baranowski et al., 2004). There are four sources of self-efficacy, which include personal accomplishment or mastery, vicarious experience, verbal persuasion, and emotional arousal. Outcome expectations refer to a person’s belief about the outcomes that occur as a result of a behaviour and outcome expectancies refer to the value that a person places on the perceived outcomes of the behaviour (Baranowski et al., 2004). In previous studies,
outcome expectations and expectancies have been combined to create one variable called outcome expectancy value (Hallam & Petosa, 1998; Hortz et al., 2008). Self-regulation refers to personal regulation of goal-directed behaviour or performance (Baranowski et al., 2004). This includes providing opportunities for self-monitoring and goal setting. These variables are often used as predictors of health behaviour change and can provide a framework for designing, implementing, and evaluating health promotion programs (Baranowski et al., 2004).

In a review of the application of SCT variables to predict health behaviours, self-efficacy, self-regulation, and outcome expectations and expectancies were reported as predictors of physical activity and healthy eating behaviours (Luszczynska et al., 2005). Self-efficacy has received the most attention in the literature as a potential mediator for physical activity and healthy eating behaviour (Lewis et al., 2002; Shaikh et al., 2008). However, the results of studies that examined self-efficacy as a mediator are inconsistent. For example, one study explored the mediators of change in physical activity following an intervention and reported that self-efficacy may be a mediator of physical activity behaviour change (Miller, Trost, & Brown, 2002). In comparison, other studies examining self-efficacy, self-regulation, and outcome expectancy value as mediators of physical activity and healthy eating found that it was self-regulation, not self-efficacy and outcome expectancy value, mediating change in these behaviours (Anderson et al., 2007; Hallam & Petosa, 2004; Hortz et al., 2008; Lewis et al., 2002; Shaikh et al., 2008).

**Health action process approach.**

The HAPA is another theory of behaviour change. It postulates that adoption, initiation, and maintenance of health behaviours must consist of a motivation phase where
a person develops an intention to act, and a self-regulation phase in which a person pursues their goal (Schwarzer, 2001). Similar to the SCT, processes of the HAPA include self-efficacy, self-regulation, and outcome expectancies. In the HAPA, self-efficacy and outcome expectancies are seen as important predictors of intentions in the motivational phase. In addition, self-efficacy and self-regulation processes play a central role in the self-regulation phase.

In comparison to the SCT, the HAPA provides a clearer understanding of self-regulation mechanisms by breaking it down into two additional variables called planning and action control. Sniehotta et al. (2005) refer to two types of planning called action planning and coping planning. According to Sniehotta and colleagues (2005), action planning refers to when, where, and how to act in order to perform an intended behaviour whereas coping planning refers to the anticipation of barriers to executing an intended behaviour and planning corresponding coping responses. In addition, action control refers to a self-regulatory strategy that consists of three interplaying processes, awareness of standards, self-monitoring, and self-regulatory effort (Sniehotta, Scholz, & Schwarzer, 2005).

In previous studies, there has been little focus on the role of action planning, coping planning, and action control as potential mediators of physical activity and healthy eating. A recent study found that action planning significantly predicted fruit consumption and suggested that it should be incorporated in current social cognitive models and interventions (Van Osch et al., 2009). Furthermore, the researchers recommend that future research should focus on coping planning as a predictor of health behaviour.
Summary of the Literature Review

Given the high rates of overweight and obesity associated with physical inactivity and unhealthy eating behaviours among adults, the workplace provides an important setting to offer effective health promotion interventions aimed at changing these behaviours. This literature review discussed previous workplaces health promotion interventions and the importance of evaluating interventions to determine if they are effective at changing health behaviour. Furthermore, since there has been limited success translating research into practice, the RE-AIM framework was discussed as a possible solution.

Researchers agree that interventions should be based on theory and that understanding the mechanisms of behaviour change is key to developing effective interventions. The theoretical variables self-efficacy, self-regulation, and outcome expectancy value are commonly studied mediators of behaviour change but evidence of their roles as mediators is limited. This suggests that more evidence is needed in this area of study.

Rationale

To the researcher’s knowledge, this is the first theory-based evaluation of a workplace health promotion program that uses the RE-AIM framework. The RE-AIM framework focuses on the external validity of the findings, which is needed to translate research into practice. This study also has the potential to demonstrate the ability of theoretical variables from the SCT and HAPA (self-efficacy, self-regulation, and outcome expectancy value) to mediate intervention effects on physical activity and healthy eating.
behaviours. This study also expands our understanding of self-regulation by breaking it down to examine possible mechanisms through which it may act as a potential mediator.

Furthermore, this study provides information on the feasibility and logistics of the MWS. These findings can be used to inform decisions to continue or make changes to improve the implementation and evaluation of the MWS. This pilot evaluation also provides estimates of the results and scores needed for sample size calculations that would be required to design a definitive evaluation of the intervention. Lastly, this study pilots the methods of a full scale evaluation. If a positive change in physical activity and healthy eating is found in this study, and a full scale evaluation finds similar results, it suggests that the MWS could be offered by other public health units in Canada.
Chapter 3

Description of the Motiv8 Workplace Series

Description of the Program

The setting for the evaluation project consisted of workplaces in the KFL&A area. The sampling frame was public and private sector workplaces, in both urban and rural areas, and supporting a number of different industries.

History of the Motiv8 Workplace Series

The Motiv8 initiative, launched in January 2008, is a community based comprehensive health promotion program at KFL&A Public Health. It was developed in response to the 2004 Chief Medical Officer of Health of Ontario Report, Healthy Weights, Health Lives that brought attention to the epidemic of overweight and obesity in Canada. In November 2006, KFL&A Public Health hosted a community forum for partners to voice what they wanted KFL&A Public Health to do to address the problem of overweight and obesity, and chronic disease in KFL&A area. Priorities that were identified in the forum were incorporated into the planning of a new initiative. In 2007, managers and staff were hired at KFL&A Public Health to start program planning. The new initiative was labelled as Motiv8 with the tag line Eat Well. Get Fit. Live Life. The ‘8’ in Motiv8 represents eight, evidence-based healthy lifestyle behaviours, which are: 1) eat a healthy breakfast every day, 2) re-think your snack, 3) be active every day, 4) choose water, 5) enjoy more fruit and vegetables, 6) make meals at home, 7) breastfeed your baby, and 8) watch less TV. All health programming at KFL&A Public Health was to be revised to include Motiv8 messaging.
Motiv8 was developed to be a multi-level health promotion initiative targeting adults aged 18-64 through their homes, schools and childcare facilities, workplaces and community in order to reduce the incidence of overweight and obesity, and chronic disease in KFL&A area. The vision of the program is that adults will have supportive environments to increase awareness, enhance motivation, and build skills to improve their health and will pass these healthy habits on to children.

In February 2008, health professionals at KFL&A Public Health determined that there was a need to incorporate the Motiv8 messages into the Workplace Wellness Program. The Workplace Wellness Program provides displays, presentations, kits, educational sessions, and support services to workplaces. The health professionals wanted to develop a new program with strategies at the individual and environmental level of influence on Motiv8 behaviours, with special attention to physical activity and healthy eating. The health professionals intended to do this by first getting employees interested in improving their health behaviours by offering an educational series. The educational series would provide information on awareness of the Motiv8 messages with a specific focus on physical activity and healthy eating as well as strategies for skill building. After the series was finished at the workplace, the health professionals would then contact the workplace’s management regarding environmental supports and organizational changes that promote healthy behaviours in their workplace.

During the development phase of the program, the health professionals submitted a grant proposal for funding from Cancer Care Ontario (CCO) for a health behaviour change logbook. The health professionals received the funding and developed a logbook using evidence from the peer reviewed literature. As a requirement for receiving CCO
funding, the CCO required the logbook to be tested in focus groups. The new series, termed the MWS, was developed from material derived from the literature scan and the logbook was included as part of the program.

Due to the considerable amount of information that the health professionals wanted to provide to employees, the MWS was first developed as a group of four, 1-hour sessions to be delivered over the span of four weeks. The health professionals developed the sessions, incorporating evidence from published studies that were successful at bringing about behaviour change.

In March 2008, four workplaces that had previously contacted KFL&A Public Health and requested information on healthy eating and/or physical activity were told about the pilot MWS. They were asked if they were interested in receiving the MWS and participating in focus groups to evaluate the logbook. In the focus groups, participants were asked questions about components of the logbook and the MWS which included usability, usage, and what they liked and disliked. In addition, participants were asked to give feedback about the MWS after each session. After the initial pilot testing of the MWS and evaluation of the logbook, the health professionals made a number of changes to the series which included adding an extra session and making minor changes to the logbook.
Objectives of the MWS Identified by the Health Professionals

The overall goal of the MWS is to decrease the prevalence of overweight and obesity, and chronic disease in the KFL&A area.

Primary objectives of the program are:

- To increase participants’ total amount of physical activity.
- To increase healthy eating behaviours of participants.

Secondary objectives of the program are:

**Physical activity.**

- To increase the number of participants, by the end of the MWS, who feel confident in their ability to perform physical activity (for endurance, strength, and flexibility) according to Canada’s Physical Activity Guide for their age group.
- To increase the number of participants, by the end of the MWS, who feel motivated to perform physical activity (for endurance, strength, and flexibility) according to Canada’s Physical Activity Guide for their age group.
- To increase the number of participants, by the end of the MWS, who have developed skills to perform physical activity (for endurance, strength, and flexibility) according to Canada’s Physical Activity Guide.
- All MWS participants will perform physical activity (for endurance, strength, and flexibility) according to Canada’s Physical Activity Guide for their age group by the end of the MWS.
Healthy eating.

- To increase the number of participants, by the end of the MWS, who feel confident in their ability to eat the daily amount of fruit and vegetables recommended by Canada’s Food Guide.
- To increase the number of participants, by the end of the MWS, who feel motivated to eat the daily amounts of fruit and vegetables recommended by Canada’s Food Guide.
- To increase the number of participants, by the end of the MWS, who have developed skills to increase the average number of servings of fruit and vegetables they consume each day.
- All MWS participants will eat the daily amounts of fruit and vegetables recommended by Canada’s Food Guide by the end of the MWS.

Additional objectives associated with physical activity and healthy eating were determined for goal setting, barriers, healthy breakfast, healthy snack, choosing water, nutrition labels, intuitive eating, and journaling. However, these objectives are beyond the scope of this study and are not further discussed.

**Objectives of the MWS as Adapted for the Evaluation**

The primary and secondary objectives developed by the health professionals were refined to make them suitable for an evaluation.

Primary Objectives of the program are:

- To increase the proportion of participants who are physically active at moderate and high levels.
To increase the proportion of participants who are eating according to Canada’s Food Guide (using servings of fruit and vegetables as an indicator of a diet following Canada’s Food Guide).

Secondary Objectives of the program are:

**Physical activity.**

By the end of the MWS,

- To increase the number of participants who feel confident in their abilities to overcome barriers associated with being physically active (self-efficacy).

- To increase the number of participants who have positive beliefs about the outcomes of being physically active and place value on these outcomes (outcome expectancy value).

- To increase the number of participants who have a plan to increase their physical activity (i.e. when, where, and how to be physically active, how to cope with possible setbacks, and consistently monitor their physical activity) (self-regulation)

**Healthy eating.**

By the end of the MWS,

- To increase the number of participants who feel confident in their abilities to overcome barriers associated with consuming more fruit and vegetables (self-efficacy).

- To increase the number of participants who have positive beliefs about the outcomes of having a healthy diet and place value on these outcomes (outcome expectancy value).
To increase the number of participants who have a plan to improve their diet (i.e. when and how to change health eating habits, how to deal with relapses, and follow Canada’s Food Guide recommendations for servings of fruit and vegetables) (self-regulation).

Activities of the Motiv8 Workplace Series

The MWS consists of five sessions about physical activity, healthy eating, and changing behaviours. The sessions run for approximately one hour, once a week and are delivered by health professionals who include a physical activity specialist, a public health dietitian, a community food advisor, and public health nurses from KFL&A Public Health. Each employee who participates is lent a pedometer and receives a logbook, education support materials and other Motiv8 incentives. The logbook includes information about the Motiv8 behaviours and a healthy behaviours log for each day. In addition, healthy snacks are provided at the healthy eating sessions.

The first session provides a brief introduction to the Motiv8 initiative and reviews each of the eight behaviours that can help people to increase physical activity and improve eating habits. This session also includes education about: 1) goal setting; 2) emotional, physical, and psychological barriers and ways to overcome barriers; 3) misperceptions about changing physical activity and eating behaviours; 4) short-term rewards that will reinforce sticking with goals; 5) the habit pathway (e.g. turn Tuesday night ‘movie’ night into ‘move’ night); 6) factors that influence decisions; 7) risks associated with physical inactivity and benefits of regular physical activity such as walking; 8) recommendations from Canada’s physical activity guide; and 9) pedometer use. Furthermore, each participant is provided with a pedometer and logbook to track
physical activity and eating behaviours. Participants are given time to try the pedometer and asked to complete the logbook for the previous day. Also, participants are asked to set short and long-term goals associated with physical activity and healthy eating. The theoretical variables targeted in the first session include self-efficacy through verbal persuasion (e.g. overcoming barriers), outcome expectancy value (e.g. benefits of physical activity and healthy eating), and self-regulation (e.g. goal setting, pedometer, and logbook).

The remaining sessions begin by reviewing barriers and challenges faced by the participants each week, describing ways to keep motivated for change and to overcome the barriers, and providing tips on how colleagues, friends and family can provide social support. The second session continues with education on Canada’s Food Guide, regular eating patterns, intuitive eating, portion size and food label information, and ends with a healthy snack demonstration. The third session proceeds with education on endurance activities, intensity levels, and flexibility. Participants are provided with specific training ideas and are able to practice some stretches. After both sessions, participants are asked to modify their short-term goals. The theoretical variables targeted in the second and third sessions include self-efficacy through personal mastery (e.g. skills training), outcome expectancy value (e.g. benefits of physical activity), and self-regulation (e.g. goal revision, pedometer, logbook).

The fourth session provides education about label reading and making informed nutrition choices, ingredient lists and nutrition facts and claims, and includes a presentation of the virtual grocery tour (available at http://www.healthyeatingisinstore.ca/virtual_grocery.asp) and preparation of a healthy meal.
snack. The fifth (and final) session focuses on strength training and provides information on the benefits and myths about strength training, and warm-up and cool down activities. Participants are also encouraged to practice some strength training exercises that have been demonstrated. The session ends by giving participants a summary of the Motiv8 behaviours and ways to make them a part of their lifestyle. In addition, the challenges of behaviour change are discussed and ways to maintain changes in behaviour are identified. The theoretical variables targeted in the fourth and fifth sessions include self-efficacy through personal mastery and verbal persuasion (e.g. skills training, overcoming barriers), outcome expectancy value (e.g. motivators for change), and self-regulation (e.g. goal revision, pedometer, logbook).

Key Stakeholders and Program Logic Model

Table 1 outlines the MWS key stakeholders, their roles, and their responsibilities. Figure 1 is the logic model and is the graphical representation of the structure and function of the program as it was evaluated in this study. The logic model was developed by the researcher as part of the preparation for this evaluation. In the logic model, the block under medium term outcomes with the dashed line represents a hypothesized pathway that was added by the researcher to present a framework for the evaluation. The variables in the dashed line box were used to expand the logic model to include theory. Although the MWS was not explicitly based on the theoretical variables included in the dashed line box, these variables were identified in the literature review as being consistent with the content of the MWS.
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<th>Stakeholders</th>
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<tr>
<td>Medical Officer of Health</td>
<td>Support healthy weights, healthy lives and Motiv8</td>
<td>Support adult health programming</td>
</tr>
<tr>
<td>Director of Chronic Disease and Injury Prevention</td>
<td>Oversee operations of all adult health programs, includes Motiv8</td>
<td>Act as main contact to CCO for funding for the Motiv8 logbook</td>
</tr>
<tr>
<td>Manager of Chronic Disease and Injury Prevention</td>
<td>Oversee operations of the adult health program</td>
<td>Approve content, process, staffing and logistics for the adult health program</td>
</tr>
<tr>
<td>Public Health Nurses</td>
<td>Deliver program intervention</td>
<td>Plan, develop, and implement the behaviour change components of the MWS</td>
</tr>
<tr>
<td>Public Health Promoter</td>
<td>Deliver program intervention</td>
<td>Plan, develop, and implement the physical activity components of the MWS</td>
</tr>
<tr>
<td>Public Health Dietitians</td>
<td>Deliver program intervention</td>
<td>Plan, develop, and implement the healthy eating components of the MWS</td>
</tr>
<tr>
<td>Community Food Advisors</td>
<td>Volunteer and deliver program intervention</td>
<td>Assist dietitians with planning and implementation of a food demonstration included in the nutrition sessions</td>
</tr>
<tr>
<td>Role</td>
<td>Task</td>
<td>Details</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Public Health Physical Activity Specialist</td>
<td>Deliver program intervention</td>
<td>Plan, develop, and implement the physical activity components of the MWS.</td>
</tr>
<tr>
<td>Workplace Health Champion (WHC)</td>
<td>Liaise with the MWS staff</td>
<td>Receive approval to offer the MWS from management; register participants; advertise and schedule MWS sessions</td>
</tr>
<tr>
<td>Participant</td>
<td>Participate in program</td>
<td>Register for the MWS and participate in the program</td>
</tr>
<tr>
<td>Participant’s Workplace</td>
<td>Provide resources</td>
<td>Provide space to facilitate the MWS (some workplaces also allowed the program on work time or partially on work time)</td>
</tr>
<tr>
<td>Director of Research and Education Program</td>
<td>Provide leadership and oversee operations of the MWS evaluation and ongoing evaluation of the Motiv8 initiative</td>
<td>Oversee evaluation processes</td>
</tr>
<tr>
<td>Research Associate</td>
<td>Facilitate evaluation and its use</td>
<td>Plan, implement, monitor, and adjust the evaluation; oversee compliance with study procedures and data collection and analysis; and use and disseminate findings</td>
</tr>
<tr>
<td>Role</td>
<td>Task 1</td>
<td>Task 2</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Program Assistant</td>
<td>Organize and prepare resources for the MWS</td>
<td>Prepare and forward marketing material for the MWS to the WHC; prepare resources and materials for presenters prior to sessions</td>
</tr>
<tr>
<td>Workplace Health Consultant</td>
<td>Liaise with the WHC and presenters to schedule the MWS sessions</td>
<td>Schedule MWS sessions; ensure that the program assistant has the information needed to create the marketing materials and send them to the WHC; and book resources required for presentations</td>
</tr>
</tbody>
</table>
Figure 1: Logic model for the Motiv8 Workplace Series used in the evaluation.
Chapter 4

Methods

Design

The study was conducted using a quasi-experimental, non-equivalent control group design with an intervention and comparison group, using a delayed intervention for the comparison group. A comparison group was included to identify any changes in study outcomes that could be attributed to factors other than the MWS (e.g. history, maturation, testing, and instrumentation). To avoid potential contamination of outcome variable scores among employees in the same workplace, workplaces, not individuals, were assigned to the intervention or comparison group. Because randomization of workplaces was not possible, comparison workplaces were matched with intervention workplaces.

Employees in the intervention group received a five-session educational program, the MWS, loosely based on theoretical variables from the SCT and the HAPA. Employees in both groups were exposed to standard health promotion messages in the workplace. These included educational posters promoting physical activity and healthy eating, Eat Smart cafeteria programs, and a newsletter containing information on topics related to workplace wellness. Figure 2 outlines the study design.
<table>
<thead>
<tr>
<th>Groups</th>
<th>Baseline</th>
<th>Intervention (5-weeks)</th>
<th>1-week Follow-up</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td>O₁</td>
<td>X</td>
<td>O₂</td>
<td>-</td>
</tr>
<tr>
<td>Comparison</td>
<td>O₁</td>
<td>-</td>
<td>O₂</td>
<td>X</td>
</tr>
</tbody>
</table>

**Figure 2: Outline of the quasi-experimental, non-equivalent control group design.**

O₁=baseline assessment of measures; O₂=follow-up assessment of measures; X=application of the intervention.

For each workplace, data were collected at two time points, baseline and follow-up (i.e. before the intervention, and one week following the intervention in the intervention group and simultaneously in its comparison group). Data collection took place from October 14, 2008 to April 30, 2009. Approval for the research protocol was obtained from the General Research Ethics Board at Queen’s University.

**Population of Interest**

The population under study consisted of employed adults aged 18 and older, working in any kind of industry, and living in the KFL&A Public Health catchment area.

**Inclusion and Exclusion Criteria**

To participate in the study, a workplace had to have a minimum of approximately 10 employees willing to take part in the MWS. In this study, there were no workplaces that did not satisfy this condition. In addition, the workplace had to allow all MWS sessions to be delivered in their entirety, once a week for five weeks, and agree to allow the researcher to visit their workplace one week after the program had ended. For
inclusion in this research, participants had to be: 1) employed adults aged 18 and older, 2) living in Kingston, Frontenac, or Lennox and Addington Counties, 3) able to speak, read, and write English, and 5) willing to complete baseline, and 1-week follow-up questionnaires. Given the real world conditions of this study, no attendance requirements were placed on participants to be included in the research. In addition, all participants initially in the intervention group remained in this group in the analyses, regardless of whether they received the intervention. There were only two individuals in the intervention group who did not receive any of the intervention. These were still included in the analyses as participants in the intervention group.

Recruitment

Before data collection began in October 2008, KFL&A Public Health program staff had scheduled two workplaces to receive the MWS. These workplaces had originally contacted KFL&A Public Health and requested a presentation on healthy eating and/or physical activity promotion. The workplaces were asked by KFL&A Public Health staff if they would like to receive the pilot MWS and both workplaces agreed. The researcher then contacted the workplaces to see if employees were willing to participate in the evaluation. One of the workplaces was used as an intervention workplace and received the MWS between October and December, 2008. The other workplace was used as a matched comparison workplace and was not scheduled to receive the intervention until after the New Year.
In January 2009, a recruitment letter was prepared by KFL&A Public Health Staff and sent out via e-mail to workplaces on the Living Well newsletter e-mail distribution list. The Living Well newsletter is published four times a year and is aimed at employees and managers in the workplace. It mainly focuses on workplace wellness topics and consists of short, easy-to-read articles that inform employees of the full range of health-related issues that affect them and their families. The distribution list included approximately 224 workplaces in the KFL&A area. There was no information available on workplaces that were not included on the distribution list.

Recruitment letters were sent to the human resources office, an occupational health nurse, or a manager. The letter invited workplaces to participate in the MWS, and included a brief description of the program and the benefits of workplace health to both the employee and employer (see Appendix A). In addition, an advertisement for the MWS was included in the February 2009 issue of the Living Well newsletter (see Appendix B). There were also approximately 487 hardcopies mailed to 170 of the workplaces in the KFL&A area that had been sent the newsletter via e-mail.

If workplaces were interested in learning more about the MWS or wanted to receive the program, an employee of the workplace called the KFL&A Public Health workplace wellness phoneline and left their contact information. Health professionals at KFL&A Public Health made contact with the workplaces. If a workplace wished to receive the program, the health professionals arranged for five presentation dates at the workplace over five consecutive weeks. They also briefly mentioned the evaluation
research. The workplace contact who arranged for the workplace to receive the MWS was referred to by KFL&A Public Health staff as the WHC. The researcher contacted the WHC by e-mail, followed by a phone call, to see if the workplace would be interested in participating in the research project.

Twelve workplaces wished to receive the MWS and were interested in participating in this study. Workplaces were roughly matched according to their size (i.e. total number of employees) and whether or not they were part of the public or private sector. The workplaces that were asked to participate as a comparison workplace were scheduled to receive the intervention more than a week after the final session of the intervention group to which they were matched. After assignment to the comparison group, two workplaces dropped out because they reported being too busy. This left a convenience sample of ten workplaces available for this study. The final sample therefore consisted of six intervention workplaces and four workplaces that were matched as closely as possible to the intervention workplaces to act as a comparison group.

At each registered workplace, the MWS was advertised using posters and an email which was sent out by the WHC prior to the start of the intervention (See Appendix B for an example). The posters and email provided brief details about the program components, benefits of participating, and Motiv8 incentives. Employees voluntarily registered for the MWS with their WHC. Once registered, employees were advised by letter of the evaluation and informed that they would be contacted by the researcher to see if they were willing to participate (See Appendix C). Employees were able to
participate in the MWS regardless of their decision to participate in the research. The employees who agreed to participate in the research were asked to provide informed consent (See Appendix D for the consent form). As an incentive, all employees who were involved in the research were entered in a draw to receive a $50.00 gift certificate to a Kingston Eat Smart restaurant. Eat Smart is a program supported by the Ontario Public Health Association and run by local public health units. It recognizes restaurants that meet exceptional standards in nutrition and safe food handling, and provide a smoke-free environment.

Each workplace was limited to 20 participants, given the monetary and human resources that were needed to implement the program. In each workplace, registration was based on a first-come, first-served basis.

**Measures**

**Objective 1: To Assess Adoption, Reach and Implementation**

**Adoption.**

The percentage (%) of workplaces that received, or were registered to receive, the MWS between October 2008 and May 2009 was calculated, and their representativeness of all workplaces on the Living Well Distribution List was determined. Participant and non-participant workplaces were compared on size and the location of the workplaces, the type of industry they supported, whether they were from the public or private sector, and whether health promotion programs offered by KFL&A Public Health had been delivered to them in the past.
Size of workplace was defined by Industry Canada’s Definition of business size (Industry Canada, 2007). A workplace with 1 to 50 employees was defined as a small-sized business, 51 to 499 as a medium-sized business, and 500 employees or more as a large-sized business.

Location of workplace was classified according to Health Canada’s 2006 Census definitions of large urban, small urban and rural areas (Francisco & Chenier, 2007). Large urban areas were defined as census metropolitan areas, such as the City of Kingston, that represent one or more adjacent municipalities centered on an urban core of at least 100,000 population. Small urban areas were defined as any urban area outside of a census metropolitan area that has a population of at least 1,000 people and a population density of at least 400 people per square kilometer. Rural areas were defined as all areas that were not included in either of the other two categories.

Type of industry supported was also defined by Health Canada’s 2006 Census. Industry was separated into ten categories which include agriculture/resources-based industry, construction, manufacturing, wholesale trade, retail trade, finance/real estate, health care/social services, educational services, business services, and other services. Given the large number of categories in type of industry, and the small number of workplaces, the categories were collapsed into three larger categories which included health care/social services, education/other (i.e. public administration industry such as government services), and manufacturing/wholesale/retail/finance/business.
Workplaces were determined to be in the public sector according to Statistic Canada’s Guide to the Public Sector (2008), where the private sector was defined by exclusion from the public sector.

Past public health programming was assessed from KFL&A Public Health records and classified as being low intensity, moderate intensity, or high intensity programming within the previous five years. The time was limited to the previous five years to allow for employee turnover. The low intensity group included workplaces that requested health-promoting resources such as pamphlets and displays or did not have public health programming in the previous five years. The moderate intensity group included workplaces where KFL&A public health staff had provided health behaviour presentations. The high intensity group included workplaces that received a combination of resources, displays, and presentations.

Reach.

Reach was calculated as the percentage (%) of employees who participated in the MWS of all employees contacted. The researcher obtained the number of employees who participated in the MWS from attendance records. After the MWS ended at an intervention workplace, the WHC was asked to provide the total number of employees at the workplace and the approximate number who would have received information or been contacted about the MWS (e.g. received an email, saw a poster). The representativeness of participants was determined by asking the WHC, who may or may not have attended the MWS sessions, two additional questions.
1. Was the MWS open to all employees? If no, who was excluded?

2. Do you think that the employees who participated in the program were representative of the majority of employees at your workplace? If no, please write a couple of sentences explaining (e.g. mainly managers participated).

**Implementation.**

At the end of each session, the KFL&A Public Health presenter was asked to fill out a form in response to questions about the content of the session and who attended (e.g. “Was there enough time to go through all the educational material? Did all the practical skills training occur? Was everyone from the previous session present?”) (See Appendix E). This was done to assess the extent to which the MWS components were delivered as intended, so that if the intended outcomes were not achieved, the researcher could assess possible explanations.

**Objective 2: To Provide Estimates of Effectiveness**

**Effectiveness.**

Physical activity and healthy eating were the two main behavioural outcomes of the intervention. For this study, physical activity was defined as “any bodily movement produced by skeletal muscle that results in energy expenditure; it includes occupational activity, household chores, leisure activity, playing sports and exercise that is planned for fitness or health purposes” (Dishman, Washburn, & Schoeller, 2001, p.295). The number of servings of fruit and vegetables per day were used as a proxy for the extent to which a diet follows Canada’s Food Guide. At baseline and follow-up, participants were asked to
fill out a questionnaire (see Appendix F) that included measures of their physical activity, servings of fruit and vegetables, and SCT and HAPA variables. In addition, demographic information was assessed at baseline.

**Physical activity measure.**

Physical activity was measured using the short version of the self-administered International Physical Activity Questionnaire (IPAQ) (Craig et al., 2003; IPAQ Research Committee, 2005). The short version of the IPAQ was chosen to reduce the burden on respondents created by multiple outcome measures. In addition, by making it as short as possible, the researcher believed that participant compliance might be improved.

The IPAQ was developed for use with participants aged 18-65 (Craig et al. 2003). The short version consists of 7 items that measure the frequency and duration of vigorous and moderate physical activity and walking in the previous 7 days. An example of an item about frequency is, “During the last 7 days, on how many days did you do vigorous physical activities, (think about only those physical activities that you did for at least 10 minutes at a time)?”. An example of an item about duration is, “How much time in total did you usually spend on one of those days doing vigorous physical activities?”.

The IPAQ measures a number of physical activity domains that include leisure-time physical activity, domestic and gardening activities, work-related activities, and transport-related activities. Furthermore, it has established reliability and validity and its measurement properties have been found to be as good as other self-reported physical activity measures (Craig et al., 2003). Although previous research has shown that self-
reports of physical activity generally overestimate levels of participation in physical activity compared to objective measures (Troiano et al., 2008), the IPAQ was chosen over other alternatives such as the logbook because of its established reliability and validity and because there are many studies that used the IPAQ, meaning findings can be directly compared to these studies. In addition, logbooks were not available for the comparison group.

The document, Guidelines for Data Processing and Analysis of the IPAQ (2005), was used to score the IPAQ. First, for each activity category (vigorous activities, moderate activities, and walking) total minutes of activity per week was calculated and then converted to MET energy expenditure estimates. The guidelines recommend that vigorous activity is equal to 8.0 METs, moderate activity is equal to 4.0 METs, and walking is equal to 3.3 METs. In order to obtain a continuous score for physical activity, results were expressed as total MET–minutes per week. This was done by entering the data into four equations (outlined by the guidelines) that incorporated the MET values. These are:

1) Vigorous MET-minutes per week = 8.0 * vigorous intensity activity minutes * vigorous intensity days
2) Moderate MET-minutes per week = 4.0 * moderate intensity activity minutes * moderate intensity days
3) Walking MET-minutes per week = 3.3 * walking minutes * walking days
4) Total physical activity MET- minutes per week = sum of vigorous + moderate +
walking MET minutes /week scores

All participants for whom the total sum of all vigorous, moderate, and walking
time variables was more than 16 hours per day were excluded from analysis. This
assumed that on average, most adults spend approximately 8 hours of the day sleeping
(IPAQ Research Committee, 2005).

The 2008 Physical Activity Guidelines for Americans recommends that adults
should accrue between 500 and 1000 MET-minutes per week to obtain the health benefits
from physical activity (U.S. Department of Health and Human Services, 2008).
Furthermore, amounts of activity above this range are considered to provide even further
benefits. The range of 500 to 1000 MET-minutes per week is approximately equivalent
to a moderate level of physical activity (U.S. Department of Health and Human Services,
2008).

Physical activity behaviour was also expressed as a categorical score and
represented by three levels of physical activity (low, moderate, and high) using the IPAQ
Scoring Protocol (IPAQ Research Committee, 2005). A low level of physical activity
was defined as no activity reported or insufficient activity to meet moderate or high
levels. A moderate level of physical activity was defined as 3 or more days of vigorous
physical activity of at least 20 minutes per day, or 5 or more days of moderate-intensity
activity and/or walking of at least 30 minutes per day, or 5 or more days of any
combination of walking, moderate-intensity or vigorous-intensity activities achieving a
minimum of 600 MET-minutes/week. A high level of physical activity was defined as at least 3 days of vigorous-intensity activity accumulating at least 1500 MET-minutes/week, or 7 or more days of any combination of walking, moderate- or vigorous-intensity activities accumulating at least 3000 MET-minutes/week.

**Healthy eating measure.**

The intake of fruit and vegetables was measured using a semi-quantitative, self-reported food frequency questionnaire. A quantitative dietary measure directly reports all foods and amounts consumed (Institute of Medicine, 2000). Twenty-four hour recall (24-HR) is the commonly used reference method to estimate dietary intake in the absence of a gold standard for measuring dietary change (Nelson, 1997). A semi-quantitative measure is less accurate than a quantitative measure because there is no direct quantitative assessment of an individual’s dietary intake, not all foods are included, and many foods are combined into one question (Institute of Medicine, 2000). However, an advantage of using a semi-quantitative dietary measure is that it is easier to administer (Institute of Medicine, 2000). Furthermore, the high cost of a 24-HR recall in terms of money, participant burden, and feasibility make a Fruit and Vegetable Screener (FVS) a good alternative (Institute of Medicine, 2000).

The National Cancer Institute’s By-Meal FVS was developed for use in adults. The 27-item screener asks about the frequency and portion sizes of 10 categories of fruit and vegetables eaten over the previous month. The categories are: 100% fruit juice, lettuce salad, French fries/fried potatoes, other white potatoes, cooked dried beans, other
vegetables, fruit, tomato sauce, vegetable soup, and mixtures that include vegetables (e.g. sandwiches).

In a study by Thompson et al. (2002), the FVS produced estimates of fruit and vegetable intake that were relatively consistent with 24-HR among a nationwide sample of adults. For these results, Thompson and colleagues (2002) suggested that the FVS might be useful for estimating fruit and vegetable intake for use in intervention research. Although the FVS was originally developed for use with the United States’ Food Guide Pyramid, in this study serving size was based on the 2007 Canada’s Food Guide. For fruits, a serving was defined as a whole fruit, ½ cup cut-up fruit, or ½ cup fruit juice. For vegetables, a serving was defined as 1 cup of raw leafy vegetables, such as lettuce; ½ cup other vegetables, or ½ cup vegetable juice. Two items about beans were excluded because they are not included in the fruit and vegetable group of Canada’s Food Guide. Frequency and portion size data from the FVS was used to estimate daily mean intakes of servings of fruit and vegetables using Canada’s Food Guide. Standard scoring procedures (frequency X respondent-assessed portion size) were used to calculate servings estimated by the FVS (Peterson et al., 2008).

Number of servings of fruit and vegetables was also expressed as a categorical variable. Canada’s Food Guide (Garriguet, 2004) recommends a minimum of five servings a day. Consumption of fruit and vegetables was therefore treated as a dichotomized variable, meeting the guideline of five or more servings per day, or not meeting the guideline.
Measures of theoretical variables.

Participants were asked questions to measure SCT and HAPA variables associated with physical activity and healthy eating and targeted by the MWS. The SCT variables are self-efficacy and outcome expectancy value, and the HAPA variables are action planning, coping planning, and action control, components of self-regulation (see Appendix G). This section discusses measures for self-efficacy, self-regulation, and outcome expectancy value.

Self-efficacy.

Self-efficacy for physical activity was assessed using a 9 item scale developed by Plotnikoff, Blanchard, and Hotz (2001). Eight items have been validated previously by Plotnikoff and colleagues (2001) with one additional item developed by Plotnikoff and colleagues (2008). Participants were asked to rate their confidence that they could participate in regular physical activity when faced with a number of barriers. An example of an item is “I am confident that I can participate in regular physical activity when it becomes boring”. These items were measured on a ten-point response option scale ranging from “not at all confident” (1) to “extremely confident” (10). Although the instrument was developed for use with a five-point scale ranging from “not at all confident” to “extremely confident”, the researcher chose to widen the scale in order to increase variability in the responses. Other published physical activity self-efficacy instruments have included larger scales similar to the one chosen by the researcher
Self-efficacy for consumption of fruit and vegetables was assessed using a 13 item instrument. Ten items were taken from a developed and validated scale to assess self-efficacy for increasing fruit and vegetable consumption in Chinese adults (Ling & Horwath, 1999). Ling and Horwath (2001) reported high internal consistency (α=.89). The researcher, with help from KFL&A Public Health Staff, assessed these ten items to be applicable to workplace employees living in the KFL&A area and were included in the questionnaire. After reviewing the literature on barriers to fruit and vegetable consumption, the researcher adapted three additional items developed by Dittus, Hillers, & Beerman (1995). Responses to items were adapted to be consistent with the self-efficacy scale for physical activity and reduce the complexity of the questionnaire. Therefore, this instrument rated employees’ confidence to regularly consume fruit and vegetables under difficult situations on a ten-point scale ranging from “not at all confident” (1) to “extremely confident” (10). An example of an item was, “I am confident that I can regularly consume fruit and vegetables when I am in a rush”. The score was the mean response to the 13 items.

**Self-regulation.**

Self-regulation of physical activity was assessed using two instruments to measure planning and action control. The first instrument consisted of 10 items and measured planning, which consists of both action planning (5 items) and coping planning
(5 items) (Sniehotta, Schwarzer, Scholz, & Schuz, 2005). To suit the current study purpose, the planning instrument was adapted. Specifically, the term ‘physical activity’ was substituted for the term ‘exercise’ for each item and the item stem, “I have made a detailed plan regarding…” was changed to “I have my own plan regarding…” because participants weren’t asked to make a detailed plan in the MWS. An example of an item measuring action planning is, “I have my own plan regarding when to be physically active”. An example of an item measuring coping planning is, “I have my own plan regarding what to do if something intervenes with my plans”. Each item was scored on a 4-point scale ranging from 1 (not at all true) to 4 (exactly true). Action planning and coping planning were both scored by calculating the mean response to the 5 items.

The second instrument consisted of 6 items measuring action control. Adaptations were made to fit with the current study purpose and population. For instance, the term ‘exercise’ was changed to ‘physical activity’, and items were changed to include Canada’s Physical Activity Guide. An example of an item is “During the last week, I have done my best to follow Canada’s Physical Activity Guide recommendations”. Prior to adapting this item it was, “During the last weeks, I have tried my best to act in accordance to my prescribed training program”. Each item was scored on a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree). Action control was scored by calculating the mean response to the 6 items.

Similarly, self-regulation of healthy eating was assessed using two instruments to measure planning and action control. The scales of both instruments were the same as
those used to measure self-regulation of physical activity. Renner and Schwarzer (2005) developed the instrument to measure action planning (2 items) and coping planning (3 items). No previous instrument existed to measure action control of healthy eating so 6 items were developed similar to the physical activity instrument on action control, substituting recommendations from Canada’s Food Guide. Scoring the instruments used the same methods as those described for self-regulation of physical activity.

*Outcome expectancy value.*

Outcome expectancy value for physical activity was examined through a 15 item instrument that was a modified version of an instrument developed and validated by Winters (2003). The instrument used in this study assesses three dimensions of outcome expectancy value that are likely to occur from physical activity, and include stress reduction, fitness, and social continuation. The original instrument assesses eight dimensions of the variable that are most likely to occur from physical activity, and include social continuation, social growth, competition, thrills, beautiful movement, relaxation, fitness, and stress reduction. Based on the work of Kenyon, Winters developed this instrument in response to the idea that there can be infinite expectations of engaging in physical activity behaviours (Hortz, 2005). Only three dimensions were chosen in this study in order to decrease participant burden: social continuation, fitness, and stress reduction. The dimensions were chosen after being identified as important by health behaviour experts in the School of Kinesiology and Health Studies at Queen’s University.
In the instrument, participants first respond to a statement that asks about their beliefs about an outcome of physical activity (e.g. “physical activity will relieve my stress”) (outcome expectations) and then respond to a statement about the value they place on the outcome statement (outcome expectancies) (as cited in Winters, Petosa, & Charlton, 2003). A pilot test determined that the original scale was confusing to use and therefore it was adapted by the researcher. All of the item statements developed by Winters remained the same, but the new scale used an outcome expectancy value scale developed by Gao, Xiang, Lee, and Harrison (2008). Participants were asked the likelihood of each outcome (0 = not at all likely; 100 = completely likely), and the employees’ value of each outcome was assessed on a 9-point Likert-type scale (1= not at all valuable; 9= extremely valuable). The instrument was scored by multiplying the outcome expectations and outcome expectancies scores for each item and then finding the mean response score for each participant.

The minimum possible score on the outcome expectancy value instrument is one and the maximum score is 110. A low score represents a low expectation (i.e. belief about an outcome) and a low expectancy (i.e. value placed on the expectation), a high score represents a high expectation and a high expectancy, and an intermediate score represents either a low expectation and a high expectancy, or a high expectation and a low expectancy.

To the researcher’s knowledge, no instrument exists to measure outcome expectancy value for consumption of fruit and vegetables. For this reason, an 8 item
instrument was developed by using possible expected outcomes of consuming fruit and vegetables that were identified in the peer-reviewed literature. An example of an item is, “Eating fruits and vegetables will make me feel healthy”. The items demonstrated face validity when they were reviewed by a public health dietitian. The instrument was scored using the same methods as the outcome expectancy value scale for physical activity.

**Procedure**

Prior to the start of the intervention, a list of workplaces invited to participate in the MWS was created. In participating workplaces, WHC were approached to provide information on the number of employees in the workplace and the number of employees contacted to participate by MWS advertisements. They also reported on the number of employees who registered for the MWS.

After employees registered to participate, the WHC gave them a letter of information describing the evaluation, and advising them to notify the researcher if they did not wish to be contacted. No employees indicated that they were not interested in participating.

Prior to the first MWS, employees were asked to sign the consent form and to fill out a baseline questionnaire. The questionnaires were collected by the researcher before the first session began. One week after the last session, participants were asked by the researcher to fill out a follow-up questionnaire. Participants who dropped out of the study after only completing the baseline questionnaire were still included in the reporting of results unless they asked for their initial data to be destroyed. After each of the five
sessions, KFL&A Public Health program staff were asked about the content of the session.

**Data Analysis**

Quantitative analyses were conducted using the Statistical Package for the Social Sciences (SPSS) version 17.0 for Windows.

**Objective 1: To Assess Adoption, Reach and Implementation**

**Adoption.**

Representativeness was assessed by comparing the participating workplaces to a simple random sample of 30 non-participating workplaces. Given that data were not available on all the workplaces in KFL&A area, and that it would have been beyond the scope of this study to collect these data, a simple random sample of workplaces was used for this comparison. The sample was taken from 130 workplaces in KFL&A area that had their profile on file at KFL&A Public Health and were all on the Living Well newsletter list.

Participating workplaces were compared to the random sample of non-participating workplace using a series of chi-square tests. This was done to look for evidence of associations between workplace participation (participating and non-participating) and workplace descriptives (e.g. location of workplace).

**Reach.**

The percentage of employees who volunteered to participate out of all employees who were contacted in a workplace was calculated. Qualitative responses from the open-
ended questions used to assess the representativeness of participants within the workplace were grouped into themes and summarized.

**Implementation.**

Qualitative responses from KFL&A Public Health staff to the open-ended questions about the content of each session were grouped into themes and summarized.

**Objective 2: To Provide Estimates of Effectiveness**

The intervention and comparison groups were compared with respect to demographic characteristics to assess for potential confounders such as age, sex, and education.

**Effectiveness.**

To meet the second objective, the researcher used two-way repeated measures analysis of variance (ANOVA). This model was appropriate because it provided the researcher with a statistic that allowed for a description of both within subject (baseline and 1-week follow-up) and between subject (intervention or comparison group) effects and allowed for the exploration of an interaction. A finding of a significant interaction between time and group would mean that there was a significant difference in change over time between the intervention and comparison groups.

**Testing of assumptions.**

Before calculating the ANOVA for this study, underlying assumptions needed to be considered. These assumptions are random selection and assignment, interval or greater data, independent observations, homogeneity of variances, and normality.
Participants were not sampled randomly because they were clustered in workplaces, nor were they randomly allocated to the intervention because it was not feasible to do so. This means that the results may not be generalizable to other populations, and that uncontrolled factors may influence the outcome variables. The outcome variables are all continuous, and are at least of interval data. However, the assumption of independent observations was violated in this study because individuals within workplaces share characteristics (e.g., socio-demographics, education) that may result in a response to the intervention that is more similar among these individuals than those across workplaces, thus spuriously deflating the standard error of the parameter estimate. As such, non-independence increases the chances of falsely declaring statistical significance. An additional source of non-independence or correlation was the use of a before and after, repeated measure, outcome variable. While the repeated measure ANOVA accounted for the latter correlation, it did not account for the potential correlation introduced by clustering within workplaces.

As a test of independent observations, a correlated data analysis was conducted. First, an intraclass correlation (ICC) was calculated, using “workplace” as the grouping variable, to determine the strength of the correlation introduced by the use of participants clustered within workplaces. A high ICC (> 0.10) indicated that it was worth exploring the impact of the correlation on the precision (i.e. standard error) of the findings of the repeated measure ANOVA using a mixed model that accounted for the correlation. If the ICC was high, a multiple linear regression model was fitted to assess the parameter
estimate for the intervention and its standard error, not taking the correlation into account (reference model). Then a mixed model with a random intercept for “workplace” was used to account for the influence of the correlation and allow for differences across workplaces. The results of the mixed model (i.e., point estimate, standard error, and 95% CI) were then compared with those of the multiple linear regression model (reference model). These analyses were carried out using SAS version 9.1.3.

Homogeneity of variance was assessed through Levene’s Test. If the level of significance was less than .05 then the null hypothesis that the variances are equal was rejected and the assumption of equal variances was not satisfied. The assumption of normality was assessed using the Kolmogorov-Smirnov (K-S) test for normality. For both baseline and follow-up data for the outcome variables, if \( p < .05 \) then the null hypothesis that there was no difference between the distribution of the data set and a normal distribution was rejected. However, since this is an exploratory study and ANOVA is robust to violations of normality and homogeneity of variance assumptions when there is a relatively large sample size, caution will be added to any significant findings rather than concluding that this is an incorrect application of a statistic.

**Analysis of variance.**

For each outcome variable (total MET-minutes per week, total daily number of servings of fruit and vegetables, self-efficacy, action planning, coping planning, action control, and outcome expectancy value) descriptive statistics such as score means,
standard deviations, skewness value, assumption checks, and the ANOVA of follow-up scores between the groups (intervention and comparison groups) were examined.

Using the two-way ANOVA design for analysis, the hypotheses tested were:

**HA1:** Those who received the intervention increased physical activity, as measured by total MET-minutes per week, to a significantly greater extent than those who did not receive the intervention.

**HA2:** Those who received the intervention improved eating behaviours, as measured by total number of servings of fruit and vegetables per day, to a significantly greater extent than those who did not receive the intervention.

**HA3:** Those who received the intervention increased theoretical variable scores, as measured by self-efficacy, self-regulation, and outcome expectancy value, to a significantly greater extent than those who did not receive the intervention.

The alpha level was set at .05, which is common in social science research. This means that there was a 5% chance of detecting an effect even if there was no actual effect (a so-called type one error). Multiple testing as in this study may increase the chance of type one error, which could have warranted a more conservative p-value such as .01. However, this was a pilot study and it was important to see any potential effects of the intervention that a more conservative level may have obscured. At the same time, because of the multiple testing, a more liberal p-value such as .10 was not warranted.
**Missing Data.**

Participants were removed from the data analysis if they were missing either a completed baseline or a follow-up questionnaire. In order to have a complete questionnaire, participants must have completed at least 80% of responses to the items on each of the instruments with the exception of the IPAQ that measured total MET-minutes per week. After meeting this criterion, any missing responses for score items were dealt with by dividing the sum of item scores by the number of items with a response. The issue of missing data for total MET-minutes per week was addressed through mean replacement. If 20% of the items on the IPAQ were missing, then missing data values were replaced with the mean score for all answered measures for that item. Descriptive statistics were run before and after replacing the missing values to see if there was a difference.

**Objective 3: To Use the Data to Investigate the Role of Theoretical Variables as Possible Mediators in Changing Physical Activity and Healthy Eating Behaviours**

To meet the third objective, a mediation analysis was used. In this study, a mediator is on the causal pathway between exposure to the MWS and program outcomes such as an increase in total MET-minutes per week and consumption of fruit and vegetables. It is hypothesized that mediators are from the SCT and HAPA and include self-efficacy, self-regulation (i.e. action planning, coping planning, and action control), and outcome expectancy value. Mediation was tested using the method described by
Baron and Kenny and reported by a number of other studies (Baron & Kenny, 1986; Hallam et al., 2004; Hortz et al., 2008; Lubans et al., 2009).

If results of the repeated measures ANOVA indicated a statistically significant interaction, or main effects of time and group on the primary outcomes of interest (total MET-minutes per week and total daily servings of fruit and vegetables), the SCT and HAPA variables were examined as potential mediators. Only the SCT and HAPA variables impacted positively by the intervention could possibly mediate follow-up changes in physical activity and consumption of fruit and vegetables. To control for group differences at baseline, change scores (follow-up score minus baseline score) were used in all mediation analyses (Hallam et al., 2004; Hortz et al., 2008; Lubans et al., 2009).

Separate regression analyses were conducted with each SCT and HAPA variable on which the intervention had statistically significant effects. To determine if a theoretical variable was a potential mediator, the researcher went through a series of three regression analyses. In the first equation, group assignment was used to predict the change in the theoretical variable. In the second equation, group assignment was used to predict the change in the primary outcome variable. If both of these conditions for mediation were satisfied, the third equation was used to test the mediation model. In the third equation, both group assignment and the theoretical variable were used to predict the change in the primary outcome variable. If the regression coefficient for group assignment was not significantly different from zero, or p>.05, and the regression
coefficient for the theoretical variable was significantly different from zero ($p<.05$), the
data supported a mediation model. This result would demonstrate that the effect of the
intervention on the primary outcome of interest was mediated by change in the theoretical
variable.
Chapter 5
Results

Introduction

This chapter is divided into sections corresponding to the study objectives and research questions. The first objective of the study was to provide measures of adoption, reach and implementation of the MWS. The second objective was to provide estimates of effectiveness, including behaviour change in terms of physical activity, fruit and vegetables consumption, and the theoretical variables related to these behaviours (i.e. self-efficacy, self-regulation, and outcome expectancy value). The third objective was to use the data to investigate the role of the theoretical variables as mediators in changing physical activity and healthy eating behaviours.

Exact sample sizes in some analyses varied from those presented in Table 4 due to missing data. This is explained where applicable.

Objective 1: To Assess Adoption, Reach and Implementation

Adoption

Out of approximately 224 workplaces which were sent recruitment letters, a total of 20 workplaces registered to receive the MWS between October 2008 and May 2009, resulting in a participation rate of 8.9% (20/224). Characteristics of participating and the 30 randomly-selected non-participating workplaces are presented in Table 2. Participating workplaces consisted of mainly small (35.0%) and medium sized (45.0%) businesses. A large percentage of participating workplaces were from the public sector
(80.0%), located in a large urban area (75.0%), and supporting industry in health care or social services (45.0%), educational services (20%), and other services (20%). Only a small percentage of workplaces were from other industries such as manufacturing, finance and real estate, and business. No workplaces were from the agriculture, resource-based, or construction industry. Participating workplaces did not significantly differ from non-participating workplaces in size, location, sector, or type of industry supported (p>.05).

Participating and non-participating workplaces did significantly differ in regard to past public health programming (p<.05). Both groups had similar experience with low intensity programming, but a higher percentage of participating workplaces had high intensity programming in the past. This means that compared to non-participating workplaces, participating workplaces were more likely to have received a combination of resources, displays, and presentations within the previous five years.
### Table 2: Comparison of Characteristics of Participating and Non-Participating Workplaces

<table>
<thead>
<tr>
<th></th>
<th>Participating Workplaces n= 20</th>
<th>Non-Participating Workplaces n=30</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size of Workplace</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small (1 to 50 employees)</td>
<td>7 (35.0)</td>
<td>15 (50.0)</td>
<td>.14</td>
</tr>
<tr>
<td>Medium (51 to 499 employees)</td>
<td>9 (45.0)</td>
<td>14 (46.7)</td>
<td></td>
</tr>
<tr>
<td>Large (&gt;500 employees)</td>
<td>4 (20.0)</td>
<td>1 (3.3)</td>
<td></td>
</tr>
<tr>
<td><strong>Workplace Location</strong></td>
<td></td>
<td></td>
<td>.18</td>
</tr>
<tr>
<td>Large urban area</td>
<td>15 (75.0)</td>
<td>28 (93.3)</td>
<td></td>
</tr>
<tr>
<td>Small urban area</td>
<td>3 (15.0)</td>
<td>1 (3.3)</td>
<td></td>
</tr>
<tr>
<td>Rural area</td>
<td>2 (10.0)</td>
<td>1 (3.3)</td>
<td></td>
</tr>
<tr>
<td><strong>Type of Industry</strong></td>
<td></td>
<td></td>
<td>.35</td>
</tr>
<tr>
<td>Health/ social services</td>
<td>9 (45.0)</td>
<td>11 (36.7)</td>
<td></td>
</tr>
<tr>
<td>Education/ other (e.g. public administration, government services)</td>
<td>8 (40.0)</td>
<td>9 (30.0)</td>
<td></td>
</tr>
<tr>
<td>All other industry (e.g. manufacturing, retail, finance, business)</td>
<td>3 (15.0)</td>
<td>10 (33.3)</td>
<td></td>
</tr>
<tr>
<td><strong>Business Sector</strong></td>
<td></td>
<td></td>
<td>.10</td>
</tr>
<tr>
<td>Public sector</td>
<td>16 (80.0)</td>
<td>16 (53.3)</td>
<td></td>
</tr>
<tr>
<td>Private sector</td>
<td>4 (20.0)</td>
<td>14 (46.7)</td>
<td></td>
</tr>
<tr>
<td><strong>Public Health Programming ≤ 5 yrs</strong></td>
<td></td>
<td></td>
<td>.04</td>
</tr>
<tr>
<td>Low intensity</td>
<td>9 (45.0)</td>
<td>12 (40.0)</td>
<td></td>
</tr>
<tr>
<td>Medium intensity</td>
<td>2 (10.0)</td>
<td>12 (40.0)</td>
<td></td>
</tr>
<tr>
<td>High intensity</td>
<td>9 (45.0)</td>
<td>6 (20.0)</td>
<td></td>
</tr>
</tbody>
</table>

### Reach

In the intervention workplaces, employee participation rate ranged from 1.9% to 26.0%. The mean employee participation rate among all intervention workplaces was 8.2%. However, each workplace was limited to approximately 20 employees because of
the monetary and human resources that were needed to implement the MWS. Two workplaces had the maximum number of employees registered for the MWS. This means that the participation rate of these workplaces might underestimate the potential participation rate because, if registration had not been limited, it is possible that more employees would have taken part.

WHC were asked to comment about the representativeness of participating employees of all employees of the workplace. With the exception of two workplaces, each WHC said that the MWS was open to all employees. The two workplaces that excluded employees were educational institutions. In these workplaces, only non-academic staff were contacted by the WHC to participate in the MWS.

In most intervention workplaces, the WHC stated that participants were usually office workers, administrative staff, and management. One WHC also reported that participants included those employees who started their shift around the time the sessions took place. Workplace contacts frequently stated that non-participants usually included shift workers and young employees. This suggests that participants were not representative of all employees.

**Implementation**

Each MWS session was conducted as intended and the program was consistent across workplaces. None of the forms indicated that staff did not follow implementation protocol. Almost all staff reported that they were the assigned presenter for the session, had all the materials they needed, and were able to do all the practical skills training and
demonstrations. In regards to the logbook, the staff reported that participants appeared to be filling out their logbooks in the first two sessions but compliance decreased for the remaining sessions. Similarly, staff reported that after the first session, participants were less likely to have completed their goal-setting assignments. It appeared to staff that participants’ goals tended to be more related to healthy eating than to physical activity.

Within workplaces, the attendance rate across all sessions ranged from 64.6% (educational services) to 84.0% (retail trade). Across all workplaces, an average of 74.6% of registered participants attended each session. This is approximately equal to attending four sessions. The first session had the highest attendance rate (88.3%) and the attendance decreased over the remaining sessions. Session four and five had the lowest attendance rates, 65.1% and 69.2% respectively. An average of 35.4% of participants attended all five sessions. Participants arriving late or leaving early were not considered in the calculation of attendance rates. Excuses were provided by approximately half of the participants who missed a session. The most common excuses for missing a session were illness, a meeting or appointment, vacation, and bad weather.

Objective 2: To Provide Estimates of Effectiveness

Prior to examining the results of the primary and secondary research questions, the comparability of the intervention and comparison groups is discussed.
Comparison of the Intervention and Comparison Groups with respect to Demographic Characteristics

Sample at baseline.

The total sample consisted of 97 participants who registered to receive the MWS in the intervention group, and 61 participants who agreed to participate in the comparison group, for a total of 158 participants. Eight participants in the intervention group did not consent to participate in the study. This left an available sample of 150 participants at baseline.

The baseline demographic characteristics are presented in Table 3. The total sample consisted of participants who were primarily female (88.7%), above 40 years old (69.2%), highly educated (64.7%), and employed full-time (90.7%). The comparability of the intervention group and comparison group in terms of demographic characteristics at baseline is displayed in Table 3. There were no differences between the intervention and comparison groups on these characteristics.
<table>
<thead>
<tr>
<th></th>
<th>Intervention Group n = 89</th>
<th>Comparison Group n = 61</th>
<th>Total n = 150</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>12 (13.5)</td>
<td>5 (8.2)</td>
<td>17 (11.3)</td>
<td>.46</td>
</tr>
<tr>
<td>Female</td>
<td>77 (86.5)</td>
<td>56 (91.8)</td>
<td>133 (88.7)</td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td>.45</td>
</tr>
<tr>
<td>18-29 years</td>
<td>10 (11.2)</td>
<td>10 (16.7)</td>
<td>20 (13.4)</td>
<td></td>
</tr>
<tr>
<td>30-39 years</td>
<td>13 (14.6)</td>
<td>13 (21.7)</td>
<td>26 (17.4)</td>
<td></td>
</tr>
<tr>
<td>40-49 years</td>
<td>29 (32.6)</td>
<td>17 (28.3)</td>
<td>46 (30.9)</td>
<td></td>
</tr>
<tr>
<td>50 years and over</td>
<td>37 (41.6)</td>
<td>20 (33.3)</td>
<td>57 (38.3)</td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
<td>.38</td>
</tr>
<tr>
<td>Graduated from high school</td>
<td>17 (19.1)</td>
<td>7 (11.5)</td>
<td>24 (16.0)</td>
<td></td>
</tr>
<tr>
<td>Some post-high school education</td>
<td>18 (20.2)</td>
<td>11 (18.0)</td>
<td>29 (19.3)</td>
<td></td>
</tr>
<tr>
<td>College/university diploma/degree</td>
<td>54 (60.7)</td>
<td>43 (70.5)</td>
<td>97 (64.7)</td>
<td></td>
</tr>
<tr>
<td><strong>Employment</strong></td>
<td></td>
<td></td>
<td></td>
<td>.49</td>
</tr>
<tr>
<td>Full-time</td>
<td>79 (88.8)</td>
<td>57 (93.4)</td>
<td>136 (90.7)</td>
<td></td>
</tr>
<tr>
<td>Part-time</td>
<td>10 (11.2)</td>
<td>4 (6.6)</td>
<td>14 (9.3)</td>
<td></td>
</tr>
<tr>
<td><strong>Have children &lt; 6 years old living at home</strong></td>
<td></td>
<td></td>
<td></td>
<td>.15</td>
</tr>
<tr>
<td>No</td>
<td>75 (86.2)</td>
<td>57 (95.0)</td>
<td>132 (89.8)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>12 (13.8)</td>
<td>3 (5.0)</td>
<td>15 (10.2)</td>
<td></td>
</tr>
<tr>
<td><strong>Have children 6-12 years old living at home</strong></td>
<td></td>
<td></td>
<td></td>
<td>.24</td>
</tr>
<tr>
<td>No</td>
<td>71 (81.6)</td>
<td>54 (90.0)</td>
<td>125 (85.0)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>16 (18.4)</td>
<td>6 (10.0)</td>
<td>22 (15.0)</td>
<td></td>
</tr>
<tr>
<td><strong>Have children 12 years and older living at home</strong></td>
<td></td>
<td></td>
<td></td>
<td>.23</td>
</tr>
<tr>
<td>No</td>
<td>51 (58.6)</td>
<td>40 (66.7)</td>
<td>91 (61.9)</td>
<td></td>
</tr>
<tr>
<td>1 child</td>
<td>20 (23.0)</td>
<td>15 (25.0)</td>
<td>35 (23.8)</td>
<td></td>
</tr>
<tr>
<td>2 or more children</td>
<td>16 (18.4)</td>
<td>5 (8.3)</td>
<td>21 (14.3)</td>
<td></td>
</tr>
</tbody>
</table>
Attrition of participants during the study.

There was a moderately high attrition rate between baseline and follow-up. At baseline, 89 participants were from the intervention group and 61 were from the comparison group. Of the 89 participants in the intervention group, two participants were excluded for submitting their initial questionnaires more than two weeks after the intervention started. All remaining participants provided useable baseline data. At follow-up, 62 participants in the intervention group and 54 participants in the comparison completed a follow-up questionnaire. Therefore, 77.3% of the sample was retained at follow-up. No reasons were provided for not completing the follow-up questionnaire.

Attrition analysis.

Although demographic data were already presented for baseline data, this included participants who dropped out over the course of the study. Socio-demographics (i.e., sex, age group, educational attainment, employment status, and number of children living at home) of the sample for which there is both baseline and follow-up information are presented in Table 4. This table excludes dropouts, that is, subjects who dropped out over the course of the study or were excluded for submitting their questionnaire more than two weeks after the due date. With regard to the demographic variables, the two groups are not statistically different (p>.05). The groups consisted of mainly females (91.4%). A large proportion of participants were over 40 years old (71.6%), highly educated (64.7% received a college or university degree/diploma), and employed full-time (91.4%). Furthermore, the majority of participants did not have children under the
age of 6 (92.9%), between the ages of 6 to 12 years (89.4%), or age 12 years and older (63.4%) living at home. Since there were no significant differences between the intervention and comparison groups, these demographic characteristics were not regarded as potential confounders and were not controlled for in analyses.
Table 4: Comparability of the Intervention and Comparison Groups with respect to Demographic Characteristics in the Final Sample

<table>
<thead>
<tr>
<th></th>
<th>Intervention Group</th>
<th>Comparison Group</th>
<th>Total</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n = 62</td>
<td>n = 54</td>
<td>n = 116</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td></td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>5 (8.1)</td>
<td>5 (9.3)</td>
<td>10 (8.6)</td>
<td>1.00</td>
</tr>
<tr>
<td>Female</td>
<td>57 (91.9)</td>
<td>49 (90.7)</td>
<td>106 (91.4)</td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td>.29</td>
</tr>
<tr>
<td>18-29 years</td>
<td>6 (9.8)</td>
<td>9 (17.0)</td>
<td>15 (13.2)</td>
<td></td>
</tr>
<tr>
<td>30-39 years</td>
<td>7 (11.5)</td>
<td>11 (20.8)</td>
<td>18 (15.8)</td>
<td></td>
</tr>
<tr>
<td>40-49 years</td>
<td>24 (38.7)</td>
<td>15 (28.3)</td>
<td>39 (33.9)</td>
<td></td>
</tr>
<tr>
<td>50 years and over</td>
<td>25 (41.0)</td>
<td>18 (34.0)</td>
<td>43 (37.7)</td>
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<tr>
<td><strong>Education</strong></td>
<td></td>
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<td>.62</td>
</tr>
<tr>
<td>Graduated from high school</td>
<td>12 (19.4)</td>
<td>7 (13.0)</td>
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<tr>
<td>Some post-high school education</td>
<td>12 (19.4)</td>
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<td>College/university diploma/degree</td>
<td>38 (61.3)</td>
<td>37 (68.5)</td>
<td>75 (64.7)</td>
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<td><strong>Employment</strong></td>
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<td>.10</td>
</tr>
<tr>
<td>Full-time</td>
<td>54 (87.1)</td>
<td>52 (96.3)</td>
<td>106 (91.4)</td>
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<tr>
<td>Part-time</td>
<td>8 (12.9)</td>
<td>2 (3.7)</td>
<td>10 (8.6)</td>
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</tr>
<tr>
<td><strong>Have children &lt; 6 years old living at home</strong></td>
<td></td>
<td></td>
<td></td>
<td>.72</td>
</tr>
<tr>
<td>No</td>
<td>54 (91.5)</td>
<td>51 (96.2)</td>
<td>105 (92.9)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>5 (8.5)</td>
<td>3 (5.7)</td>
<td>8 (7.1)</td>
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</tr>
<tr>
<td><strong>Have children 6-12 years old living at home</strong></td>
<td></td>
<td></td>
<td></td>
<td>.47</td>
</tr>
<tr>
<td>No</td>
<td>51 (86.4)</td>
<td>50 (94.3)</td>
<td>101 (89.4)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>8 (13.6)</td>
<td>4 (7.5)</td>
<td>12 (10.7)</td>
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<tr>
<td><strong>Have children 12 years and older living at home</strong></td>
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<td>.11</td>
</tr>
<tr>
<td>No</td>
<td>34 (57.6)</td>
<td>37 (69.8)</td>
<td>71 (63.4)</td>
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</tr>
<tr>
<td>1 child</td>
<td>14 (23.7)</td>
<td>14 (25.9)</td>
<td>28 (24.8)</td>
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<tr>
<td>2 or more children</td>
<td>11 (18.6)</td>
<td>3 (5.7)</td>
<td>14 (12.5)</td>
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</tbody>
</table>
Comparison of the Final Sample and the Dropouts with respect to Demographic Characteristics

A comparison of the demographic characteristics of participants who completed the baseline and follow-up questionnaires (final sample) and participants who didn’t complete the follow-up questionnaire and dropped out of the study (dropouts) is presented in Table 5. A higher percentage of males (41.2%) than females (20.3%) dropped out of the study. However, the distribution of sex in the final sample and the dropouts was similar (above 79% female).

The frequency distributions for age, educational attainment, full-time and part-time employment were similar for the final sample and the dropouts (p>.05). The final sample and the dropouts differ with respect to the number with children under the age of 6 years living at home, 7.1% and 20.6% respectively (p<.05). There was also a statistically significant difference between the final sample and the dropouts in the number with children between age 6 and 12 years living at home (p<.05). Fewer participants in the final sample than in the dropouts reported having children between age 6 and 12 years living at home, 10.6% and 29.4% respectively. In regards to having children 12 years and older living at home, the final sample and the dropouts were similar (p>.05). The final sample and the dropouts were comparable with respect to sex, age, education, and employment but may not be comparable in regards to number of children under age 12 years living at home.
Table 5: Comparability of the Final Sample and the Dropouts with respect to Demographic Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Final Sample</th>
<th>Dropouts</th>
<th>Total</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n = 116</td>
<td>n = 34</td>
<td>n = 150</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>10 (8.6)</td>
<td>7 (20.6)</td>
<td>17 (11.3)</td>
<td>.07</td>
</tr>
<tr>
<td>Female</td>
<td>106 (91.4)</td>
<td>27 (79.4)</td>
<td>133 (88.7)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-29 years</td>
<td>15 (13.0)</td>
<td>5 (14.7)</td>
<td>20 (13.4)</td>
<td>.46</td>
</tr>
<tr>
<td>30-39 years</td>
<td>18 (15.7)</td>
<td>8 (23.5)</td>
<td>26 (17.4)</td>
<td></td>
</tr>
<tr>
<td>40-49 years</td>
<td>39 (33.9)</td>
<td>7 (20.6)</td>
<td>46 (30.9)</td>
<td></td>
</tr>
<tr>
<td>50 years and over</td>
<td>43 (37.4)</td>
<td>14 (41.2)</td>
<td>57 (38.3)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td>.96</td>
</tr>
<tr>
<td>Graduated from high school</td>
<td>19 (16.4)</td>
<td>5 (14.7)</td>
<td>24 (16.0)</td>
<td></td>
</tr>
<tr>
<td>Some post-high school education</td>
<td>22 (19.0)</td>
<td>7 (20.6)</td>
<td>29 (19.3)</td>
<td></td>
</tr>
<tr>
<td>College/university diploma/degree</td>
<td>75 (64.7)</td>
<td>22 (64.7)</td>
<td>97 (64.7)</td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
<td></td>
<td>.52</td>
</tr>
<tr>
<td>Full-time</td>
<td>106 (91.4)</td>
<td>30 (88.2)</td>
<td>136 (90.7)</td>
<td></td>
</tr>
<tr>
<td>Part-time</td>
<td>10 (8.6)</td>
<td>4 (11.8)</td>
<td>14 (9.3)</td>
<td></td>
</tr>
<tr>
<td>Have children &lt; 6 years old living at home</td>
<td></td>
<td></td>
<td></td>
<td>.05*</td>
</tr>
<tr>
<td>No</td>
<td>105 (92.9)</td>
<td>27 (79.4)</td>
<td>132 (89.8)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>8 (7.1)</td>
<td>7 (20.6)</td>
<td>15 (10.2)</td>
<td></td>
</tr>
<tr>
<td>Have children 6-12 years old living at home</td>
<td></td>
<td></td>
<td></td>
<td>.02</td>
</tr>
<tr>
<td>No</td>
<td>101 (89.4)</td>
<td>24 (70.6)</td>
<td>125 (85.0)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>12 (10.6)</td>
<td>10 (29.4)</td>
<td>22 (15.0)</td>
<td></td>
</tr>
<tr>
<td>Have children 12 years and older living at home</td>
<td></td>
<td></td>
<td></td>
<td>.47</td>
</tr>
<tr>
<td>No</td>
<td>71 (62.8)</td>
<td>20 (66.7)</td>
<td>91 (61.9)</td>
<td></td>
</tr>
<tr>
<td>1 child</td>
<td>28 (24.8)</td>
<td>7 (20.6)</td>
<td>35 (23.8)</td>
<td></td>
</tr>
<tr>
<td>2 or more children</td>
<td>14 (12.4)</td>
<td>7 (20.6)</td>
<td>21 (14.3)</td>
<td></td>
</tr>
</tbody>
</table>

*<.05.
Comparison of the Final Sample and Dropouts on Outcome Measures

The final sample and the dropouts were compared with respect to baseline values of outcome measures. This information was used to determine if there were differences between participants in the intervention and comparison groups who completed both a baseline and follow-up questionnaire and the participants who dropped out of the study.

Physical activity-related measures.

Table 6 presents the means and standard deviations of physical activity-related measures of the final sample and the dropouts in the intervention and comparison groups at baseline. In the intervention group, the final sample was similar to the dropouts with respect to physical activity, expressed as total MET-minutes per week, ($t(87) = 1.71$, $p>.05$), action control ($t(87)= 1.53$, $p>.05$), and outcome expectancy value ($t(87)= 1.32$, $p>.05$). The analysis did reveal systematic differences between the final sample and the dropouts in regards to self-efficacy ($t(87) = 2.90$, $p<.05$), action planning ($t(87)= 2.18$, $p<.05$), and coping planning ($t(86)= 2.58$, $p<.05$).

In the comparison group, no baseline differences were found between the final sample and the dropouts in regards to total MET-minutes per week ($t (59) = 1.18$, $p>.05$), action planning ($t(59)= 1.27$, $p>.05$), coping planning ($t(59)= 1.31$, $p>.05$), outcome expectancy value ($t(59)= 1.56$, $p>.05$), and self-efficacy ($t(59) = 2.02$, $p>.05$). However, the final sample was different from the dropouts with respect to action control ($t(2.53)= 1.55$, $p<.05$). These findings provide evidence that the final sample and the dropouts may
not be comparable with respect to outcome variables related to physical activity. This may need to be taken into account when interpreting the main analyses.

Table 6: Baseline Means and Standard Deviations for Physical Activity-Related Variables in the Final Sample and the Dropouts

<table>
<thead>
<tr>
<th>Variable</th>
<th>Final Sample</th>
<th></th>
<th>Dropouts</th>
<th></th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (x)</td>
<td>Standard Deviation (SD)</td>
<td>Mean(x)</td>
<td>Standard Deviation (SD)</td>
<td></td>
</tr>
<tr>
<td>Intervention Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total MET-minutes/week</td>
<td>3211.91</td>
<td>2778.82</td>
<td>2198.54</td>
<td>1994.97</td>
<td>0.09</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>6.16</td>
<td>2.11</td>
<td>4.67</td>
<td>2.49</td>
<td>0.01</td>
</tr>
<tr>
<td>Self-Regulation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action Planning</td>
<td>2.85</td>
<td>0.95</td>
<td>2.38</td>
<td>0.90</td>
<td>0.03</td>
</tr>
<tr>
<td>Coping Planning</td>
<td>2.42</td>
<td>0.87</td>
<td>1.93</td>
<td>0.64</td>
<td>0.01</td>
</tr>
<tr>
<td>Action Control</td>
<td>2.34</td>
<td>0.78</td>
<td>2.09</td>
<td>0.54</td>
<td>0.13</td>
</tr>
<tr>
<td>Outcome Expectancy Value</td>
<td>70.30</td>
<td>20.06</td>
<td>64.35</td>
<td>18.22</td>
<td>0.19</td>
</tr>
<tr>
<td>Comparison Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total MET-minutes/week</td>
<td>2864.34</td>
<td>2280.61</td>
<td>1801.77</td>
<td>1776.24</td>
<td>0.24</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>5.75</td>
<td>1.97</td>
<td>4.16</td>
<td>1.75</td>
<td>0.05*</td>
</tr>
<tr>
<td>Self-Regulation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action Planning</td>
<td>2.93</td>
<td>0.87</td>
<td>2.49</td>
<td>0.90</td>
<td>0.21</td>
</tr>
<tr>
<td>Coping Planning</td>
<td>2.42</td>
<td>0.80</td>
<td>2.00</td>
<td>0.86</td>
<td>0.19</td>
</tr>
<tr>
<td>Action Control</td>
<td>2.39</td>
<td>0.65</td>
<td>1.74</td>
<td>0.51</td>
<td>0.01</td>
</tr>
<tr>
<td>Outcome Expectancy Value</td>
<td>68.47</td>
<td>18.99</td>
<td>56.26</td>
<td>23.05</td>
<td>0.12</td>
</tr>
</tbody>
</table>

*<.05.
Health eating-related measures.

The means and standard deviations with respect to healthy eating of the final sample and the dropouts in the intervention and comparison groups at baseline are presented in Table 7. The analysis revealed no systematic differences in regards to healthy eating variables for the final sample and the dropouts in the intervention and comparison groups.

In the intervention group, the final sample and the dropouts were similar with respect to total daily number of fruit and vegetables servings (t(87) = 0.16, p>.05), self-efficacy (t(87) = 0.62, p>.05), action planning (t(87)= 1.05, p>.05), coping planning (t(87)= 1.96, p>.05), action control (t(87)= 1.99, p>.05), and outcome expectancy value (t(87)= -0.01, p>.05).

In the comparison group, the final sample was similar to the dropouts with regards to total daily servings of fruit and vegetables (t (59) = 1.10, p>.05), self-efficacy (t(58) = 0.24, p>.05), action planning (t(59)= 0.95, p>.05), coping planning (t(59)=0.10, p>.05), action control (t(59)= 0.72, p>.05), and outcome expectancy value (t(59)= -0.57, p>.05).
Table 7: Baseline Means and Standard Deviations for Healthy Eating-Related Variables in the Final Sample and Dropouts

<table>
<thead>
<tr>
<th>Variable</th>
<th>Final Sample</th>
<th>Dropouts</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (\bar{x})</td>
<td>Standard Deviation (SD)</td>
<td>Mean(\bar{x})</td>
</tr>
<tr>
<td><strong>Intervention Group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total servings of fruit and vegetables/day</td>
<td>5.60 3.07</td>
<td>5.48 3.19</td>
<td>0.87</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>6.43 2.01</td>
<td>6.14 1.93</td>
<td>0.53</td>
</tr>
<tr>
<td>Self-Regulation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action Planning</td>
<td>2.59 0.97</td>
<td>2.37 0.73</td>
<td>0.30</td>
</tr>
<tr>
<td>Coping Planning</td>
<td>2.40 0.91</td>
<td>2.01 0.70</td>
<td>0.05</td>
</tr>
<tr>
<td>Action Control</td>
<td>2.45 0.73</td>
<td>2.13 0.59</td>
<td>0.05</td>
</tr>
<tr>
<td>Outcome Expectancy Value</td>
<td>87.56 20.77</td>
<td>87.62 17.48</td>
<td>0.99</td>
</tr>
<tr>
<td><strong>Comparison Group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total servings of fruit and vegetables/day</td>
<td>6.39 2.68</td>
<td>5.19 3.01</td>
<td>0.28</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>6.13 1.99</td>
<td>5.94 1.36</td>
<td>0.81</td>
</tr>
<tr>
<td>Self-Regulation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action Planning</td>
<td>2.74 0.78</td>
<td>2.43 1.10</td>
<td>0.35</td>
</tr>
<tr>
<td>Coping Planning</td>
<td>2.46 0.79</td>
<td>2.14 0.90</td>
<td>0.32</td>
</tr>
<tr>
<td>Action Control</td>
<td>2.43 0.69</td>
<td>2.22 0.86</td>
<td>0.47</td>
</tr>
<tr>
<td>Outcome Expectancy Value</td>
<td>88.64 18.01</td>
<td>92.61 11.69</td>
<td>0.57</td>
</tr>
</tbody>
</table>

In summary, there were very few differences between the final sample and the dropouts in the intervention and comparison groups for the outcome measures used in this study. In the intervention group, the dropouts had lower physical activity self-efficacy, physical activity action planning, and physical activity coping planning. In the
comparison group, the dropouts had lower physical activity action control. These differences will be considered in interpretation of the results. In terms of the variables related to healthy eating, there appeared to be no significant differences between participants who completed a baseline and follow-up questionnaire and participants who dropped out of the study. It is important to mention that, even when results are not significant, participants who dropped out of the study appear systematically different from those who completed the study, illustrated by lower scores for almost all of the outcome measures.

**Description of Physical Activity and Healthy Eating in the Final Sample**

This section provides a summary of physical activity and healthy eating in the intervention and comparison groups at baseline and follow-up.

**Level of physical activity in the sample.**

Table 8 presents the percentage of the sample in the intervention and comparison groups in increasing levels of physical activity at baseline and follow-up.
Table 8: Level of Physical Activity in the Intervention and Comparison Groups at Baseline and Follow-up

<table>
<thead>
<tr>
<th>Physical Activity Level</th>
<th>Intervention Group</th>
<th></th>
<th>Comparison Group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline (%) n=62</td>
<td>Follow-up (%) n=61</td>
<td>Baseline (%) n=54</td>
<td>Follow-up (%) n=52</td>
</tr>
<tr>
<td>Low</td>
<td>16.1</td>
<td>9.8</td>
<td>13.0</td>
<td>13.5</td>
</tr>
<tr>
<td>Moderate</td>
<td>37.1</td>
<td>26.2</td>
<td>38.9</td>
<td>23.1</td>
</tr>
<tr>
<td>High</td>
<td>46.8</td>
<td>63.9</td>
<td>48.1</td>
<td>63.5</td>
</tr>
</tbody>
</table>

Note. Data missing for one participant in the intervention group at follow-up. Data missing for two participants at follow-up in the comparison group.

At baseline, almost half of both the intervention and comparison groups engaged in a high level of physical activity, 46.8% and 48.1% respectively. A moderate level of physical activity was reported by similar proportions of the two groups (intervention group, 37.1%; comparison group, 38.9%). At baseline, a small percentage of both the intervention group and the comparison group reported a low level of physical activity, 16.1% and 13.0% respectively.

At follow-up, in both the intervention and comparison group, the majority of the sample was in the high level physical activity category, 63.9% and 63.5% respectively. This represents a 17.1% increase in those meeting the criteria for a high level of physical activity in the intervention group and a 15.4% increase in those meeting the criteria for a high level of physical activity in the comparison group. At follow-up, fewer people in the intervention group met the criteria for the low level physical activity category (9.8%; a decrease of 6.3%) and moderate level physical activity category (26.2%; a 10.9%
decrease). In the comparison group, the percentage of the sample in the low level physical activity category stayed approximately the same while the percentage of the sample in the moderate level physical activity category decreased by 15.8% at follow-up.

**Consumption of fruit and vegetables in the sample.**

Percentages of the intervention and comparison groups meeting or not meeting the recommendation of 5 or more servings of fruit and vegetables per day are presented in Table 9.

**Table 9: Consumption of Fruit and Vegetables in the Intervention and Comparison Groups at Baseline and Follow-up**

<table>
<thead>
<tr>
<th>Fruit and Vegetable Consumption</th>
<th>Intervention Group</th>
<th>Comparison Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline (n=62)</td>
<td>Follow-up (n=61)</td>
</tr>
<tr>
<td>5 or more servings/day</td>
<td>48.4%</td>
<td>75.4%</td>
</tr>
<tr>
<td>Fewer than 5 servings/day</td>
<td>51.6%</td>
<td>24.6%</td>
</tr>
</tbody>
</table>

*Note.* Data missing for one participant.

At baseline, a large proportion of both the intervention and comparison groups consumed fewer than the recommended five servings per day, 51.6% and 31.5% respectively.

At follow-up, a large percentage of the sample consumed five or more servings per day. There appear to be changes in fruit and vegetable consumption from baseline in the intervention group. At follow-up, three quarters of the intervention group consumed
five or more servings per day (75.4%), a 27.0% increase. In the comparison group, 7.4% fewer people consumed 5 or more servings per day at follow-up.

Measurement of Effectiveness

Analysis of primary and secondary research questions.
Research Question 1: Does the MWS increase total MET-minutes per week (including walking, moderate physical activity, and vigorous physical activity) among participants in the intervention group?

This section provides a description of total MET-minutes/week for the intervention and comparison groups. Means, standard deviations, assumption checks, and the ANOVA using baseline and follow-up scores of the two groups are presented. A summary of the evidence for research question 1 is also provided.

Descriptive statistics.

The means and standard deviations of total MET-minutes per week for the intervention and comparison groups at baseline and follow-up are presented in Table 10.

Table 10: Means and Standard Deviations of Total MET-Minutes per Week in the Intervention and Comparison Groups at Baseline and Follow-up

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intervention Group</th>
<th></th>
<th>Comparison Group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline n=62</td>
<td>Follow-up n=62</td>
<td>Baseline n=54</td>
<td>Follow-up n=54</td>
</tr>
<tr>
<td></td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
</tr>
<tr>
<td>Total MET-minutes/week</td>
<td>3211.91 (2778.82)</td>
<td>4069.18 (3500.09)</td>
<td>2864.34 (2280.61)</td>
<td>3644.02 (2916.39)</td>
</tr>
</tbody>
</table>
The assumption of equal variances was satisfied (p>.05) for total MET-minutes per week at baseline and follow-up. For baseline and follow-up data, the assumption of normality for total MET-minutes per week was not met in either the intervention or comparison group (p<.05). In regards to the assumptions underlying the ANOVA for total MET-minutes per week, violations were noted for random selection, random assignment, normality, and independent observations.

There were two missing values for the question “How much time in total did you usually spend on one of those days doing vigorous physical activities?”, three missing values for the question “How much time in total did you usually spend on one of those days doing moderate physical activities?”, two missing values for the question “During the last 7 days, on how many days did you walk for at least 10 minutes at a time?”, and eight missing values for the question “How much time did you usually spend walking on one of those days?”. There was only a small difference between the means before and after replacing the missing values.

The ANOVA revealed no significant interaction between group assignment and time, F(1,114)= 0.019, p= 0.89. There was a significant main effect for time, F(1,114)= 8.650, p<0.01, with both groups showing an increase in total MET-minutes per week from baseline to follow-up (see Table 10). The main effect comparing the intervention and comparison groups was not significant, F(1,114)=0.684, p=0.41, suggesting no effect of the MWS on total MET-minutes per week.
**Research Question 2:** Does the MWS increase total daily servings of fruit and vegetables among participants in the intervention group?

This section provides a description of total daily servings of fruit and vegetables for the intervention and comparison groups. Means, standard deviations, assumption checks, and the ANOVA using baseline and follow-up scores of the two groups are presented. A summary of the evidence for research question 2 is provided.

*Descriptive statistics.*

The means and standard deviations of total daily servings of fruit and vegetables for the intervention and comparison groups at baseline and follow-up are presented in Table 11.

**Table 11: Means and Standard Deviations of Total Daily Servings of Fruit and Vegetables in the Intervention and Comparison Groups at Baseline and Follow-up**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intervention Group</th>
<th>Comparison Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
</tr>
<tr>
<td>Total servings of fruit and</td>
<td>Intervention Group</td>
<td>Comparison Group</td>
</tr>
<tr>
<td>vegetables/day</td>
<td>n=61</td>
<td>n=54</td>
</tr>
<tr>
<td></td>
<td>5.57 (3.08)</td>
<td>6.39 (2.68)</td>
</tr>
<tr>
<td></td>
<td>Follow-up n=61</td>
<td>Follow-up n=54</td>
</tr>
<tr>
<td></td>
<td>7.13 (2.97)</td>
<td>6.23 (3.26)</td>
</tr>
</tbody>
</table>

*Note.* Missing data for one participant in the intervention group.

The assumption of equal variances for total daily servings of fruit and vegetables at baseline and follow-up was satisfied (p>.05). In addition, the K-S test showed that the assumption of normality for total daily servings of fruit and vegetables was met (p>.05).
As previously stated, violations of assumptions were noted for random selection, random assignment, and independent observations.

The ANOVA showed a significant interaction between group assignment and time, \( F(1,113) = 12.29, p < .01 \). There was a significant main effect for time, \( F(1,113) = 8.022, p < .01 \). The main effect for group was not significant, \( F(1,113) = 0.006, p = 0.94 \). Overall, this analysis provides evidence that the MWS was effective for increasing fruit and vegetable intake.

**Correlated data analysis.**

Given that the total number of servings of fruit and vegetables consumed per day was significantly lower at baseline than follow-up in the intervention group, it was important to consider the impact of non-independence, due to the clustering of participants within workplaces, on the precision of this estimate. The intraclass correlation (ICC) for the difference in fruit and vegetable consumption between baseline and follow-up indicated that participants within a workplace may have shared similar behaviours in regards to their response to the intervention (ICC = 0.14). However, the results of the mixed model taking this correlation into account were virtually the same as those of the simple linear regression (Table 12), indicating that the ‘within workplace’ correlation was not strong enough to affect the magnitude of the standard error. Therefore, the repeated measure ANOVA provided a valid estimate of the effect of the intervention on the consumption of fruits and vegetables.
Table 12: Comparison of the Parameter Estimate and Standard Error for the Correlated Data Analysis

<table>
<thead>
<tr>
<th>Parameter Estimate</th>
<th>SE</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear Regression</td>
<td>-1.727 (^a)</td>
<td>0.493 (^b)</td>
</tr>
<tr>
<td>Mixed Model</td>
<td>-1.727 (^a)</td>
<td>0.493 (^b)</td>
</tr>
</tbody>
</table>

Note. SE=Standard Error; CI=Confidence Interval
\(^a\)Differed at the fifth decimal place
\(^b\)Differed at the fourth decimal place

Research Question 3: Does the MWS increase physical activity self-efficacy scores among the participants in the intervention group?

This section provides a description of physical activity self-efficacy scores for the intervention and comparison groups. Means, standard deviations, assumption checks, and the ANOVA using baseline and follow-up scores of the two groups are presented. A summary of the evidence for research question 3 is also provided.

**Descriptive statistics.**

The means and standard deviations of physical activity self-efficacy for the intervention and comparison groups at baseline and follow-up are presented in Table 13.

Table 13: Means and Standard Deviations of Physical Activity Self-Efficacy in the Intervention and Comparison Groups at Baseline and Follow-up

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intervention Group</th>
<th></th>
<th>Comparison Group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline n=62</td>
<td>Follow-up n=62</td>
<td>Baseline n=54</td>
<td>Follow-up n=54</td>
</tr>
<tr>
<td>Physical Activity Self-Efficacy</td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
</tr>
<tr>
<td></td>
<td>6.16 (2.11)</td>
<td>6.20 (2.05)</td>
<td>5.75 (1.97)</td>
<td>5.81 (1.90)</td>
</tr>
</tbody>
</table>
The assumption of equal variances was satisfied using Levene’s Test (p>.05). In addition, the K-S test showed that the assumption of normality was also satisfied (p>.05). In regards to the assumptions underlying the ANOVA for physical activity self-efficacy, violations were noted for random selection, random assignment, and independent observations.

The ANOVA revealed no significant interaction between group assignment and time, \( F(1,114)= 0.011, p=0.92 \). There was no significant main effect of time, \( F(1,114)= 0.118, p=0.73 \), with neither groups showing a change in physical activity self-efficacy from baseline to follow-up (see Table 13). The main effect comparing the intervention and comparison groups was not significant, \( F(1,114)= 1.357, p=0.25 \), suggesting no effect of the MWS on physical activity self-efficacy.

**Research Question 4: Does the MWS increase physical activity self-regulation scores among the participants in the intervention group?**

This section provides a description of physical activity self-regulation including action planning, coping planning, and action control for the intervention and comparison groups. Means, standard deviations, assumption checks, and the ANOVA using baseline and follow-up scores of the two groups are presented. A summary of the evidence for research question 4 is also provided.
**Descriptive statistics.**

The means and standard deviations of physical activity action planning, coping planning, and action control for the intervention and comparison groups at baseline and follow-up are presented in Table 14.

**Table 14: Means and Standard Deviations of Physical Activity Self-Regulation in the Intervention and Comparison Groups at Baseline and Follow-up**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intervention Group</th>
<th>Comparison Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline n=62</td>
<td>Follow-up n=62</td>
</tr>
<tr>
<td></td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
</tr>
<tr>
<td>Physical Activity Self-Regulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Action Planning</td>
<td>2.85 (0.95)</td>
<td>3.13 (0.76)</td>
</tr>
<tr>
<td>Coping Planning</td>
<td>2.42 (0.87)</td>
<td>2.83 (0.78)</td>
</tr>
<tr>
<td>Action Control</td>
<td>2.35 (0.78)</td>
<td>2.86 (0.66)</td>
</tr>
</tbody>
</table>

*a Missing data for two participants. In the intervention group at baseline and follow-up n=61, in the comparison group at baseline and follow-up n=53*

**Physical activity action planning.**

Levene’s Test showed that the assumption for equal variances was satisfied (p>.05). The K-S test found that for baseline data the assumption of normality was satisfied (p>.05) but for the follow-up data the assumption was not satisfied (p<.05). In regards to the assumptions underlying the ANOVA for physical activity action planning, violations were noted for random selection, random assignment, normality, and independent observations.
Using ANOVA, there was no significant interaction between group assignment and time, $F(1,114)= 1.944, p=0.17$. There was a significant main effect of time, $F(1,114)= 9.805, p<.01$, with both groups showing an increase in physical activity action planning from baseline to follow-up (see Table 14). The main effect comparing the intervention and comparison groups was not significant, $F(1,114)=0.005, p=0.95$, suggesting no effect of the MWS on physical activity action planning.

*Physical activity coping planning.*

The assumptions for equal variances and normality were both satisfied ($p>.05$) for physical activity coping planning. With respect to the assumptions underlying the ANOVA for coping planning, violations were noted for random selection, random assignment, and independent observations.

The ANOVA showed no significant interaction between group assignment and time, $F(1,114)= 2.849, p=0.09$. There was a significant main effect of time, $F(1,114)= 24.851, p<.01$, with both groups showing an increase in physical activity coping planning from baseline to follow-up (see Table 14). The main effect comparing the intervention and comparison groups was not significant, $F(1,114)=0.497, p=0.48$, suggesting no effect of the MWS on physical activity coping planning.

*Physical activity action control.*

The assumptions for equal variances and normality were met for physical activity action control at baseline and follow-up ($p>.05$). However, violations were noted for random selection, random assignment, and independent observations.
The results of the ANOVA provide evidence for a significant interaction between group assignment and time, $F(1,112)= 14.162, p<.01$. There was a significant main effect for time, $F(1,112)= 25.703, p<.01$. The main effect for group was not significant, $F(1,112)= 2.327, p=0.13$. Overall, this analysis provides evidence that the MWS is effective for increasing physical activity action control.

Research Question 5: Does the MWS increase physical activity outcome expectancy value scores among the participants in the intervention group?

This section provides a description of physical activity outcome expectancy value scores for the intervention and comparison groups. Using baseline and follow-up scores, means, standard deviations, assumption checks, and the results of the ANOVA are presented. A summary of the evidence for research question 5 is also provided.

**Descriptive statistics.**

The means and standard deviations of outcome expectancy value for the intervention and comparison groups at baseline and follow-up are presented in Table 15.

**Table 15: Means and Standard Deviations of Outcome Expectancy Value in the Intervention and Comparison Groups at Baseline and Follow-up**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intervention Group</th>
<th></th>
<th>Comparison Group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline n=62</td>
<td>Follow-up n=62</td>
<td>Baseline n=54</td>
<td>Follow-up n=54</td>
</tr>
<tr>
<td></td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
</tr>
<tr>
<td>Physical Activity Outcome Expectancy Value</td>
<td>70.30 (20.06)</td>
<td>73.40 (19.74)</td>
<td>68.47 (18.99)</td>
<td>70.89 (20.22)</td>
</tr>
</tbody>
</table>
Assumptions for both equality of variances and normality were satisfied (p>.05). However, violations were noted for random selection, random assignment, and independent observations.

The ANOVA revealed no significant interaction between group assignment and time, $F(1,114)= 0.076$, $p=0.78$. There was a significant main effect of time, $F(1,114)= 4.875$, $p=0.03$, with both groups showing an increase in physical activity outcome expectancy value from baseline to follow-up (see Table 15). The main effect comparing the intervention and comparison groups was not significant, $F(1,114)= 0.393$, $p=0.53$, suggesting no effect of the MWS on physical activity outcome expectancy value.

**Research Question 6: Does the MWS increase healthy eating self-efficacy scores among the participants in the intervention group?**

This section provides a description of healthy eating self-efficacy scores for the intervention and comparison groups. Means, standard deviations, assumption checks, and the ANOVA using baseline and follow-up scores of the two groups are presented. A summary of the evidence for research question 6 is also provided.

**Descriptive Statistics.**

The means and standard deviations of healthy eating self-efficacy for the intervention and comparison groups at baseline and follow-up are presented in Table 16.
Table 16: Means and Standard Deviations of Health Eating Self-Efficacy in the Intervention and Comparison Groups at Baseline and Follow-up

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intervention Group</th>
<th></th>
<th>Comparison Group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline n=62</td>
<td>Follow-up n=62</td>
<td>Baseline n=53</td>
<td>Follow-up n=53</td>
</tr>
<tr>
<td></td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
</tr>
<tr>
<td>Healthy Eating Self-Efficacy</td>
<td>6.43 (2.01)</td>
<td>6.78 (2.06)</td>
<td>6.13 (1.99)</td>
<td>6.09 (1.83)</td>
</tr>
</tbody>
</table>

Note: Missing data for one participant in the comparison group.

Using Levene’s test, the assumption for equal variances was satisfied (p>.05). The assumption for normality was satisfied using the K-S test (p>.05). In regards to the assumptions underlying the ANOVA for healthy eating self-efficacy, violations were noted for random selection, random assignment, and independent observations.

The ANOVA showed no significant interaction between group assignment and time, $F(1,113)= 1.655, p=0.20$. There was no significant main effect of time, $F(1,113)= 1.031, p=0.31$, with neither group showing a change in healthy eating self-efficacy from baseline to follow-up (see Table 16). The main effect comparing the intervention and comparison groups was not significant, $F(1,113)=2.140, p=0.15$, suggesting no effect of the MWS on healthy eating self-efficacy.

Research Question 7: Does the MWS increase healthy eating self-regulation scores among the participants in the intervention group?

This section provides a description of healthy eating self-regulation including action planning, coping planning, and action control for the intervention and comparison
groups. Means, standard deviations, assumption checks, and the ANOVA are presented. A summary of the evidence for research question 7 is also provided.

**Descriptive statistics.**

The means and standard deviations of action planning, coping planning, and action control for the intervention and comparison groups at baseline and follow-up are presented in Table 17.

**Table 17: Means and Standard Deviations of Healthy Eating Self-Regulation in the Intervention and Comparison Groups at Baseline and Follow-up**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intervention Group</th>
<th></th>
<th>Comparison Group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline n=62</td>
<td>Follow-up n=62</td>
<td>Baseline n=54</td>
<td>Follow-up n=54</td>
</tr>
<tr>
<td>Healthy eating self-regulation</td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
</tr>
<tr>
<td>Action Planning</td>
<td>2.59 (0.97)</td>
<td>3.08 (0.76)</td>
<td>2.74 (0.78)</td>
<td>2.76 (0.68)</td>
</tr>
<tr>
<td>Coping Planning</td>
<td>2.40 (0.91)</td>
<td>2.96 (0.69)</td>
<td>2.46 (0.79)</td>
<td>2.50 (0.69)</td>
</tr>
<tr>
<td>Action Control</td>
<td>2.45 (0.73)</td>
<td>3.03 (0.62)</td>
<td>2.43 (0.69)</td>
<td>2.45 (0.61)</td>
</tr>
</tbody>
</table>

**Healthy eating action planning.**

The assumption for equality of variances was not satisfied for action planning at baseline (p<.05) but was satisfied at follow-up (p>.05). In addition, the K-S test showed that the assumption of normality was not met for baseline or follow-up data. In regards to the assumptions underlying the ANOVA for action planning, violations were noted for
random selection, random assignment, equal variances, normality, and independent observations.

The ANOVA showed a significant interaction between group assignment and time, \( F(1,114)= 11.572, p<.01 \). There was a significant main effect for time, \( F(1,114)= 13.453, p<.01 \). The main effect for group was not significant, \( F(1,114)= 0.399, p=0.53 \). Overall, this analysis provides evidence that the MWS is effective for increasing healthy eating action planning.

*Healthy eating coping planning.*

The assumption for equality of variances was satisfied using Levene’s Test \( (p>.05) \). The assumption for normality was not satisfied \( (p>.05) \), meaning that healthy eating coping planning was not found to follow a normal distribution. Therefore, violations of assumptions were noted for random selection, random assignment, normality, and independent observations.

The ANOVA showed a significant interaction between group assignment and time, \( F(1,114)= 10.665, p<.01 \). There was a significant main effect for time, \( F(1,114)= 13.871, p<.01 \). The main effect for group was not significant, \( F(1,114)= 2.743, p=0.10 \). Overall, this analysis provides evidence for increasing healthy eating coping planning.

*Healthy eating action control.*

Both the assumptions for equality of variances and normality were satisfied \( (p>.05) \). However, violations of assumptions were noted for random selection, random assignment, and independent observations.
The ANOVA revealed a significant interaction between group assignment and time, \( F(1,114)= 21.592, p<.01 \). There was a significant main effect for time, \( F(1,114)= 25.025, p<.01 \). The main effect for group was significant, \( F(1,114)= 7.758, p=0.01 \). Overall, this analysis provides evidence that the MWS is effective for increasing healthy eating action control.

Research Question 8: Does the MWS increase healthy eating outcome expectancy value scores among the participants in the intervention group?

This section provides a description of healthy eating outcome expectancy value scores for the intervention and comparison groups. Means, standard deviations, assumption checks, and the ANOVA using baseline and follow-up scores of the two groups are presented. A summary of the evidence for research question 8 is also provided.

**Descriptive statistics.**

The means and standard deviations of outcome expectancy value for the intervention and comparison groups at baseline and follow-up are presented in Table 18.

**Table 18: Means and Standard Deviations of Health Eating Outcome Expectancy Value in the Intervention and Comparison Groups at Baseline and Follow-up**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Intervention Group</th>
<th></th>
<th>Comparison Group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline n=62</td>
<td>Follow-up n=62</td>
<td>Baseline n=54</td>
<td>Follow-up n=54</td>
</tr>
<tr>
<td></td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
<td>Mean (±SD)</td>
</tr>
<tr>
<td>Healthy Eating Outcome Expectancy Value</td>
<td>87.56 (20.77)</td>
<td>91.88 (17.78)</td>
<td>88.64 (18.01)</td>
<td>86.93 (19.49)</td>
</tr>
</tbody>
</table>
The assumption for equal variances was satisfied (p>.05). The assumption of normality was not satisfied for either baseline or follow-up outcome expectancy value (p<.05). With respect to the assumptions underlying the ANOVA for outcome expectancy value, violations were noted for random selection, random assignment, normality, and independent observations.

The ANOVA revealed a significant interaction between group assignment and time, F(1,114)= 6.032, p=0.02. There was no significant main effect for time, F(1,114)= 1.137, p=0.29. The main effect for group was not significant, F(1,114)=0.337, p=0.56. Overall, this analysis provides evidence that the MWS is effective for increasing healthy eating outcome expectancy value.

**Summary of primary and secondary research questions.**

With respect to the primary research questions, the results show that healthy eating was significantly affected by the intervention whereas physical activity was not. The results from the secondary research questions provide evidence that healthy eating action planning, coping planning, action control, and outcome expectancy value were also positively affected by the intervention. Although some physical activity-related variables were affected by the intervention, they will not be discussed in the mediation analyses section because there was no significant change in physical activity behaviour.
Objective 3: To Use the Data to Investigate the Role of Theoretical Variables as Possible Mediators in Changing Physical Activity and Healthy Eating Behaviours

In the following mediation analyses, the change in total daily servings of fruit and vegetables is the outcome variable. Possible mediators related to healthy eating were self-efficacy, self-regulation, and outcome expectancy value. However, in regards to the secondary research questions, only healthy eating action planning, coping planning, action control, and outcome expectancy value were significantly affected by the intervention and could possibly mediate the change in total daily servings of fruit and vegetables. Separate analyses were therefore conducted for action planning, coping planning, action control, and outcome expectancy value.

Healthy Eating Action Planning as a Mediator

The results of the regression analysis using action planning as the mediator are presented in Table 19. In the first equation, in which group assignment was used to predict the change in action planning, the F statistic was 11.572, with p=0.001, and an $R^2$ of 0.304. In the second equation, in which group assignment was used to predict the change in total daily servings of fruit and vegetables, the F statistic was 12.290, with p=0.001, and an $R^2$ of 0.098. The first two conditions for mediation were satisfied and the third equation was used to test the mediation model. In the third equation, containing both group assignment and action planning as predictors of change in fruit and vegetable consumption, the F statistic was 7.829, with p=0.001, and $R^2$ of 0.123. The regression coefficient for action planning was not significantly different from zero (p>.05), and the
The regression coefficient for group assignment was significantly different from zero (p<.05). However, the relationship between group assignment and total daily servings of fruit and vegetables was marginally attenuated when controlling for changes in action planning. Although the results did not support a full mediation model, they do suggest that the effect of the intervention was partially mediated by differences in action planning.

Table 19: Regression Analyses Demonstrating Mediation Effects of Action Planning

<table>
<thead>
<tr>
<th>Equations</th>
<th>Outcome</th>
<th>Predictors</th>
<th>B</th>
<th>Std. Error</th>
<th>Beta</th>
<th>t</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Action Planning</td>
<td>Group Assignment</td>
<td>-0.473</td>
<td>0.139</td>
<td>-0.304</td>
<td>-3.402</td>
<td>0.001</td>
</tr>
<tr>
<td>2</td>
<td>Total Daily Servings of Fruit and Vegetables</td>
<td>Group Assignment</td>
<td>-1.728</td>
<td>0.493</td>
<td>-0.313</td>
<td>-3.506</td>
<td>0.001</td>
</tr>
<tr>
<td>3</td>
<td>Total Daily Servings of Fruit and Vegetables</td>
<td>Group Assignment</td>
<td>-1.457</td>
<td>0.511</td>
<td>-0.264</td>
<td>-2.849</td>
<td>0.005</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Action Planning</td>
<td>0.581</td>
<td>0.328</td>
<td>-0.164</td>
<td>1.771</td>
<td>0.079</td>
</tr>
</tbody>
</table>

Healthy Eating Coping Planning as a Mediator

The results of the regression analysis using coping planning as the mediator are presented in Table 20. In the first equation, in which group assignment was used to predict the change in coping planning, the F statistic was 10.665, with p=0.001, and an $R^2$ of 0.292. In the second equation, in which group assignment was used to predict the change in total daily servings of fruit and vegetables, the F statistic was 12.290, with p=0.001, and an $R^2$ of 0.098. The first two conditions for mediation were satisfied and the third equation was used to test the mediation model. In the third equation, containing
both group assignment and coping planning as predictors of change in fruit and vegetable consumption, the F statistic was 6.156, with p=0.003, and R$^2$ of 0.099. The regression coefficient for coping planning was not significantly different from zero (p>.05), and the regression coefficient for group assignment was significantly different from zero (p<.05). The results do not provide evidence that the effect of the intervention was mediated by differences in coping planning.

**Table 20: Regression Analyses Demonstrating Mediation Effects of Coping Planning**

<table>
<thead>
<tr>
<th>Equations</th>
<th>Outcome</th>
<th>Predictors</th>
<th>B</th>
<th>Std. Error</th>
<th>Beta</th>
<th>t</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Coping Planning</td>
<td>Group Assignment</td>
<td>-0.527</td>
<td>0.162</td>
<td>-0.292</td>
<td>-3.266</td>
<td>0.001</td>
</tr>
<tr>
<td>2</td>
<td>Total Daily Servings of Fruit and Vegetables</td>
<td>Group Assignment</td>
<td>-1.728</td>
<td>0.493</td>
<td>-0.313</td>
<td>-3.506</td>
<td>0.001</td>
</tr>
<tr>
<td>3</td>
<td>Total Daily Servings of Fruit and Vegetables</td>
<td>Group Assignment</td>
<td>-1.675</td>
<td>0.517</td>
<td>-0.304</td>
<td>-3.237</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coping Planning</td>
<td>0.098</td>
<td>0.286</td>
<td>0.032</td>
<td>0.344</td>
<td>0.731</td>
</tr>
</tbody>
</table>

**Healthy Eating Action Control as a Mediator**

Table 21 presents the results of the regression analysis using action control as the mediator. In the first equation, in which group assignment was used to predict the change in action control, the F statistic was 21.592, with P<0.001, and an R$^2$ of 0.159. In the second equation, in which group assignment was used to predict the change in total daily servings of fruit and vegetables, the F statistic was 12.290, with P=0.001, and an R$^2$ of 0.098. The first two conditions for mediation were satisfied and the third equation was
used to test the mediation model. In the third equation, containing both group assignment and action control as predictors of change in fruit and vegetable consumption, the F statistic was 6.260, with P=0.003, and $R^2$ of 0.101. The regression coefficient for action control was not significantly different from zero (p>0.05), and the regression coefficient for group assignment was significant different from zero (p<0.05). Therefore, the data did not support a mediation model.

**Table 21: Regression Analyses Demonstrating Mediation Effects of Action Control**

<table>
<thead>
<tr>
<th>Equations</th>
<th>Outcome</th>
<th>Predictors</th>
<th>B</th>
<th>Std. Error</th>
<th>Beta</th>
<th>t</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Action Control</td>
<td>Group Assignment</td>
<td>-0.564</td>
<td>0.121</td>
<td>-0.399</td>
<td>-4.647</td>
<td>0.001</td>
</tr>
<tr>
<td>2</td>
<td>Total Daily Servings of Fruit and Vegetables</td>
<td>Group Assignment</td>
<td>-1.728</td>
<td>0.493</td>
<td>-0.313</td>
<td>-3.506</td>
<td>0.001</td>
</tr>
<tr>
<td>3</td>
<td>Total Daily Servings of Fruit and Vegetables</td>
<td>Group Assignment</td>
<td>-1.846</td>
<td>0.539</td>
<td>-0.335</td>
<td>-3.427</td>
<td>0.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Action Control</th>
<th>B</th>
<th>Std. Error</th>
<th>Beta</th>
<th>t</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>-0.210</td>
<td>0.380</td>
<td>-0.054</td>
<td>-0.553</td>
<td>0.581</td>
</tr>
</tbody>
</table>

**Healthy Eating Outcome Expectancy Value as a Mediator**

The results of the regression analysis using outcome expectancy value as the mediator are presented in Table 22. In the first equation, the F statistic was 6.032, with p=0.016, and an $R^2$ of 0.050. In the second equation, the F statistic was 12.290, with p=0.001, and an $R^2$ of 0.098. The first two conditions for mediation were satisfied and the third equation was used to test the mediation model. In the third equation, containing both group assignment and outcome expectancy value as predictors of change in fruit and...
vegetable consumption, the F statistic was 6.538, with p=0.002, and R² of 0.105. The regression coefficient for outcome expectancy value was not significant different from zero (p>0.05), and the regression coefficient for group assignment was significant different from zero (p<0.05). Based on the results of the analyses, the data did not provide evidence the effect of the intervention was mediated by differences in outcome expectancy value.

**Table 22: Regression Analyses Demonstrating Mediation Effects of Outcome Expectancy Value**

<table>
<thead>
<tr>
<th>Equations</th>
<th>Outcome Predictors</th>
<th>B</th>
<th>Std. Error</th>
<th>Beta</th>
<th>t</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Outcome Expectancy Value</td>
<td>Group Assignment</td>
<td>-6.031</td>
<td>2.456</td>
<td>-0.224</td>
<td>-2.456</td>
</tr>
<tr>
<td>2</td>
<td>Total Daily Servings of Fruit and Vegetables</td>
<td>Group Assignment</td>
<td>-1.728</td>
<td>0.493</td>
<td>-0.313</td>
<td>-3.506</td>
</tr>
<tr>
<td>3</td>
<td>Total Daily Servings of Fruit and Vegetables</td>
<td>Group Assignment</td>
<td>-1.625</td>
<td>0.506</td>
<td>-0.295</td>
<td>-3.210</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outcome Expectancy Value</td>
<td>0.017</td>
<td>0.019</td>
<td>0.082</td>
<td>0.899</td>
</tr>
</tbody>
</table>

**Summary**

The results provide no evidence that any of the hypothesized mediators directly affected change in total daily servings of fruit and vegetables. However, the results provide evidence that healthy eating action planning may be a partial mediator of healthy eating behaviour change.
Chapter 6
Discussion

This pilot study was designed to provide information on the feasibility and logistics of implementation of the MWS and to gather information required for a more extensive evaluation of the outcomes. Components of the RE-AIM framework were used to guide the evaluation. By assessing the adoption, reach, and implementation of the MWS, this study provides information about implementing the MWS in the community. By presenting the effectiveness of the MWS, this study provides preliminary evidence of the public health impact of the MWS. If the MWS was successful in terms of effectiveness, and a more extensive evaluation of the MWS confirmed these findings, this could provide evidence that the MWS could be translated to similar settings. Furthermore, providing estimates of the effectiveness of the MWS at improving physical activity and eating behaviours could be used to determine what would be needed for a full-scale evaluation, including the sample size.

This pilot study also investigated the role of theoretical variables from the SCT and the HAPA as potential mediators of physical activity and health eating behaviour change. A finding of mediation provides preliminary evidence that the SCT and/or HAPA variable should be included as a component in future interventions and suggests a mechanism through which the MWS changed physical activity and health eating behaviours.
This chapter is divided into two sections. The first section addresses the process-related components of the evaluation: adoption, reach, and implementation. The second section discusses the preliminary findings of the effectiveness of the MWS at changing physical activity and eating behaviours, and the extent to which the SCT and HAPA variables are potential mediators of these behaviours. Each section presents strengths and limitations, and provides recommendations for future evaluation and the MWS.

**Process Evaluation**

There is little research on the participation rate of workplaces in health promotion interventions (Glasgow et al., 1993; Dzewaltowski et al., 2004). Studies that have included this information report relatively low participation rates, ranging from 9% to 55% (Bull et al., 2003; Kwak et al., 2006). The present study found that 8.9% of workplaces participated in the MWS, a low rate of participation. Since it could not be determined if workplaces on the Living Well newsletter e-mail distribution list actually received the recruitment letter, or saw the advertisement in the newsletter, it is possible that many workplaces were unaware of the MWS. If the MWS had been introduced into the community through a combination of channels it may have had a higher uptake among workplaces. Furthermore, it is likely that uptake will increase over time as the MWS has more time to diffuse through interpersonal channels of communication; workplaces that were aware of the MWS, or have received it, may suggest the program to other workplaces. In addition, employees who are aware of the MWS, or have received the program, may suggest the MWS to other employees in their workplace.
Researchers have previously discussed the importance of including information on the representativeness of workplaces participating in workplace health promotion programs (Bull et al., 2003). However, there is currently little research actually comparing participating workplaces and non-participating workplaces. Previous studies have found that workplaces with a larger number of employees have implemented more health promotion programs than have workplaces with fewer than 50 employees (Fielding et al., 1989; Linnan et al., 2001). This could be due to the greater availability of resources (e.g. money, people, and space) within larger workplaces. In contrast, the findings from this study show that participating workplaces were mainly small-sized with 50 employees or fewer (35%) and medium-sized workplaces with 51 to 499 employees (45%). There were minimal resources needed to implement the MWS, as almost all components were provided free of charge by KFL&A Public Health. This could help explain why more small-to-medium sized workplaces participated in the MWS.

This study also found that there were no participating workplaces supporting industry in agriculture and construction, and only a small percentage (15%) supporting industry in manufacturing, retail, finance, and business. This finding parallels previous research which found that workplaces supporting the agriculture, mining, construction, and retail industries were the least likely to offer workplace health promotion programs (Linnan et al., 2001). It is possible that these workplaces have the bulk of their employees working off-site, or working away from a main building, which may explain why they are not as likely to implement health promotion programs. In order to
accommodate employees at these workplaces, KFL&A Public Health staff may need to take this into consideration during future implementation of the MWS. This could include making components of the MWS available on the internet. It is also possible that people in those industries are more likely to be part-time or temporary employees, which decreases the likelihood that the company would want to offer programs such as the MWS to their employees.

An additional explanation for low participation among these workplaces is that they are scarce in the KFL&A catchment area. Information from the 2006 Census on industry in KFL&A area shows that the smallest industry sectors include agriculture, construction, manufacturing, finance and real estate (Statistics Canada, 2006b).

In a comparison of participating and non-participating workplaces, the only significant finding was that a higher percentage of participating than non-participating workplaces had high intensity programming in the previous five years. Previous experience with high intensity programming may have been positive and helped build relationships between the workplace and KFL&A Public Health, making these workplaces more receptive to the MWS. This finding might also suggest that workplaces that have lower intensity public health programming are less likely to receive the MWS. This may be explained by lack of resources available for high intensity programming. KFL&A Public Health staff may want to direct future promotion of the MWS at these workplaces. It is important to note that these findings should be interpreted with caution given the relatively small number of workplaces that were included in this study.
Previous studies about employee participation in workplace health promotion programs showed participation rates between 8% and 97% among eligible employees (Bull et al., 2003; Robroek et al., 2009). In this study the mean participation rate was 8.2%, which was low even though an incentive was given. However, since registration was limited to 20 participants, with two workplaces meeting the maximum, it is possible that more employees would have taken part in the MWS had a greater number of participants been eligible to participate in those two workplaces. This study did not determine how many employees registered for the program beyond the limit of 20 participants. If more than 20 participants wished to take part, this would suggest that a wait list for the MWS should be developed at the workplace, or that arrangements should be made to accommodate a larger number of employees.

This study found that employees participating in the MWS were mainly female, office workers, aged 40 years and older, and highly educated. These findings are consistent with previous research which shows that female workers, and those who are better educated and older have higher participation in health promotion interventions (Bull et al., 2003; Robroek et al., 2009; Glasgow et al., 2003; Robroek et al., 2009). The findings suggest that women with these socio-demographic characteristics are more interested in gaining knowledge about physical activity and healthy eating. Furthermore, it may be that women are potentially early adopters of health promotion interventions. This could mean that if the MWS was offered over time in the same workplace, people with other socio-demographic characteristics, or later adopters, might participate in the
MWS. In regards to characteristics of employees not participating in the MWS, the majority of WHC stated that non-participants were generally shift workers and young employees. This finding demonstrates that the participating employees may not have been representative of all employees in the workplace. It appears that the MWS did not target employees who worked hours which made attending inconvenient and youth employees who may not be interested in health behaviour change.

It also appears that the MWS attracted employees who were already physically active. At baseline, roughly half of the intervention and comparison groups fit the criteria for a high level of physical activity. Furthermore, approximately 40% of the two groups were considered moderately active. These findings differ from the physical activity levels in the general Canadian population. For instance, data from the 2005 Canadian Community Health Survey showed that only 27% of people aged 12 years and older were considered active and 25% were considered moderately active (Gilmour, 2007). Although this study did not use the same measure of physical activity as the Canadian Community Health Survey, the difference is striking. Another study examined leisure time energy expenditure among the Canadian adult population and found that most people were expending between 500 and 2500 MET-minutes per week (Craig, Russell, Cameron, & Bauman, 2004). In comparison, in this study at baseline the intervention group was expending approximately 3200 MET-minutes per week and the comparison group was expending almost 2900 MET-minutes per week. Again, different measures of physical activity were used. However, this suggests that the people who volunteered to
participate in the MWS were more active than the general Canadian population. To be successful, the MWS should also be targeting less active people who can substantially benefit from health behaviour change.

In this study, the number of daily servings of fruit and vegetables consumed in the sample was similar to fruit and vegetable intake in the majority of Canadian adults. At baseline, almost half of the participants in the intervention group were consuming 5 or more servings of fruit and vegetables per day (48.4%). In the comparison group, approximately 68% of participants at baseline were consuming 5 or more servings of fruit and vegetables per day. Similarly, findings from the 2004 Canadian Community Health Survey show that approximately half of adults fall short of the five serving threshold (Garriguet, 2004). The Canadian Community Health Survey also found that Canadian adults consumed an average of 5.2 servings per day. This finding is close to the number of daily servings found in the intervention and comparison groups of this study, 5.6 and 6.4 servings respectively. Therefore, unlike physical activity, it would appear that there is room for improvement in fruit and vegetable intake since the MWS was effective at targeting people who are eating only the minimum recommendations. For instance, Canada’s Food Guide recommends that females aged 19-50 should consume between 7-8 servings of fruit and vegetables per day. This comparison needs to be interpreted with caution as the Canadian Community Health Survey used twenty-four hour dietary recall to measure number of daily servings of fruit and vegetables.
Although it is important to know who participated in the MWS, it is also vital to determine if various elements of the program were delivered as intended and if participants actually attended the sessions. In a review of literature, Bull and colleagues (2003) determined that implementation is one of the most frequently excluded components of the RE-AIM framework when used in the evaluation of workplace health promotion programs. Furthermore, measures of individual and program-level implementation vary according to the study context. For example, one study defined adherence at the individual-level as a class attendance rate of at least 75% across all sessions. Other studies determined successful implementation as delivering most process objectives (Emmons et al., 1999). Most studies lack information about how closely the program delivery followed protocol.

In this study the MWS was successfully implemented by KFL&A Public Health staff; almost all staff stated that they did not deviate from the implementation plan. An average of only 35.4% of participants attended all five MWS sessions with most participants attending the early sessions and fewer participants attending the final sessions. Therefore, two-thirds of participants did not receive the complete MWS. A possible explanation for this finding is that participants believed they had acquired the information they needed after attending the first couple of sessions and were not motivated to attend the rest. Maybe MWS presenters should discuss the additional physical activity and healthy eating information that participants obtain if they attend all the sessions. It is also possible that the earlier sessions need to be changed, or perhaps
the program is too long. It might be a good idea to tailor the MWS to suit the level of knowledge of employees in the workplace to keep them interested. This could involve sending out a questionnaire prior to implementing the MWS to see what employees already know about physical activity and healthy eating and what they are interested in learning.

**Strengths and limitations of the process evaluation.**

Information on the adoption, reach, and implementation of the MWS provides useful information for future implementation of the MWS. In addition, these components provide information needed to determine the external validity of the findings. This is of particular importance because the majority of health promotion intervention research is limited to measuring change in behavioural outcomes (Glasgow et al., 1999).

There are a number of limitations to be considered in this section. First, the workplaces that received the MWS may not have been representative of all workplaces in KFL&A area. Although there was only one significant difference found between participating and non-participating workplaces, the findings should be interpreted with caution given the small sample size of this study. This means that with a larger sample of workplaces, and a higher power to detect significance, it is likely that there would have been evidence of an association between workplace participation and other characteristics such as size of workplace and business sector.

Second, the findings show that the majority of participants who were motivated to participate in the MWS were female, older, and had a high level of education.
Furthermore, employees who volunteered to participate in the MWS might have been more motivated to change their health behaviours. Previous studies have suggested that highly motivated people may have a tendency to self-select for workplace health promotion interventions (Bull et al., 2003). Also, the MWS attracted employees who were already physically active. All of these factors threaten the generalizability of the findings in this study. However, these findings are important for this pilot study because they provide an indication of characteristics of employees who do not participate in the MWS, or who were not well represented in this study, and could be targeted in future planning of the MWS.

This study also relied on information about non-participating employees from WHC who may not have provided correct information. Other researchers have reported the difficulty of determining the representativeness of participating employees of all employees in the workplaces. This is because non-participating employees have not given consent, meaning that information about them cannot be collected to determine representativeness (Glasgow et al., 1999).

Lastly, other than reports from KFL&A Public Health staff, there was no way to assess whether or not participants completed their logbook each day or set short term and long term goals related to both physical activity and healthy eating.

**Recommendations for the MWS and future research.**

This pilot study provides preliminary findings which suggest the workplaces and employees who participated in the MWS may not be representative of the general
population. It may be beneficial to target workplaces that were not well represented in this pilot study such as workplaces in the construction industry. In addition, because the MWS appears to be attracting staff who are already physically active, the MWS and future research may want to specifically target sedentary employees or people with other socio-demographic characteristics (e.g. male, less educated). Furthermore, it may be necessary to adapt the MWS to meet the needs of these groups.

Also, taking into consideration the small percentage of workplaces that participated in this pilot study from all workplaces contacted, a full-scale study may benefit from a larger multipronged campaign to increase awareness of the MWS. A future study should also provide more time for information about the MWS to be spread through word of mouth. These features might lead to a higher participation rate among workplaces and the ability to recruit sufficient numbers of workplaces for a larger study.

Within workplaces, there was a low participation rate and more than half of employees who did participate did not attend all of the MWS sessions. KFL&A Public Health staff should determine strategies to improve participation rates and keep attendance rates high across all sessions. This could be done by asking participants why they did not attend all the sessions and asking non-participants why they did not want to participate in the MWS. For instance, if participants state that they do not participate in the MWS because they value their free time over the lunch hour, then offering the MWS on paid work time might encourage more employees to participate in the series and attend the complete program.
**Program Effectiveness**

This section discusses the preliminary findings and provides estimates of the effectiveness of the MWS with respect to changes in the primary outcomes of interest, physical activity and healthy eating, and changes in the theoretical variables related to these health behaviours (i.e. self-efficacy, self-regulation, and outcome expectancy value).

In a review of 26 studies, Dishman and colleagues (1998) found that the typical workplace health promotion intervention aimed at increasing physical activity had not demonstrated a significant increase in physical activity. This finding differs from that of the present study, in which both the intervention and comparison groups experienced improvement in their physical activity, from similar baselines. Given that the comparison group was to receive the MWS after this study ended, it is possible that they anticipated program participation and became motivated to make behaviour changes on their own. This may help explain why there was no significant effect of the intervention on physical activity behaviour. It may also be that participants in both groups felt important because they were participating in this study, and changed their physical activity regardless of the MWS. In addition, it is also possible that external factors such as community wide Motiv8 messaging or another program may explain the increased physical activity in both groups.

This study did find a significant difference in change over time in healthy eating, as measured by total daily servings of fruit and vegetables, between the intervention and
comparison groups. This result is promising and needs to be confirmed in a more extensive study on the effectiveness of the MWS. Previous interventions designed to increase fruit and vegetable intake among employees in the workplace have also shown mainly positive results. Most studies generally reported an increase between 0.13 and 0.77 servings of fruit and vegetables per day from interventions using face-to-face education and counselling (Pomerleau et al., 2005).

The SCT and HAPA were used as the theoretical frameworks for this study to investigate the role of self-efficacy, self-regulation (i.e. action planning, coping planning, and action control), and outcome expectancy value as possible mediators of physical activity and healthy eating. For the theoretical variables pertaining to physical activity, there was no significant difference in change over time in self-efficacy and outcome expectancy value between the intervention and comparison groups. Scores were initially high in both groups. This may mean that employees who are likely to register for workplace health promotion interventions already have high physical activity self-efficacy which may make it more difficult to change. This finding could also mean that if participants already have a relatively high self-efficacy for physical activity, it may be that the MWS does not need to change this variable or does not need to include the necessary components to change self-efficacy. It is also possible that there was not sufficient power to detect a change in self-efficacy.

Physical activity outcome expectancy value scores were also high at baseline and increased only slightly in both groups. Employees who believed in positive outcomes
from physical activity and placed value on these outcomes may have been more likely to self-select to participate in the MWS. As was mentioned for self-efficacy, it might be more difficult to increase outcome expectancy value if it is already high prior to starting the program, the MWS may not be intensive enough to change this variable, or there have been insufficient power to detect a difference. Future studies may want to examine whether the MWS can significantly change physical activity outcome expectancy value and self-efficacy among employees who have lower scores for these variables to start.

There was no significant difference in change over time in physical activity action planning and coping planning between the intervention and comparison groups. Participants initially had high levels of these variables which might have made them more difficult to improve. At baseline and follow-up, there was only a minor change in action planning and coping planning scores in the intervention and comparison groups. This suggests that there might have been insufficient focus in the MWS on physical activity action planning and coping planning. It may also be that there was not enough power to detect a significant difference.

In this study, there was a significant difference in change over time in action control between the intervention and comparison groups. Thus, either the MWS might be responsible for changing the participants’ physical activity action control, or given the large number of analyses in this study, the significant difference may be due to chance. Regardless, this is a promising finding and needs to be confirmed in future studies.
For the theoretical variables related to healthy eating, this study found high baseline scores for healthy eating self-efficacy and no change over time in both the intervention and comparison groups. Again, it is possible that employees who are likely to register for workplace health promotion interventions already have high self-efficacy for healthy eating which may make it more difficult to change. It may also be the case that the MWS did not sufficiently target healthy eating self-efficacy, or that there was not sufficient power to detect change.

In the present study, there was a significant difference in change over time in healthy eating action planning, coping planning, action control, and outcome expectancy value between the intervention and comparison groups. Thus, it is possible that the MWS may be responsible for the change in these variables, and that these variables might have played a role as mediators of change in healthy eating. Many researchers have discussed the importance of understanding the causes of intervention success by examining the role of theoretical variables as mechanisms through which interventions exert their effects in order to improve future interventions (Bauman et al., 2002; Lewis et al., 2002; Shaikh, Yaroch, Nebeling, Yeh, & Resnicow, 2008).

There was some evidence for action planning as a partial mediator. This means that action planning attenuated some of the relationship between the MWS and physical activity. Although action planning is not a perfect mediator, meaning when it is controlled for there is no effect of the MWS on healthy eating behaviour, perfect mediation would be unusual in this study, or any study of human behaviour, because
there are many potential mediators that could account for change in healthy eating (Lewis et al., 2002). Therefore, this finding provides evidence that the MWS positively affected action planning and the subsequent change in healthy eating behaviour. If a more extensive study confirmed this finding, recommendations should include that future interventions develop strategies that specifically address this variable.

Strategies might include developing specific plans that commit a person to a time, a location, and a certain process to eat healthfully. This preliminary finding is consistent with previous research which found that action planning significantly predicted fruit consumption and fully mediated the relationship between intention and behaviour (Van Osch et al., 2009). Furthermore, Van Osch and colleagues (2009) recommended that action planning is an important strategy to promote health behaviours and suggested that it should be incorporated into current social cognitive models and future interventions.

In contrast, the preliminary findings indicated that coping planning, action control, and outcome expectancy value did not mediate the MWS effects on healthy eating. It is also possible that there was not sufficient power to detect significance. These findings are different from previous studies, in which self-efficacy and outcome expectancy value were found to be mediators of healthy eating (Shaikh et al., 2008). To the researcher’s knowledge, there is no previous research available on the role of coping planning and action control in mediating the relationship between health promotion interventions and healthy eating.
**Strengths and limitations of the study.**

A number of strengths are considered in this section. First, this pilot study included an investigation of the non-independence of the data i.e., people clustered within workplaces sharing characteristics that may result in a response to the MWS that is more similar among these individuals than those across workplaces, thus increasing the chances of falsely declaring statistical significance. Many previous studies evaluate the effect of interventions but do not account appropriately for clustering within workplaces which can lead to inaccurate results and misleading conclusions (Campbell, Mollison, Steen, Grimshaw, & Eccles, 2000). An additional strength of this study was that it determined initial estimates (i.e. means and standard deviations) of the primary outcomes of interest which can be used to determine the sample size needed in a larger scale study (Lancaster, Dodd, & Williamson, 2004).

There are also a number of limitations that need to be considered when discussing the results of this study. First, this study used a quasi-experimental, non-equivalent control group design, meaning that there was no random selection and allocation of participants into intervention and comparison groups. This study design can introduce threats to the internal and external validity of the study (Campbell & Stanley, 1966). For example, the baseline questionnaire might have increased or decreased the participants’ responsiveness to the MWS and thus make the results obtained from participants unrepresentative of the effects of the MWS on employees receiving the intervention but not filling out the baseline questionnaire. It is also possible that after completing the
baseline questionnaire employees became motivated to change their health behaviours, or became aware and anticipated positive effects of the MWS. Another important limitation of this study was the sample size. Since the sample size was low, and no formal power calculations were carried out for the analyses, there may have been insufficient power to detect significant effects.

In addition, all measures used self-report, which can introduce social desirability and recall bias. Although it is possible that within this sample the participants actually had higher than average levels of physical activity, it is also possible that the use of the IPAQ caused inflated physical activity results. More objective measures of physical activity and healthy eating should be used in future research (e.g. accelerometers). However, measuring physical activity using pedometers and accelerometers can be expensive and more of a burden to participants and researchers than self-reported measures, which are more practical and cost-effective (Dishman, Washburn, & Schoeller, 2001).

Another limitation of this study is that the instruments used were mostly adapted and not tested for reliability and validity in this study population. Furthermore, behaviours were assessed using a short follow-up period of only one week. Possibly, if more time had been given between baseline and follow-up assessments, or if a second follow-up assessment had been added (i.e. 6 months or more), the effects of the interventions might have been reduced or greater effects could have been found. Lastly, the MWS was not explicitly based on self-efficacy, action planning, coping planning,
action control, or outcome expectancy value. This would make it more difficult to detect a significant effect of the intervention on some of these theoretical variables. However, the findings could also be the result of having a small sample size with insufficient power. Therefore, maybe the MWS should be adapted to focus on strategies that specifically target these variables.

**Recommendations.**

The preliminary findings that the intervention did not significantly increase physical activity may be the result of the small sample size. However, if a more extensive study confirms this finding, it might suggest that the MWS should be revised to have a greater focus on physical activity, or implemented among a different population. Also, it appears that the MWS was reaching active employees where there is little room for improvement in physical activity. This finding was similar for self-efficacy, self-regulation, and outcome expectancy value.

Future research should determine if the MWS would have a significant effect on physical activity in less active employees, those who most need to improve physical activity. Furthermore, employees could be screened prior to receiving the MWS with respect to their health behaviour and theoretical variables so that the MWS could be tailored to their needs. In addition, it could be that there is not enough time spent on physical activity in the MWS. This would suggest that including an additional session on physical activity in the MWS may be beneficial.
Although previous studies have found only a small or no effect of workplace health promotion interventions on physical activity, researchers maintain that interventions can be effective when they are grounded in research and theories of behaviour change (Dishman et al., 1998). Some intervention studies have shown physical activity self-efficacy, self-regulation, and outcome expectancies as mediators of physical activity behaviour among adults (Lewis et al., 2002; Petosa, Suminski, & Hortz, 2003). Similarly, studies have found that self-efficacy, and outcome expectancies for healthy eating have been mediators of fruit and vegetable consumption. Because this was a pilot study, with a small sample size, KFL&A Public Health staff should continue to focus components of the MWS on these potential mediators. Mediators should then be included in future evaluation of the MWS.

There are several areas of research related to this thesis that should be explored further. A more extensive study should establish validity and reliability for the instruments used in the questionnaire. Furthermore, a more definitive study, using randomization of the workplace to intervention and control groups, a larger sample size, and including workplaces with employees from a range of socio-economic backgrounds should be carried out to confirm the findings in this study. A future study could also collect data at multiple points in time to establish a temporal sequence and see the long-term effects of the MWS on health behaviours. This may include distributing a questionnaire at baseline, during program implementation, at 1-week follow-up, at 6-months follow-up, and at 12-months follow-up. If similar findings are produced in a
definitive study, potential avenues for future research may include examining the influence of the MWS on individuals’ physical activity and healthy eating behaviours in other settings (e.g. community setting, primary care settings).

Future studies should provide information on the RE-AIM component maintenance, for both the individual-level and program-level. At the individual-level, this means determining how long the beneficial changes in behaviour will last and if change in health behaviours would have been greater in the intervention group if given a longer follow-up period. At the program-level, future research should measure how the MWS was sustained in the workplace over time. This would involve determining if a workplace maintained relations with KFL&A Public Health and continued the MWS in their workplace after the series. This could also include developing and enforcing policies in the workplace that promote physical activity and healthy eating behaviours.

Lastly, after this pilot study, KFL&A Public Health staff began using the MWS as an initial means to get their ‘foot in the door’ at workplaces so they could promote environmental supports for physical activity and healthy eating. It might be of interest in the future to evaluate the added value of the MWS with and without environmental supports.
Conclusions

To the researcher’s knowledge, this is the first pilot evaluation of a workplace health promotion program that uses the RE-AIM framework. The preliminary findings from this evaluation suggest that the MWS had moderately low reach and adoption, good program implementation, and was effective at changing eating behaviour among employed adults. Although a clear intervention effect on physical activity was not apparent as a result of this pilot study, the potential for the workplace as a setting for the promotion of physical activity and healthy eating in adults was demonstrated.

This pilot establishes the need for a definitive study of the outcomes of the MWS. Such work adds to the growing body of evidence recognizing the ability of workplace health promotion interventions to improve health behaviours. In addition, the findings from this evaluation demonstrate the potential of the MWS for achieving positive outcomes related to physical activity and healthy eating that are needed to improve and protect the health of residents of the KFL&A area.


Federal and Provincial/ Territorial Ministers Responsible for Sport (2003). Federal-Provincial-Territorial Conference of Ministers responsible for sport, recreation


Mapping in the development, implementation and evaluation of weight gain prevention at the worksite. *Obesity Reviews*, 8, 347-361.


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self-regulation following coronary rehabilitation. *International Journal of Behavioral Medicine, 12*, 244-255.


http://www.who.int/dietphysicalactivity/strategy/eb11344/strategy_english_web.pdf
Appendix A

Workplace Recruitment Letter

[Date]

[Contacts Name, Contacts Title]
[Organization Name]
[Street Address]
Kingston, ON
[Postal Code]

Dear [Name]:

Kingston, Frontenac and Lennox & Addington Public Health, your local accredited health agency, is offering a pilot program to your employees at no cost. The program is provided by health professionals and takes approximately 1-hour per week, for five weeks. The program covers physical activity, nutrition, and behaviour change. Benefits of workplace health promotion include increasing employee health, increasing productivity, and improving organizational effectiveness.

This is open to all employees, up to a maximum of 20 participants, at [Organization] as part of the new Motiv8 initiative. The five sessions run for approximately 55 – 75 minutes once a week (time of day is negotiable) and are delivered by health professionals who include a physical activity specialist, a public health dietitian, a community food advisor, and public health nurses. Each employee will receive a pedometer, a log book,
education support materials and other Motiv8 incentives. In addition, healthy snacks will be provided at the nutrition sessions.

This educational series is being offered by KFL&A Public Health as a pilot program to [Organization] and there is no charge for attending these sessions. Materials such as posters and email messages promoting the program will also be provided. The price of having these same services brought into your workplace by a private company would be approximately $500 per hour.

As a pilot program, it is important that KFL&A Public Health determines the effectiveness of the Motiv8 workplace program. For this reason, participants will be asked to complete a brief questionnaire two times - prior to starting the program and one week after completion. Participants will be asked to maintain confidentiality by not discussing personal information obtained during the sessions. All information collected throughout the program will be kept strictly confidential.

Given the number of hours that Canadians spend at work, workplace health promotion is beneficial to both the employee and employer. Benefits of a healthy workplace include higher employee morale and job satisfaction, increased employee health, increased productivity, and improved organizational effectiveness.

If you are interested in registering for the Motiv8 workplace program, please contact [KFL&A Contact] at [Phone Number] or [Email Address] before September ____, 2008. For more information about Motiv8 click on www.eatwellgetfitlivelife.ca

Sincerely,

[KFL&A Contact]
Appendix B

Participant Recruitment Advertisement
Appendix C

Letter of Information

Dear Employee:

KFL&A Public Health is pleased to provide a five-session workplace health promotion program at <Organization> as part of the new Motiv8 initiative. Because this is a pilot program, it is important that KFL&A Public Health determines the effectiveness of the Motiv8 Workplace Wellness Program at changing health behaviours. For this reason, you are invited to participate in a research project titled “Evaluation of the effect of a workplace health promotion intervention targeting employees’ health behaviours: The Motiv8 Workplace Wellness Program”, conducted by Abby Smith, a graduate student in the School of Kinesiology and Health Studies at Queen’s University. Dr. Stevenson Fergus (at Queen’s University) and Dr. Kate O’Connor (at KFL&A Public Health) are the co-supervisors of this project. This research has been approved by the General Research Ethics Board at Queen’s University.

**Participant Requirements**

If you agree to participate in this project you will be asked to complete a paper-and-pencil questionnaire at two times (prior to starting the program and 1-week after the program has ended). The questionnaire will ask about your confidence in performing certain behaviours and the value of the outcomes that are associated with these behaviours as well as some information about you. The questionnaire should take about 20 minutes to complete.

If you are unable to attend all five sessions, you will be asked why you were not able to attend to help us understand how this program can better meet employee’s needs. However, if you don’t want to say why you were not available, that is okay too.

**Risks**

There are no known risks associated with participation in this study. Participation in this study is absolutely voluntary. You are free to refuse to participate in or to withdraw from any section of the study at any time. You will still be able to attend the Motiv8 Workplace Wellness Program regardless of your decision to participate in the study. If you decide to stop participating at any time it will not affect any relationship you have with your employer or KFL&A Public Health. You may refuse to answer any questions that you do not wish to answer.
Confidentiality/Anonymity
It is important to us to protect the privacy of the employees participating in this project. Here is how we will protect your privacy:

- Although employee names will be collected for this study, names will be kept separate from the information you provide by assigning a number to each participant.
- The information you provide will be locked in a filing cabinet at KFL&A Public Health and will be accessible only to the researchers. Names will be erased as soon as the questionnaires and logs have been received.
- Once this project has ended, all paper documents will be shredded. The anonymous computer data will be stored for 7 years at KFL&A Public Health and then destroyed.
- Only group results will ever be reported. Research results may be used by KFL&A Public Health as well as other public health agencies and interested parties to improve workplace wellness programs. Results will be reported and published as part of a graduate level study and submitted to various health publication journals/conferences. Research results may be used as part of other studies; however access to these results will be restricted to the previously mentioned investigators.
- Your information will never be available to any outside parties.
- Your personal information will not be accessible to your employer.

Remuneration
All participants in your workplace who are involved in this research, including those who withdraw, will be entered in a draw to receive a $50.00 gift certificate to a Kingston restaurant. You have approximately a 1 in 20 chance of winning the gift certificate. In addition, participants in this project will be provided with the results of the study upon request.

You will be contacted by the researcher and asked to participate in this study by completing two questionnaires. If you do not wish to be contacted please call me, Abby Smith, at (613) 549-1232 extension 1144 and say that you would not like to participate in the research. You can leave a message at this number. If you do this, you will still be able to participate in Motiv8 workplace wellness program.

If you have any questions about this project or require additional information, please contact me, Abby Smith (613-549-1232 ext 1144, asmith@kflapublichealth.ca) or my supervisors, Stevenson Fergus (613-533-6000 ext 78656, ferguss@queensu.ca) and Kate O’Connor (613-549-1232 ext 1578, koconnor@kflapublichealth.ca). If you have any questions, concerns, or complaints about the research ethics of this study please contact the Director of the School of Kinesiology and Health Studies, Dr. Patrick Costigan (613-533-6601, pat.costigan@queensu.ca) or the chair of the General Research Ethics Board, Dr. Joan Stevenson (613-533-6081, stevensj@queensu.ca).
Appendix D

Participant Consent Form

I, ________________________ agree to participate in the study titled, “Evaluation of the effect of a workplace health promotion intervention targeting employees’ health behaviours: The Motiv8 Workplace Series”. I have read the information about this research study and have had the purposes, procedures, and technical language explained to me. I have had all my questions answered to my satisfaction. I understand that I will be asked to attend five sessions and fill out a questionnaire at two times - prior to starting the program and one week after the final session.

I give permission for the researchers to use information collected for the study for use in the improvement of workplace wellness programs and educational, research, and publication purposes. My identity will not be disclosed. No one will know the results of any of the information I provide. I understand that my participation in the study is completely voluntary and that I am free to withdraw at any time. I have received an Information Letter explaining the study and a copy of the Consent Form. If I have any questions or concerns about the research, I may discuss them with:

Abby Smith, Graduate Student, Research and Education Program
KFL&A Public Health
221 Portsmouth Avenue,
Kingston ON, K7M 1V5
Phone: (613) 549-1232 extension 1144
Email: asmith@kflapublichealth.ca

Dr. Stevenson Fergus, Assistant Professor
School of Kinesiology and Health Studies, Queen’s University
Kingston, ON, K7L 3N6
Phone: (613) 533-6000 extension 78656
Email: ferguss@queensu.ca

Dr. Joan Stevenson, Chair, General Research Ethics Board
School of Kinesiology and Health Studies, Queen’s University
Kingston, ON, K7L 3N6
Phone: (613) 533-6081
Email: stevensj@queensu.ca
By signing this consent form, I am indicating that I have read and understood this consent form and I agree to participate in this study.

____________________________________  ____________________________
Signature of Participant              Date

If you would like a copy of the results please return this form to the researcher. This form will be kept separate from your other forms.

Name _______________________________________________________

Email _______________________________________________________

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Appendix E
Implementation Questions

Workplace Session Date________________
Workplace Session Number___________

Questions for KFL&A Public Health staff who implement the program (to be filled out after each session):

1. Are you the assigned staff member for this session? (If no, explain)
   ___________________________________________________________________
   ___________________________________________________________________
   _________________________________________________________________

2. Were all the materials you needed for implementing the MWS available to you? (If no, please explain what was not available)
   ___________________________________________________________________
   ___________________________________________________________________
   ___________________________________________________________________

3. Was there enough time to all the MWS educational material? (If no, please explain what was not included)
   ___________________________________________________________________
   ___________________________________________________________________
   ___________________________________________________________________

4. Did you have to rush through some of the material? (If yes, please explain)
   ___________________________________________________________________
   ___________________________________________________________________
   _________________________________________________________________

5. Did all the practical skills training (e.g. flexibility practice) occur? (If no, please describe what was not included)
   ___________________________________________________________________
6. Did participants take part in the practical skills training?

7. How many people attended this session? ______

8. Is everyone from the previous session present? ______

9. If people were missing, were any excuses provided? (If yes, please explain)

10. Are participants filling out their logbooks?

11. Are participants completing their homework assignments (e.g. goal setting)?

12. What do you think is working about the program? What do you think is not working?

13. Has anything changed from the original implementation design? (E.g. the order in which the information is being offered)
Appendix F

Questionnaire

Dear Employee,

We are interested in looking at employee physical activity and nutrition behaviours, your confidence in performing these behaviours, and the value you place on the outcomes of the behaviours.

For some questions in the following questionnaire you will be asked to circle or write down the most appropriate answer. For other questions please put a check mark in the space provided.

Participation in this questionnaire is voluntary. Please try to answer all the questions. You do not have to answer any questions that make you feel uncomfortable or that you do not want to answer.

Please email me, Abby Smith, at asmith@kflapublichealth.ca if you have any questions regarding the questionnaire.

Name: _____________________________________

(please print)

ID Number: ___________

(This sheet will be removed after your questionnaire is returned to the researcher so that your information can not be linked back to you.)
ID Number: ___________

We are interested in finding out about the kinds of physical activities that you do as part of your everyday life.

The questions are about the time you spend being physically active in the last 7 days. They include questions about activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Your answers are important.

Please answer each question even if you do not consider yourself to be an active person.

THANK YOU FOR PARTICIPATING!

In answering the following questions,

- **Vigorous activities** refer to activities that take hard physical effort and make you breathe much harder than normal.
- **Moderate activities** refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.
1. During the last 7 days, on how many days did you do **vigorous** physical activities? (i.e. heavy lifting, running, jogging, fast bicycling, aerobics, judo, cross-country skiing, soccer, football, hockey, squash, basketball, vigorous swimming)

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

   a. __________ days a week     or     __________ none

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

      ______ hours ______ minutes

2. Again, think only about those physical activities that you did at least 10 minutes at a time. During the last 7 days, on how many days did you do **moderate** physical activities like carrying light loads (e.g. carrying a child), easy swimming, easy bicycling, popular or folk dancing, yoga, doubles tennis, volleyball, baseball?

   a. __________ days a week     or     __________ none

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

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

   a. __________ days a week     or     __________ none

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

      ______ hours ______ minutes

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

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

      ______ hours ______ minutes
The next section focuses on what you usually ate last month.

➢ The questions are about all the fruit and vegetables that you ate last month. Include those that were:

- Raw and cooked,
- Eaten as snacks and at meals
- Eaten at home and away from home (restaurants, friends, takeout), and
- Eaten alone and mixed with other foods.

➢ Report how many times per month, week, or day, you ate each food, and if you ate it, how much you usually had.

➢ If you mark “Never” for a question, follow the “Go to” instruction.

➢ Choose the best answer for each question. Mark only one response for each question.
1. Over the last month, how many times per month, week, or day did you drink 100% fruit juice such as orange, apple, grape, or grapefruit juice? **Do not count** fruit drinks like Kool-Aid, lemonade, Hi-C, cranberry juice drink, Tang, and Twister. Include juice you drank at all mealtimes and between meals.

☐ Never 1-3 1-2 3-4 5-8 1 2 3 4 5 or more

(Option 2) last month per week per week per week per day per day per day per day per day

1a. Each time you drank 100% juice, how much did you usually drink?

☐ Less than ¼ cup (less than 6 ounces) ☐ ¾ to 1¼ cup (6 to 10 ounces) ☐ 1¼ to 2 cups (10 to 16 ounces) ☐ More than 2 cups (more than 16 ounces)

2. Over the last month, how often did you eat lettuce salad (with or without other vegetables)?

☐ Never 1-3 1-2 3-4 5-6 1 2 3 4 5 or more

(Option 3) last month per week per week per week per day per day per day per day per day

2a. Each time you ate lettuce salad, how much did you usually eat?

☐ About ½ cup ☐ About 1 cup ☐ About 2 cups ☐ More than 2 cups

3. Over the last month, how often did you eat French fries or fried potatoes?

☐ Never 1-3 1-2 3-4 5-6 1 2 3 4 5 or more

(Option 4) last month per week per week per week per day per day per day per day per day

3a. Each time you ate French fries or fried potatoes, how much did you usually eat?

☐ Small order or less (About 1 cup or less) ☐ Medium order (About 1½ cups) ☐ Large order (About 2 cups) ☐ Super Size order or more (About 3 cups or more)
4. Over the last month, how often did you eat other white potatoes? Count baked, boiled, and mashed potatoes, potato salad, and white potatoes that were not fried.

<table>
<thead>
<tr>
<th>5 or more times</th>
<th>4 times</th>
<th>3 times</th>
<th>2 times</th>
<th>1 time</th>
<th>0-1 times</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 5</td>
<td>per day</td>
<td>per day</td>
<td>per day</td>
<td>per week</td>
<td>per week</td>
<td>last month</td>
</tr>
</tbody>
</table>

4a. Each time you ate these potatoes, how much did you usually eat?

- [ ] 1 small potato or less (½ cup or less)
- [ ] 1 medium potato (½ to 1 cup)
- [ ] 1 large potato (1 to 1½ cups)
- [ ] 2 medium potatoes or more (1½ cups or more)

5. Over the last month, how often did you eat cooked dried beans? Count baked beans, bean soup, refried beans, pork and beans and other bean dishes.

<table>
<thead>
<tr>
<th>5 or more times</th>
<th>4 times</th>
<th>3 times</th>
<th>2 times</th>
<th>1 time</th>
<th>0-1 times</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 6</td>
<td>per day</td>
<td>per day</td>
<td>per day</td>
<td>per week</td>
<td>per week</td>
<td>last month</td>
</tr>
</tbody>
</table>

5a. Each time you ate these beans, how much did you usually eat?

- [ ] Less than ½ cup
- [ ] ½ to 1 cup
- [ ] 1 to 1½ cups
- [ ] More than 1½ cups

Now, divide your waking hours into three time periods:

- **Morning**
- **Lunchtime and Afternoon**
- **Suppertime and Evening**

Please think about foods you ate during each of those time periods over the last month.
MORNING

6. Think about all the foods you ate at your morning meal and snacks over the last month. On how many days did you eat fruit for your morning meal or morning snacks? Count any kind of fruit—fresh, canned, and frozen. Do not count juices.

☐ Never 
(Go to Question 7)  ☐ 1-3 days last month  ☐ 1-2 days per week  ☐ 3-4 days per week  ☐ 5-6 days per week  ☐ Every day

6a. When you ate fruit in the morning, what is the total amount of fruit that you usually ate in a morning?

☐ Less than 1 medium fruit  ☐ 1 medium fruit  ☐ 2 medium fruits  ☐ More than 2 medium fruits

☐ Less than ½ cup  ☐ About ½ cup  ☐ About 1 cup  ☐ More than 1 cup  OR

7. Think about all the foods you ate at your morning meal and morning snacks. On how many days did you eat vegetables for your morning meal or morning snacks?

DO NOT COUNT:  • Lettuce salads  • White potatoes  • Cooked dried beans  • Vegetables in mixtures, such as in sandwiches, omelets, casseroles, Mexican dishes, stews, stir-fry, soups, etc.  • Rice

COUNT:  • All other vegetables—raw, cooked, canned, and frozen

☐ Never 
(Go to Question 8)  ☐ 1-3 days last month  ☐ 1-2 days per week  ☐ 3-4 days per week  ☐ 5-6 days per week  ☐ Every day

7a. When you ate vegetables in the morning, what is the total amount of vegetables that you usually ate in a morning?

☐ Less than ½ cup  ☐ ½ to 1 cup  ☐ 1 to 2 cups  ☐ More than 2 cups
LUNCHTIME AND AFTERNOON

8. Think about all the foods you ate at lunchtime and for your afternoon snacks last month. On how many days did you eat fruit at lunchtime or for your afternoon snacks? Count any kind of fruit—fresh, canned, and frozen. **Do not count** juices.

☐ Never  ☐ 1-3 days last month  ☐ 1-2 days per week  ☐ 3-4 days per week  ☐ 5-6 days per week  ☐ Every day  

(Go to Question 9)

8a. When you ate **fruit** at lunchtime or for your **afternoon** snacks, what is the **total** amount of **fruit** that you usually ate then?

☐ Less than 1 medium fruit

☐ 1 medium fruit

☐ 2 medium fruits

☐ More than 2 medium fruits

☐ Less than ½ cup

☐ About ½ cup

☐ About 1 cup

☐ More than 1 cup

OR

9. Think about all the foods you ate at lunchtime and for your afternoon snacks. On how many days did you eat **vegetables** at lunchtime or for your **afternoon** snacks?

**DO NOT COUNT:**
- Lettuce salads
- White potatoes
- Cooked dried beans
- Vegetables in mixtures, such as in sandwiches, omelets, casseroles, Mexican dishes, stews, stir-fry, soups, etc.
- Rice

**COUNT:**
- All other vegetables—raw, cooked, canned, and frozen

☐ Never  ☐ 1-3 days last month  ☐ 1-2 days per week  ☐ 3-4 days per week  ☐ 5-6 days per week  ☐ Every day

(To Question 10)

9a. When you ate **vegetables** at lunchtime or for your **afternoon** snacks, what is the **total** amount of **vegetables** that you usually ate then?

☐ Less than ½ cup

☐ ½ to 1 cup

☐ 1 to 2 cups

☐ More than 2 cups
### Suppertime and Evening

10. Think about all the foods you ate at suppertime and for your evening snacks last month. On how many days did you eat fruit at suppertime or for your evening snacks? Count any kind of fruit—fresh, canned, and frozen. Do not count juices.

<table>
<thead>
<tr>
<th>Days Last Month</th>
<th>1-2 Days Per Week</th>
<th>3-4 Days Per Week</th>
<th>5-6 Days Per Week</th>
<th>Every Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never (Go to Question 11)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10a. When you ate fruit at suppertime or for your evening snacks, what is the total amount of fruit that you usually ate then?

- Less than 1 medium fruit
- 1 medium fruit
- 2 medium fruits
- More than 2 medium fruits

- Less than ½ cup
- About ½ cup
- About 1 cup
- More than 1 cup

OR

11. Think about all the foods you ate at suppertime and for your evening snacks. On how many days did you eat vegetables at suppertime or for your evening snacks?

**DO NOT COUNT:**
- Lettuce salads
- White potatoes
- Cooked dried beans
- Vegetables in mixtures, such as in sandwiches, omelets, casseroles, Mexican dishes, stews, stir-fry, soups, etc.
- Rice

**COUNT:**
- All other vegetables—raw, cooked, canned, and frozen

<table>
<thead>
<tr>
<th>Days Last Month</th>
<th>1-2 Days Per Week</th>
<th>3-4 Days Per Week</th>
<th>5-6 Days Per Week</th>
<th>Every Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never (Go to Question 12)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

11a. When you ate vegetables at suppertime or for your evening snacks, what is the total amount of vegetables that you usually ate then?

- Less than ½ cup
- ½ to 1 cup
- 1 to 2 cups
- More than 2 cups
These last few questions ask about how often you ate particular foods at any time of the day.

12. Over the last month, how often did you eat tomato sauce? Include tomato sauce on pasta or macaroni, rice, pizza and other dishes.

☐ □ □ □ □ □ □ □
Never (Go to Question 13) 1-3 times per week 1-2 times per week 3-4 times per week 5-6 times per week 1 time per day 2 times per day 3 times per day 4 times per day 5 or more times per day

12a. Each time you ate tomato sauce, how much did you usually eat?

☐ □ □ □ □
About ¼ cup About ½ cup About 1 cup More than 1 cup

13. Over the last month, how often did you eat vegetable soups? Include tomato soup, gazpacho, beef wit

☐ □ □ □ □ □ □ □
Never (Go to Question 14) 1-3 times per week 1-2 times per week 3-4 times per week 5-6 times per week 1 time per day 2 times per day 3 times per day 4 times per day 5 or more times per day

13a. When you ate vegetable soup, how much did you usually eat?

☐ □ □ □ □
Less than 1 cup 1 to 2 cups 2 to 3 cups More than 3 cups

14. Over the last month, how often did you eat mixtures that included vegetables? Count such foods as sandwiches, casseroles, stews, stir-fry, omelets, and tacos.

☐ □ □ □ □ □ □ □
Never 1-3 times per week 1-2 times per week 3-4 times per week 5-6 times per week 1 time per day 2 times per day 3 times per day 4 times per day 5 or more times per day
The following section asks about your confidence in overcoming barriers to physical activity under different circumstances. Please circle only one of the following responses for each question.

I am confident that I can participate in regular physical activity:

<table>
<thead>
<tr>
<th></th>
<th>Not at all confident</th>
<th>Extremely confident</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. When I am a little tired.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>2. When I am in a bad mood or feeling depressed.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>3. When I have to do it by myself.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>4. When it becomes boring.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>5. When I can't notice any improvements in my fitness.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>
6. When I have many other demands on my time.

7. When I feel a little stiff or sore.

8. When the weather is bad.

9. When I feel a little ill.
The following section asks about your confidence in overcoming barriers to consuming fruit and vegetables under different circumstances.

**I am confident that I can regularly consume fruit and vegetables:**

<table>
<thead>
<tr>
<th></th>
<th>Not at all confident</th>
<th>Extremely confident</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. When I miss out at lunch and need to have extra ones at dinner.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>11. When I am feeling tired.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>12. When I feel stressed.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>13. When my favourite ones are unavailable.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>14. When things are not going well.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>15. When I feel frustrated.</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>
16. When I am eating out (e.g. at a restaurant) 1 2 3 4 5 6 7 8 9 10

17. When I am in a rush. 1 2 3 4 5 6 7 8 9 10

18. When the only ones available need to be peeled and cut. 1 2 3 4 5 6 7 8 9 10

19. When I have to prepare a meal for myself. 1 2 3 4 5 6 7 8 9 10

20. When they are expensive. 1 2 3 4 5 6 7 8 9 10

21. When I don't have the time to prepare them. 1 2 3 4 5 6 7 8 9 10

22. When they are not readily available. 1 2 3 4 5 6 7 8 9 10
People use various techniques to help them be physically active on a regular basis. Please answer the following questions regarding techniques you may use to help you be physically active. In the scale provided next to each item, circle the number that best represents your answer.

**I have my own plan regarding ...**

<table>
<thead>
<tr>
<th></th>
<th>Not at all true</th>
<th>Barely true</th>
<th>Mostly true</th>
<th>Exactly true</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ... when to be physically active.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. ... where to be physically active.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3. ... how to be physically active.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4. ... how often to be physically active.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5. ... with whom to be physically active.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6. ... what to do if something intervenes with my plans.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
7. ...how to cope with possible setbacks.

8. ...what to do in difficult situations in order to act according to my intentions (e.g. be physically active regularly).

9. ...which good opportunities for action to take.

10. ...when I have to pay extra attention to prevent lapses.

During the last week, I have…

11. ...often had my physical activity goals on my mind.
12. ...always been aware of the recommendations for physical activity from Canada's Physical Activity Guide.

13. ...consistently monitored myself (e.g. in a written record/log) to assess whether I am physically active frequently enough.

14. ...taken care to do at least 60 minutes of light to moderate physical activity on most days as recommended by Canada's Physical Activity Guide.

15. ...really tried hard to be physically active regularly.

16. ...done my best to follow Canada’s Physical Activity Guide recommendations.
Please answer the following questions regarding techniques you may use to help improve your nutrition. In the scale provided next to each item, circle the number that best represents your answer.

I have my own plan regarding...

<table>
<thead>
<tr>
<th></th>
<th>Not at all true</th>
<th>Barely true</th>
<th>Mostly true</th>
<th>Exactly true</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. ...when to change my nutrition habits.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18. ...how to change my nutrition habits.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19. ...when to especially watch out in order to maintain my new nutrition habits.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20. ...what to do in difficult situations in order to stick to my intentions (e.g. consuming the Canada's Food Guide's recommended intake of fruit and vegetables).</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
21. ...how to deal with relapses.

During the last week, I have...

<table>
<thead>
<tr>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

22. ...often had my nutrition goals on my mind.

| 1 | 2 | 3 | 4 |

23. ...always been aware of the recommendations for nutrition from Canada’s Food Guide.

| 1 | 2 | 3 | 4 |

24. ...consistently monitored myself (e.g. in a written record/log) to assess whether I am consuming enough servings of fruit and vegetables.

| 1 | 2 | 3 | 4 |
25. ...taken care to consume the recommended number of servings of fruit and vegetables put forth by Canada’s Food Guide (e.g. 7-8 servings every day for women between the ages of 19-50).

26. ...really tried hard to consume fruit and vegetables regularly.

27. ...done my best to follow Canada’s Food Guide recommendations for servings of fruit and vegetables.
The following section asks you about outcomes you think you might experience as a result of being physically active. Then you are asked to tell us how valuable that outcome is for you. Please circle the most appropriate number for each question.

**For example**, first answer the question on the left side column.

1. Physical activity will .... .... relieve my stress

<table>
<thead>
<tr>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>not</td>
<td>at all</td>
<td>likely</td>
<td>completely</td>
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And then answer the second part of the question in the right hand column.

1. Stress reduction is...

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
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<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>not at all</td>
<td>extremely valuable</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
Physical activity will...

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</table>

2. ...make me more relaxed.

<table>
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<tr>
<th>0</th>
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<th>20</th>
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<td></td>
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<td></td>
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</tbody>
</table>

3. ...get rid of my frustrations.

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<th>0</th>
<th>10</th>
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<th>30</th>
<th>40</th>
<th>50</th>
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</table>

4. ...make me happy.

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<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
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1. Stress reduction is ...

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<th>10</th>
</tr>
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<tbody>
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<td></td>
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</table>

2. Being more relaxed is...

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<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

3. Getting rid of frustrations is.....

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</table>

4. Being happy is.....

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</tr>
</tbody>
</table>
5. ...get me to calm down.

6. ... make me feel healthy.

7. ... keep me in good condition.

8. ... make me leaner.

5. Being calm is...

6. Feeling healthy is ....

7. Keeping in good condition is....

8. Being leaner is......
9. ... improve my endurance.

10. ... make me stronger.

11. ... help me to be with my friends.

12. ... allow me to stay connected with the lives of my friends.

9. Improving my endurance is....

10. Being stronger is....

11. Being with my friends is ....

12. Staying connected with the lives of my friends is....
13. ... allow me to become closer to my friends.

13. Becoming closer to my friends is......

1 2 3 4 5 6 7 8 9 10
totally not at all completely likely valuable

14. ... allow me to share experiences with my friends.

14. Sharing experiences with my friends is....

1 2 3 4 5 6 7 8 9 10
totally not at all completely likely valuable

15. ... give me the opportunity to develop a bond with my friends.

15. Developing a bond with my friends is....

1 2 3 4 5 6 7 8 9 10
totally not at all completely likely valuable

The following section asks you about outcomes you think you might experience as a result of consuming fruit and vegetables. Then you are asked to tell us how valuable that outcome is for you.
Eating fruit and vegetables will...

1. ...make me feel healthy.
   0  10  20  30  40  50  60  70  80  90  100
   not at all completely likely likely

2. ...keep me in good condition.
   0  10  20  30  40  50  60  70  80  90  100
   not at all completely likely likely

3. ...help me have more energy.
   0  10  20  30  40  50  60  70  80  90  100
   not at all completely likely likely

4. ...help me achieve a healthy weight.
   0  10  20  30  40  50  60  70  80  90  100
   not at all completely likely likely

1. Feeling healthy is....
   1  2  3  4  5  6  7  8  9  10
   not at all extremely valuable

2. Keeping in good condition is....
   1  2  3  4  5  6  7  8  9  10
   not at all extremely valuable

3. Having more energy is......
   1  2  3  4  5  6  7  8  9  10
   not at all extremely valuable

4. Achieving a healthy weight is.....
   1  2  3  4  5  6  7  8  9  10
   not at all extremely valuable
5. ...help me maintain a healthy weight.

6. ...help me prevent chronic disease (e.g. cancer, heart disease).

7. ...ensure that I get enough vitamins and minerals.

8. ...provide me with healthy snacks.

5. Maintaining a healthy weight is.....

6. Preventing chronic disease is....

7. Getting more vitamins & minerals is....

8. Having healthy snacks is....
Tell Us About Yourself

1. Are you male ____ or female ____?

2. What is your age? (circle the appropriate answer)
   a) 18-29 years old
   b) 30-39 years old
   c) 40-49 years old
   d) 50-65 years old
   e) over 65 years old

3. What is the highest level of education you have obtained? (circle the correct answer)
   a) did not graduate from high school
   b) graduated from high school
   c) some post-high school education
   d) college / university diploma / degree

4. Are you a full-time _____ or part-time _____ employee?

5. How many children do you have currently living at home (more than half the time) in each of the following categories?
   Number of children under 6 years old _______
   Number of children 6-12 years old _______
   Number of children 12 years old and over _______
   I have no children living at home _______

For your chance to win a $50.00 gift certificate to a Kingston restaurant please complete the following ballot.

THANK YOU FOR PARTICIPATING!