A Review of Workplace and Community Interventions for Adults

Effects on physical activity, eating behaviours and BMI – risk factors for diabetes

Health Promotion, Chronic Disease and Injury Prevention Division

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Introduction

This report presents findings from a review of literature on the effectiveness of interventions to increase physical activity participation and (healthy) eating behaviour, and decrease overweight and obesity. These health-related behaviours have been found to be important factors in the prevention of type 2 diabetes and other chronic disease conditions (Steyn, Lambert, & Tabana, 2009). It is important to identify intervention approaches that have been shown to be effective for middle-aged adults – as this group will contribute the greatest number of future incident cases of type 2 diabetes in Canada (Manuel, Rosella, Tuna, & Bennett, 2010; Public Health Agency of Canada, 2008; Rosella, Manuel, Burchill, & Stukel, 2009). Given that this group represents for the most part, active working age adults, two related research questions provide focus to this review and synthesis of evidence for interventions that include a policy and/or environmental component:

1. What is the effectiveness of workplace-based interventions on physical activity, eating behaviours, and BMI among adults age 45-64?
2. What is the effectiveness of community-based interventions on physical activity, eating behaviour, and BMI among adults age 45-64?

Methods

PubMed and Scholar's Portal were used as the two systems for the scientific literature search. Separate search strategies were developed for the two research questions. Application of the search strategy and review criteria and abstract review by four members of the research team resulted in the following (described in detail in the full report):

The 43 original articles focusing on workplace settings (2005-2010), deemed eligible through the search process, were reviewed and summarized in tabular form, using a standard template identifying the following: authors and date; sample; research method and measures; intervention; relevant results; and comments. In this final report, in addition to the complete summary table, a narrative synthesis of the workplace literature studies and findings was included. Consistent with the table template, this synthesis presents aggregate information on study attributes, such as location of study, sample composition, primary outcomes included, theoretical framework used (if any), and study design used. In addition, the effectiveness of the interventions on primary outcomes was summarized for the studies reviewed.

For review articles focusing on community and workplace settings (2000-2010), we identified 31 scientific articles through screening. For those papers reviewed and summarized in tabular form, the characteristics and findings of these review papers used a standard template that included: author and date, scope (type of review, target group, outcome(s) of interest), key results and comments. In addition, a narrative synthesis of the findings has been included in this report, including a section on review paper attributes and a summary of salient substantive findings regarding the effectiveness of workplace and community setting interventions respectively. Review papers/reports from the grey literature have also been included under a separate heading in the summary table as well as integrated into the narrative synthesis of findings from the review of workplace and community interventions respectively.

Findings and Recommendations

Based on the review of original articles (workplace interventions) and the assessment of review articles and grey literature (community and workplace interventions), we offer the following summary of findings and recommendations for consideration:

WORKPLACE INTERVENTIONS

- Although the findings for workplace interventions increasing physical activity participation were not conclusive, there was some support for multi-component intervention approaches that include a combination of educational and environmental components (access to facilities) as well as employee participation in planning. This approach appears promising and should be considered for further development.
- The scientific literature showed some support for point of decision prompts to engage in physical activity. This approach consists primarily of signage encouraging employees to take the stairs instead of the elevator. This intervention approach should be considered for further development.

- There was some support for the importance of workplace employee/employer advisory boards/committees in planning and implementing workplace physical activity interventions. Although the evidence in support of this component was not conclusive, joint participation in workplace advisory boards is important and consistent from both conceptual and ethical standpoints. Thus, this component should be included in any further development of workplace interventions.
- Several papers reporting workplace interventions found the use of pedometers to be effective components in increasing physical activity participation. The provision of this means of assessing activity provides a positive, motivational, and relatively inexpensive means of facilitating activity. Thus, the use of pedometers as a component of workplace interventions should be considered.
- Findings from the current review indicated support for interventions that provide access to, and opportunities for, healthier foods in the workplace. Thus nutritious foods, such as fruits and vegetables and low-fat/low-sugar products, would be made available in the workplace at meetings, in the cafeteria, and in vending machines. This type of intervention, representing a workplace organizational policy, could also be augmented by reducing the price of these items such that there would be an additional incentive for choosing them over less nutritious alternatives. This intervention approach should be strongly considered for further development.
- The review also indicated support for multi-component workplace interventions aimed at improving eating behaviours. Based on ecological theory and the principle of joint participation of employees and employers in advising the intervention, this approach includes a combination of environmental and educational components. This approach should also be considered for further development.
- Findings from the review support the effectiveness and importance of workplace advisory committees in planning interventions to increase consumption of nutritious foods, such as fruits and vegetables and low-fat products. This should be built into the components of any future workplace intervention being considered.
- Although there was limited support for the effectiveness of workplace interventions in changing BMI, there was some support for their effectiveness in changing other anthropometric measures of overweight and obesity (weight, body composition, and waist circumference). Though not examined in this review, it may be that issues of intervention duration and dose may be related to the findings regarding BMI. Many interventions are of relatively short duration while changes in BMI are more distal outcomes, perhaps mediated by other anthropometric changes or changes in physical activity participation or eating behaviours. Thus, BMI should not be considered to be the primary proximal outcome in subsequent interventions. Instead, impact level changes, such as increases in physical activity participation or improved eating behaviour, as the result of workplace interventions, should be used. However, BMI and related measures should be included and tracked in interventions, since they may be influenced more directly be the impact level changes themselves.

COMMUNITY INTERVENTIONS

- Evidence from the current review of review papers and grey literature reviews suggests a number of community-level intervention approaches are effective in increasing physical activity participation. One approach receiving considerable support was point of decision prompts (signs) to increase stair use, as opposed to using the elevator or escalator in public buildings and residences. Point of decision prompts to increase stair use should be strongly considered as a community intervention.
- Another intervention approach used to increase physical activity participation receiving support in the review was community-wide campaigns. This includes the use of media and other components, including education. Community-wide campaigns should be considered as a possible component in a multi-component social marketing approach for increasing physical activity in community settings.
- Additional evidence from the review supported interventions to increase access to facilities, places, and opportunities for physical activity participation. This approach represents the importance of public policy and program interventions on both a micro- and macro-environment level. Related to these are “community-scale” policies and “street-scale urban design and land use” policies as interventions to enhance and promote physical activity participation in communities. This approach should be considered in those settings which will be able to dedicate considerable time and resources to its development.
- The review also identified support for a number of community intervention approaches aimed to increase fruit and vegetable and low-fat food consumption. Point of purchase information regarding the nutritional

value of foods available in public locations is one such approach. There is more evidence in support of point of purchase interventions in restaurants as compared to grocery store/supermarkets. Point of purchase interventions should be considered in cases where restaurants express an interest in providing this information.

- Findings from the review also support the use of interventions which increase access and availability of healthy foods. Most of the studies reviewed considered this as more of a micro-level intervention, such as changing the location of foods in supermarket displays. Less frequent were studies that emphasized issues around the provision of access and availability of nutritious foods by members of communities which are based on more macro-level factors such as the cost of nutritious foods, access to fruit and vegetable vendors, and similar issues. Food pricing was also shown to be an important factor in relation to food purchasing decisions. Thus, there are important public policy implications for consideration of approaches that can enhance equitable access to nutritious foods. This intervention approach should be considered in cases in which inter-sectoral policy can be devoted to this outcome.
- The review also indicated support for multi-component intervention approaches, combining both individual and environmental components. These approaches also emphasize the importance of having a strong theoretical basis of support (such as Social Ecological Theory, Social Cognitive Theory, or the Transtheoretical/Stages of Change Model) and participatory approaches to intervention planning, implementation and evaluation. This approach should be considered as an intervention approach in situations that provide considerable resources and time to develop it.
- Similar to the review of workplace interventions, there was little evidence found in support of community interventions aimed at changes in BMI. Though physical activity and nutritious eating behaviour were found to have a desired effect on body fat, specific individual or environmental interventions were not found to consistently influence BMI or other anthropometric measures of overweight/obesity. Thus, physical activity and eating behaviours should be used as the primary outcomes of focus and BMI, and other anthropometric measures, should be tracked over longer periods of time in relation to the intervention and changes in the proximal outcomes.
- This review and synthesis of evidence suggests a number of research gaps and questions that should be addressed. It will be important to ensure that subsequent designs for intervention studies include adequate follow-up. Related to the need to assess long-term intervention effectiveness are the questions – what factors influence/facilitate sustained changes in behaviour, and what types of research and evaluation design are most suitable to address specific objectives. Other important research gaps and questions include: What are the practical and logistical issues around provision of healthy foods in the workplace or community? What are the most rigorous and feasible ways to assess the effectiveness of policy and environmental interventions to increase physical activity participation and healthy eating in workplace and community settings? Related to the latter question is the need to capitalize on opportunities to utilize natural experiments to assess the effectiveness of policy and environmental interventions by tracking changes in outcomes using existing (or new) surveillance mechanisms (Ramanathan, Allison, Faulkner, & Dwyer, 2008).
- The current review and synthesis of evidence also indicate a number of specific policy and environmental interventions needing further study including: transportation policy in relation to opportunities and participation in physical activity, long-term effects of interventions based on the use of environmental prompts to increase the use of stairs in workplace and community settings, and the effectiveness of policy interventions to increase access to, and availability of, nutritious foods for the population at large and those most vulnerable.

GENERAL RECOMMENDATIONS

- As a next step, the findings and recommendations should be discussed to inform the development of policy and strategies within Ontario. In order to facilitate this, discussion with representatives of the Ministry of Health and Long Term Care (MOHLTC).
- The findings and recommendations should also be discussed with stakeholders from the diabetes prevention modelling workshop in order to examine issues around the relevance, feasibility and costs involved in adapting these approaches for possible implementation in public health settings in Ontario.

Introduction and Background

This report presents findings from a review of literature on the effectiveness of interventions to increase physical activity participation and (healthy) eating behaviour, and decrease overweight and obesity. These health-related behaviours have been found to be important factors in the prevention of type 2 diabetes and other chronic disease conditions (Steyn, Lambert, & Tabana, 2009). It is important to identify intervention approaches that have been shown to be effective for middle-aged adults – as this group will contribute the greatest number of future incident cases of type 2 diabetes in Canada (Manuel, Rosella, Tuna, & Bennett, 2010; Public Health Agency of Canada, 2008; Rosella, Manuel, Burchill, & Stukel, 2009).

Given that this group represents for the most part, active working age adults, two related research questions provide focus to this review and synthesis of evidence for interventions that include a policy and/or environmental component:

1. What is the effectiveness of workplace-based interventions on physical activity, eating behaviours, and BMI among adults age 45-64?
2. What is the effectiveness of community-based interventions on physical activity, eating behaviour, and BMI among adults age 45-64?

A central difference in the way we addressed the two research questions is that the review of workplace intervention effectiveness was based on a search and review of original articles published between 2005-2010 as well as review articles published between 2000-2010, while the review of community-based intervention effectiveness was based solely on a search and review of review articles and grey literature published between 2000-2010. This strategy allowed us the opportunity to examine the workplace intervention literature in additional depth, and to assess and summarize the community intervention literature.

Background

Type 2 diabetes is a condition involving reduced ability of insulin to "stimulate glucose uptake in body fat and muscles (insulin resistance) combined with insufficient insulin secretion that leads to increased blood glucose levels" (Orozco et al., 2008). On a global level, type 2 diabetes is projected to affect 200 million individuals by 2010 and 300 million by the year 2025 (Steyn et al., 2009). In Ontario, a 2008 report of the National Diabetes Surveillance System (Public Health Agency of Canada, 2008) estimates that levels of diabetes will increase dramatically in the years to come, as the number of at-risk individuals middle-aged and older expands the prevalence of this condition. These predictions have implications for the health care system in Ontario, with a likely increased burden of illness, higher costs of treatment and health care, and significant challenges for public health researchers, planners, and practitioners (Ochinmaa, Jacobs, Simpson, & Johnson, 2004).

According to findings from The Nurses' Study, a longitudinal study of 84,941 female nurses followed between 1980-1996, overweight or obesity was the strongest predictor of type 2 diabetes, while lack of physical activity (PA), unhealthy diet, smoking, and abstinence from alcohol were also associated with an increased risk of type 2 diabetes, even when controlling for BMI (Steyn et al., 2009). Further, through their effects on decreasing insulin resistance, weight reduction and increased daily physical activity have been shown to modify the risk profile for type 2 diabetes (Orozco et al., 2008). Thus, there appears to be sound empirical support for examining the prominence of such factors as overweight and obesity, unhealthy diet, and physical inactivity as predictors of type 2 diabetes, and for the potential benefit of weight reduction, enhanced regular physical activity, and healthy diet as primary prevention measures to reduce the risk of type 2 diabetes in members of the population and among those groups most at-risk (Aboriginals, pregnant women, pre-diabetics). There is some evidence in support of preventive interventions such as combined individual dietary counselling and dietary modification and physical activity among adults at-risk of type 2 diabetes (Orozco et al., 2008; Steyn et al., 2009; Williamson, Vinicor, Bowman, & the Centers for Disease Control and Prevention Working Group, 2004). A recent review of the effectiveness of NIH's Diabetes Prevention Program indicates a consistent significant amount of weight loss immediately following use of the curriculum as well as empirical support for improvements in physical activity and metabolic syndrome components in some instances (Jackson, 2009). These studies, however, largely dealt with prevention of type 2 diabetes among those groups more at-risk (for example, those who screen positive for abnormal fasting glucose). In the current review, we focus instead on the effectiveness of interventions on physical activity participation, eating behaviour, and BMI among

those in the general population – who will likely contribute the greatest number of people with type 2 diabetes in the future.

In this review we are particularly interested in interventions that include a policy or environmental component. In fact the inclusion criteria for the review specified that this component must be included in the paper or report examined. With increasing interest and emphasis on ecological frameworks underlying health and health behaviour, policy and environmental factors have become more prominent than previously (Sallis, Owen & Fisher, 2008). Brownson and his colleagues state that environmental and policy approaches are "designed to provide opportunities, support, and cues to help people develop healthier behaviors" (Brownson, Haire-Joshu & Luke, 2006). Further, they point out that policy and environmental approaches are potentially more powerful than individual approaches since they provide an opportunity to reach more people. In addition, because policy and environmental changes are likely to be more permanent than most public health programs, they have the benefit of a longer exposure time (Brownson et al., 2006).

We have adopted Matson-Koffman, Brownstein, Neiner, and Greaney's (2005) definition of environmental interventions as "those strategies that involve changing the physical surroundings and social, economic, or organizational systems in order to promote individual behaviour change." Matson-Koffman et al. (2005) also distinguish between two types of policy used to create environmental changes. Legislative/regulatory policies are the result of formal laws and regulations and pertain to the entire population (or a specific sub-group of the population). Organizational policies are seen as more jurisdictional or site-specific, such as regulations developed by worksites or schools. These policies are more likely to affect a smaller number of the population (Matson-Koffman et al., 2005).

The current review, commissioned by request of the Chief Medical Officer of Health (Ontario), was developed as an outcome of a planning process of OAHPP and a number of stakeholder organizations with an interest in prevention of type 2 diabetes through public/population health approaches. A workshop was held in the spring, 2010 to review the results of a modelling exercise and to inform the literature review. Subsequently, a number of meetings were held between the literature review team and OAHPP to discuss the scope of the review and specify the eligibility criteria for the search strategy. As part of the process, interim reports on the specific search strategy and preliminary findings from the review were submitted to OAHPP for review and discussion.

Methods: Search Process and Results

In conducting the literature searches, we attempted to adhere to the guidelines stated in the initial interim report (March 31, 2010) which described the inclusion criteria (below) and specific search strategy. Where we needed to deviate from these guidelines, a note to that effect is included in this report. A summary of the literature search process and results follows.

Inclusion Criteria

1. Search both published and unpublished (grey) literature.
2. Search for original research articles (2005-2010) and search for review articles appearing 2000-2010 for the workplace review. Include review articles, meta-analyses, and grey literature (reviews) conducted 2000-2010 for the community review.
3. Articles published in English.
4. Articles based on research conducted in Canada, U.S., Europe, Australia, New Zealand, and Scandanavia.
5. Primary emphasis on articles with intervention outcomes: physical activity; BMI; energy balance; and fruit and vegetable consumption.
6. Age group of primary interest - adults age 45-64.
7. Focus on primary prevention interventions directed at the population at large rather than at those at documented higher risk of type 2 diabetes.
8. Focus on policy and environmental (both social and built/physical) components of interventions. That is, the intervention should not consist of only a program (e.g., health education or counseling). Rather, the intervention needs to include a component dealing with such issues as increasing/improving availability, access, or opportunities.
9. Examine those articles that deal with the cost-effectiveness of interventions, where possible.

10. Exclude pharmacological interventions and clinically-based interventions.

Literature Review Search Strategy

An academic librarian on the research team used PubMed and Scholar's Portal as the two systems for the scientific literature search. PubMed is a medical database while Scholar's Portal is a search tool through which many databases are simultaneously searched. Included in this latter tool are the following relevant databases: Medline, Biological Sciences, PsycInfo, Embase and Web of Science. For all searches, the librarian used the eligibility criteria (e.g., English language, year of publication, and intervention has an environmental or policy component) for initial identification of potential abstracts. Then, these abstracts were screened to identify relevant abstracts. Screening included the elimination of duplicate abstracts. Next, these identified abstracts were submitted to three additional reviewers (principal investigator, co-investigator, and research assistant) who reviewed the abstracts and/or actual articles to ensure relevance. Three content areas related to physical activity, healthy eating and BMI were searched separately to make it easier to review related abstracts and articles. The following search strategy was utilized for the workplace component of the review.

A. RESEARCH QUESTION #1 (WORKPLACE INTERVENTIONS)

1. (**Workplace[1] or worksite**) and (diabetes mellitus[1] or diabetes or motor activity[1] or physical activity or exercise[1] or life style[1]) and (intervention studies[1] or intervention* or program evaluation[1] or program* or policy or policies or environment*[1] or social environment[1] or environment design[1] or environment or public health[1]
2. (**Workplace[1] or worksite**) and (diabetes mellitus[1] or diabetes or dietary intake or food habits[1] or energy intake[1] or calori* or energy balance or eating[1] or fruit* or vegetable* or eating behavi*) and (intervention studies[1] or intervention* or program evaluation[1] or program* or policy or policies or nutrition policy[1] or environment*[1] or social environment[1] or environment design[1] or environment or public health[1])
3. (**Workplace[1] or worksite**) and (diabetes mellitus[1] or diabetes or BMI or body mass index[1] or body weight* or bodyweight* or obesity[1] or overweight or healthy weight*) and (intervention studies[1] or intervention* or program evaluation[1] or program* or policy or policies or environment*[1] or social environment[1] or environment design[1] or environment or public health[1])

   MESH heading[1]
   Indicates truncation*

First, the three search strategies were performed utilizing PubMed. The breakdown of results is as follows:

1. For the first search, 620 abstracts were initially identified. The librarian screened these abstracts and deemed 82 of these as potentially relevant.
2. For the second search, 252 abstracts were initially identified and 17 of these were deemed potentially relevant.
3. For the third search, 388 abstracts were initially identified and 7 of these were deemed potentially relevant.

A total of 106 abstracts from the PubMed searches were sent to the three reviewers for assessment.

Next, the three search strategies were performed utilizing Scholar's Portal. The breakdown of results is as follows:

1. For the first search, 498 abstracts were initially identified. The librarian screened these abstracts and deemed 91 as potentially relevant.
2. For the second search, 198 abstracts were initially identified and 21 of these were deemed potentially relevant.
3. For the third search, 148 abstracts were initially identified and 17 of these were deemed potentially relevant.

A total of 129 abstracts from the Scholar's Portal searches were sent to the three reviewers for assessment. The reviewers' assessment of abstracts identified from both the PubMed and Scholar's Portal searches (total = 235) resulted in identification of 43 relevant articles for subsequent review.

B. RESEARCH QUESTION #2 (COMMUNITY INTERVENTIONS)

This search strategy included only journal articles that were reviews of various original studies (e.g., meta-analysis; systematic reviews). The following search strategy was initially used:

1. (**Review**[1] **or review* or meta-analysis**[1] **or meta analysis or systematic review***) and (diabetes mellitus[1] or diabetes or motor activity[1] or physical activity or exercise[1] or life style[1]) and (intervention studies[1] or intervention* or program evaluation[1] or program* or policy or policies or environment*[1] or social environment[1] or environment design[1] or environment or public health[1])
2. (**Review**[1] **or review* or meta-analysis**[1] or **meta analysis or systematic review***) and (diabetes mellitus[1] or diabetes or dietary intake or food habits[1] or energy intake[1] or calori* or energy balance or eating[1] or fruit* or vegetable* or eating behavi*) and (intervention studies[1] or intervention* or program evaluation[1] or program* or policy or policies or nutrition policy[1] or environment*[1] or social environment[1] or environment design[1] or environment or public health[1])
3. (**Review**[1] **or review* or meta-analysis**[1] **or meta analysis or systematic review***) and (diabetes mellitus[1] or diabetes or BMI or body mass index[1] or body weight* or bodyweight* or obesity[1] or overweight or healthy weight*) and (intervention studies[1] or intervention* or program evaluation[1] or program* or policy or policies or environment*[1] or social environment[1] or environment design[1] or environment or public health[1])

   MESH heading[1]
   Indicates truncation*

However, this search strategy needed to be modified. By removing "workplace or worksite" from the search, in order to address the broader scope of community interventions, it became apparent that the search was too broad. For example, a PubMed search for only the physical activity component resulted in over 55,000 retrieved abstracts and most abstracts were non-relevant "false hits". Thus, the search strategy was further refined to allow for a more focused review of relevant articles while still representing an exhaustive review of the literature. Thus, the following search strategy was utilized in both PubMed and Scholar's Portal: (diabetes mellitus or diabetes or physical activity or exercise or dietary intake or food habits or energy intake or calori* or energy balance or eating* or fruit* or vegetable* or BMI or body mass index or body weight or bodyweight or overweight or healthy weight*) and (program* or intervention*) and (policy or policies or environment*) and (review* or meta-analysis or meta analysis or systematic review).

The librarian screened 2242 abstracts from PubMed and deemed 155 abstracts as potentially relevant. She screened 2616 abstracts from Scholar's Portal and deemed 80 of these as potentially relevant. A total of 235 abstracts were sent to the three reviewers for assessment. The reviewers' assessment of abstracts identified from both the PubMed and Scholar's Portal searches resulted in 46 relevant articles. Further screening resulted in a total of 31 peer-reviewed papers for review by the team.

Various reports from health organizations, government bodies and departments (both Canadian and international) were considered from the grey literature. Also several databases and sources suggested by OAHPP were examined for relevance to the review. This resulted in the review of six papers/reports from the grey literature.

Review Process

The 43 original articles focusing on workplace settings (2005-2010), deemed eligible through the search process, were reviewed and summarized in tabular form, using a standard template identifying the following: authors and date; sample; research method and measures; intervention; relevant results; and comments. In this final report, in addition to the complete summary table, a narrative synthesis of the workplace literature studies and findings was included. Consistent with the table template, this synthesis presents aggregate information on study attributes, such as location of study, sample composition, primary outcomes included, theoretical framework used (if any), and study design used. In addition, the effectiveness of the interventions on primary outcomes was summarized for the studies reviewed.

For the review articles focusing on community settings (2000-2010), we identified 31 scientific articles through screening. Many of these papers included reviews of interventions in both community and workplace settings and, instead of grouping them all together, the findings were summarized separately for community and workplace settings. For those papers reviewed and summarized in tabular form, the characteristics and findings of these review papers used a standard template that included: author and date, scope (type of review, target group, outcome(s) of interest), key results and comments. In addition, a narrative synthesis of the findings has been included in this report, including a section on review paper attributes and a summary of salient substantive findings regarding the effectiveness of workplace and community setting interventions

respectively. Review papers/reports from the grey literature have also been included under a separate heading in the summary table as well as integrated into the narrative synthesis of findings from the review of workplace and community interventions respectively.

Findings

Workplace Studies - Original Papers

STUDY ATTRIBUTES

The review included 43 peer-reviewed papers that examined the effectiveness of workplace interventions for improving physical activity, eating behaviour, and BMI. A summary of the study attributes for these papers is presented in Table 1. Eighteen papers (42%) focused on interventions that promoted physical activity, including six that specifically targeted an increase in stair use at the workplace, and three papers (7%) focused on interventions aimed at improving dietary intake. Twenty-one papers (49%) focused on interventions that targeted multiple health behaviours, most commonly a combination of physical activity and nutrition, with some specifically aiming to decrease BMI as well. Additionally, one paper examined the effect of workplace flexibility on health behaviours.

Though some of the interventions reviewed had specific target behaviours, the effectiveness of the intervention was often judged more broadly and many papers contained more outcomes than were included in the current review. We focused on outcomes in three main categories: physical activity, eating behaviour, and BMI/anthropometric measures. Thirty-two papers (74%) reported various physical activity behaviours as an outcome, including moderate and vigorous physical activity, walking, step counts, and stair use. Seventeen papers (40%) reported dietary intake as an outcome. The focus was largely on consumption of fruits and vegetables and fat (reported in 13 and 6 of the 17 papers, respectively), though some papers also provided information on total caloric intake and consumption of fiber, sugar and sweets, meat, fast food, grains, and protein. BMI/anthropometric measures were reported in 20 (47%) of the papers. BMI was the most commonly used measurement (in 17 of the 20 papers, calculated using objectively measured height and weight in all but 2 cases), with weight, body composition, and waist circumference being reported less frequently.

The interventions were implemented primarily in the United States (25 papers, 58%). Of the remaining interventions, six (14%) were located in the Netherlands, three (7%) were located in the United Kingdom, two were located in each of Canada, Australia, and Sweden, and one intervention was implemented in each of New Zealand, Belgium, Switzerland, Spain, Mexico, and Japan. Across the papers, the number of participants ranged from 8 to 10,281 at baseline, with seven papers reporting samples of fewer than 100 participants. The mean age of the samples ranged from 32 to 50 years old, but most papers reported a mean age in the mid-forties. Sex distribution varied widely among the papers: two samples were female-only and the percentage of male participants in the remaining samples ranged from 2 to 88%.

In terms of methodology, a mixture of randomized controlled (32%), quasi-experimental (26%), and single-group observational designs (42%) were used. Of the 14 randomized controlled trials, 6 used a true no-intervention control group, 4 used a comparison group, and 4 did not elaborate on the details of the control condition. The randomized controlled trials used randomization both at the worksite level (9 papers) and at the employee level (5 papers). In all of the papers employing a quasi-experimental design, allocation was made at the worksite level. Less than half of the papers reviewed made reference to a specific theoretical framework used to inform the intervention. Of the 19 papers that did report a theoretical basis for the intervention, the most frequently cited frameworks included the Social Ecological Model, Social Cognitive Theory, and the Transtheoretical/Stages of Change Model. Social marketing techniques and participatory research strategies were also cited in several papers.

Table 1 **SUMMARY OF WORKPLACE STUDY ATTRIBUTES – ORIGINAL PAPERS**

Study Attribute	Number of Papers (%)*
Focus of the intervention	
Physical activity	18 (42)
Eating behaviour	3 (7)
Multiple health behaviours	21 (49)
Other	1 (2)
Outcomes of interest	
Physical activity	32 (74)
Eating behaviour	17 (40)
BMI/anthropometric measures	20 (47)
Location	
United States	25 (58)
Netherlands	6 (14)
United Kingdom	3 (7)
Canada, Australia, Sweden (each)**	2 (5)
New Zealand, Belgium, Switzerland, Spain, Mexico, Japan (each)	1 (2)
Number of participants (range)	8 - 10,281
Mean age (range)	32 - 50 years
Sex distribution, male participants (range)	0 - 88%
Methodological design	
Randomized controlled	14 (32)
Quasi-experimental	11 (26)
Single-group observational	18 (42)
Theoretical basis for intervention reported	19 (44)
Social ecological model	10 (23)
Social cognitive theory	8 (19)
Transtheoretical (stages of change) model	3 (7)

*unless otherwise stated in parentheses
**each country was the intervention location in two papers

EFFECTIVENESS OF INTERVENTIONS

Physical Activity

Twenty-one of the 32 papers (66%) that included physical activity as an outcome showed improvements in participants' physical activity levels over the intervention period. Detailed results are presented in Table 7 at the end of the report, while Table 2 shows a brief summary of these findings. Across the papers, significant increases were reported in moderate to vigorous physical activity, walking, stair use, step counts, and the percentage of participants meeting current physical activity recommendations (Auweele, Boen, Schapendonk, & Dornez, 2005; Behrens, Domina, & Fletcher, 2007; Davis et al., 2009; Dishman, DeJoy, Wilson, & Vandenberg, 2009; Eves, Webb, & Mutrie, 2006; Faghri et al., 2008; Gilson, McKenna, Cooke, & Brown, 2007; Gilson et al., 2009; Green, Cheadle, Pellegrini, & Harris, 2007; Haines et al., 2007; Kwak, Kremers, van Baak, & Brug, 2007; Kwak, Kremers, Visscher, van Baak, & Brug, 2009; Meyer et al., 2010; Naito et al., 2008; Nicoll & Zimring, 2009; Polacsek, O'Brien, Lagasse, & Hammar, 2006; Racette et al., 2009; Renaud et al., 2008; Thompson, Foster, Eide, & Levine, 2008; von Thiele Schwartz, Lindfors, & Lundberg, 2008; Yancey et al., 2006). However, of the five papers that measured physical activity beyond the endpoint of the intervention, only two reported that gains were maintained long term (3 months to 1 year post-intervention) (Kwak et al., 2009; Meyer et al., 2010).

The papers described a variety of strategies that were used to increase physical activity levels. Several

interventions used pedometers or other physical activity monitors to encourage employees to track and increase their step counts, with six out of seven reporting positive results. For example, during an intervention at a university in the United Kingdom, Gilson et al. (2009) provided university employees with pedometers for motivation, set a goal of 10,000 steps per day, and encouraged the utilization of campus space for walking. The employees attained significantly higher step counts compared to a control group during the intervention.

Signs and prompts were a commonly employed and effective method of encouraging employees to use the stairs instead of the elevators at the workplace. Four of the five interventions that used signage to promote stair use were successful. For example, Eves et al. (2006) implemented a 6-week intervention campaign at a worksite in the United Kingdom during which a large poster was displayed in the lobby, prompts were placed near the elevator buttons, and brief encouraging messages were posted in the stairwells. During the intervention, both stair ascent and stair descent were significantly greater than at baseline, especially for overweight employees.

Typically used as one component of a multi-faceted intervention, support in the form of employee teams, workplace advisory boards, or support directly from management were included in many of the interventions aiming to improve physical activity. The success of this strategy was mixed, with 8 of the 14 papers employing a team or management support approach reporting increases in physical activity. While Dishman et al. (2009) found that forming employee teams, an employee-management committee to implement the intervention, and securing support from senior and middle management were associated with increases in moderate to vigorous physical activity and walking among Home Depot employees in the US and Canada, French et al. (2010b) found that similar strategies were not successful in improving physical activity among employees in a number of Minnesota garages. The mixed success of colleague and management support in improving physical activity levels is difficult to interpret, however, because it is often implemented in conjunction with other intervention components.

Other strategies, such as developing walking routes around the worksite and creating or improving fitness facilities at the worksite, were reported occasionally in the papers and were moderately successful. Approximately half of the interventions that implemented worksite walking routes or fitness facilities were associated with improvements in physical activity.

Eating Behaviour

Of the 17 papers that included eating behaviour as an outcome, 12 (71%) reported that the intervention was effective in improving at least some aspects of dietary intake (see Table 7 at the end of this report for a detailed summary and Table 2 for a brief summary of the findings). As previously mentioned, most papers focused on reporting changes in fruit and vegetable intake as well as fat intake, though some papers also reported changes in energy intake and various other foods and nutrients. Thirteen papers reported fruit and vegetable intake, 10 (77%) of which demonstrated an increased consumption (French et al., 2010b; Green et al., 2007; Lowe et al., 2010; Perez, Phillips, Cornell, Mays, & Adams, 2009; Polacsek et al., 2006; Racette et al., 2009; Renaud et al., 2008; Sorensen et al., 2005, 2007; Yancey et al., 2006). Six papers reported fat intake, with four (67%) describing positive changes (Lowe et al., 2010; Polacsek et al., 2006; Racette et al., 2009; Renaud et al., 2008). Both of the interventions providing changes in energy intake as an outcome were successful in decreasing energy intake (French et al., 2010b; Lowe et al., 2010). Only two papers reported following dietary intake beyond the endpoint of the intervention and, in these, positive dietary changes were maintained over the follow-up period (ranging from 6 months to 1 year) (Green et al., 2007; Kwak et al., 2009).

As only three papers focused on interventions that exclusively targeted eating behaviours, most of the strategies used to improve dietary intake were implemented in conjunction with other intervention components. Thus, it is difficult to determine with certainty the association between dietary outcomes and a particular intervention strategy. However, like those used to promote physical activity, some strategies used to improve eating behaviours were generally more successful than others.

Having some form of employee team, advisory board, or management support was associated with improvements in dietary intake in 9 of 11 interventions in which this strategy was included. Sorensen et al. (2005) used an employee advisory board consisting of employees and managers to help implement their intervention and also solicited the help of worksite managers to develop and adopt policies to support healthy eating at the workplace. The intervention was associated with a significant increase in the number of employees reporting that they ate five or more servings of fruits and vegetables a day

compared to a control group (though the positive results did not extend to managers). In combination with other dietary strategies, French et al.'s (2010b) intervention offered fruit and vegetable intake challenges for teams of employees and found that both energy intake and fruit and vegetable intake significantly improved compared to a control group.

Providing healthier foods in work settings (e.g., meetings and the cafeteria) and in worksite vending machines was a popular and effective environmental strategy for promoting healthy eating behaviour. Of the nine interventions that included changes to the foods available at the worksite, seven reported positive changes in fruit and vegetable intake, fat intake, or the consumption of other foods. French et al.'s (2010b) intervention for garage employees provides an example of such strategies. The garage vending machines were modified, such that the availability of healthy foods was increased and prices on healthy items were reduced by 10%, and the researchers also ran a small farmer's market with low-priced produce at the intervention worksites during the summer months. These environmental changes were associated with a decrease in energy intake and fast food meals, as well as an increase in fruit and vegetable intake among the intervention employees.

Several papers also described educational components that were included in an intervention to improve eating behaviours. With 8 of the 10 interventions with an education component reporting positive results, educating employees on nutrition and health seemed to consistently contribute to changes in eating behaviours. How the education was delivered differed from intervention to intervention. For example, Perez et al. (2009) distributed written educational material regarding healthy eating and also ran lunch-and-learn sessions for health and human services employees in Arkansas, whereas Renaud et al. (2008) ran six educational modules covering various health-related topics, including healthy eating, for employees of a financial organization in Quebec. Both papers reported increases in fruit and vegetable intake, and Renaud et al. also reported an increase in employees who limited fat in their diet; however, the results should be interpreted with caution, as both studies lacked a control group.

Providing incentives for healthy eating and using food labels or point-of-purchase prompts were two other strategies mentioned in several papers. Giving incentives such as gift certificates, t-shirts, days of paid leave from work, and kitchen gadgets were associated with positive changes in fruit and vegetable intake (Green et al., 2007; Perez et al., 2009; Racette et al., 2009), as well as fat intake (Racette et al., 2009) in the three papers that reported using incentives in an intervention. Food labels and point-of-purchase prompts were less likely to be associated with improvements in eating behaviour. Though Lowe et al. (2010) found that their intervention, which included a colour-coded food labeling scheme to identify the energy density of cafeteria foods (e.g., green for low energy-dense foods), was associated with a significant decrease in energy intake and percent of energy from fat in employees' lunches, the other two papers that described similar methods did not report any positive results for eating behaviours (Engbers, van Poppel, Chin A Paw, & van Mechelen, 2006; Goetzel et al., 2010).

BMI/Anthropometric Measures

The workplace interventions were less successful in improving BMI. Of the 17 papers that examined BMI as an outcome, only 7 (41%) reported that the intervention was associated with significant positive changes in BMI. Details of the individual interventions are provided in Table 7 at the end of this report and a brief summary of findings appears in Table 2. Half of the interventions that focused exclusively on increasing physical activity as a means of decreasing BMI were successful (Haines et al., 2007; Lara et al., 2008; Meyer et al., 2010), whereas only about a third of the interventions that combined physical activity and nutrition strategies were associated with positive changes in BMI (Goetzel et al., 2009, 2010; Racette et al., 2009; Siegel, Prelip, Erausquin, & Kim, 2010). None of the papers that measured BMI described an intervention that used a solely nutrition-based approach. In all of the papers that reported improvements, the absolute changes from baseline BMI were quite small: all decreases in BMI were less than 0.5 kg/m2 and, in some papers, the intervention group maintained a stable BMI while the control group showed an increase in BMI over time.

Table 2 **SUMMARY OF THE EFFECTIVENESS OF WORKPLACE INTERVENTIONS (BASED ON ORIGINAL ARTICLES)**

Outcome of Interest	Number of Papers (%)
Physical activity	32
Positive changes reported	21 (66)
Eating behaviour	17
Positive changes reported	12 (71)
BMI/anthropometric measures	20
Positive changes reported in BMI	7/17 (41)
Positive changes reported in weight	6/7 (86)
Positive changes reported in body composition	4/5 (80)
Positive changes reported in waist circumference	3/4 (75)
Success of Strategies Used	**Number of Papers (%)**
Physical activity	
Pedometer	6/7 (86)
Signs and prompts	4/5 (80)
Peer/management support	8/14 (57)
Increased availability of facilities/walking routes	4/8 (50)
Eating behaviour	
Peer/management support	9/11 (82)
Increased access to healthy food	7/9 (78)
Education	8/10 (80)
Incentives	3/3 (100)
Signage/labeling/point-of-purchase prompts	1/3 (33)
BMI/anthropometrics	
Signs and prompts	3/4 (75)
Peer/management support	4/10 (40)
Pedometer	2/5 (40)

Not surprisingly, various strategies were employed to improve BMI and they generally had mixed success. Using environmental prompts or signage to increase healthy eating or physical activity was positively associated with small improvements in, or maintenance of, BMI in three of the four interventions that used this strategy. For example, Meyer et al. (2010) focused on increasing stair use at the workplace with environmental prompts as a means of improving BMI among hospital workers in Switzerland and observed a small but significant 1% decrease in BMI over 12 weeks.

Using support from employee teams, advisory boards, and management as a component of an intervention to decrease BMI was only marginally effective, with 4 of the 10 papers indicating that significant improvements were made. Goetzel et al. (2009, 2010) used strong management support (e.g., making health goals part of the worksite's management plans) in addition to other strategies in their intervention for employees of the Dow Chemical Company in the US and found that BMI outcomes were more favourable over time compared to a control group. However, an employee advisory committee included as a component in Lemon et al.'s (2010) intervention to promote weight gain prevention among hospital employees in Massachusetts was not associated with significant improvements in BMI over 2 years.

The provision of pedometers to increase employees' awareness of and motivation for engaging in physical activity was a component of five papers and showed mixed effectiveness, with only two of the papers reporting minimal success in decreasing BMI.

Ten papers also reported one or more of weight, body composition, and waist circumference as outcomes. Generally, the interventions seemed to be more effective in improving these outcomes than BMI. Six out of the seven papers with weight change as an outcome reported significant weight loss (Davis et al., 2009; Goetzel et al., 2009; Lara et al., 2008; Meyer et al., 2010; Polacsek et al., 2006; Racette et al., 2009), four of the five papers with body composition as an outcome reported significant positive changes in body fat percentage or fat mass (Davis et al., 2009; Meyer et al., 2010; Milani & Lavie, 2009; Racette et al., 2009), and three of the four papers with waist circumference as an outcome reported significant decreases over the intervention (Kwak et al., 2010; Lara et al., 2008; Meyer et al., 2010).

Workplace Studies - Review Papers

STUDY ATTRIBUTES

The current review of workplace intervention review papers contained 23 peer-reviewed papers (of the total 31 peer reviewed review papers) and 5 papers/reports from the grey literature. All of the papers contained an environmental or policy component and summarized the effectiveness of environmentally-based community interventions to improve physical activity, eating behaviour, and BMI. A summary of the study attributes of these papers is presented in Table 3. It should be noted that a number of the workplace intervention review papers also described community interventions; 10 (36%) of the papers focused exclusively on reviewing workplace interventions and the other 18 (64%) examined both workplace and community interventions. Thus, there was some overlap in the papers that were included in the current review and those that were included in the review of community interventions that follows.

Eighteen (64%) of the papers were narrative reviews, eight (29%) were systematic reviews, and two (7%) were meta-analyses. In terms of design, 14 (50%) of the papers accepted any study design that met the various inclusion criteria, ranging from focus groups and observational studies to quasi-experimental studies and randomized controlled trials (RCTs). Other papers were more selective and included only RCTs (3 papers, 11%) or studies that were somehow controlled (either concurrently or using a pre-post design) but not necessarily randomized (4 papers, 14%). Additionally, 6 (21%) of the papers were reviews of previous review studies (systematic review or meta-analyses), and 1 paper did not specify the type of studies that were reviewed. Seventeen of the narrative, systematic, and meta-analysis reviews reported the number of studies that were included in the review; the number ranged from 4 to 395 studies in a review, with 82% of the reviews summarizing less than 50 studies. Among the reviews of previous reviews, the number of included studies ranged from 6 to 28.

Six (21%) of the papers reviewed interventions that focused on improving physical activity, including one paper that targeted increases in stair use. Another six (21%) of the papers reviewed interventions that sought to improve eating behaviours. Sixteen (58%) of the papers reviewed interventions that aimed to improve multiple health behaviours simultaneously, most often physical activity and dietary intake, with some also targeting a reduction in BMI. Though the current review focused on papers with an environmental or policy component, some of the papers included other types of interventions in addition to environmental or policy interventions. Of the 28 papers in the current review, 11 (39%) reviewed only interventions with an environmental or policy component. When reviewing the other 17 papers, we focused, as much as possible, only on those results related to the environmental or policy interventions.

The effectiveness or impact of the interventions was often assessed more broadly than the behaviour targeted by the intervention and some papers contained more outcomes than those relevant to this review. We focused on outcomes in three main categories: physical activity, eating behaviours, and BMI/anthropometric measures. Sixteen papers (57%) reported physical activity behaviours as an outcome, including general physical activity, exercise, physical fitness, stair use, and active travel mode. Seventeen papers (61%) reported diet-related behaviours as an outcome. Most papers focused on general dietary intake and on consumption of fruits and vegetables, but consumption of fat, fiber, and grains, as well as food purchasing behaviour, were also assessed in some papers. Thirteen papers (46%) reported BMI/anthropometric measures. Body weight was reported in seven papers, BMI and percent body fat/body composition were each reported in five papers, and the prevalence of overweight or obesity was reported in two papers.

Half of the papers noted the countries in which the reviewed interventions were implemented. Nine of these (64%) reported that the interventions were primarily located in the United States, while three (22%) reported that the interventions were primarily located in Europe. Two papers (14%) mentioned only that the interventions took place in countries with established market

economies. The use of theories to guide the interventions was generally not well documented in the review papers. Only one paper explicitly mentioned which theories were used in the reviewed studies and two papers reported that none of the reviewed studies were theoretically based. However, four papers reported that having a theoretical basis for the intervention was associated with positive outcomes and several papers mentioned the need for more theory-driven interventions.

Table 3 **SUMMARY OF WORKPLACE REVIEW PAPER STUDY ATTRIBUTES**

Study Attribute (n=28)	Number of Papers (%)*
Type of article	
Peer-reviewed	23 (82)
Report/grey literature	5 (18)
Focus of review	
Workplace interventions	10 (36)
Both workplace and community interventions	18 (64)
Type of review	
Narrative	18 (64)
Systematic	8 (29)
Meta-analysis	2 (7)
Methodological designs included	
Any type of design	14 (50)
RCTs only	3 (11)
Controlled, not randomized	4 (14)
Review of reviews	6 (21)
Observational	0 (0)
Not specified	1 (4)
Number of studies included in the review (range)	
Original reviews	4 - 395
Review of reviews	6 - 28
Focus of the review	
Interventions targeting physical activity	6 (21)
Interventions targeting eating behaviour	6 (21)
Interventions targeting multiple health behaviours	16 (58)
Environmental/policy component	
All studies in review included an environmental/policy intervention component	11 (39)
Some but not all studies in review included an environmental/ policy intervention component	17 (61)
Outcomes of interest	
Physical activity	16 (57)
Eating behaviour	17 (61)
BMI/anthropometric measures	13 (46)
Primary location of interventions (reported in 14 papers only)	
United States	9/14 (64)
Europe	3/14 (22)
Established market economies	2/14 (14)

*unless otherwise stated in parentheses

EFFECTIVENESS OF INTERVENTIONS

Physical Activity

Evidence from the review of review papers on the effectiveness of workplace interventions to increase physical activity participation was, to some extent, inconclusive. A detailed summary of the findings appears in Table 8 at the end of this report, while a brief summary is shown in Table 4. A review by Conn, Hafdahl, Cooper, Brown, and Lusk (2009) stated that worksite physical activity programs assessed had a significant positive effect on both physical activity and fitness, although an earlier review by Marcus et al. (2006) concluded that evidence for such programs was inconsistent. Moreover, two review papers found the evidence inconclusive for "environmental/organizational approaches" (Micucci & Thomas, 2007) or worksite health promotion programs with "environmental modifications" (Engbers, van Poppel, Chin A Paw, & van Mechelen, 2005). In assessing the results of these reviews it is important to keep in mind that, in principle, later reviews (chronologically) would include more recent studies which may partly account for the inconclusiveness of the findings (more positive findings in more recent review papers).

There was some support for the effectiveness of comprehensive, multi-component worksite intervention approaches in increasing physical activity participation/outcomes (BC Ministry of Health, 2006; Goldgruber & Ahrens, 2010; Matson-Koffman et al., 2005; Pronk, 2009). Matson-Koffman et al. (2005) described this approach as including "education, employee and peer support for physical activity, incentives and access to exercise facilities". Approaches that included participation of both employees and employers were considered to be important (BC Ministry of Health, 2006; Goldgruber & Ahrens, 2010) although, as is the case in most multi-component interventions, it is difficult to determine the effectiveness of any specific component.

Evidence in support of point of choice (decision) prompts to promote stair-climbing in the workplace was a feature of some review papers (Brownson et al., 2006; Eves & Webb, 2006; Marcus et al., 2006; Matson-Koffman et al., 2005). However, some reservations were expressed in terms of whether stair ascent or stair descent were measured in some studies and other review papers indicated that additional methodological limitations of studies of the effectiveness of point of choice prompts in the workplace suggest that the evidence should be considered to be inconclusive.

A review paper by Marcus et al. (2006) stated that programs established to provide fitness facilities in the workplace in order to positively affect participation in physical activity have generally not been effective, particularly among those not already physically active.

Eating Behaviour

Evidence for the effectiveness of workplace interventions to improve eating behaviour was also summarized in a number of review papers and reports (detailed summary of findings appears in Table 8 at the end of this report and a summary is shown in Table 4). Support for workplace-based interventions designed to influence eating behaviour included increasing access and availability of healthy food (increase in fruit and vegetable consumption; decrease in fat consumption). A review by Brownson et al. (2006) indicated that increasing access to ready-to-eat foods in worksites was considered to be a promising intervention and a review by Seymour, Fenley, Yaroch, Khan, & Serdula (2004) indicated that changes in the availability of foods was frequently associated with significant positive changes in eating behaviour. Changes to worksites such as the addition of healthier choices in cafeterias and vending machines have been shown to positively influence food intake (Sallis & Glanz, 2009). The use of reduced food pricing and other incentives in worksite vending machines and cafeterias was considered to be a promising strategy by Brownson et al. (2006).

Multi-component strategies/approaches have also received support in some review papers (BC Ministry of Health, 2006; Sorensen, Linnan, & Hunt, 2004; World Health Organization, 2009). According to Sorensen et al. (2004), comprehensive worksite health promotion approaches can positively affect fruit and vegetable consumption. Some key components of this comprehensive strategy include: using a socio-ecological model, using participatory strategies, accounting for the social context of the issue, targeting multiple health behaviours, and tailoring interventions to specific groups of individuals.

Though a review paper by Micucci and Thomas (2007) suggested that there is insufficient evidence regarding the effectiveness of strategies that target the workplace environment, there appear to be at least some promising approaches (summarized above) in need of further development, implementation, and evaluation.

BMI/Anthropometric Measures

Some review papers indicated support for the effectiveness of workplace interventions in modifying weight-related changes of employees (see detailed summary of findings in Table 8 at the end of this report and a brief summary in Table 4). Mulvihill and Quigley (2003) stated support for workplace programs in reducing overweight and obesity among employees, though the only environmental component seen as effective was plant reorganization. There was some support for interventions based on the combination of physical activity and nutrition (diet) (Anderson et al., 2009; Kremers et al., 2010; Micucci & Thomas, 2007; Verweij, Coffeng, van Mechelen, & Proper, 2010). Verweij et al. (2010) reported that moderate quality evidence indicated that physical activity and diet interventions resulted in a mean reduction in weight of 1.2 kg, a mean reduction in BMI of -0.3 km/m2, and a mean decrease in body fat of 1.1%. A review by Micucci and Thomas (2007) indicated that 2 out of 3 interventions combining physical activity and nutrition resulted in significant decreases in body fat. In addition, review papers by Matson-Koffman et al. (2005) and Ni Mhurchu, Aston, and Jebb (2010) reported a few studies in which a combination of physical activity and nutrition interventions resulted in a significant decrease in employee weight. However, Engbers et al. (2005) stated that there was no evidence for a positive effect of worksite health promotion programs with an environmental component on employee BMI. One possible explanation for these findings is that BMI may not be a sensitive measure in the short term and needs to be assessed over a longer period of time than is normally the case in original intervention studies or those described in review papers.

Table 4 **SUMMARY OF THE EFFECTIVENESS OF WORKPLACE INTERVENTIONS (BASED ON REVIEW PAPERS/REPORTS)**

Outcome of Interest	Number of Papers (%)
Physical activity	16
Positive results reported*	12 (75)
Eating behaviour	17
Positive results reported*	16 (94)
BMI/anthropometric measures	13
Positive results reported*	11 (85)
Success of Strategies Used	**Number of Papers (%)**
Physical activity	
Reviews of workplace interventions	4/6 (67)
Reviews of workplace and community interventions	8/10 (80)
Eating behaviour	
Reviews of workplace interventions	5/6 (83)
Reviews of workplace and community interventions	11/11 (100)
BMI/anthropometric measures	
Reviews of workplace interventions	7/8 (88)
Reviews of workplace and community interventions	4/6 (67)

Community Studies

STUDY ATTRIBUTES

The review of community intervention studies included 22 peer-reviewed papers (of the total 31 peer reviewed review papers) and 5 papers/reports from the grey literature (containing an environmental or policy component) that summarized the effectiveness of environmentally-based community interventions to improve physical activity, eating behaviour, and BMI. A summary of the study attributes of these papers is presented in Table 5. As with the workplace intervention review papers, a number of the community intervention review papers described workplace interventions as well; 9 (33%) of the papers focused only on community interventions and the other 18 (67%) addressed both community and workplace interventions.

Eighteen (67%) of the papers were narrative reviews and 9 (33%) were systematic reviews. Fifteen (55%) of the papers accepted any type of methodological design and 6 (22%) of the papers included studies that were somehow controlled, but not necessarily randomized. Additionally, 4 (15%) of the papers were reviews of previous review studies (systematic review or meta-analyses), 1 paper reviewed only observational studies, and 1 paper did not specify the type of studies that were reviewed. Seventeen of the narrative and systematic reviews reported the number of studies that were included in the review; the number ranged from 8 to 395 studies in a review, with 71% of the reviews summarizing less than 50 studies. Among the reviews of previous reviews, the number of included studies ranged from 6 to 13.

Ten (37%) of the papers reviewed interventions that specifically targeted improvements in physical activity, including three papers that promoted increases in stair use, while six (22%) of the papers reviewed interventions that aimed to improve eating behaviours. Eleven (41%) of the papers reviewed interventions that targeted multiple health behaviours, typically physical activity and dietary intake, with some papers focusing on a reduction in BMI as well. Though the focus of the current review was on interventions that included environmental or policy components, not all of the papers focused exclusively on environmental interventions. Of the 27 papers in the current review, 14 (52%) specifically examined interventions with an environmental component. When reviewing the other 13 papers, we focused, whenever possible, only on the results pertaining to the interventions that included an environmental component.

As with the review of workplace intervention studies summarized earlier in this report, to evaluate the effectiveness of the interventions, we focused on outcomes in three main categories: physical activity, eating behaviours, and BMI/anthropometric measures. Eighteen papers (67%) reported physical activity behaviours as an outcome, including general physical activity, exercise, physical fitness, stair use, and active travel mode. Fourteen papers (52%) reported diet-related behaviours as an outcome, including general dietary intake, consumption of fruits and vegetables, fat, fiber, and grains, and food purchasing behaviour. Eight papers (30%) reported BMI/anthropometric measures. Body weight was reported in four papers, the prevalence of overweight or obesity was reported in three papers, and BMI and percent body fat/body composition were each reported in two papers.

Just over half of the papers (52%) mentioned the countries in which the reviewed interventions were implemented. Of these, 9 papers (64%) reported that the interventions were primarily located in the United States, while 3 papers (22%) reported that the interventions were primarily located in Europe, and 2 papers (14%) reported only that the interventions took place in countries with established market economies. As with the workplace intervention review papers, the community review papers did not generally describe the use of theory in the interventions. None of the papers explicitly mentioned which theories were used in the reviewed studies and two papers specifically reported that none of the reviewed studies were theoretically based. However, the need for more theory-driven interventions was noted in several papers.

Table 5 **SUMMARY OF COMMUNITY REVIEW STUDY ATTRIBUTES**

Study Attribute (n=27)	Number of Papers (%)*
Type of article	
Peer-reviewed	22 (81)
Report/grey literature	5 (19)
Focus of review	
Community interventions	9 (33)
Both community and workplace interventions	18 (67)
Type of review	
Narrative	18 (67)
Systematic	9 (33)
Meta-analysis	0 (0)
Methodological designs included	
Any type of design	15 (55)
RCTs only	0 (0)
Controlled, not randomized	6 (22)
Review of reviews	4 (15)
Observational	1 (4)
Not specified	1 (4)
Number of studies included in the review (range)	
Original reviews	8 - 395
Review of reviews	6 - 13
Focus of the review	
Interventions targeting physical activity	10 (37)
Interventions targeting eating behaviour	6 (22)
Interventions targeting multiple health behaviours	11 (41)
Environmental/policy component	
All studies in review included an environmental/policy intervention component	14 (52)
Some but not all studies in review included an environmental/ policy intervention component	13 (48)
Outcomes of interest	
Physical activity	18 (67)
Eating behaviour	14 (52)
BMI/anthropometric measures	8 (30)
Primary location of interventions (reported in 14 papers only)	
United States	9/14 (64)
Europe	3/14 (22)
Established market economies	2/14 (14)

*unless otherwise stated in parentheses

EFFECTIVENESS OF INTERVENTIONS

Physical Activity

Findings from the review of review papers/reports focusing on community interventions to increase physical activity participation indicate support for a number of approaches. A detailed summary of findings appears in Table 8 at the end of this report and a brief summary is in Table 6. According to several reviews, there is considerable support for point-of-choice (decision) prompts to increase the use of stairs in public buildings (Brownson et al., 2006; Dolan et al., 2006; Eves & Webb, 2006; French, Story, & Jeffery, 2001; Kahn et al., 2002; Matson-Koffman et al., 2005; Soler et al, 2010; World Health Organization, 2009). Prompts included signs and posters placed in prominent places, such as beside an elevator or escalator. This approach was frequently considered to be an environmental intervention, although it was classified as an informational approach in Kahn et al.'s (2002) review, based on the Guide to Community Health Services. On a conceptual level, prompts can be considered to be an environmental approach in that they are structured attempts to increase opportunities for physical activity in buildings. As well, they can be seen as cues to motivate action on the part of individuals. Soler et al. (2010) indicated that point-of-decision prompts were found to have significant effects on activity in a majority of studies, though the absolute changes (increases) in stair-climbing were frequently modest. Also, Foster and Hillsdon (2004) indicated that point-of-decision prompts were frequently shown to exert short-term, but not long-term, effects.

Some reviews indicated strong evidence for community-wide campaigns to increase physical activity participation (BC Ministry of Health, 2006; Kahn et al., 2002). According to Kahn et al. (2002), these approaches include messages directed at the overall population, combining media and other intervention components that may be targeted to physical activity and a number of other preventive behaviours. A limitation is that it is frequently difficult to determine the effectiveness of specific intervention components among the combination of approaches implemented is these community-wide campaigns.

Large scale (national) mass media approaches on their own were generally not considered to be effective in affecting physical activity participation, though they may influence awareness (French et al., 2001). According to Kahn et al.'s (2002) review, there was insufficient evidence to assess the effectiveness of mass media campaigns and information alone in increasing physical activity participation.

A number of reviews indicated strong evidence for the effectiveness of interventions facilitating access to facilities, places, and opportunities for physical activity (BC Ministry of Health, 2006; Brownson et al., 2006; Brug, van Lenthe, & Kremers, 2006; Matson-Koffman, 2005; Sallis & Glanz, 2009). Brug et al. (2006) focused specifically on increasing opportunities for walking, while Sallis and Glanz (2009) indicated that changing the environment by creating facilities for physical activity, such as walking ("walkability") and cycling trails, led to increases in physical activity in some cases. On a conceptual level, these approaches can be seen as both environmental and policy interventions, which is elaborated below.

Several review papers indicated the importance and effectiveness of policy initiatives in influencing physical activity participation (Brownson et al., 2006; French et al., 2001; Heath et al., 2006; Raine et al., 2008; Sallis & Glanz, 2009). Based on a review by Sallis and Glanz (2009), there was sufficient evidence to recommend changes to urban planning, transportation and recreation policy. Policy approaches considered to be effective included "community-scale urban design and land use policies" and "street-scale urban design and land use policies" (Heath et al., 2006). "Community-scale" policies included zoning regulations and building codes – these were shown to be associated with higher levels of physical activity in community studies (Heath et al., 2006). Sufficient evidence was also found for "street-scale" policies including more micro-level approaches, such as providing resources for bicycle lanes, street lights, and landscaping. However, unlike the findings of Sallis and Glanz's review (2009), Heath et al. (2006) did not find sufficient evidence (based on a single study) in support of transportation and travel policies, indicating the need for additional research on this topic. A review of the influence of travel plans on physical activity participation produced inconclusive results (Hosking, Macmillan, Connor, Bullen, & Ameratunga, 2010).

A review by Raine et al. (2008) indicated that experimental evidence supported a potential environmental effect on physical activity at the "physical, economic, and socio-cultural" levels but not at the "political" level. Reviews by Brownson et al. (2006), Raine, et al. (2008), and French et al. (2001) also provided support for the effectiveness of a combination of policy and financial supports for such initiatives as bicycle paths.

Eating Behaviour

Several types of community intervention strategies and approaches have been used to influence eating behaviours - such as increasing fruit and vegetable consumption and decreasing consumption of dietary fats (more frequently assessed). Table 8 at the end of this report shows a detailed summary of findings and Table 6 shows a brief summary of findings. Point of purchase information, including nutrition labeling in restaurants and grocery stores has been used in a number of interventions. Review papers examining the effectiveness of this approach generally considered the evidence to be sufficient (Brownson et al., 2006; Glanz & Hoelscher, 2004; Matson-Koffman et al., 2005; Seymour et al., 2004; World Health Organization, 2009). However, an important proviso is that some interventions may be successful in increasing sales of healthier foods, or knowledge about them, and may not necessarily be successful in making positive changes in eating behaviour (Glanz & Hoelscher, 2004; Glanz & Yaroch, 2004; Seymour et al., 2004). There was more evidence in support of point of purchase approaches in restaurant settings rather than in grocery stores (Glanz & Hoelscher, 2004; Glanz & Yaroch, 2004; Raine et al., 2007; Sallis & Glanz, 2009; Seymour et al., 2004).

Considerable support for community interventions that influence eating behaviours by increasing access and availability of healthy foods was prominent in several review papers (BC Ministry of Health, 2006; Brownson et al., 2006; Brug et al., 2006; Glanz & Hoelscher, 2004; Glanz & Yaroch, 2004; Matson-Koffman, 2005; Sallis & Glanz, 2009; Seymour et al., 2004). Regarding access, a review paper by Glanz and Hoelscher (2004) stated that manipulating the effort to ease access and availability required to obtain a certain food affects the consumption of that food. Grocery store interventions included micro-level changes in influencing the effort to obtain healthy foods, such as changing the location of these foods in the store or developing specific displays for them (Glanz & Yaroch, 2004; Seymour et al., 2004). In restaurant settings, increasing the number of healthier food choices available appeared to be more effective than simply showing nutritional information on menus (Glanz & Hoelscher, 2004). According to the review paper by Seymour et al. (2004), about half of overall interventions assessed were effective in increasing sales. While most review papers assessing the evidence for community interventions to increase access and availability of healthy foods have found a positive influence on purchasing behaviour or eating behaviour, one review paper suggested that there is only minimal evidence in support of interventions that manipulate availability of healthy foods in order to influence purchasing or food intake (Faith, Fontaine, Baskin, & Allison, 2007).

The practice of altering food prices to positively influence purchase and consumption of healthy foods received considerable support in reviews (Brownson et al., 2006; Faith et al., 2007; Glanz & Hoelscher, 2004; Glanz & Yaroch, 2004; World Health Organization, 2009). Using food pricing and related incentives, such as reducing prices for nutritious items in vending machines, was considered to be a promising intervention strategy in the review by Brownson et al. (2006), while the WHO review considered pricing strategies to be moderately effective (World Health Organization, 2009). Faith et al. (2007) stated that there was strong and consistent evidence in support of interventions in which food prices are altered to influence food purchases, with the proviso that food purchases may not translate directly to food intake. According to Glanz and Yaroch (2004), approaches that seek to reduce prices or provide coupons for healthy foods at grocery stores or farmers' markets appear promising, though the authors mentioned that these approaches may benefit most those individuals who would have purchased fruits and vegetables anyway.

Multi-component approaches delivered in community settings, such as the national (US) "5-A-Day" intervention, were considered to be effective in increasing awareness and increasing the number of adults meeting goals for healthy eating (French et al., 2001). Goldgruber and Ahrens (2010) expressed support for comprehensive interventions that combine both individual and environmental components, take into account organizational culture, and have a theoretical basis for development. Participatory models and strategies for intervention planning and implementation, such as establishing employee advisory boards and peer-led interventions, were endorsed as a central feature of multi-component approaches in a number of reviews (BC Ministry of Health, 2006; Sahay, Ashbury, Roberts, & Rootman, 2006; Sorensen et al., 2004).

Those approaches not considered to be effective in influencing eating behaviour on the basis of the evidence assessed in the review papers included media and marketing campaigns (Brownson, et al., 2006) and promotion and advertising approaches (Glanz & Yaroch, 2004). As noted earlier, mass media approaches are generally useful in influencing awareness, but are not frequently effective by themselves if the intervention outcome is changes in behaviour.

BMI/Anthropometric Measures

The current review of review papers dealing with effectiveness of community interventions to decrease anthropometric outcomes such as weight, BMI, and body composition (body fat percentage) included studies of the effectiveness of both physical activity and nutrition (diet) interventions, and additional approaches such as the effects of pricing, access, and availability. Table 8 at the end of this report presents a detailed summary of findings and Table 6 shows a summary.

Overall, assessment of the effectiveness of community-level interventions on BMI/anthropometric measures did not produce strong or compelling evidence in support of these approaches. According to Reeder and Katzmarzyk's (2006) review, there was insufficient evidence to recommend support of community interventions designed to modify weight-related outcomes. Even when reviews list positive and significant changes or differences in anthropometric measures as a result of community interventions, these are frequently small, especially in the case of BMI (Kremers et al., 2010).

Regarding specific types of community interventions, a review by Faith et al. (2007) indicated that there was no evidence to suggest that reducing food prices influences weight outcomes. Also, there was minimal evidence indicating that manipulating access or availability of nutritious foods, or restricting specific types of foods, were related to weight reduction or desired changes in body composition (Faith et al., 2007).

Table 6 **SUMMARY OF THE EFFECTIVENESS OF COMMUNITY INTERVENTIONS (BASED ON REVIEW PAPERS/REPORTS)**

Outcome of Interest	Number of Papers (%)
Physical activity	18
Positive results reported*	16 (89)
Eating behaviour	14
Positive results reported*	13 (93)
BMI/anthropometric measures	8
Positive results reported*	4 (50)
Success of Strategies Used	**Number of Papers (%)**
Physical activity	
Reviews of community interventions	7/8 (88)
Reviews of workplace and community interventions	9/10 (90)
Eating behaviour	
Reviews of community interventions	2/3 (67)
Reviews of workplace and community interventions	11/11 (100)
BMI/anthropometric measures	
Reviews of community interventions	1/2 (50)
Reviews of workplace and community interventions	3/6 (50)

Overview of the Theoretical Constructs within the Studies

As mentioned earlier, our review of original workplace intervention studies revealed that less than half of the papers reviewed identified specific theoretical frameworks/models/constructs as the basis for the intervention. Of the 19 papers that did discuss theoretical frameworks, the most prominent were ecological theories, Social Learning Theory/Social Cognitive Theory (SCT), and the Transtheoretical/Stages of Change Model. Ecological models of health and health behaviour have been described by McLeroy, Bibeau, Steckler, and Glanz (1988) and Sallis et al. (2008). According to Sallis and Glanz (2009), ecological models are based on the principle of multiple levels of influence on behaviours, "including individual, social and cultural, organizational, community, and policy levels". They further specify that, because individual behaviour is affected by a number of factors at different levels of influence, the "most effective interventions also should operate at multiple levels" (Sallis & Glanz, 2009). Social Cognitive Theory stresses the importance of experience and social environmental factors on future cognitions and behaviour. The model is seen as consisting of a dynamic interrelationship between behaviour, personal factors, and environment in which these factors influence each other reciprocally (Baranowski, Perry, & Parcel, 1997). A key concept is the notion of self-efficacy, which is based on the effects of past behaviour and experience on the confidence individuals have in continuing to persevere. The Transtheoretical Model is based on identification of an individual's stage of readiness for change, including precontemplation, contemplation, preparation, action, maintenance, and termination (Prochaska, Redding, & Evers, 1997). That these frameworks/models were mentioned most frequently in our review of workplace interventions is not surprising since they are more relevant to policy and social and physical environmental factors influencing change (a key component in the scope of our review), as opposed to more micro-level, individually-based factors, such as knowledge, attitudes, beliefs, and values which are central components of such frameworks as the Theory of Reasoned Action, the Theory of Planned Behavior, and similar models.

Our review of review papers similarly did not uncover a uniform or extensive mention of theoretical frameworks/models, though those that did emphasized the importance of theoretically-based intervention planning, implementation and evaluation (Brownson et al., 2006; Kahn et al., 2002; Kremers et al., 2010; Marcus et al. 2006; Matson-Koffman et al., 2005; Sahay et al., 2006; Sallis & Glanz, 2009; Sorensen et al., 2004). Marcus et al. (2006) discuss the prominence and importance of SCT, particularly in relation to the framework's principle of "triadic reciprocal causation" in relation to individual behaviour and behaviour change. Also discussed in their review is the tendency in the past for the environmental component of SCT to be ignored as well as the renewed emphasis on it currently, as more attention is placed on issues around the importance of physical and social environmental factors affecting health and health behaviour. The environmental component of SCT is also seen as receiving additional attention because of its relationship to ecological theories of behaviour. According to Marcus et al. (2006), these models are "explicitly multilevel". Thus, from a methodological perspective, the analytic potential of these models is enhanced by such approaches as multi-level modeling and analysis (Sallis & Glanz, 2009). Sallis and Glanz (2009) also emphasize the importance of using ecological models to assist in focusing on "multiple levels to create an environment that makes it easy to make the healthy choice". They further discuss an important principle of ecological models as their need to be tailored to specific behaviours. Thus, they believe that environmental and policy influences "are expected to have particular behavior-specific effects".

Brownson et al. (2006) have developed a conceptual framework for understanding the prevention of chronic diseases through environmental and policy intervention approaches. However, their framework offers a fairly broad description of the factors involved, which is not consistent with Sallis and Glanz's (2009) notion regarding behaviour-specific effects of the environment and policy interventions. Nevertheless, Brownson et al.'s (2006) approach, as well as Kahn et al.'s (2002) is implicitly ecological.

Matson-Koffman et al. (2005) emphasize the importance and relevance of the social ecological model in their review paper. They state that the expected outcomes of this model are "more effective interventions that reduce the barriers to positive and sustained behavioral change". In addition, they describe the CDC's funding support to 33

states in the US to build cardiovascular health capacity and programs for "system-level environmental and policy interventions" in four settings: health care facilities, schools, communities, and worksites. The status of these programs is described in a CDC report (Association of State and Territorial Directors of Health Promotion and Public Health Education & US Centers for Disease Control and Prevention, 2001). Kremers et al. (2010) call for more emphasis on the use of theoretical models in intervention research. In their review paper, they describe the use of planning and research processes and tools, such as Intervention Mapping and the Environmental Research Framework for Weight Gain Prevention (EnRG) to utilize in ensuring that interventions are based on sound theoretical principles.

Though not described explicitly in any of the papers examined in our current review, another issue of theoretical importance and relevance is social-structural/conflict theory in relation to understanding the dynamics of relationships, particularly in workplace settings. For example, it could be argued that there is a fundamental tension/conflict between employers and employees regarding such issues as work conditions, compensation, and worksite safety that likely may influence discussions about interventions to prevent disease or obesity through increased physical activity and improved nutrition. Thus, while Sorensen et al. (2004) and others espouse employee/employer advisory boards as a fundamental component of effective workplace interventions, it is important to consider some of the challenges and potential barriers to operationalizing this process in particular workplace settings in which employer-employee relationships may be tenuous. This issue also introduces the point that environmental interventions and/or environment-level changes include a fairly broad spectrum of approaches, ranging from locating low-fat foods in a specific area of a supermarket to dealing with issues of food insecurity. Sometimes the distinction is made between the micro-environment and the macro-environment in this regard.

A final point relevant to discussions of theoretical frameworks for the studies reviewed is that, while there is strong theoretical and growing empirical support for social ecological theories as the basis for physical activity, healthy eating, and obesity prevention (and ultimately prevention of type 2 diabetes), some community and workplace interventions will need to consider desired change to occur through a process of cognitive mediation. For example, as recognized by those espousing prompts for stair use, individuals must attend to these signs and agree that taking the action is important and will have a beneficial outcome. It is not simply the case that if these programs are "built, they will come". Thus, the relevance of more cognitive models underlying health behaviour comes back into play. In particular, SCT should be seen as an important adjunct to ecological models in further development of interventions designed to increase physical activity and food-related behaviours such as fruit and vegetable consumption.

Limitations of Findings

Some features of our review, including the scope of the search, eligibility criteria for inclusion, and decisions around the format used to report findings in tabular and narrative form, represent limitations by definition. The act of limiting the scope of a review to issues considered to be most salient is necessarily exclusionary. Also, issues around the feasibility of including specific features of a search and review, resource and time implications, and other practical considerations imply necessary limitations on what can be accomplished. Two types of limitations are discussed here – those that were based on the features of our current review, and those that were based on features of the original studies and review papers that affected the findings themselves. Though these types of limitations are related, it is important to consider that their origin and the degree to which they could be addressed differ. In the first case, most of the limitations of the current review were self-imposed and necessary. In the second case, limitations of the findings present questions and challenges around the extent to which there is consensus about the evidence and what it suggests for the field.

The issue of "sufficiency" of effects and outcomes was beyond the scope of our review. Even so, discussion around the type and "dose" of physical activity or fruit and vegetable consumption sufficient for preventive purposes is important, as are questions concerning the intervention type and amount needed in order to produce a positive and significant effect on physical activity, eating behaviour, and obesity or weight-related outcomes. These questions are particularly important in relation to

developing consensus around what public health approaches are needed. In relation to these issues, aside from them being outside the scope of the review, many of the review papers we summarized were limited by a lack of homogeneity in terms of identification (in many cases) of the specific outcomes (amount of change) sought in particular studies, as well as considerable variability in the types of measures used for the primary outcomes (Dolan et al., 2006; Engbers et al., 2005; Eves & Webb, 2006; Ni Mhurchu et al., 2010; Seymour et al., 2004). Thus, for the most part, we were unable to determine whether the effects of interventions on outcomes, even when found to be statistically significant, were sufficient to result in changes that will benefit individual or community health. Instead, many of the findings reviewed suggest that interventions were effective in the desired direction – they resulted in increased physical activity participation or fruit and vegetable consumption, decreased consumption of dietary fats, or improvements in measures of overweight or obesity.

While we have summarized and considered the evidence for a number of intervention approaches in this review, we have not examined the feasibility of these approaches for public health policy and practice, though we know this issue is fundamental to subsequent decisions regarding the type and scope of potential interventions for community and workplace settings. We will return to this issue when discussing recommendations and implications of the findings for public health.

We have noted, but not analyzed, the issue of quality of evidence in the original papers and reviews. Issues raised in original studies or review articles include discussion of design and measurement limitations (Brownson et al. 2006; French et al., 2001; Glanz & Yaroch, 2004; Heath et al., 2006, Micucci & Thomas, 2007; Muller-Reimenschneider, Reinhold, & Willich, 2009; Ni Mhurchu et al., 2010; Raine et al., 2008; Sallis & Glanz, 2009; Seymour et al., 2004). The “comments” section of the summary tables and discussion of evidence in the synthesis sections allows us to discuss these issues to some extent. Along with the need for specific interventions to be examined for relevance and feasibility, more detailed examination of the quality of evidence for these approaches should be undertaken once recommended approaches are narrowed down. Meanwhile, in our review, we have adopted the principle suggested in several previous reviews - that the preponderance of evidence available suggests that particular intervention approaches are effective.

We have not systematically examined the process by which interventions reviewed influence outcomes. Many papers do not discuss this, though some do. In the previous section of this report, we have discussed the importance of the theoretical and conceptual basis for intervention approaches. In part, ecological theory and SCT have been shown to be important and relevant frameworks for both understanding factors influencing change and, potentially, how they can serve as the basis for interventions to affect change on environmental and individual levels. More attention to these issues is an important and challenging step needed to assist in elucidating these processes.

Several authors of original and review papers have mentioned difficulties in identifying effective components of program interventions, particularly when these programs are multi-faceted – consisting of a number of intervention approaches (Anderson et al., 2009; Goldgruber & Ahrens, 2010; Matson-Koffman, et al., 2005; Sorensen et al., 2004). For example, a community-level or workplace-level intervention might rely on a number of approaches, making it difficult to determine which parts of the intervention are effective. As mentioned earlier, Sorensen et al. (2004) have suggested the need for process-level evaluations to determine the specific contribution of component parts of an intervention.

Another possible limitation which may have affected the findings reviewed include the possibility of publication bias, which would tend to underestimate the number of negative findings in studies reviewed. It is also possible that low statistical power may have affected the findings of some studies limited by low sample sizes.

Recommendations and Implications for Further Public Health Research, Policy, and Practice

Based on the review of original articles (workplace interventions) and review articles and grey literature (community and workplace interventions), we offer the following recommendations for consideration by OAHPP and its stakeholders:

WORKPLACE INTERVENTIONS

1. Though the evidence was inconclusive, overall, for interventions increasing physical activity participation, there was some support for multi-component intervention approaches that include a combination of educational and environmental components (access to facilities) as well as employee participation in planning. A potential disadvantage is that it is difficult to determine which intervention components are effective. Nevertheless, this approach appears promising and should be considered for further development.
2. The scientific literature showed some support for point of decision prompts to engage in physical activity. This approach consists primarily of signage encouraging employees to take the stairs instead of the elevator. This type of intervention could be used as a stand-alone program and potential costs involved in implementing it would likely be relatively low. Some studies have not shown large changes in stairs climbed and there was some concern expressed in review papers that stair ascent and stair descent are not distinguished in all cases. Despite these limitations, this intervention approach should be considered for further development.
3. There was some support for the importance of workplace employee/employer advisory boards/committees in planning and implementing workplace physical activity interventions. Although the evidence in support of this component was not conclusive, joint participation in workplace advisory boards is important and consistent from both conceptual and ethical standpoints. Thus, this component should be included in any further development of workplace interventions.
4. Several papers reporting workplace interventions found the use of pedometers to be effective components in increasing physical activity participation. The provision of this means of assessing activity provides a positive, motivational, and relatively inexpensive means of facilitating activity. Thus, the use of pedometers as a component of workplace interventions should be considered.
5. Findings from the current review indicated support for interventions that provide access to, and opportunities for, healthier foods in the workplace. Thus nutritious foods, such as fruits and vegetables and low-fat/low-sugar products, would be made available in the workplace at meetings, in the cafeteria, and in vending machines. This type of intervention, representing a workplace organizational policy, could also be augmented by reducing the price of these items such that there would be an additional incentive for choosing them over less nutritious alternatives. This intervention approach should be strongly considered for further development.
6. The review also indicated support for multi-component workplace interventions aimed at improving eating behaviours. This approach, based on ecological theory and the principle of joint participation of employees and employers in advising the intervention, includes a combination of environmental and educational components. As was the case with multi-component intervention approaches for increasing physical activity participation, a limitation of this approach is difficulty in determining the effectiveness of specific intervention components included. Despite this limitation, this approach should also be considered for further development.
7. Findings from the review support the effectiveness and importance of workplace advisory committees in planning interventions to increase consumption of nutritious foods, such as fruits and vegetables and low-fat products. This process-oriented feature of intervention planning and implementation has been extensively developed and studied by Sorensen and her colleagues. Since it also is theoretically and ethically defensible, it should be built into the

components of any future workplace intervention being considered.

8. There was little support for the effectiveness of workplace interventions in changing BMI, though there was some support for their effectiveness in changing other anthropometric measures of overweight and obesity (weight, body composition, and waist circumference). Though not examined in this review, it may be that issues of intervention duration and dose may be related to the findings regarding BMI. Many interventions are of relatively short duration while changes in BMI are more distal outcomes, perhaps mediated by other anthropometric changes or changes in physical activity participation or eating behaviours. Thus, BMI should not be considered to be the primary proximal outcome in subsequent interventions. Instead, impact level changes, such as increases in physical activity participation or improved eating behaviour, as the result of workplace interventions, should be used. However, BMI and related measures should be included and tracked in interventions, since they may be influenced more directly be the impact level changes themselves. In a model of future intervention planning, the intervention would lead to changes in physical activity or eating behaviours which, in turn, would influence changes in body composition and/or waist circumference as precursors to the prevention of type 2 diabetes. Finally, the logic of this model would state that changes in overweight/obesity would contribute to prevention of type 2 diabetes. To achieve sustained behavioural change with interventions, environmental supports and policy inititatives will be needed.

COMMUNITY INTERVENTIONS

9. Evidence from the current review of review papers and grey literature reviews suggests a number of community-level intervention approaches are effective in increasing physical activity participation. One approach receiving considerable support was point of decision prompts (signs) to increase stair use, as opposed to using the elevator or escalator in public buildings and residences. Some of the strengths and weaknesses of this approach are listed above (see recommendation #2). Aids to assist these decision prompts include ensuring the safety and attractiveness of stairwells. This approach can be used as a stand-alone intervention or as part of a multi-component intervention. Point of decision prompts to increase stair use should be strongly considered as a community intervention.

10. Another intervention approach used to increase physical activity participation receiving support in the review was community-wide campaigns. This includes the use of media and other components, including education. If a number of components are used in this type of intervention, it is difficult to determine the effectiveness of any specific approach included. Nevertheless, community-wide campaigns should be considered as a possible component in a multi-component social marketing approach for increasing physical activity in community settings.

11. Additional evidence from the review supported interventions to increase access to facilities, places, and opportunities for physical activity participation. This approach represents the importance of public policy and program interventions on both a micro- and macro-environment level. Related to these are "community-scale" policies and "street-scale urban design and land use" policies as interventions to enhance and promote physical activity participation in communities. An advantage of this approach is its potential inclusion of large numbers of community members, though a disadvantage is the likelihood of lengthy time commitments involved in community coalitions in order to influence political and economic decisions. In addition, this type of intervention presents a number of evaluation challenges, primarily the difficulty of assessing intervention effectiveness as well as assigning it to specific components. Despite these limitations, this approach should be considered in those settings which will be able to dedicate considerable time and resources to its development.

12. The review also identified support for a number of community intervention approaches aimed to increase fruit and vegetable and low-fat food consumption. Point of purchase information regarding the nutritional value of foods available in public locations is one such approach. There is more evidence in support of point of purchase interventions in restaurants as compared to grocery store/supermarkets. It is important to consider that any such approach would need to be incremental as it is unlikely that such changes could be legislated through public policy changes without considerable time and effort. Despite this limitation, point of purchase interventions should be considered in cases where restaurants express an interest in providing this information. Some believe that providing alternative food choices in restaurants is more

effective than simply providing information on menus. This approach should be considered as a potential intervention approach in particular settings.

13. Findings from the review also support the use of interventions which increase access and availability of healthy foods. Most of the studies reviewed considered this as more of a micro-level intervention, such as changing the location of foods in supermarket displays. Less frequent were studies that emphasized issues around the provision of access and availability of nutritious foods by members of communities which are based also on more macro-level factors such as the cost of nutritious foods, access to fruit and vegetable vendors, and similar issues. Food pricing was also shown to be an important factor in relation to food purchasing decisions. Thus, there are important public policy implications for consideration of approaches that can enhance equitable access to nutritious foods. This intervention approach should be considered in cases in which inter-sectoral policy can be devoted to this outcome. Aside from that, more micro-level approaches can be used to situate access and availability of healthy foods in public settings, which may have some effect on food choice, though as others have pointed out, not necessarily on food consumption behaviour.
14. The review also indicated support for multi-component intervention approaches, combining both individual and environmental components. These approaches also emphasize the importance of having a strong theoretical basis of support (such as Social Ecological Theory, Social Cognitive Theory, or the Transtheoretical/Stages of Change Model) and participatory approaches to intervention planning, implementation and evaluation. As noted above, the primary limitation of this approach is difficulty in attributing intervention effectiveness to specific components of the intervention. Nevertheless, it should be considered as an intervention approach in situations that provide considerable resources and time to develop it.
15. Similar to the review of workplace interventions, there was little evidence found in support of community interventions aimed at changes in BMI. Though physical activity and nutritious eating behaviour were found to have a desired effect on body fat, specific individual or environmental interventions were not found to consistently influence BMI or other anthropometric measures of overweight/obesity. As was the case with workplace interventions, BMI should not be used as the primary outcome measure in interventions. More proximal changes such as physical activity and eating behaviours should be used as the primary outcomes of focus and BMI, and other anthropometric measures, should be tracked over longer periods of time in relation to the intervention and changes in the proximal outcomes.
16. This review and synthesis of evidence suggest a number of research gaps and questions that should be addressed. Many of the original papers and review articles suggest, either explicitly or implicitly, that an important study limitation is that long-term effectiveness of interventions is frequently not shown or not assessed at all. Thus, it will be important to ensure that subsequent designs for intervention studies include adequate follow-up. This point is particularly relevant to issues raised earlier in this report regarding the need to track BMI over time, and to questions about the sufficiency of intervention effects (see Limitations section). Related to the need to assess long-term intervention effectiveness are the questions – what factors influence/facilitate sustained changes in behaviour, and what types of research and evaluation design are most suitable to address specific objectives (for example, the advantages and disadvantages of different types of longitudinal designs (panel vs. repeated cross-sectional) in assessing population trends. Other important research gaps and questions include: What are the practical and logistical issues around provision of healthy foods in the workplace or community? What are the most rigorous and feasible ways to assess the effectiveness of policy and environmental interventions to increase physical activity participation and healthy eating in workplace and community settings? Related to the latter question is the need to capitalize on opportunities to utilize natural experiments to assess the effectiveness of policy and environmental interventions by tracking changes in outcomes using existing (or new) surveillance mechanisms (Ramanathan, Allison, Faulkner, & Dwyer, 2008).

The current review and synthesis of evidence also provide a number of specific policy and environmental interventions needing further study including: transportation policy in relation to opportunities and participation in physical activity, long-term effects of interventions based on the use of environmental prompts to increase the use of stairs in workplace and community settings, and the effectiveness of policy interventions to

increase access to, and availability of, nutritious foods for the population at large and those most vulnerable.

GENERAL RECOMMENDATIONS

17. As a next step, the findings and recommendations should be discussed to inform the development of policy and strategies within Ontario. In order to facilitate this, discussion with representatives of the Ministry of Health and Long Term Care (MOHLC) and the Ministry of Health Promotion and Sport (MHPS) is needed.
18. The findings and recommendations should also be discussed with stakeholders from the diabetes prevention modelling workshop in order to examine issues around the relevance, feasibility and costs involved in adapting these approaches for possible implementation in public health settings in Ontario.

IMPLICATIONS FOR PUBLIC HEALTH

Most, if not all, of the recommendations listed above are relevant to public health research, policy, and practice. In further discussions regarding the most suitable intervention for public health settings in Ontario, a key issue is whether or not a specific approach is feasible for various contexts. Resource issues such as costs, personnel, and time availability all enter into decisions as to which intervention approach to adopt. Thus the findings and recommendations from this review offer a selection of intervention approaches that have empirical and theoretical support. Decisions regarding which approach is most appropriate will need to weigh the various factors that influence issues of scientific rigour and feasibility.

Findings from this review can be used to inform the development of a provincial strategy to address physical inactivity and unhealthy eating for the primary prevention of type 2 diabetes (or precursors such as obesity). Several of the priorities and research gaps listed in the recommendations could be considered and developed further for this purpose. OAHPP could play an important lead role in developing a theory- and research-based intervention in this regard. For example, the findings could be used to provide support for the development of a pilot intervention study, using one or more of the approaches discussed and located in workplace or community settings. Representatives from a number of interested public health departments/agencies in Ontario would participate in the planning, implementation, and evaluation of this pilot study. Results of the pilot study could be used as the basis for the development of proposals for peer-reviewed funding proposals for a larger intervention research study.

The findings from the current review can also be used to inform the development of public health policy and program initiatives. If adopted for use in Ontario, these initiatives should be further developed using a systematic planning framework or program logic model which would include examining risk factors, distal and intermediate factors which can be measured in the context of shorter and longer term behaviour change outcomes as well as proposing mechanisms of action on which interventions would be designed. For interventions implemented in Ontario, it will be particularly important to establish clear objectives for change and to evaluate the process, impact, and outcomes of such policy and program initiatives. It would be ideal if such a process involved key stakeholders (such as MHPS, the office of the Associate Chief Medical Officer of Health, scientists, and policy and program advisors).

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Table 7. Summary of workplace interventions – original articles

Author(s) and date	Sample	Research method and measures	Intervention	Relevant results	Comments
Auweele et al. (2005) [J Sp Exer Psyc]	135 employees of an administrative worksite in Belgium. The worksite employed predominantly women (131 of 135 persons). No other demographic data were provided.	Single-group, observational, pre-test post-test design: Employees' stair use was observed over a baseline period (1 week), two intervention periods (1 week each), and a follow-up period (1 week). The baseline and intervention periods were in consecutive weeks, but there was a 3-week break between the second intervention period and the follow-up period. Stair use observations were made by observers sitting behind a desk, pretending to be trainees of the company. Observations were made on Tuesday mornings between 8 am and 9 am on the first floor only, and on Tuesday, Wednesday, and Thursday afternoons between 2 pm and 4:30 pm on every floor. Only stair use by the female employees was recorded. Stair use was only recorded when the employee entered the stairway, not when they came out (so as to be recorded only once).	Theories: social cognitive theory, health belief model, and exercise behavior model. The interventions aimed to promote regular stair use in the 5-floor worksite. The first week of the intervention involved placing a large sign on an easel by the entrance to the elevator and the staircase on every floor. The sign was 11 X 17 inches and featured a picture of a staircase with the words "fit and healthy" (in Dutch) above the staircase and the words "I take the stairs" (in Dutch) below the staircase. During the second week of the intervention, in addition to the health signs on each floor, an email was sent to all employees from the worksite's doctor. The email was sent on the Monday of the second intervention week and contained a short message from the doctor which encouraged employees to use the stairs, explained the health benefits of regular physical activity, and indicated that he, too, regularly used the stairs. The signs were removed 4 days after the observations during the second intervention week, just less than 1 month before the follow-up observations.	3146 observations were made in total over the 4 weeks of the study. Stair use during the baseline period was 69% (568 of 823 observations). During the first intervention period, stair use increased significantly, to 77% (582 of 755 observations). During the second intervention period, stair use increased again, to 85% (691 of 814 observations). Stair use during the second intervention period was significantly higher than stair use during both the baseline and the first intervention periods. However, during the follow-up week, stair use had decreased to 67% (509 of 754 observations) and was not significantly different from the baseline level.	Strengths of the study include the ease of implementation and the use of social prompting (i.e., encouragement from the doctor, a relevant social model). Limitations of the study include the lack of control group, a visible observer who may have influenced the employees' behaviour, and the limited time frame of the interventions (Auweele et al., 2005).
Badland & Schofield (2005) [Hlth Pro J Aust]	46 employees from two council departments (i.e., two separate worksites) in New Zealand. The sample was 59% male. No other demographic data were provided.	Two-group crossover design: Worksite 1 (n = 24) was exposed to the poster intervention for 3 weeks, then had a 6-week washout period, and then served as the control group for a 3-week period. Simultaneously, worksite 2 had the study implemented in the reverse order, starting with a control period, then a washout period, then the intervention period. Assessments were conducted at the beginning and the end of each 3-week block (4 assessments were made in total and each lasted for 3 days).	Theory: none. Posters were displayed in an attempt to increase physical activity both at the workplace and overall. Two sizes of posters were used. The small posters measured 14.5 cm by 21 cm and stated "Better Steps to Health; use the stairs instead of the lift". The large posters measured 67 cm by 28.5 cm and contained three messages: "Better steps to health; use the stairs instead of the lift, take a walk during your break, drive less and walk more". Ten small posters and eight large posters were visible at each worksite. The small posters were placed near the elevators and on bulletin boards	The posters were not associated with a positive change in either total or worksite physical activity at either worksite. In fact, when the posters were being displayed, mean step counts decreased (-868 steps for worksite physical activity and -1861 steps for total physical activity). Women's step counts decreased more than did men's during the intervention period (-9% for worksite physical activity and -13% for total physical activity vs. -2% for worksite physical activity and -8% for total physical activity,	Strengths of the study include an objective measure of physical activity and assessing both worksite and total physical activity. Limitations of the study include a small sample size, a sample that was unrepresentative of all working adults, and no self-report data to provide insight into possible barriers to engaging in physical

Author(s) and date	Sample	Research method and measures	Intervention	Relevant results	Comments
		Total physical activity was measured using a sealed pedometer that was worn for the entire assessment period. Worksite physical activity was measured using a second sealed pedometer that was worn only during work hours.	and the large posters were displayed on the stairwell landing walls. Both sizes could be seen from the hallways. Participants were not informed of the purpose of the intervention.	respectively).	activity (Badland & Schofield, 2005).
Behrens et al. (2007) [P&M Skills]	520 city government employees from nine occupational divisions (e.g., police, fire, and airports) in the western US. Participants were blue- and white-collar employees, both male and female, and at least 18 years of age. No other demographic data were reported.	Single-group, repeated measures design: Employees self-selected into teams of 10 (usually within the same workplace) that competed against each other to accumulate the most steps per day (with the goal of each participant attaining 10,000 steps per day). The program was 12 weeks long and teams' steps were reported weekly. 640 employees (64 teams) began the program and 520 employees (52 teams) had complete data for all 12 weeks. Steps were recorded using an electric pedometer and were self-reported by each participant to his or her team captain, who passed the total count on to the project staff.	Theory: none. The intervention used a competition format. Each participant was given a pedometer and the goal of accumulating 10,000 steps per day. Teams of 10 employees competed against each other to accumulate the most steps per week. Team captains entered the team's total steps per week on a webpage on the city's website. Over the 12-week program, all teams were kept up to date on the participation and progress of all the other competing teams. The individuals and teams with the highest number of steps at the end of the 12-week program were recognized with a certificate from the city mayor.	There was no significant difference in steps taken from week 1 to week 12 (averaged across all teams). However, there was a significant difference in steps between week 1 and the middle weeks of the program (545,175 steps in week 1 vs. 594,905 to 601,789 steps in weeks 6 to 8). After the peak in the middle weeks, there was a general decline in steps until the end of the program.	A strength of the study was the competition format that was used to externally motivate employees. Limitations of the study include a lack of comparison group, no true baseline values, and no individual data being assessed (Behrens et al., 2007). Also, the reliability and validity of the pedometer chosen for the study have been found to be questionable in other studies (Behrens et al., 2007). Lastly, a certificate from the mayor may not have been enough of a reward to motivate employees in the competition.
Bergstroem et al. (2008) [Work] Work and Health in the Processing and Engineering Industries intervention study (AHA	Approximately 4100 employees from 4 large companies in Sweden. Across the 4 companies, the sample was approximately 88% male, with a mean age of 41 years (54% fell between 30 and 49 years old and 25% fell	Controlled, multiple post-test, cohort design: The 4 companies received the intervention from 2000 to 2003. Four similar companies served as a reference group from 2001 to 2003. The intervention was approximately 3.5 years long. Assessments, in the form of short questionnaires, were conducted at 10 time points throughout the study period (assessments 1 to 3 were conducted in 2000, assessments 4 to 6 in 2001, assessments 7 and 8 in 2002, and assessments 9 and 10 in 2003). Analyses	Theory: none. The AHA intervention method consisted of three main steps: screening, feedback (personal and group), and intervention. *Screening:* Screening was accomplished using a comprehensive questionnaire that assessed various health, lifestyle, and work-related factors. The questionnaire was mailed to all employees at the 4 intervention companies. The screening	Results regarding regular exercise habits (≥ 2 times/week) indicated changes a positive direction over time for two of the four intervention companies. However, none of the intervention companies showed significant changes over time in regular exercises habits compared to the reference group.	Strengths of the study include a large sample size and the incorporation of a reference group. Limitations of the study include the non-randomized design and conducting the analyses on cohorts at each assessment period, rather than following

Author(s) and date	Sample	Research method and measures	Intervention	Relevant results	Comments
study)	between 50 and 59 years old). 80% of the sample was considered blue-collar.	were conducted using cohorts from each company at each time point and did not follow the same group of employees over time. Exercise habits were measured by a single item on the questionnaire.	questionnaire was administered 3 times during the intervention period (every 18 months). *Feedback:* Personal written feedback was given to employees based on the information in the questionnaire. The purpose of the feedback was to motivate employees who were identified as "at risk" in at least one area (e.g., for cardiovascular disease) to contact the occupational health services for a clinical examination, as well as to generally motivate employees to consider any necessary lifestyle changes and to address the employees' psychosocial work environment. Group feedback was given according to the survey-feedback method, which was based on active participation by supervisors and employees in work teams. The main objective of the survey-feedback method was to engage employees and increase their influence over their work situation, including both health and work environment issues. The results of the comprehensive questionnaires were presented at the work team level and time was given to each work team to process its own results and to create specific action plans based on the results. Each work team supervisor was responsible for overseeing the presentation and processing of his or her work team's results. *Individually directed interventions:* Examinations and appropriate clinical interventions (e.g., advice and referrals) were provided for employees for neck and back pain, cardiovascular risk and disease, chronic obstructive pulmonary disease, asthma, and hazardous alcohol consumption.		one group longitudinally. The authors also reported that there were differences in intervention implementation and compliance among the four intervention companies, which may have affected the results (Bergstroem et al., 2008).

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Davis et al. (2009) [Prev Chr Dis] Steps to a Healthier Austin/Health & Lifestyles Corporate Wellness intervention program.	1282 employees at Capital Metro in Austin, Texas. Participants were bus operators, mechanics, and administrative employees. No demographic data were provided.	Single-group, observational design: The wellness program was launched at Capital Metro in January 2003 and the program and participants were tracked until 2007. Assessments were conducted yearly. In 2007, 300 employees (or about 25% of Capital Metro's workforce) were enrolled in the wellness program. Measures included the number of visits to the wellness center, the number of fitness center visits, the number of personal training sessions given, cash incentives given for reaching wellness goals, weight, and body fat. Full body assessments (including weight and body composition) were conducted with a TriFIT machine.	Theory: none. The wellness program initially consisted of health information, consulting, and education and wellness seminars and demonstrations by local vendors. Over time, the program grew to include: ○ On-site fitness centers with a low membership fee ($5 per month) ○ A part-time personal trainer ○ Healthier food options in the cafeteria at discounted prices ○ Healthy vending machine options ○ Cash incentives for reaching wellness goals (e.g., 10% weight loss, maintaining weight loss for 6 months, participation in 5K and 10K races, and sustained use of the on-site gym) ○ Health newsletters and workshops ○ Dietary counseling ○ Smoking cessation programs ○ Subsidized Weight Watchers classes ○ Health screenings (e.g., stroke, vision and hearing, mammograms, and blood pressure) ○ Cooking demonstrations ○ A yearly Health and Wellness Expo for employees and their families	The following results are descriptive only. The number of visits to the wellness center increased from 1571 visits in 2006 to 3174 visits in 2007. The number of fitness center workouts increased from 2137 workouts in 2006 to 11176 workouts in 2007. The number of personal training sessions increased from 561 sessions in 2006 to 2348 sessions in 2007. $31,500 in cash incentives had been paid to employees for weight loss, smoking cessation, gym memberships, TriFIT assessments, and 5K and 10K participation. 86 of the 133 employees who had at least 2 TriFIT assessments showed weight loss in 2007, with a mean weight loss per person of approximately 10 pounds. There was also a mean loss of 3% body fat per person. *Cost-effectiveness* From 2003 to 2006, Capital Metro's health care costs increased. However, in 2007, when enrollment in the wellness program increased markedly, health care costs decreased by 4%. Absenteeism fell from 10% in 2005 to 7.6% in 2007, representing a savings of $450,000. However, these results cannot be directly attributed to the wellness program. A return on investment (ROI) was calculated by dividing the health care and absenteeism savings by	Strengths of the study include a multifaceted, multi-component program that used both an individual and environmental approach, as well as an analysis of the cost-effectiveness of the program. Limitations of the study include a lack of comparison group, no demographic data on the employees (e.g., sex and age), minimal reported findings on actual diet and physical activity behaviour, and minimal information on the TriFIT machine used to conduct body assessments.

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				the cost of the program during the four years it had run. The ROI for health care savings was 1.86, the ROI for absenteeism was 0.57, and the total ROI for the 4 years was 2.43.	
Dishman et al. (2009) [AJPM] Move to Improve intervention.	1442 employees at 16 Home Depot worksites across the US and in Toronto, Canada. Participants were 69% female, 60% white and 25% black, with a mean age of 36 years (range of 19-64 years). 9% had graduated from high school only, 34% had some technical or college education, 31% had a bachelor's degree, and 14% had done post-graduate work. 45% of the sample had a non-manager/supervisor position, 8% had a supervisor position, 12% had a manager/senior manager/director position, and 35% held other positions.	Randomized, controlled design: 16 worksites were paired and randomized into the intervention group (8 worksites, n = 885) or the control group (8 worksites, n = 557). The intervention was 12 weeks long. Assessments were conducted at baseline, at the 6-week mid-point, and at the 12-week end-point. 664 participants from the intervention group and 301 participants from the control group completed at least two of the three assessments and were included in the analyses. Moderate and vigorous physical activity was measured using the International Physical Activity Questionnaire and expressed in MET hours/week. Physical activity was corroborated by self-reported blocks of daily activity and pedometer steps.	Theory: social ecological approach. The intervention consisted of the following components: *Goal Setting* The intervention included personal goals and team goals that were self-set, specific, realistic and attainable, and easily assessed. Personal goals involved increasing physical activity in 10-minute blocks each week during the 12-week intervention. Personal goals were guided by established public health recommendations for physical activity (≥ 150 minutes of moderate to vigorous physical activity (MVPA) per week or ≥ 10,000 steps per day). Teams of employees were formed and were usually bound by organizational or workgroup structures. Each team had a team captain who acted as a liaison between the employees and project staff and they helped the team set its own team goals. *Organizational Action* This intervention component had four features: 1. Senior management endorsement and encouragement from middle managers. 2. Joint employee-management steering committees that were responsible for implementing intervention activities. 3. Group and organizational goals and incentives set by the steering committee, such as a 50% employee participation rate and 75% of	Among intervention participants, there was a large initial increase in MVPA and, by week 7, MVPA exceeded 300 minutes per week. Pedometer steps increased throughout the intervention and exceeded 9000 steps per day by week 6. In the intervention group, there was a significant linear increase in moderate physical activity (MPA) of 1.9 MET hours/week (approximated at 29 minutes each week). There was also a significant linear increase in vigorous physical activity (VPA) of 3.1 MET hours/week (or approximately 24 minutes each week). Additionally, there was a significant linear increase in walking (2.9 MET hours/week or approximately 50 minutes each week). In the control group, there was a significant linear increase in walking (1.1 MET hours/week or approximately 19 minutes each week). Latent growth modeling showed that, compared to the control group, the intervention group had a similar initial level but a significantly greater increase (1.9 vs. 0.8 MET hours/week) in MPA, a higher initial level (15.5 vs. 11.4 MET hours/week) and a greater increase (3.1 vs. 0.4 MET hours/week) in VPA, and a higher	Strengths of the study include the pairing and randomization of worksites (Dishman et al., 2009) and the use of multiple measures of physical activity with demonstrated reliability and validity, including a highly accurate pedometer. Limitations of the study include an absence of follow-up measures after the end of the intervention, that randomization occurred after the baseline assessment, and that intervention participants were volunteers who may have been more motivated to be physically active (Dishman et al., 2009). In addition, both the intervention and control groups had a high, but similar, attrition rate.

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			participating employees meeting public health recommendations for physical activity at 9 or the 12 weeks of the intervention. 4. Environmental prompts (i.e., signage) were used to encourage physical activity, promote its health benefits, emphasize the target goals, and illustrate opportunities to be active (e.g., parking and walking, taking the stairs, and taking walk breaks). Prompts were placed in areas of high employee traffic and changed bi-weekly. The control condition completed a CDC health risk appraisal and received a monthly newsletter promoting the benefits of physical activity.	initial level (9.8 vs. 8.3 MET hours/week) and a greater increase (2.9 vs. 1.1 MET hours/week) in walking. At baseline, 24% of the control group and 31% of the intervention group were meeting recommendations for physical activity. At the end of the intervention, the control group had not changed and the intervention group had increased to 51% of employees meeting the recommendations. The odds that intervention participants would transition from not meeting the recommendations at baseline to meeting the recommendations were 2.1 times higher at the mid-point and 2.2 times higher at the end-point compared to the control participants. The odds of transitioning in the other direction (negatively) were 1.3 times higher for the control group from baseline to the mid-point and 1.9 times higher for the control group from the mid-point to the end-point compared to the intervention group.	
Engbers et al. (2006) [BMC Pub Health] FoodSteps intervention.	515 government employees in the Netherlands. The sample was 40% female and 67% "highly educated", with a mean age of 45 years. 18% smoked at baseline and the mean BMI was 26.5 kg/m^2. At baseline, the median F&V intake per day was 2.0	Controlled longitudinal design: Two similar governmental companies were chosen to be the intervention (n = 244) and control worksites (n = 271). The intervention was 12 months long. Assessments were conducted at baseline and 3 and 12 months after baseline. 432 participants completed the 12-month questionnaire. F&V consumption was measured using the validated Short Fruit and Vegetable Questionnaire. Fat intake was measured using the validated Fat List.	Theory: none. The intervention consisted of two parts: one part focused on food and one part focused on physical activity. *Food intervention*: The food intervention took place in the company canteen (cafeteria) of the intervention company. Informational sheets were placed near food products to stimulate healthier food choices. Different product groups (e.g., dairy, warm snacks, and F&Vs/salads) were highlighted in a 4-	There were no significant differences in F&V intake between the intervention and control groups at either 3 or 12 months after baseline. Similarly, there were no significant differences in fat intake between the intervention and control groups at either 3 or 12 months after baseline. However, at 3 months after baseline, there was an interaction between the group and bringing	The strengths of the study include using validated measures of F&V and fat intake and an environmental approach (i.e., using the worksite cafeteria). The limitations of the study include a lack of randomization (because only one worksite was included in each group) and a relatively large

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	servings and the mean F&V intake per day in weight was 158g.		week rotation over the 12-month intervention. On the informational sheets, the kcal value of a food product was translated into the number of minutes of a certain activity (e.g., climbing the stairs or having a meeting) needed to burn the calories. Similar information sheets were attached to three vending machines that highlighted the snacks that the vending machines offered (e.g., candy bars, crisps, and soda). An information stand was also placed in the canteen with brochures on healthy food, blood pressure, and cholesterol. Lastly, every 2 months, a lunch buffet with healthy products was offered to employees who frequented the canteen. No further information was provided on the physical activity part of the intervention in this article. See Engbers et al. (2007) for a description.	lunch to work, such that those in the intervention group who did not bring their lunch to work had a significantly higher fat intake than did those in the control group. The interaction was not significant at 12 months after baseline.	proportion of the worksite population (about 40%) not using the cafeteria regularly (Engbers et al., 2006).
Engbers et al. (2007) [Prev Med] FoodSteps intervention.	540 employees in two office buildings in the Netherlands. One building served as the intervention group and the other as the control group. The intervention sample was 37% female with a mean age of 45 years. 70% had a university education and 58% had a BMI of 25 kg/m^2 or higher. The control sample was 42% female with a mean age of 46 years. 64% had a university education and 68% had a BMI of 25 kg/m^2 or higher.	Controlled longitudinal design: Two similar companies were assigned to be the intervention (n = 257) and control groups (n = 283). The intervention was 12 months long. Assessments were conducted at baseline and 3 and 12 months after baseline. 483 participants completed the 3-month assessment and 452 participants completed the 12-month assessment. Height and weight were measured during a physical examination and were used to calculate BMI.	Theory: none. The intervention consisted of two parts: one part focused on food and one part focused on physical activity. The food part is as described for Engbers et al. (2006). *Steps intervention*: The Steps, or physical activity-targeted, part of the intervention focused on increasing stair use. Point-of-decision prompts were placed on elevator doors on the ground floor. Footsteps were also painted on the floor, leading from the three entrances to the building to the three main staircases that were close to the entrances. Motivational texts, poems, and exercise-related facts were placed on the windows between floors to make the staircases more attractive. “Slim-making” big mirrors were also placed on every other floor in the staircases. No intervention materials were placed in the control worksite.	There was no significant difference in BMI between the intervention group and the control group at either the 3- or the 12- month assessments.	A strength of the study was the multi-component approach to increasing stair use. Limitations of the study include a lack of randomization (due to only two worksites being used) and possible bias due to a co-intervention at the control company (free physical check-ups for some employees) (Engbers et al., 2006).

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Eves et al. (2006) [Obesity]	Employees at a five-story worksite with adjacent stairs and elevators in the UK. No demographic data were provided.	Observational design with pre-test: Video cameras were positioned in the ground floor foyer of the building that gave a clear view of the elevators and stairs. Usage was monitored for a 2-week baseline period before the intervention campaign was implemented and during the 6-week campaign. Two time periods during each day were monitored: morning (8am to 10am) and lunch (12pm to 2pm). An observer coded the videos for traveler sex, presence of a bag, weight status (compared against a silhouette-based rating scale to determine overweight vs. normal weight), and whether the traveler was ascending or descending the stairs.	Theory: none. The intervention consisted of three components: 1. A main poster (23.5 by 16.5 inches) was displayed in the ground floor lobby and showed a mannequin climbing the stairs and the text "Doctors have found that 7 minutes of stair climbing a day halves your risk of heart attack over a ten year period. There are 1440 minutes in a day. Can you spare 7 minutes to live longer?" 2. An arrow near the elevator button pointed to the stairs with the message, "Stairs this way." Above the arrow was a poster (11.75 by 8.25 inches) with the prompt message, "7 minutes of stair climbing a day protects your heart." The same poster was displayed in the elevator. 3. In the stairwell, each flight of stairs contained six different brief messages displayed on the stair risers (e.g., "Regular stair climbing aids weight loss" and "Regular stair climbing burns more calories per minute than jogging"). The main poster was also displayed at the top of each flight of stairs.	There was a significant association between the intervention and stair climbing, such that during the intervention, stair ascent was 1.1 times more like to occur and stair descent was 1.2 times more likely to occur than during the baseline monitoring. Overall, stair descent was more common than stair ascent (OR = 3.0). For stair ascent, there was a stronger significant association between the intervention and stair climbing for overweight participants (OR = 1.3) than for normal weight participants (OR = 1.1), such that participants coded as overweight showed a greater increase in stair ascent over the intervention than did participants coded as normal weight. Stair ascent was more frequent in men, normal weight participants, and those not carrying a bag compared to their counterparts. For stair descent, there was a significant association with the intervention for overweight participants (OR = 1.2), such that participants coded as overweight showed a significant increase in stair descent over the intervention. The intervention was not significantly associated with stair descent for normal weight participants. As with stair ascent, men, normal weight participants, and those not carrying a bag descended the stairs more frequently.	Strengths of the study include the various methods used to promote stair climbing and the use of an objective measure (video) to capture stair vs. elevator use. Limitations of the study include not having a comparison worksite, not double coding all observations, and using a silhouette rating scale to estimate weight status.

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Faghri et al. (2008) [J Prim Prev]	206 employees from two large state agencies in the US. The sample was 80% female, 59% white and 20% black, and 51% were over the age of 45 years. The mean BMI was 27.3 kg/m^2.	Pre-test post-test design, in which participants served as their own controls. The program was 10 weeks long. Assessments consisted of questionnaires and brief physical measurements and were conducted at baseline and follow-up (10 weeks after baseline). 56% of participants completed the 10-week program. Physical activity at work was measured using a pedometer. Participants submitted weekly walking logs (including steps walked per work day and minutes walked per work day). Physical activity level was also self-reported by participants (as "active" vs. "non active" and as regular, mild, moderate, and vigorous physical activity according to the American College of Sports Medicine classification). Height and weight were measured and used to calculate BMI.	Theory: transtheoretical (stages of change) model. The walking-based intervention aimed to increase physical activity at work and the walking program was progressive in nature. Participants chose their own walking speed and increases in their walking speed and time based on their comfort level. Participants put on a pedometer when they arrived at work (before exiting their car or public transit) and removed the pedometer upon leaving work. Participants were encouraged to form teams and choose a team leader. The team leader collected his or her team's walking logs and delivered them to project staff weekly. Motivational emails were sent to participants each week and provided encouragement and instructions on goal setting and overcoming barriers. Participants were also encouraged to visit the intervention website, which contained the weekly logs, guides for team leaders and participants, maps of worksite walking routes, and other relevant information. Maps of worksite routes were colour coded and the distance of each route was identified. Monthly newsletters and information about healthy living seminars were also available on the website.	Baseline steps per week were defined as the steps taken in week 1. The weekly logs showed a significant increase in the number of steps per week in weeks 2, 3, 4, 5, 6 and 8, relative to baseline. There was a significant drop in steps per week in week 7 compared to the other weeks (perhaps because week 7 included the Thanksgiving holiday). Taking the average of all participants, the highest steps per week was reached in week 8. The mean steps per day during working hours were 4185 steps at baseline and 5300 steps at the week 8 peak, resulting in a 27% increase. There was a significant increase in participants' subjective physical activity level. 40% of participants who reported themselves as "non active" at baseline moved to "active" at follow-up. There was also a significant increase in the number of participants meeting the American College of Sports Medicine recommendations for mild, moderate, and regular physical activity (data were not shown). There was no significant difference in participants' BMI from baseline to follow-up.	A strength of the study was the use of pedometers to objectively measure steps taken. Limitations of the study include a high attrition rate, no control group, no mention of the reliability or validity of the measures used, and no follow-up measure beyond the end of the intervention.
French et al. (2010a) [J Occ Env Med] Route H	1094 employees from four bus garages in Minneapolis/St. Paul, Minnesota. The sample was 79% male and 63%	Randomized, controlled, pre-test post-test design: Four bus garages (two urban, two suburban) were paired and then randomized to either the intervention (n = 554) or control group (n = 540). The intervention was 18 months long.	Theory: none. The entire Route H intervention is as described for French et al. (2010b). This article focused on the vending machine component of the intervention,	At the intervention garages, the percent of healthier items available in the vending machines ranged from 46% to 61% and prices for healthier items were a mean of 31% lower than unhealthy items.	Strengths of the study include a lengthy intervention period and careful implementation and monitoring of vending machines throughout the

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intervention.	white, with a mean age of 47 years (range of 19 to 79 years). 49% had a high school/ vocational school education or less and 43% had an annual income of less than $50000. The mean BMI was 32.3 kg/m^2 and 56% were classified as obese at baseline.	Assessments were conducted at baseline and follow-up (2 years after baseline) on cross-sectional cohorts. 513 intervention and 552 control participants completed the follow-up survey. Sales data from the vending machines at the garages was collected monthly. Frequency of vending machine use by employees was also assessed using a self-report survey.	which included increasing the availability of healthier food and beverage choices and lowering the prices of the healthier items in the vending machines at the intervention garages. The vending machine intervention ran for the entire 18-month intervention period, during which time 50% of the available vending machine options met the "healthy" criteria (e.g., 30% or fewer calories from fat, less than 35% sugar by weight, and under 150 kcal, 400 kcal, and 50 kcal for snacks, entrees, and beverages, respectively) and the healthier options were prices 10% lower than usual. Examples of healthy vending machine choices were bagels, fresh fruit, baked chips, and 100 kcal wheat snack cracker packets. The vending machine choices and placement of items were consistent for both garages during the intervention period. Control garages continued to offer the same items as before the intervention period.	Sales data from the 18-month intervention period showed that healthy items made up a larger percentage of the total vending machine purchases at the intervention garages than at the control garages. The difference was most apparent for snack foods, for which healthy items made up 48% of total snack items purchased at the intervention garages compared to 6% at the control garages. Healthy cold beverage sales comprised 54% of total beverage purchases at the intervention garages compared to 40% at the control garages. Healthy frozen foods comprised 24% of total frozen food purchases at the intervention garages compared to 14% at the control garages. At follow-up, employees at both the intervention and control garages reported using the vending machines less frequently than at baseline (86% vs. 81% for intervention employees, 88% vs. 85% for control employees). There was no significant difference in the frequency of vending machine use between the intervention and control employees at follow-up.	intervention, as well as close collaboration with the vending machine service company (French et al., 2010a). Limitations of the study include having only aggregate data rather than information on individual changes in vending machine choices, self-reported frequency of individual vending machine use, and a discrepancy in sales data versus survey data, such that the sales data represented only those employees physically at the garage and able to use the vending machines, whereas the survey data encompassed a broader range of employees, some of whom did not spend much time at the garage (French et al., 2010a).
French et al. (2010b) [Prev Med] Route H intervention.	1123 employees (mostly bus drivers) with the Metropolitan Transit Council in Minneapolis/St. Paul, Minnesota. The sample was 79% male and 63%	Randomized, controlled, pre-test post-test design: Four bus garages (two urban, two suburban) were paired and then randomized to either the intervention or control group. The intervention was 18 months long. Assessments were conducted at baseline and follow-up (18 months after baseline). 1070 employees	Theory: none. The intervention program focused on changing the physical and social environment at the garages to promote healthier food choices and higher physical activity levels. The program consisted of various components:	From baseline to follow-up, there was no difference in the change in BMI between the intervention and control garages. Baseline energy intake was 2363 kcal/day for the intervention garages and 2424 kcal/day for the control garages. The intervention	Strengths of the study include objectively measured height and weight, a thorough measure of diet (24-hour recall) and physical activity (accelerometer) on a subset of participants,

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	white, with a mean age of 47 years (age range, 20-79 years). 49% had a high school/ vocational school education or less and 43% had an annual income of less than $50000. 87% were overweight or obese.	completed the follow-up survey. Height and weight were measured and used to calculate BMI. Diet was assessed using a food frequency questionnaire and a subset of participants also completed a telephone-administered 24-hour dietary recall. Physical activity was self-reported using the Godin Leisure Time Physical Activity Questionnaire. A subset was also assessed by accelerometer for 4 days at baseline and follow-up.	*Garage advisory groups*: Garage advisory groups comprised of 6 to 10 employees were formed at each worksite to provide feedback to project staff about the intervention activities. *Vending machines*: The availability of healthful food and beverage choices in vending machines was increased and the prices of healthful choices were lowered. At least half of the items available met specific criteria for calories, fat, and sugar. Prices on these items were reduced by 10% and nutrition information for the items was displayed on the vending machine. *Fitness facilities*: The intervention garages spent their participation incentive funds from the research team (from $2500 to $6000) on new fitness equipment (e.g., treadmill, exercise bicycle, and weight lifting machine) for the garage. *Self-weighing team competition*: Scales were purchased and placed in restrooms and fitness rooms in the intervention garages. A team competition for daily self-weighing was implemented to increase awareness of the importance of daily self-weighing for weight gain prevention. *Behavioural food and physical activity programs*: Team walking competitions, F&V intake challenges, and fitness classes with individual instruction (e.g., yoga, tai chi, and personal training) were offered. *Route H garage expo*: A free 1-day health and fitness expo was held at each intervention site and offered fresh F&V samples, walking team	garages showed a significantly greater decrease in energy intake (kcal) at follow-up than did the control garages, with an intervention effect of -407 kcal/day. Baseline fast food meals per week were 1.2 among the intervention garages and 1.1 among the control garages. At follow-up, there was a significant decrease in fast food meals per week among the intervention garages (from 1.2 to 1.0 times/week) compared to the control garages (no change). Baseline servings of F&Vs/day were 2.2 for the intervention garages and 2.0 for the control garages. At follow-up, the intervention garages showed a significant difference in servings of F&Vs/day compared to the control garages. The intervention garages maintained their F&V intake, whereas the control garages intake of F&V intake declined to 1.9 servings/day. The intervention effect was +0.25 servings of F&Vs/day. There was no difference between the intervention and control garages in servings/day of sugar beverages or servings/day of snacks/sweets at follow-up. There was no difference in either self-reported or accelerometer-measured physical activity between the intervention and control garages at follow-up.	validated self-report measures, and the opportunity for participant input (through garage advisory groups). The authors also note the intervention's strong environmental focus and multiple components as strengths (French et al., 2010). Limitations of the study include the participation of only four garages, differing schedules of the bus drivers, and the limited exposure to the intervention in the garage environment due to the mobile nature of the job (French et al., 2010). Generally, there was also low participation overall (e.g., only 55% participated in at least one activity) and in the specific intervention activities (e.g., the highest rate was 22% in the self-weighing competition). Note: Though many of the study participants were overweight or obese, the intervention was not targeted specifically toward overweight or obese individuals.

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			competition sign-ups, demonstrations of short exercise routines and fitness equipment, bike rides, basketball demonstrations, and tai chi classes. *Farmer's market at the garage*: During the summer months, project staff ran mini farmer's markets at the worksites that offered low-priced produce. *New driver weight gain prevention peer mentoring program*: Formative research indicated that the first 6 months of employment as a bus driver is a high-risk period for weight gain. Peer mentor volunteers received training from project staff on implementing the weight gain prevention messages with new driver mentees and on providing support for healthy eating and physical activity at work.		
Gilson et al. (2007) [Prev Med}	64 university employees in the UK. The sample was 91% female, with a mean age of approximately 42 years.	Randomized, controlled design: 70 participants were conveniently recruited for the feasibility study and randomly assigned to a "walking routes" intervention group (n = 23), a "walking within tasks" intervention group (n = 23), or a control group (n = 24). The intervention was 10 weeks long. Step count data were collected at pre-intervention (over 5 days) and during weeks 1, 5, and 10. 64 participants completed all assessments. Step counts were measured using an unsealed pedometer.	Theory: none. Participants in the walking routes intervention group completed prescribed walks around the university campus. Participants were asked to engage in at least 15 minutes of continuous brisk walking during each work day. Participants in the walking within tasks group were encouraged to accumulate steps throughout the workday, rather than during specific prescribed walks. The office, lectures, and seminars were suggested contexts for incorporating walking (e.g., standing and walking instead of sitting and "walk and talk" tutorials). Participants in each intervention group were given detailed instructions and goals prior to the intervention and these were reinforced weekly through group emails. The control group did not receive an intervention and continued with normal	At pre-intervention, the mean step counts were 8922 steps/day for the control group, 8816 steps/day for the walking routes group, and 9287 steps/day for the walking within tasks group. The difference among groups was not significant during this period. Comparing the pre-intervention period to the intervention period, there was a significant difference among the groups, such that the walking routes group and the walking within tasks group both showed significantly higher mean step counts during the intervention than did the control group (the intervention groups both increased the mean number of steps/day, whereas the control group decreased its mean number of steps/day). There was no significant difference between the walking routes and the	Strengths of the study include the randomized, controlled design and the comparison of two intervention strategies to increase walking behaviour at work. Limitations of the study include the small and conveniently selected sample, self-reported step counts, and the short duration of the intervention (Gilson et al., 2007).

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			behaviour during the intervention period.	walking within tasks groups. No specific step count data were reported for the intervention period.	
Gilson et al. (2009) [Int J of Behav Nutr and PA]	179 white-collar university employees in the UK (n = 63), Australia (n = 49), and Spain (n = 67). Participants were randomized into 3 groups: the control group, the routes intervention group, and the incidental intervention group. The control group was 82% female, with a mean age of 41 years and a mean BMI of 24.2 kg/m^2. The routes group was 75% female, with a mean age of 42 years and a mean BMI of 25.1 kg/m^2. The incidental group was 80% female, with a mean age of 41 years and a mean BMI of 25.4 kg/m^2.	Randomized, controlled design: Based on pre-intervention step counts and block stratification, employees at each site (UK, Australia, and Spain) were randomized to the control group (n = 60), the route-based walking intervention group (n = 60), or the incidental walking intervention group (n = 59). The intervention was 10 weeks long. Assessments included workday step counts and self-reported sitting times and were made at pre-intervention (over 5 consecutive workdays) and at the beginning (week 1), mid-point (week 5), and endpoint (week 10) of the intervention. Step counts were assessed using a pedometer and a self-report diary. Workday sitting times were self-reported in a logbook.	Theory: ecological approach. Control participants were asked to maintain their normal walking behaviour over the intervention period, whereas intervention participants were asked to increase their step counts. Participants in the route-based walking intervention group were instructed to increase their step count through brisk, sustained, route-based walking during work breaks. Participants in the incidental walking intervention group were instructed to engage in incidental walking and accumulate steps during work-related tasks, such as walking to talk to colleagues rather than emailing or using the telephone. Participants in all groups were instructed not to increase their additional physical activities beyond those in which they usually engaged. Intervention participants were encouraged to use their pedometers for motivation and self-regulation, with the step target set as 10,000 steps per day. Prior to the interventions, detailed instructions were given to participants on goals and strategies for changing behaviour. These goals and strategies were reinforced through weekly group emails (emails to control participants contained reminders to maintain usual behaviour). The routes intervention group received suggestions of campus walks, supported by maps, times, and step counts. The incidental intervention group was encouraged to use the workplace environment as a means of increasing steps (e.g., using the bathroom at the far end of the building instead of the one close by) and managers were	On average, at pre-intervention, the mean number of steps per day per employee was 9630 steps and the mean sitting time per day per employee was 337 minutes. From pre-intervention to the intervention endpoint, there was a significant interactive effect between group and time for step counts. Specifically, the routes intervention group and the incidental intervention group both showed a significant increase in steps per day from pre-intervention to week 1 (9380 to 10696 steps/day for the routes group and 9186 to 9754 steps/day for the incidental group), whereas the control group did not show a significant change. The routes and incidental intervention groups also had a significantly higher step count averaged over the entire intervention compared to pre-intervention (+968 steps/day and + 699 steps/day, respectively), whereas the control group did not significantly change. There was no significant change in minutes of sitting time per day for any of the three groups during the intervention.	Strengths of the study include the randomized, controlled design and the use of different walking strategies (routes-based vs. incidental) (Gilson et al., 2009). The study also included employees from three countries and randomized at the individual level instead of at the worksite level. Limitations of the study include a predominantly female sample, a small sample size, a convenience sample recruited from a higher education population, and a limited ability to accurately and objectively measure the sit-stand-walk continuum using self-reports and pedometers (Gilson et al., 2009).

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			encouraged to provide opportunities for employees to engage in walking for work-related tasks (e.g., delivering messages to colleagues).		
Goetzel et al. (2009) [J Occ Env Med]	10,281 employees from 12 worksites of the Dow Chemical Company, located in Texas, Louisiana, New Jersey, and West Virginia. The intervention sample was 73% male and 77% white, with a mean age of 44 years. 24% had less than a bachelor's degree, 34% had a bachelor's degree, and 12% had a graduate degree. The control sample was 75% male and 79% white, with a mean age of 44 years. 26% had less than a bachelor's degree, 35% had a bachelor's degree, and 12% had a graduate degree.	Quasi-experimental, pre-test post-test, cohort design: 9 worksites were assigned to the intervention group (n = 8013) and 3 worksites were assigned to the control group (n = 2268). Of the nine intervention worksites, four were randomly assigned to a moderate intervention condition and four were randomly assigned to an intense intervention condition, while the last intervention was assigned to the intense condition by Dow's leaders because of its large size and strategic importance. All employees at the worksites were designated as participants. The intervention had been implemented for 1 year (the full intervention was 2 years long). Assessments were conducted at baseline and at a 1-year follow-up. 2518 intervention participants and 634 control participants completed both the baseline and follow-up assessments. Height and weight were measured and used to calculate BMI. Overweight was classified as 25.0 – 29.9 kg/m^2 and obesity was classified as ≥ 30.0 kg/m^2.	Theory: social ecological framework. The environmental interventions were aimed at decreasing energy intake and increasing energy expenditure. The interventions were meant to be evidence-based, inexpensive, and broadly applied and sustained in various work settings. Individually-focused interventions were implemented at the intervention and control worksites. Activities were part of Dow's health promotion program and examples include the dissemination of multiple health education materials (e.g., newsletters and an intranet site), leadership training, physical activity and weight management programs, health assessments, online behaviour change programs, and reimbursements for participating in weight management. The moderate environmental interventions were implemented at the four worksites in the moderate intervention condition. The interventions used environmental prompts and point-of-choice messages to encourage employees to make healthy food choices and engage in physical activity. Examples of strategies include providing healthy eating information and choices in vending machines, cafeterias, and company meetings, establishing walking paths at the worksites, disseminating targeted messages that encouraged healthy eating and physical activity, and developing an employee recognition program for healthy lifestyles. The intense environmental interventions were implemented at the five worksites in	The two intervention conditions were merged for the presentation of results, as there were no significant differences between them. There was a significant difference in the mean weight change between the intervention and control groups, such that the intervention group lost 0.1 lbs over the intervention period, whereas the control group gained 1.4 lbs. Similarly, there was a significant difference between the intervention and control groups in mean change in BMI, with the intervention group increasing by 0.1 kg/m^2 and the control group increasing by 0.3 kg/m^2 over the intervention period. There was no significant difference between the intervention and control groups in the percentage of participants classified as overweight or obese at follow-up.	Strengths of the study include randomly assigning the intervention sites to moderate or intense conditions and objectively measuring height and weight (Goetzel et al., 2009). Limitations of the study include a low response rate (all employees were targeted, but not all completed the assessments) and differences in the intervention implementation (i.e., fidelity) from worksite to worksite (Goetzel et al., 2009).

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			the intense intervention condition. In addition to the moderate intervention strategies, programs were added that were designed to increase a healthy organizational culture and commitment to employee health. Health goals were established as part of the worksites' management plans and training was provided for site leaders on health promotion topics. Progress reports were sent to senior corporate leadership. The interventions were meant to encourage strong leadership support and integrate the interventions into the company's existing business practices.		
Goetzel et al. (2010) [J Occ Env Med]	10,281 employees from 12 worksites of the Dow Chemical Company, located in Texas, Louisiana, New Jersey, and West Virginia. The intervention sample was 73% male and 77% white, with a mean age of 45 years. 25% had less than a bachelor's degree, 33% had a bachelor's degree, and 12% had a graduate degree. The prevalence of overweight and obesity were 36% and 27%, respectively, at baseline. The control sample was 73% male and 79% white, with a mean age of 44 years. 23% had less than a bachelor's degree,	Quasi-experimental, pre-test post-test, cohort design: 9 worksites were assigned to the intervention group (n = 8013) and 3 worksites were assigned to the control group (n = 2268). Of the nine intervention worksites, four were randomly assigned to a moderate intervention condition and four were randomly assigned to an intense intervention condition, while the last intervention was assigned to the intense condition by Dow's leaders because of its large size and strategic importance. All employees at the worksites were designated as participants. The intervention was 2 years long. Assessments were conducted at baseline and follow-up (2 years later). The final cohort consisted of 2431 participants and 1521 of those participants provided anthropometric data at both time points. Height and weight were measured and used to calculate BMI. Overweight was classified as ≥ 25.0 kg/m^2 and obesity was classified as ≥ 30.0 kg/m^2. Nutrition and physical activity risk behaviours were assessed using survey questions during a health risk assessment.	Theory: social ecological framework. The high intensity intervention consisted of a combination of individual, environmental, and management commitment programs. The moderate intensity intervention consisted of individual and environmental programs. The control sites provided only individual level programs. See Goetzel et al. (2009) for details on each intervention condition.	*Two-group comparisons:* After controlling for site effects*, the mean weight and BMI did not change significantly from baseline to follow-up in the intervention group, but both increased significantly in the control group (1.3 lbs and 0.2 kg/m^2, respectively). However, there was no significant change in the percentage of participants classified as overweight or obese at follow-up in the intervention group compared to the control group. After controlling for site effects, there were no significant differences between the intervention and control groups for changes in nutrition risk or physical activity risk from baseline to follow-up. *Three-group comparisons:* After controlling for site effects, there was a significant difference between the moderate- and high-intensity intervention groups compared to the control group.	Strengths of the study include a long intervention period, measuring various health outcomes, and comparing two levels of intervention intensity, the more intense of which used a leadership/ management approach (Goetzel et al., 2010). Limitations of the study include using the individual rather than the worksite as the level of analysis (when the intervention was aimed at the entire worksite), differences between the cohorts at baseline and follow-up, a high attrition rate (53%), using a quasi-experimental rather than randomized design, and differences among worksites in geography, culture, and

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	35% had a bachelor's degree, and 12% had a graduate degree. The prevalence of overweight and obesity were 37% and 26%, respectively, at baseline.			Specifically, the moderate- and high-intensity groups maintained their mean weight and BMI, whereas the control group gained a mean of 1.3 lbs and increased its mean BMI by 0.2 kg/m^2. However, there was no significant change in the percentage of participants classified as overweight or obese at follow-up in the moderate- or high-intensity group compared to the control group. After controlling for site effects, there were no significant differences among the moderate-intensity, high-intensity, and control groups for changes in nutrition or physical activity risk from baseline to follow-up. * The authors controlled for site effects (based on the probability of being employed at the intervention sites) to equalize baseline differences between intervention and control site employees.	intervention implementation (Goetzel et al., 2010).
Gosliner et al. (2010) [AJHP]	82 employees from 13 child care centers located in low-income neighbourhoods in Northern California. The sample was 98% female and 91% were between 25 and 64 years of age. 49% of the sample was white, 24% was Asian or Pacific Islander, 17% was African American, 13% was	Quasi-experimental, controlled, pre-test post-test design: Employees from 6 intervention worksites (n = 43) and 7 control worksites (n = 39) participated in the study. The intervention was approximately 10 months long. Assessments were conducted at baseline and at the end of the intervention (approximately 10 months later). 124 participants enrolled in the study and 82 completed all measures. Level of physical activity and the frequency of consuming particular foods (i.e., junk foods and F&Vs) were assessed using self-report questionnaires.	Theory: none. Both the intervention and control sites received training and education regarding children's nutrition and physical activity, as well as a set of nutrition- and physical activity-related policies for the child care centers. The intervention worksites also received a worksite wellness program. The program was developed with the employees at the intervention worksites and consisted of four activities: 1. Kick-off wellness training with individual health consultations. The	From baseline to the end of the intervention, there was no significant difference between the intervention participants and control participants in the change in days/week of exercise ≥ 30 minutes long. There was also no significant difference between the intervention participants and the control participants in the change in days/week of eating ≥ 1 servings of junk food or the change in days/week of eating ≥ 5 servings of F&Vs.	Strengths of the study include the multi-component approach to the intervention and involving employees in its planning and implementation. Limitations of the study include a small sample size, a high attrition rate (28%), and self-reported dietary intake and physical activity (Gosliner et al., 2010).

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	Hispanic, and 6% was classified as another race/ethnicity. 52% had attended some college, 21% hafd an associate degree, and 16% had a bachelor's degree.		kick-off was a 1-day event and focused on the importance of nutrition and physical activity for health and the challenges of healthy eating and physical activity in a culture that promotes overeating and sedentary behaviours. The purpose of the kick-off was to inform and empower participants and to brainstorm about ways in which their worksite could support their health behaviours. Health consultations covered various anthropometric and physical measurements, as well as diet and physical activity. 2. Monthly newsletters and paycheck stuffers. The newsletters promoted a healthy diet and physical activity and were distributed for 9 months. Paycheck stuffers contained similar messages and were distributed for the same length of time. 3. A group walking program. Collective incentives were offered to the group as it reached milestones. 4. Employee follow-up visits.		
Green et al. (2007) [Prev Chr Dis] Active for Life intervention.	1167 employees at a nonprofit health organization (with multiple worksites, including clinics, hospitals, and administrative centers) in the Pacific Northwest US. The sample was 86% female, 82% white, and 59% were between 35 and 54 years old.	Single-group, observational design: Employees volunteered to participate in the 10-week intervention. Assessments were conducted using web-based surveys at baseline, at the 10-week endpoint, and at a follow-up 6 months post-baseline. 565 participants (48%) completed all three surveys. Physical activity was assessed using three different outcomes: METs per week, using the Godin Weekly Leisure Time Exercise Questionnaire; frequency of sweating with exercise, using an additional question from the Godin questionnaire; and frequency of physical activity, using a stage of change-related question. F&V consumption was measured using a single question from the Seattle 5 A Day	Theory: none. The Active for Life intervention program was licensed and supported by the American Cancer Society. A steering committee for the intervention was formed and consisted of employees from various areas (e.g., education and communications). The steering committee performed leadership, development, implementation, and evaluation functions related to the intervention. The steering committee also selected and trained site captains for each worksite. Site captains encouraged enrollment and helped to form teams and choose team captains. Each team consisted of a team captain and 4 to 8 employees from the same worksite. A program website for participants offered	At baseline, 23% of participants reported being sedentary and 36% participated reported engaging in some physical activity but did not meet the CDC recommendations. At the 10-week endpoint, there was a significant decrease in participants who reported being sedentary (23% to 6%) and a significant increase in participants who reported meeting the CDC guidelines for physical activity (34% to 48%). The percentage of participants who reported exercising enough to sweat often or sometimes (i.e., moderately for ≥15 min, 5 times/week, or	Strengths of the study include support from various levels (i.e., steering committee, site captains, and team captains) and the use of measures with demonstrated reliability and validity. Limitations of the study include the lack of control group, a high attrition rate, participant self-selection into the study, and using only self-reported measures of physical activity and

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		worksite intervention. The method of measurement for BMI was not reported.	various motivational tips, healthy lifestyle resources, and ongoing success stories from other participants. Participants set weekly individual goals for minutes of physical activity and earned one point for each minute. Extra points were given for eating at least 5 servings of F&Vs a day. A team prize was awarded to the team with the highest number of points. Each participant also received a pedometer with the health organization's logo, athletic socks, and bicycle lights. Other incentives included individual awards for success stories and eligibility for entering into draws for several prizes (e.g., gift cards).	vigorously for ≥15 min, 3 times/week) increased significantly from 76% to 91%. Mean METs per week also increased significantly from 35 to 45 from baseline to the 10-week endpoint. At the 6-month follow-up, there was no significant difference from baseline for the percentage of participants who reported being sedentary or who reported meeting the CDC guidelines for physical activity. There was also no significant difference from baseline for METs per week. However, the percentage of participants who reported exercising enough to sweat was significantly higher than baseline (76% at baseline and 83% at the 6-month follow-up). At baseline, 46% of participants reported eating 5 or more servings of F&Vs per day. The percentage had increased significantly to 73% at the 10-week endpoint and this significant gain was maintained at the 6-month follow-up. There was no significant change in BMI from baseline to the endpoint or follow-up.	F&V intake (Green et al., 2007).
Grzywacz et al. (2007) [J Occ Env Med]	3193 employees from a large pharmaceutical company based in the US. The sample was 58% female and 80% white, with a mean age of 41 years.	Single-group, observational, pre-test post-test design: About 35% of eligible employees volunteered to participate in the study. The length of the study period was 1 year. Assessments were conducted at baseline and at follow-up (1 year later). Physical activity frequency was assessed using one item on a health risk	Theory: none. There was no intervention implemented, per say. The study examined the longitudinal associations between perceived workplace flexibility (e.g., compressed workweeks, flextime, job sharing, and remote or telework) and health behaviours such as physical activity	There were no significant associations between changes in perceived workplace flexibility and changes in physical activity levels from baseline to follow-up.	Limitations of the study include the lack of control group, self-selection by employees, and the use of single items to measure physical activity and perceived workplace flexibility (Grzywacz et

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		assessment questionnaire. Perceived workplace flexibility was also assessed by one item on the health risk assessment questionnaire.	at a company with a well-known reputation for its commitment to flexibility.		al., 2007).
Haines et al. (2007) [J Am College Hlth] Pedometer intervention – primarily education	120 employees from a large Midwestern US college campus. Employees were recruited from a faculty/staff wellness program and on-campus Weight Watchers classes. The sample was 93% female and 85% white. 74% were 40 years old or older and the mean age of the sample was 44 years at baseline. The mean BMI at baseline was 30.0 kg/m^2.	Single-group, pre-test post-test design: The intervention was 12 weeks long. Assessments were conducted at baseline and at follow-up (at the end of the intervention). Participants also kept daily logs of their steps taken. 60 participants completed the follow-up assessment. Height and weight were measured and used to calculate BMI. Pedometers were used to measure physical activity.	Theory: none. The intervention consisted of a 10-unit computer-based education program that aimed to improve physical activity and overall wellness. Participants logged their step counts into the program daily and received weekly email messages with walking and wellness tips. Unit 1 of the program outlined the importance of physical activity and how to use the pedometer. Unit 2 focused on creating a personal walking program. The remaining units covered a variety of physical activity, nutrition, and wellness-related topics. Each week, participants were instructed to increase their steps by 10%, with the goal of reaching 10,000 steps per day. The pedometer was used not only as a measurement tool for physical activity, but also as a way to provide participants with feedback and motivation, to promote physical activity, and to determine the participants' compliance and progress.	There was a small but significant decrease in mean BMI from baseline to follow-up (29.1 to 28.8 kg/m^2). The mean number of steps taken by participants increased by 27% from baseline to follow-up (42,797 steps per week in week 1 to 58,859 steps per week in week 12). Whether or not the increase was significant was not reported.	Strengths of the study include using objective measures of BMI and physical activity. Limitations of the study include the lack of control group, a high attrition rate, a small sample size, and participant recruitment from a wellness program and Weight Watchers classes (participants may have been more motivated to change their behaviour).
Kwak et al. (2007) [Prev Med]	150 employees from an office building (white-collar) and 800 employees from a paper factory (blue-collar) in the Netherlands. No demographic data were provided. However, out of 6771 observations of choices between the stairs and the elevator, 16% of observations were	Single-group, repeated-measures, observational design: Two worksites (office and paper factory) were chosen to receive the intervention. Baseline monitoring of stairs vs. elevator use was conducted for 2 weeks prior to the intervention. The intervention was 3 weeks long and participants were monitored for the entire period. A follow-up monitoring period occurred 1 week after the intervention had ended and was conducted for 2 weeks. During all monitoring periods, observations of stair vs. elevator use were made only between 8am and 10am and between 12pm and 2pm.	Theory: none. The intervention used environmental prompting to increase stair use. During the intervention period, large posters were placed at the entrance to the elevators on each floor and smaller posters were placed in the stairwell of each floor. There were four versions of the larger poster (e.g., "Free workout? The stairs. A good idea!") and two versions of the smaller poster (e.g., "One step closer to your energy balance. The stairs. A good idea!").	There was a significant increase in stair use from the baseline period to the intervention period, such that 33% chose the stairs over the elevator during baseline monitoring compared to 38% during the intervention. Stair use decreased significantly after the intervention, falling to 34% during the follow-up monitoring period (which was not significantly different from the baseline level). Overall, a greater percentage of women than men and a greater	Strengths of the study include consistent monitoring before, during, and after the intervention and a comparison between white- and blue-collar workers. Limitations of the study include the lack of control group and having only single coders at each site (and possible discrepancies between the coders at

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	of women and 84% of observations were of men.	Stair and elevator use was monitored by an observer situated inconspicuously in the ground floor hallway of each worksite with a view of the stairs and the elevator. The observer recorded the choice of stairs vs. elevator and whether the choice was made by a male or a female.		percentage of white-collar than blue-collar employees chose the stairs more frequently during each monitoring period. However, there was no interaction effect for either variable, suggesting that the intervention was associated with stair use independently of sex or job type.	each site). No distinction was made between stair ascent and descent, the sample was self-selected, and the study was also part of a larger intervention study directed at weight gain prevention, which may have biased the results, despite no other intervention components being implemented simultaneously (Kwak et al., 2007).
Kwak et al. (2009) [J Occ Env Med] Netherlands Research Program Weight Gain Prevention (NHF-NRG)-In Balance intervention.	489 employees from 12 worksites in the Netherlands. The sample was 53% female and 57% had a high education level. The intervention sample had a mean age of 39 years and a mean BMI of 25.6 kg/m^2 at baseline. The control sample had a mean age of 35 years and a mean BMI of 24.2 kg/m^2 at baseline.	Quasi-experimental, controlled, pre-test multiple post-test design: 6 worksites (n = 308) volunteered to receive the intervention and 6 worksites (n = 181) were matched as control sites based on socioeconomic status. The intervention was 1 year long. Assessments were conducted at baseline, at 12 months after baseline (the intervention endpoint), and at 24 months after baseline. 376 participants completed the 12-month follow-up and 303 participants completed the 24-month follow-up. Physical activity behaviour was measured using the validated Dutch short questionnaire to assess health-enhancing physical activity (SQUASH). Dietary behaviour (energy density and fiber intake) was assessed using an adapted version of the validated Energie en Vet (ENVET) list, a food frequency questionnaire, with additional questions added for this study.	Theories: self-regulation theory and implementation intention theory. The intervention included an individual component and a worksite (environmental) component. Both components were aimed at changing food intake and physical activity. *Individual interventions*: The individual component consisted of: ○ Monitoring and evaluation of body composition measures compared to standards ○ "In Balance box" with a pedometer, tape measure, calorie guide, physical activity and food intake diaries, and a steps-walked log ○ "In Balance" website, which included personalized advice for weight management ○ Two CD ROMs, which provided tailored feedback on energy-balance behaviours *Environmental interventions*: The environmental component was delivered by a worksite linkage board at	*Physical activity behaviours:* At baseline, the intervention group and control group spent a mean of 2662 minutes/week and 2878 minutes/week, respectively, in overall daily physical activity (including travel to work, work-related, household, and leisure time physical activity). At the 12-month follow-up, the intervention group had increased its overall physical activity significantly more than the control group (+401 minutes/week for the intervention group versus +191 minutes/week for the control group). Overall physical activity decreased in both groups at the 24-month follow-up, but the intervention group maintained a higher overall physical activity level than the control group (+276 minutes/week for the intervention group versus +84 minutes/week for the control group).	Strengths of the study include matching the intervention and control worksites on socioeconomic status, using an individual and an environmental approach, having a long-term (one year post-intervention) follow-up assessment, eliciting input and support from worksite linkage boards, and its focus on dietary behaviours of high importance to the target population (e.g., bread and sandwiches in the Netherlands). Limitations of the study include a low overall participation rate from worksites that were approached to participate (9%), a low participation rate of

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			each worksite, consisting of a representative from the research team and employees from the worksite who were in a position to influence change (e.g., cafeteria representative and dietitian). The worksite linkage board helped to support the adoption, implementation, and institutionalization of the intervention, and was able to choose environmental intervention activities appropriate to the specific worksite. Examples of activities include: ○ Changes to the food products available in the worksite cafeteria ○ Workshops ○ Prompts stimulating stair use ○ Forming lunch walking and cycling groups Participants at the control worksites were not given any part of the intervention and were contacted only for measurements during the 2-year study period.	*Dietary behaviours:* At the 12-month follow-up, the intervention group consumed significantly fewer sandwiches with high-energy dense fillings than at baseline, whereas the control group participants increased their consumption of sandwiches with high-energy dense fillings. The result was similarly significant at the 24-month follow-up. At the 24-month follow-up, the intervention group consumed significantly less low-fiber bread than at baseline, whereas the control group participants increased their intake of low-fiber bread. At the 24-month follow-up, the intervention group also consumed significantly more low-energy dense items during the main meal than at baseline, whereas the control group participants decreased their consumption of low-energy dense main meal items. There were no other significant differences between the intervention and control groups on the other fiber- and energy density-related behaviours assessed (e.g., high-fiber bread intake, high- and low-fiber main meals, and high- and low-energy density snacks and drinks).	individuals per worksite resulting in a possible selection bias, a non-randomized design, self-reported physical activity and dietary behaviour, and reports from worksites of limited time and resources and variations in intervention implementation (Kwak et al., 2009). It should be noted that, though the intervention was aimed at weight gain prevention in young adults, there was a relatively high response from older individuals (Kwak et al., 2009).
Kwak et al. (2010) [Int J Behav Nutr PA] Netherlands Research Program	553 employees from 12 worksites in the Netherlands. The intervention sample was 51% female, with a mean age of 39 years. 50% had a university	Quasi-experimental, controlled, pre-test multiple post-test design: 6 worksites (n = 365) volunteered to receive the intervention and 6 worksites (n = 188) were matched as control sites based on socioeconomic status. The intervention was 1 year long. Assessments were conducted at baseline, at 12 months after baseline (the intervention endpoint), and	The intervention is as described for Kwak et al. (2009).	Change in BMI did not differ significantly between the intervention and control groups at either the 12-month or the 24-month follow-up. However, there were significant differences between the intervention group and the	Strengths of the study include matching the intervention and control worksites on socioeconomic status, using an individual and an environmental approach, having a long-term (one year

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Weight Gain Prevention (NHF-NRG)-In Balance intervention.	education and the mean BMI was 25.7 kg/m^2. The control sample was 48% female, with a mean age of 35 years. 52% had a university education and the mean BMI was 24.2 kg/m^2.	at 24 months after baseline. 294 intervention and 164 control participants completed the 12-month follow-up and 255 intervention and 145 control participants completed the 24-month follow-up. Height and weight were measured and used to calculate BMI. Waist circumference was measured with a tape measure.		control group for waist circumference at both the 12-month and 24-month follow-ups. The intervention participants decreased their waist circumferences, whereas the control participants increased their waist circumferences over the study period.	post-intervention) follow-up assessment, and eliciting input and support from worksite linkage boards. Limitations of the study include a low overall participation rate from worksites that were approached to participate (9%), a non-randomized design, and a 28% drop-out rate over the 2-year period (Kwak et al., 2010). It should be noted that, though the intervention was aimed at weight gain prevention in young adults, there was a relatively high response from older individuals (Kwak et al., 2010).
Lara et al. (2008) [Prev Chr Dis] Pausa para tu Salud intervention.	335 health and social service office workers from the Mexican Ministry of Health (MMH) in Mexico. The sample was 62% female, with a mean age of 49 years (range of 18 to 87 years). The mean BMI at baseline was 27.8 kg/m^2 for women and 26.6 kg/m^2 for men.	Single-group, observational, pre-test post-test design: Employees provided data as part of routine annual clinical screening examinations conducted on all staff. The intervention had been implemented for 1 year at the time of follow-up. Assessments were conducted at baseline and 1 year after baseline. 271 employees completed the follow-up examination. Height and weight were measured and used to calculate BMI. Waist circumference was measured using a plastic tape measure.	Theories: social cognitive theory and social ecological models. The aim of the Pausa para tu Salud (Pause for your Health) intervention was to promote increased levels of physical activity and to introduce the habit of routine physical activity in the workplace. Daily 10-minute exercise breaks (pausas) were integrated into paid work time. Music for the breaks was broadcast over the worksite intercom system and employees performed the exercises in a supervised group. The breaks occurred at approximately 11-11:30am each day and initially consisted of light stretching and dance movements, with the intensity of activities increasing as the intervention progressed. The exercises were varied to	Overall, participants' weight decreased significantly by 1.0 kg over the intervention period. Participants' BMI also decreased significantly by 0.3 kg/m^2 and waist circumference decreased significantly by 1.6 cm from baseline to follow-up. However, when examining men and women separately, there was a significant decrease in weight and BMI for men only (-1.3 kg and -0.4 kg/m^2, respectively). The decrease in waist circumference from baseline to follow-up was significant for both men and women (-1.9 cm and -1.4 cm, respectively).	Strengths of the study include the use of group exercise for motivation and support, endorsement of the exercise breaks by the director of Health Promotion and Disease Prevention, and incorporating exercise into regular work hours. Limitations of the study include the lack of control group, no long-term follow-up after the intervention, an absence of information about exposure dose,

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			develop different types of strength, flexibility, and aerobic fitness. The MMH director of Health Promotion and Disease Prevention strongly encouraged all employees to participate in the breaks. Other intervention activities included posting stair prompts, distribution of written materials, and encouragement from management to engage in additional physical activity.		and no data regarding participants' physical activity outside of the workplace (Lara et al., 2008).
Lemon et al. (2010) [AJPM]	806 employees from 6 hospitals in Massachusetts. The sample was 81% female and 89% white, with 65% reporting an age of 41 years or older. 35% had a BMI of 30.0 kg/m^2 or greater at baseline.	Pair-matched, cluster-randomized, controlled design: 6 hospitals were paired and then randomized to the intervention group (n = 386) or the control group (n = 420). The intervention was 2 years long. Assessments were conducted at baseline and at 12- and 24-month follow-ups (i.e., at the midpoint and endpoint of the intervention). 344 intervention and 387 control participants completed the 12-month assessment, and 299 intervention and 349 control participants completed the 24-month assessment. Height and weight were measured and used to calculate BMI.	Theories: ecological framework and social cognitive theory. The aim of the intervention was to promote weight gain prevention through organizational and social norms related to healthy eating and physical activity at the worksite. At the intervention hospitals, employee and leadership advisory committees helped tailor the intervention to the specific hospital. Environmental strategies promoting physical activity included a social marketing campaign that consisted of a weekly newsletter, a website, and an information center with printed materials. Stairway signage was also used to promote stair use over elevator use. Indoor and outdoor walking routes were developed with accompanying maps, distances, and step counts. "Walks with the President" were offered, during which groups of employees could walk and chat with the president of the hospital for 20 minutes. Environmental strategies promoting healthy eating included posting signs in the cafeteria with nutritional information for most foods and beverages, consultation with a dietitian to increase the nutritional quality of the foods served in the cafeteria, and a weekly seasonal farmers' market. Interpersonal strategies included	There was no significant difference in change in BMI between the intervention group and the control group at either the 12-month or the 24-month follow-up.	Strengths of the study include a strong research design, a multifaceted ecological approach, and the use of employee advisory committees to obtain employee input. Limitations of the study include a low baseline response rate from eligible participants and employees' variable work schedules which made the formation of new interpersonal connections difficult (Lemon et al., 2010). Note: Though many of the study participants were classified as obese, the intervention was not targeted specifically toward obese individuals.

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			campaigns and team-based challenges aimed at increasing physical activity and healthy eating. A display, workshops, recipe books, and other printed material targeted individual knowledge, skills, and behaviours. The control hospitals did not receive any part of the intervention.		
Lowe et al. (2010) [Eating Behav]	96 employees from two hospitals in Philadelphia, Pennsylvania. The sample was 81% female, 54% white, and 39% black. The mean age was 44 years and the mean BMI at baseline was 29.7 kg/m^2.	Two-group, randomized, pre-test multiple post-test design: Participants were randomized to an environmental change (EC) condition (n = 49) or an environmental change plus energy density education and incentives (EC-plus) condition (n = 47). Randomization occurred within each worksite. The intervention period was 3 months long. Cafeteria intake data were collected for 2 months prior to the start of the intervention (baseline period) and for the 3 months of the intervention. Assessments were made at baseline, post-intervention, at a 6-month follow-up (6 months after the intervention had ended), and at a 12-month follow-up. Cafeteria intake (during lunch) was assessed with scan cards that participants used at the electronic cafeteria registers. General dietary intake was assessed using 24-hour dietary recalls. Weight was measured using an electronic scale. Waist circumference was measured using a tape measure. Body composition was assessed using bioelectric impedance analysis.	Theory: none. At the beginning of the intervention period for both conditions, some reduced energy density (ED) foods were introduced in the cafeteria and nutrition labeling was introduced for all foods sold in the cafeteria (previously, less than 10% of foods had nutritional information available). *EC intervention condition:* For EC participants, healthier choices were added to the cafeteria without removing any existing energy dense choices. Examples of lower ED foods that were introduced include low-fat mayonnaise, low-fat cheese, whole wheat buns, and steamed vegetables. Some existing food items were also modified to be less energy dense, such as a hamburger ("wellness burger") and sub sandwich ("wellness sub"). At least one main entrée and one side dish on the weekly cafeteria menu had to be low in energy density. A food labeling system was also introduced that provided nutritional information on all foods and beverages and used a colour-coding scheme that identified foods as being very low (green), low (yellow), medium (orange), or high (red) in energy density. *EC-plus intervention condition:* Participants in the EC-plus condition were exposed to all aspects of the EC condition. In addition, EC-plus participants attended	Results were reported for the baseline and post-intervention time points only (not the 6- or 12-month follow-up). *Cafeteria intake:* Over the monitoring period, there was a significant decrease in the energy content of lunch purchases of both the EC participants and the EC-plus participants (for both groups, a mean of 656 kcal at month 1 of baseline to a mean of 586 kcal at month 3 of the intervention). However, though all time points were significantly lower than baseline month 1, the remaining time points (baseline month 2, intervention months 1-3) were not significantly different from each other. The decrease in energy was not significantly different between the EC and the EC-plus condition. There was also a significant decrease in the percentage of energy from fat from baseline month 1 to intervention month 3 (for both groups, a mean of 45% to a mean of 39%). Again, the decrease was not significantly different between the EC and EC-plus condition. There was no significant change in the percentage of energy from	Strengths of the study include a strong research design with multiple post-intervention follow-ups, the major environmental changes made to the hospital cafeterias, and the scan cards used to objectively monitor cafeteria food purchases (Lowe et al., 2010). Limitations of the study include the lack of a true control group, high attrition rates (20% at post-intervention, 34% at 6-month follow-up, and 43% at 12-month follow-up), the confounding effect of having lunch purchases monitored, possible contamination across conditions (because participants were from the same worksites), and the inability to quantify food waste (Lowe et al., 2010).

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			four 1-hour group education sessions on the principles of energy density and how to apply the principles to their diet. The food labeling system was also explained in terms of energy density. Handouts were provided that summarized the content of each education session. EC-plus participants were also given a discount of 15% on low energy dense foods and 25% on very low energy dense foods.	protein or from carbohydrates. *24-hour dietary recalls:* There were no significant differences in energy density between the baseline and intervention period for either condition. However, there was a significant difference in fruit intake over time between the EC and EC-plus conditions, such that the EC group decreased its mean fruit intake (1.4 to 1.0 servings/day) and the EC-plus group increased its mean fruit intake (0.8 to 1.0 servings/day). Both conditions also showed a significant decrease in daily servings of meat over the monitoring period (data were not shown). *Anthropometric data:* When controlling for baseline weight, there was no significant change in weight at any time point in either condition. Additionally, there were no significant changes in waist circumference or body composition at any time point in either condition.	
Meyer et al. (2010) [Eur J CV Prev Rehab]	77 employees from the University Hospital of Geneva, Switzerland. All employees had an inactive lifestyle at baseline (< 2 hours/week of physical activity). The sample was 55% female, with a mean age of 43 years. The mean	Single-group, pre-test multiple post-test design: Employees volunteered to participate in the study. The intervention was 12 weeks long. Assessments were conducted at baseline, 12 weeks after baseline (at the end point of the intervention), and 6 months after baseline (3 months after the end point). 69 participants completed the 12-week follow-up and 62 participants completed both follow-ups. Height and weight were measured and	Theory: none. The purpose of the intervention was to have participants use the stairs instead of the elevators during normal working hours for 12 weeks. A hospital-wide campaign to promote stair use was implemented at the beginning of the intervention. Posters with positive messages were displayed and floor stickers were positioned at the point-of-choice between the stairs and the elevators on each floor (the hospital was 12 stories tall). Participants wore badges to identify	At the 12-week follow-up, the median number of ascended and descended one-story staircases was 20.6/day, which was significantly higher than the 4.5/day at baseline. Participants also showed significant changes in body weight (-0.7%), BMI (-0.7%), fat mass (-1.5%), and waist circumference (-1.7%). There were no significant changes from baseline to the 12-week follow-up in diet or total physical activity	Strengths of the study include a relatively low attrition rate and an objective assessment of physical activity (i.e., accelerometer). Limitations of the study include the lack of control group, small sample size, and self-selection by participants (Meyer et

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	BMI at baseline was 25.7 kg/m^2.Most participants were physicians or nurses.	used to calculate BMI. Waist circumference was measured with a measuring tape. Body composition was assessed with bioelectrical impedance. Diet was assessed using a validated food frequency questionnaire. Physical activity was assessed using a validated physical activity questionnaire. Stair use was recorded in a physical activity diary. Participants also wore an accelerometer to objectively assess physical activity (only periods between 8 am and 9 pm were analyzed).	their involvement in the study. No specific instructions were given regarding a desired number of ascended or descended staircases, physical activity outside of the intervention, or dietary habits. No control group was used due to the likelihood of contamination from the hospital-wide campaign.	(assessed by either questionnaire or accelerometer). At the 6-month follow-up, the median number of ascended and descended staircases had fallen to 7.2/day, but this was still significantly higher than the baseline level. Only the change in fat mass (-1.4%) remained significantly different from the baseline value.	al., 2010).
Milani & Lavie (2009) [Am J Cardiol]	308 employees and 31 spouses from two geographically separate worksites within the same company in Louisiana. The intervention sample was 52% male, with a mean age of 40 years (range of 23 to 65 years). The mean BMI was 28.6 kg/m^2. The control sample was 53% male, with a mean age of 43 years (no range provided). The mean BMI was 28.2 kg/m^2.	Randomized, controlled, pre-test post-test design: Employees and spouses were randomized by family units into the active intervention group (n = 185) and the usual care (control) group (n = 154). The intervention was 6 months long. Assessments were conducted at baseline and at the end of the intervention (6 months later). Three participants from the intervention group dropped out of the study. A risk evaluation conducted by health educators and nurses was used to obtain height and weight data (used to calculate BMI) and percent body fat. Health parameters were evaluated in the intervention participants only, as they were not the primary outcomes of interest in the study.	Theory: none. The active intervention consisted of various components and was implemented by health educators, dietitians, exercise physiologists, psychologists, and nurses. A month prior to the intervention, newsletters were sent out to employees describing the intervention, employee teams were formed, and team leaders were selected. During the intervention, on-site classes were offered weekly and covered nutritional education, fitness counseling, weight control, worksite and home safety, and general health measures. Awards were given out for significant milestones in behaviour change. A group competition was held, with awards (e.g., vacation days and other job related perks) given to the groups with the best outcomes. Monthly newsletters were distributed, each with a different health-related theme. Worksite lunch-and-learn programs were offered, at which free health-related premiums were given out to encourage attendance. There was no information provided on the usual care (control) condition.	There was no significant change in BMI among intervention participants from baseline to the end of the intervention. However, there was a significant decrease in body fat percentage among intervention participants from baseline (27%) to the end of the intervention (24%).	Strengths of the study include a low attrition rate and the expertise of a team of health professionals. Limitations of the study include the lack of control group for assessing health parameters, possible contamination due to interaction between the employees in the two groups, and a highly motivated and stable workforce that may not be representative of a typical worksite (Milani & Lavie, 2009).

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Naito et al. (2008) [Atherosclerosis]	2866 employees from 10 companies in Japan. The intervention sample was 80% male, with a mean age of 43 years and a mean BMI of approximately 23.0 kg/m^2 at baseline. The control sample was 86% males, with a mean age of 40 years and a mean BMI of approximately 22.6 kg/m^2 at baseline.	Controlled, pre-test post-test design: Worksites were allocated to the intervention group (n = 1014) or control group (n = 1852). The intervention was approximately 4 years long. Assessments were conducted at baseline and yearly thereafter, for a total of 5 assessments. Only the baseline and year 5 data (at the endpoint of the intervention) were analyzed in this article. Biologic data (including BMI) were collected during annual health examinations. Physical activity was assessed using a questionnaire.	Theory: none. The intervention targeted three areas: nutrition, physical activity, and cigarette smoking. This article focused on the physical activity component. Three strategies were used, including presenting the participants with information on physical activity, implementing a campaign to increase physical activity, and providing tools for walking. *Presenting information on physical activity:* A freestanding mini-poster presentation was set up in each intervention cafeteria near the point-of-purchase and the information was changed weekly. Wall posters were also mounted around the worksites. A website and intra-workplace newspapers were also used to present relevant information to participants. *Campaign to increase physical activity:* An "active point campaign" that used pedometers was implemented twice a year for 2 consecutive months each time. Participants self-reported their physical activity into a diary during this time. Lectures and instructions on active walking, stretching, and dumbbell exercises were also provided. In addition, sporting events were offered at the worksites. *Providing tools for walking:* A walking path was constructed at each intervention worksite. Participants were given maps for walking routes at the worksites and pedometers to self-monitor their physical activity. The control group was provided with individual intervention teaching materials only.	There was no significant difference in BMI from baseline to year 5 in either the intervention or the control group. At baseline, 14% of intervention participants and 15% of control participants reported that their daily walking time was less than 30 minutes. At year 5, there was a significant difference between the intervention and control participants, such that a greater percentage of intervention participants had increased their walking time at year 5 (29%) compared to control participants (26%), whereas a smaller percentage of intervention participants had decreased their walking time at year 5 (19%) compared to control participants (26%). Daily walking times increased significantly from baseline to year 5 in the intervention group, whereas there was no significant difference in walking times from baseline to year 5 in the control group (no specific data were provided).	Strengths of the study include a large sample size, a long intervention period, and a multi-component intervention that used an individual and environmental approach. Limitations of the study include non-random allocation to the intervention and control groups and self-reported physical activity that was not defined quantitatively and only in terms of walking behaviour (Naito et al., 2008).

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Napolitano et al. (2006) [J Comm Hlth]	The intervention targeted 6300 male and female employees between 18 and 65 years old from two worksites (hospital and office building) in Providence, Rhode Island. The worksites were 74% female.	Single-group, pre-test post-test design: Two worksites were chosen to participate based on characteristics of the worksites and their proximity to a local walking path upon which the intervention was based (i.e., Path to Health). The intervention campaign was 1 month long. Assessments were conducted during a baseline period (2 weeks), during the intervention campaign (4 weeks), and post-intervention (2 weeks). Counts of path use were conducted by an inconspicuous observer. Observations were made in 15-minute blocks at 10am, 12pm, and 2:30pm at four observation sites.	Theories: social cognitive theory, gain-frame theory, and social marketing techniques. The intervention was designed to increase awareness and promote the use of an existing local walking path (Path to Health) in an urban environment. Promotion of the Path to Health was conducted in collaboration with an existing worksite wellness program. Employees were reached using email messages, weekly flyers posted in various locations throughout the worksites, information booths and table tents in the worksite cafeterias, and posting information on the worksite intranet. Information booths were used as a means of distributing Path to Health information, incentives, and surveys about the intervention. Researchers also organized walks along the Path to Health to demonstrate its convenience and encourage its use.	There were marginally significant increases in walking activity (counts of path use) from baseline to the intervention period ($p = .07$) and from baseline to follow-up ($p = .08$). The counts during the intervention were almost three times the baseline counts and the counts during follow-up were approximately three and a half times those observed during baseline monitoring. Specific counts of path use were reported.	Strengths of the study include a strong theoretical basis and the use of multiple promotional methods to expose employees to an existing community resource. Limitations of the study include the lack of control group, a member of the general public potentially being counted as an employee on the path, no information on the type of path user (e.g., male vs. female), and a short intervention period (Napolitano et al., 2006).
Nicoll & Zimring (2009) [J Pub Hlth Policy]	Approximately 1700 employees in the California Department of Transportation (Caltrans) building in Los Angeles, California. The sample was 70% male, 34% white, 35% Asian, 6% black, and 11% Hispanic, with 53% of participants falling between 40 and 54 years old. 90% had a college degree.	Two-group observational design (natural experiment): Stair use was compared in two circulation cores in the Caltrans building (one circulation core with skip-stop stairs and one with enclosed fire stairs; see Intervention column for a description of the circulation cores). Stair use was measured between four floors of the 13-floor building (floors 4 to 8) over a 24-week period. A follow-up survey was administered approximately 3 months after the observation period had ended. Skip-stop stair use was measured using active infrared monitors attached to the underside of handrails on the skip-stop stairs. Enclosed fire stair use was measured using card-reader activity reports of stair access for the enclosed fire stairs. Stair use was also measured using an email-based survey that used questions from the Physical Activity	Theory: none. The Caltrans building provided a setting for a natural experiment examining how building-level environmental characteristics were associated with stair use. The Caltrans building was separated into two vertical circulation cores, with each core serving one half of the building. One core had skip-stop elevators that only stopped on every third floor and an adjacent open staircase that provided access to floors not serviced by the elevator. The skip-stop core also had an elevator available for those who could not physically use the stairs, but access was restricted to those with a security pass. The other core had six conventional elevators that stopped on every floor and an enclosed fire exit stairwell. The design of the building was meant to increase personal interaction and cohesion	During the 24-week observation period, the open skip-stop stairs were used 33 times more frequently than were the enclosed fire stairs (117,619 times compared to 3570 times). Of the 299 employees who completed the follow-up survey, 73% reported using the stairs daily, ranging from one to 3 flights (69%) to 4 to 6 flights (31%) per day. Other measured physical activity behaviours (e.g., moderate physical activity and vigorous physical activity) were not related to the number of flights of stairs traveled by employees.	Strengths of the study include using existing unique environmental characteristics of an office building to examine stair use. Limitations of the study include the uncontrolled design and a low response rate (17%) on the follow-up survey (Nicoll & Zimring, 2009). The unique features of the Caltrans building may also limit the generalizability of the findings to other office buildings (Nicoll & Zimring, 2009)

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		Questionnaire and specific questions related to the Caltrans building.	among employees, to increase physical activity, and to decrease non-productive time spent waiting for elevators.		
Perez et al. (2009) [Prev Chr Dis] The Healthy Employee Lifestyle Program (HELP) intervention.	1017 state health and human services employees from Arkansas. The sample was 88% female and 75% white. 46% were between 20 and 44 years old and 53% were between 45 and 64 years old. The mean BMI at baseline was 30 kg/m^2.	Single-group, pre-test post-test design: A 1-year pilot test was conducted to assess the effectiveness of the intervention. Assessments were conducted at baseline and at follow-up (the end of the intervention). 214 participants completed both the baseline and follow-up assessments. Dietary habits were measured using Health Risk Analysis (HRA) surveys, which assessed the frequency of consumption of fat, sweets/desserts, fruits, vegetables, protein, grains, dairy, processed meats, and fried foods.	Theory: transtheoretical model of behaviour change. The program was implemented by coordinators at the state, regional, and worksite levels. They provided trainings, managed the HELP intervention web-based system, and distributed materials and information to other coordinators and program participants. Coordinators also organized the distribution of educational information regarding healthy eating and physical activity, state and agency health events, lunch-and-learn sessions, and other health promotion activities. Participants reported their progress through the web-based system. They earned points for self-reported F&V consumption, physical activity, smoking cessation, completion of age-appropriate health screenings, weight management, and completing HRAs. Participants' activities could be reported daily, weekly, or monthly and the web-based system maintained a tally of the points earned for each participant. Points could be redeemed for rewards such as t-shirts, water bottles, and up to 3 days paid leave.	There was a significant increase in the percentage of participants who consumed 3 or more servings of vegetables per day from baseline (14%) to follow-up (26%). There was also an increase in the percentage of participants consuming 3 or more servings of fruit per day from baseline (11%) to follow-up (17%), but the change was not significant ($p = .08$). There were no significant changes in participants' consumption of fat, sweets/desserts, protein, grains, dairy, processed meats, or fried foods from baseline to follow-up.	Strengths of the study include support from various levels (state, region, and worksite) and using a points system and incentives to motivate participants. Limitations of the study include the lack of control group, a low response rate, and self-reported dietary intake (Perez et al., 2009). Note: Though many of the study participants were classified as overweight or obese (75%), the intervention was targeted toward all employees and not specifically toward overweight and obese individuals.
Polacsek et al. (2006) [Prev Chr Dis] Move & Improve intervention.	This study examined two cross-sectional cohorts of intervention participants from worksites (as well as from schools and community organizations) in Maine. The 2003 cohort was 87% female, with 63%	Cross-sectional design with two time points: The Move & Improve intervention was a 12-week program that began in March each year. In 2003, 317 (31%) of employees who completed the intervention volunteered for the assessment. In 2004, 902 (14%) of employees who completed the intervention volunteered for the assessment. Non-participant comparison groups were also assessed in each year (n = approximately 100 for each). Assessment surveys were administered	Theories: Centers for Disease Control and Prevention's *Framework for Program Evaluation in Public Health* and community-based participatory research principles. Volunteer worksite coordinators were chosen at each worksite and encouraged participants to engage in at least 30 minutes of physical activity for at least 4 days per week for a minimum of 8 weeks of the 12-week program. Participants tracked their physical activity either on paper or through an online activity log.	In 2003 and 2004, 41% and 62% of participants, respectively, reported weight loss at the end of the intervention. 40% and 50%, respectively, reported increased F&V consumption and 33% and 45%, respectively, reported decreased fat intake at the end of the intervention. No comparison non-participant data were provided. In the 3 months before beginning	Strengths of the study include the use of existing community resources to promote the intervention (e.g., local television and newspapers) and the effort to include a comparison sample. Limitations of the study include the cross-sectional study design,

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	reporting an age of 45 years or older. The 2004 cohort was 75% female, with 53% reporting an age of 45 years or older.	post-intervention by mail (2003) and online (2004). Weight loss and F&V and fat intake changes were assessed by participants self-reporting whether they had increased, decreased, or not changed the behaviour. Physical activity changes were assessed using a five-level categorization system based on the stages of change. Pre-intervention levels were determined by participants' recall at post-intervention.	Encouragement and tips were provided throughout the program. The program also provided participants with the opportunity to engage in community-based stretch breaks at the local mall, monthly walking clinics/clubs, exercise programs, fitness assessments, and educational sessions. Various tools were used to disseminate helpful information to participants, including a quarterly newspaper (with a tip of the week, healthy recipes, nutritional information, and book reviews) and a weekly online newsletter. At the community level, intervention messages were shared through local television and newspapers.	the intervention, over half of participants in both cohorts reported no or minimal regular physical activity. At post-intervention, only approximately 5% of participants from both cohorts reported being inactive or minimally active, compared to 27% of comparison non-participants in 2004. In 2004, 61% of participants reported they had increased their stage of change for physical activity by at least one stage, compared to the majority of comparison non-participants reporting no increase in stage of change for physical activity. Similar results were reported for the 2003 (no specific data were provided).	participant self-selection for the assessments, small comparison groups, and a lack of adequate resources for evaluation (Polacsek et al., 2006). The study was also limited by low response rates, self-reported data, using measures without demonstrated reliability and validity, and relying on participant recall for pre-intervention data.
Racette et al. (2009) [Prev Med] Worksite Opportunities for Wellness (WOW) intervention.	123 employees from 2 worksites within a large medical center in St. Louis, Missouri. The sample was 88% female, with a mean age of 45 years (range of 25-64 years). At baseline, 81% of the sample was classified as overweight or obese (BMI ≥ 25.0 kg/m^2), with the mean BMI falling at 32.9 kg/m^2.	Randomized, controlled, pre-test post-test design: The worksites were randomized to the intervention group (intervention + assessment, n = 68) or the control group (assessment only, n = 55). The intervention was 1 year long. Assessments were conducted at baseline and at a follow-up 1 year later (at the end of the intervention), except for the behavioural questionnaires, which were also administered at the 6-month mark. Height and weight were measured and used to calculate BMI. Body composition (fat mass) was measured using bioelectrical impedance. F&V intake was assessed using the National Institutes of Health Fruit and Vegetable Screener. Fat intake was assessed using Kristal Fat and Fiber Behavior Questionnaire. Physical activity was assessed using the International Physical Activity Questionnaire.	Theory: transtheoretical model of behaviour change. A WOW worksite coordinator was employed at each worksite. After randomization, the results of each participant's baseline personal health assessment were distributed to him or her (for individual and control groups). The intervention began at the intervention worksite with a kick-off event, which was comprised of various nutrition and physical activity components and incentives for participants. Specific components implemented throughout the intervention included providing pedometers to participants, an on-site group exercise program, a weekly healthy snack cart, Weight Watchers group meetings, monthly lunchtime seminars, monthly newsletters, walking maps, team competitions, participation cards, and participation	At baseline, the intervention group had a significantly higher mean BMI, weight, and fat mass than did the control group. From baseline to follow-up, decreases in BMI were significantly greater in the intervention group (34.5 to 34.1 kg/m^2) than in the control group (31.1 to 31.2 kg/m^2). From baseline to follow-up, decreases in weight were significantly greater in the intervention group (92.4 kg to 91.6 kg) than in the control group (84.5 kg to 85.1 kg). From baseline to follow-up, decreases in fat mass were also significantly greater in the intervention group (43.6 kg to	Strengths of the study include a multi-faceted intervention program and the use of various individual and environmental strategies. Limitations of the study include a very small number of male participants, self-reported diet and physical activity behaviour, medication use acting as a potential confounder, and a 19% attrition rate (Racette et al., 2009). It should also be noted that there was a large baseline difference between the intervention and

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			rewards (e.g., kitchen gear and exercise gear of varying values). A registered dietitian/exercise specialist was available to participants each week. An employee advisory committee was formed and helped to guide and implement the intervention. Though the intervention components were not individually tailored to each participants' stage of change, the variety of activities were designed to address the different stages of change overall. The control worksite received the assessments only.	42.9 kg) than in the control group (33.9 kg to 34.2 kg). Intervention participants significantly increased their F&V consumption over the intervention period (4.7 servings/day at baseline, 7.8 servings/day at 6 months, and 7.0 servings/day at 1 year). Smaller but significant increases in F&V consumption were also seen in the control group (4.3 servings/day at baseline, 5.3 servings/day at 6 months, and 5.1 servings/day at 1 year). Intervention participants significantly decreased their intake of saturated fat, fatty meats, and fried foods at 6 months and 1 year compared to baseline. Control participants showed smaller, but significant decreases in saturated fat intake as well. No specific data were reported. Intervention participants significantly increased their total physical activity, including significant increases in time spent walking and time spent in moderate (but not vigorous) physical activity. Control participants showed smaller but significant improvements in time spent in moderate physical activity only.	control groups in anthropometric data and that the changes in BMI, though significant, were quite small. Note: Though many of the participants were classified as overweight or obese (81%), the intervention was targeted toward all employees and not specifically toward overweight and obese individuals.
Renaud et al. (2008) [Can J Pub Hlth]	270 employees from a financial organization in Quebec. The sample had a mean age of	Single-group, pre-test post-test design: Employees volunteered to participate in the 3-year intervention. Assessments were conducted at baseline and at the end of the intervention.	Theory: none. The intervention used a personalized approach and involved management as both promoters of the program and as participants. The intervention consisted of	From the first module to the last module, there was a significant increase in the percentage of participants who reported engaging in physical activity on 5 or more days per week (17% to	Strengths of the study include strong support of employee participation from management and the range of health

Author(s) and date	Sample	Research method and measures	Intervention	Relevant results	Comments
Take care of your health! intervention.	approximately 41 years. No other demographic data were reported.	Physical activity, F&V, whole grain, and fat consumption, and a global health score (reflecting optimized health) were assessed using a self-administered health assessment survey.	six modules on various topics, including global health (two modules), stress management, heart health, healthy eating, and physical activity. Each module included a 1.5 to 2 hour education session delivered by a health professional and completion by participants of a self-administered health assessment on the topic of the module. A personalized health status profile was created based on the participants' self-assessment and was sent to participants approximately 4 weeks after the module. A telephone follow-up with a nurse regarding the profile was also available for interested participants. During the last year of the intervention, a physical activity challenge was also implemented at the worksite. Employees participated in the modules during regular work hours and managers organized replacements to encourage participation. Though participation was voluntary, it was strongly encouraged by management.	28%). There was also a significant increase in the percentages of participants who reported eating 3 or more servings of fruit per day (21% to 29%), eating 3 or more servings of vegetables per day (17% to 30%), eating whole grain products everyday (49% to 57%), and limiting the amount of fat in their diet often (44% to 60%). Participants' mean global health score also increased significantly from the first to the last module (62/100 to 70/100).	behaviours that were targeted. Limitations of the study include the lack of control group, self-reported health behaviours, and the absence of a long term follow-up.
Siegel et al. (2010) [AJPH]	413 employees from 16 school worksites in Los Angeles, California. The intervention sample was 83% female, 20% white, 4% black, and 61% Hispanic, with a mean age of 40 years. 42% had a Master's degree or above. The mean BMI was 28.4 kg/m^2 and 64% were classified as overweight or obese at baseline. The control sample was 74% female, 27% white, 10% black, and 45%	Randomized, controlled, pre-test post-test design: 16 worksites were randomized to the intervention group (n = 8) or the control group (n = 8). The intervention was 2 years long. Assessments were conducted at baseline and post-intervention. 340 participants completed the post-intervention assessment (125 of whom had completed the baseline questionnaire). Height and weight were measured and used to calculate BMI. Physical activity was assessed using the International Physical Activity Questionnaire Short Form. F&V consumption was assessed using the National Cancer Institute's All-Day Screener food frequency questionnaire.	Theory: social cognitive theory. Before the intervention began, employees at the intervention schools were given a brief survey to identify the types of wellness activities that interested them and their scheduling preferences. Each intervention worksite then developed a worksite wellness committee to help tailor and implement intervention activities. Committees were comprised of teachers, administrative staff, and support staff, and met approximately every other month. A member of the research team served as a school liaison at each worksite and attended all meetings and supported the committee in general. Intervention school worksites were given a $3500 stipend per year, dependent on providing data, to subsidize wellness activities. Most intervention activities were aimed at improving diet and physical activity habits.	There was a significant association between the intervention and BMI, such that participants in the intervention schools decreased their mean BMI by 0.14 kg/m^2 over the intervention, compared to an increase of 0.42 kg/m^2 in the participants at the control schools. The difference remained significant after controlling for age, ethnicity, and job classification, such that intervention school participants decreased their mean BMI by 0.04 kg/m^2 and control school participants increased their mean BMI by 0.37 kg/m^2. There were no significant differences between the intervention and control schools	Strengths of the study include a strong theoretical basis, the randomized, controlled design, and the participatory process used to stimulate involvement in the intervention (e.g., the worksite wellness committees). Limitations of the study include self-reported behavioural data, a mixed longitudinal/cross-sectional design (not all participants in the analysis had completed both assessments), and poor communication

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	Hispanic, with a mean age of 40 years. 42% had a Master's degree or above. The mean BMI was 27.9 kg/m^2 and 57% were classified as overweight or obese at baseline.		In addition to activities planned by the worksite wellness committees, the research team implemented several activities at the intervention schools, including an inter-school competition based on participation levels, healthy cooking classes, and a quarterly newsletter. Control school worksites were given an unrestricted $1000 stipend at baseline and post-intervention. No intervention activities were implemented.	for physical activity or F&V consumption.	between some committees and school principles (Siegel et al., 2010). Note: Though many of the participants were classified as overweight or obese (81%), the intervention was targeted toward all employees and not specifically toward overweight and obese individuals.
Slootmaker et al. (2009) [J Med Int Res]	102 employees from 8 worksites in and around Amsterdam, the Netherlands. The sample was 60% female, with a mean age of 32 years (range of 23 to 39 years). 65% was highly educated and 67% reported being compliant with physical activity recommendations (at least 150 minutes of moderate intensity physical activity per week). The mean BMI at baseline was 25.2 kg/m^2.	Randomized, controlled, pre-test multiple-post-test design: Baseline physical activity was measured for 2 weeks and employees who were in the lower active half were invited to participate in the study. Interested participants among the invited group were then randomized to the intervention group (n = 51) or the control group (n = 51). The intervention was 3 months long. Assessments were conducted at baseline, immediately post-intervention, and at a follow-up 5 months after the end of the intervention. Physical activity (of light, moderate, and vigorous intensity) was assessed using the self-report Activity Questionnaire for Adolescents and Adults. Height and weight were measured and used to calculate BMI.	Theory: none. The intervention was based on the idea that many inactive people are not aware that they are not sufficiently active and providing insight into their physical activity levels may stimulate a more physically active lifestyle. At the beginning of the intervention period, both the intervention and control participants were asked to increase their physical activity levels. The control participants were given a one-page brochure that briefly described general physical activity recommendations. The intervention participants were given a Physical Activity Monitor (PAM), a uni-axial accelerometer that provides a single index score of physical activity, as well as a web-based tailored physical activity advice program (PAM COACH). The purpose of the PAM was to raise participants' awareness of and to provide feedback on their physical activity levels, with the intention of stimulating increased physical activity. Intervention participants entered their personal data and perceived physical activity barriers into the PAM COACH program during the first week and, based	There were no significant differences between the intervention and control participants in any intensity level of physical activity at either the end of the intervention or the 5-month follow-up. There was also no significant difference between the intervention and control participants in change in BMI at the end of the intervention or at the 5-month follow-up.	Strengths of the study include providing participants with objective feedback on their physical activity levels (i.e., using the PAM) and the randomized, controlled design. Limitations of the study include self-reported physical activity levels (though the self-reported data were confirmed with the PAM data), a potential ceiling effect due to the high compliance to physical activity recommendations at baseline (67%), and characteristics of the PAM that limit detection of certain physical activity movements (e.g., cycling) (Slootmaker et al., 2009).

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			on their uploaded PAM score for the first week, were provided with tailored physical activity goals for subsequent weeks. The tailored goals were updated as additional PAM data were uploaded and were accompanied by advice and motivational tips. Computers with the PAM software were available at the worksites and the PAM website could also be accessed from the participants' homes.		Note: The study sample was younger than the range indicated in the inclusion criteria.
Sorensen et al. (2005) [AJPH] Healthy Directions-Small Business (HD-SB) intervention.	1740 employees from 26 manufacturing worksites in Massachusetts. The sample was 66% male and 68% white, and 83% had more than 4 years of college education. The mean age was 44 years. The majority (87%) were above 185% of the poverty guideline. The sample included workers (83%) and managers (17%).	Randomized, controlled, pre-test post-test design: 26 worksites were pair-matched based on whether they were unionized or non-unionized and were then randomized to the intervention condition (n = 13) or the minimal intervention (control) condition (n = 13). Two worksites were lost to follow-up, leaving 12 worksites in each condition. The intervention was 18 months long. Assessments were conducted at baseline and follow-up (18 months post-baseline). 1408 participants completed the follow-up assessment and 974 participants completed both the baseline and follow-up assessments. F&V consumption was measured using a screener developed for the National Cancer Institute's 5-a-Day for Better Health studies. Red meat consumption was measured using an abbreviated food frequency questionnaire. Physical activity was measured using an adapted version of the self-report questionnaire used in the Nurses' Health Study.	Theories: socio-ecological framework to address multiple levels of influence; theories related to employee participation. The intervention included: *Participatory strategies*: Employee advisory boards (EABs) were formed, which included workers, managers, health/safety, and other departments. EABs helped to plan and deliver the intervention. *Socio-context approaches*: At the individual/ interpersonal level, integrated interventions were offered that emphasized nutrition, physical activity, and occupational health. Activities focused largely on individual risk factors. Social support for behaviour change came from coworkers, managers, and educational materials for workers' families. At the environmental/ organizational level, interventions tried to create a supportive work environment for healthy eating and physical activity, smoking cessation, and reducing exposure to hazardous materials. Project staff and worksite managers developed and adopted polices for offering healthy food options at meetings and events, providing facilities for meeting physical activity recommendations, and maintaining a smoke-free worksite. *Addressing multiple cultures and low*	Overall, there was no significant difference between the intervention and control groups for the percent change in participants who reported eating ≥ 5 servings of F&Vs/day. However, when occupational class (worker vs. manager) was taken into account, there was a significant difference between the intervention and control groups for both managers and workers reporting ≥ 5 servings of F&Vs/day. Among the workers, the percent change was significantly higher in the intervention group (14% to 22%) than in the control group (13% to 14%). Among managers, the percentage in the intervention group reporting ≥ 5 servings of F&Vs/day decreased (20% to 15%), whereas the percent in the control group reporting ≥ 5 servings of F&Vs/day increased (8% to 12%), resulting in a significant difference between the two groups. Thus, the intervention seemed to be more successful in increasing F&V intake among workers than among managers. Overall, there was no significant difference between the	Strengths of the study include a randomized, controlled design, a multi-ethnic sample, high response rates, and the use of validated measures of behavioural outcomes (Sorensen et al., 2005). Limitations of the study include insufficient statistical power to confidently detect intervention effects among subgroups (Sorensen et al., 2005) and the use of only self-report rather than objective measures of diet and physical activity.

Author(s) and date	Sample	Research method and measures	Intervention	Relevant results	Comments
			literacy levels: Interventions were delivered in an inclusive and non-stereotyping way and relied as little as possible on written materials (to be more accessible to participants with lower literacy levels).	intervention and control groups for the percent change in participants who reported eating ≤ 3 servings of red meat/day. However, when examined by sex, the intervention effect was significantly larger among women than men, such that women reported greater decreases in red meat consumption compared to men (specific data were not reported). When examined by education level, the intervention effect was significantly larger among those with lower education levels (i.e., high school or some post-high school) than among those with higher education levels (i.e., college degree or more). The percentage of intervention participants with either a high school education or some post-high school education who reported eating ≤ 3 servings of red meat/day increased by 7% and 5%, respectively (compared to a 5% increase and 3% decrease, respectively, among control participants). The percentage of participants with a college education or more who reported eating ≤ 3 servings of red meat/day decreased by 6% (compared to an 11% increase among control participants).Thus, the intervention seemed to be more effective in decreasing red meat consumption among those with lower levels of education. Overall, there was no significant difference between the intervention and control groups for the percent change in participants who reported being	

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				active for at least 2.5 hours/week. However, after controlling for poverty status, the percentage of participants reporting at least 2.5 hours of physical activity/week significantly increased in the intervention group (64% to 72%) compared to the control group, which decreased (76% to 66%).	
Sorensen et al. (2007) [AJPH] Healthy Directions intervention.	974 employees in small businesses and 1954 employees in health centers in Boston, Massachusetts. The small business sample was 66% male and 69% white, with a mean age of 44 years. 20% had an undergraduate degree or greater and 47% had a high school education or less. 83% were in non-manager positions. 87% were above 185% of the poverty line. The health center sample was 66% female and 60% white, with a mean age of 50 years. 39% had an undergraduate degree or greater and 27% had a high school education or less. 46% worked in	Two randomized, controlled trials, using the worksite as the unit of randomization (the Small Business (SB) study and the Health Centers (HC) study). See Sorensen et al. (2005) for a description of the research methods for the SB study. In the HC study, 10 worksites were randomized to either the intervention or control group. The intervention was 18 months long. Assessments were conducted using cross-sectional surveys at baseline and at follow-up (18 months after baseline). F&V consumption was measured in both studies using a screener developed for the National Cancer Institute's 5-a-Day for Better Health studies.	Theories: socio-ecological framework to address multiple levels of influence; theories related to employee participation. The intervention for the SB study is as described for Sorensen et al. (2005). The intervention for the HC consisted of the following components: 1. An endorsement of the study from the participant's physician at a scheduled visit, as well as the provision of personalized instructions for the recommended health behaviour changes. 2. An initial counseling session with a health advisor. 3. Four follow-up telephone counseling sessions with the health advisor. 4. Six sets of personalized materials directed toward low-literacy users and targeting social contextual factors (e.g., social support, occupational status, and neighbourhood safety concerns). 5. Connections to relevant local activities. The intervention was offered in English and Spanish.	In both studies, the intervention group showed significantly greater increases in F&V intake from baseline to follow-up than did the control group. Among the SB participants, the baseline F&V intake was 3.3 servings per day. Among HC participants, the baseline F&V intake was 3.2 servings per day. Participants in the SB intervention group increased their F&V intake by 0.4 servings per day, compared to a very small increase in the SB control group. Similarly, participants in the HC intervention group increased their F&V intake by 0.3 servings per day, whereas the HC control group decreased their intake slightly. After controlling for baseline intake, intervention group, and randomization unit, increases in F&V intake among SB participants were significantly associated with being female (-0.3 servings for men), food sufficiency (+0.5 servings), less crowding in the household (+0.4 servings), having a single head of the household (-0.6 for not having a single head of household), having more positive social norms for F&V intake (+0.4	Strengths of the study include examining multiple indicators of F&V consumption, a multiethnic sample, and using two different workplace settings (small businesses and health centers) (Sorensen et al., 2007). Attention was also paid to literacy levels and the HC intervention was offered in two languages. Limitations of the study include a self-report measure of F&V intake and a possible floor or ceiling effect due to a limited number of items (only 7) in the measure (Sorensen et al., 2007). In addition, the interventions implemented in the two settings were different and thus the findings cannot be generalized from one to the other.

Author(s) and date	Sample	Research method and measures	Intervention	Relevant results	Comments
	managerial or technical jobs and 43% were working class. 84% were above 185% of the poverty line.			servings), and greater social ties (+0.1 servings). After controlling for the same variables as above, increases in F&V intake among HC participants were significantly associated with higher education (-0.2 servings per day for less than an undergraduate degree), not owing a car (-0.2 servings), more positive social norms for F&V intake (+0.2 servings), greater social networks (+0.1 servings), and greater self-efficacy (-0.2 for low self-efficacy).	
Thompson et al. (2008) [Br J Sp Med]	8 employees from the Executive Health Program at the Mayo Clinic in Rochester, Minnesota. The employees were nurses, clinical assistants, secretaries, and appointment secretaries. No other demographic data were provided.	Single-group, observational design: The employees volunteered to participate in the walking workstation trial. The study lasted for 6 weeks in total: 2 weeks while participants performed their job in the normal way, 2 weeks while they acclimated to the walking workstation, and 2 weeks using the walking workstation. Assessments were conducted for each of the three 2-week periods. Daily steps were measured using a StepWatch Activity Monitor (a device used for monitoring day-to-day ambulatory activity). The same device was used to estimate energy expenditure.	Theory: none. Three treadmills were introduced into the employees' worksite. The treadmills were chosen for quietness and the researchers built workstations to use with them. The walking workstations consisted of a computer monitor and keyboard positioned over the treadmill, as well as additional equipment required for particular occupations (e.g., a wireless headset used to take phone calls and a special keyboard to control the dictaphone used by the secretaries, instead of the normal foot pedal control). Participants were able to use the walking workstation whenever they wanted and at whichever speed, but were also allowed to get off and sit any time they wished. There were no reminders given to participants to use the walking workstation and there was no behavioural support or instruction provided.	The mean number of steps taken during work hours was 2200 during the baseline period. There was a significant increase to a mean of 4000 steps during the acclimation period and a significant increase to a mean of 4200 steps during the final walking workstation period. All participants walked at least an extra 30 minutes per day (between 9 am and 4 pm). From the activity monitor data, it was estimated that participants increased their average energy expenditure by an extra 100 kcal/day (range of 44 kcal/day to 253 kcal/day).	Strengths of the study include incorporating a means of increasing physical activity into employees' normal work routines and adapting the workstation to suit specific occupations. Limitations of the study include the lack of control group, using volunteers from a convenience sample, and the short period of implementation (Thompson et al., 2008). The authors also note that the study was designed to assess the feasibility of such a workstation and was not designed to specifically assess weight loss or other metabolic variables (Thompson et al., 2008).

Author(s) and date	Sample	Research method and measures	Intervention	Relevant results	Comments
von Thiele Schwarz et al. (2008) [Scan J Work Env Hlth]	177 female employees from 6 dentistry worksites in Stockholm, Sweden. The sample had a mean age of 47 years, with 45% having a high school education and 41% having completed a university degree.	Randomized, controlled, pre-test multiple post-test design: The worksites were paired and then randomized to one of three conditions, including, 1) a physical exercise intervention group (n = 62), 2) a reduced work hours intervention group (n = 50), or 3) a control group (n = 65). The intervention was 12 months long. Assessments were conducted at baseline and at 6 months and 12 months after baseline. However, due to seasonal variations, only baseline and 12-month follow-up data were analyzed. Physical activity (low intensity activities of daily living) and physical exercise (purposeful moderate and vigorous activities) were assessed using a self-report questionnaire.	Theory: none. *Physical exercise intervention group:* In the workplaces allocated to the physical exercise group, 2.5 hours of the 40 hour full-time work week were devoted to mandatory physical exercise on two different days. The physical activity was to be of moderate to vigorous intensity and participants were free to choose the type of physical activity as long as it fell within the intensity guidelines. Participants recorded the type of activity performed and the duration of each session and their reports were checked each week by research staff. *Reduced work hours intervention group:* Full-time weekly work hours were reduced from 40 hours/week to 37.5 hours/week. No intervention was carried out at the control worksites. Employees at all worksites retained their full salaries during the intervention and full services were still expected. Employees working part-time were given proportionally less time for physical exercise per week (physical exercise group) or had fewer hours reduced per week (reduced work hours group).	There was a significant increase in physical exercise in all three groups from baseline to the 12-month follow-up. The increase was significantly greater in the physical exercise group compared to the reduced work hours and control groups. There was also a significant increase in the mean level of physical activity from baseline to follow-up, but the increase did not differ significantly among the groups.	Strengths of the study include matching the worksites prior to randomization, a low attrition rate, and two follow-up assessments to separate temporary from sustained effects (though only one follow-up was used in the statistical analyses) (von Thiele Schwarz et al., 2008). Limitations of the study include self-reported physical activity and exercise, possible differences between full- and part-time employees, and a lack of generalizability due to an all-female dentistry-related sample (von Thiele Schwarz et al., 2008). Physical exercise reports also showed that most employees reported approximately 2 hours/week of physical exercise rather than the mandatory 2.5 hours/week (von Thiele Schwarz et al., 2008).
Wen et al. (2005) [Hlth Pro Int]	51 employees at a health care facility in inner-city Sydney, Australia. The sample was 75% female, with a mean age of 38 years. 74% had to travel more than 5 km to work and	Single-group, pre-test post-test design: A group of employees from the facility, which employed approximately 300 people, was randomly selected to participate in the pilot study (n = 94). The intervention was 12 months long. Assessments were conducted at baseline and at post-intervention (12 months after baseline). 68 employees completed the baseline assessment and 51 completed	Theory: none specifically, but the intervention used social and individualized marketing strategies. The purpose of intervention was to increase active transport to work (e.g., walking, cycling, and public transport). The intervention used both social and individual marketing strategies to address active transport behaviour at multiple levels.	There was an increase in participants reporting the use of active transport as their usual means of transport to work (37% at baseline to 45% at post-intervention); however, the increase did not reach significance. There was a significant decrease in the percentage of participants who	A strength of the study was the use of two intervention strategies (i.e., social and individualized), each with multiple components. Limitations of the study include the lack of

Author(s) and date	Sample	Research method and measures	Intervention	Relevant results	Comments
	63% reported using a car to get to work at baseline.	both baseline and post-intervention assessments. Active transport to work was assessed using a self-report questionnaire.	*Social marketing strategy:* A campaign was implemented by the research team to all employees in the workplace to promote active transport. The campaign included four events (an information day, two opportunities for employees to try alternate modes of transportation to work, and a thank you lunch at the end of the intervention), campaign materials (posters and banners displayed around the worksite, fridge magnets, and a Transport Access Guide), email newsletters, and messages on pay slips. *Individualized marketing strategies*: The individualized marketing strategy was delivered to the recruited study participants only. The strategy was delivered in three stages. First, the participants were interviewed regarding their travel arrangements to and from work and factors that affected their choices. Second, a transport plan was created for each participant from home to work based on information from his or her interview. Third, the participant was consulted on the transport plan, with a member of the research staff explaining and discussing the recommendations.	reported driving to work 5 days a week (82% at baseline to 63% at post-intervention).	control group, no direct measure of physical activity, a small sample size, and the use of health care employees who may have been more aware of health issues and more inclined to change health behaviours (Wen et al., 2005). Note: The study sample was younger than the range indicated in the inclusion criteria (mean of 38 years, mode of 30 years).
Yancey et al. (2006) [Hlth Prom Prac]	Employees from organizations, agencies, and businesses in the Los Angeles, California area. 338 employees from 27 organizations enrolled in the 12-week intervention program. The 12-week intervention sample was 89% female and 74%	Single-group, longitudinal, pre-test multiple-post-test design: Participants enrolled voluntarily for the intervention. Two forms of the intervention were implemented: a 12-week program and a 6-week program. Assessments were conducted at baseline, post-intervention (12 weeks later), and 6 months and 1 year after the start of the intervention. 126 of 338 participants in the 12-week program provided follow-up data and 48 of 52 participants in the 6-week program provided follow-up data.	Theories: social cognitive theory, social action theory, social marketing strategies, social ecological model, community-based participatory research principles, diffusion of innovation theory. The intervention programs were targeted toward African Americans. Program champions were selected from within the organization to promote the program and be sensitive to the needs of participants. The 12-week intervention consisted of 12 weekly 30-minute sessions, delivered during regular staff meetings at the	Among the 12-week program participants, there was a significant increase in reported intake of F&Vs (2.4 servings/day at baseline to 2.9 servings/day at post-intervention). There was a decrease in BMI from baseline to post-intervention (28.8 to 28.3 kg/m^2), but the change did not reach statistical significance ($p = .08$). There were no significant changes in physical activity behaviours.	Strengths of the intervention include advocating the incorporation of healthy behaviours into the organizational routine and a comparison between two forms of the same main intervention (Yancey et al., 2006). Limitations of the study include the lack of

Author(s) and date	Sample	Research method and measures	Intervention	Relevant results	Comments
	African American, with a mean age of 47 years. 70% reported some college education. 52 employees from 11 organizations enrolled in the 6-week intervention program. The 6-week intervention sample was 80% female and 80% African American, with a mean age of 50 years. 79% reported some college education.	Physical activity (vigorous physical activity and walking) was assessed using a shortened form of the International Physical Activity Questionnaire. BMI was calculated from self-reported height and weight. F&V consumption was measured using a single self-report item.	organizations. Sessions focused on incorporating physical activity into the organizational routine, accumulating lifestyle physical activity, managing stress, and procuring healthy foods in a non-affluent environment. A series of short videos were used to promote the message of incorporating physical activity and healthy eating into organizational routine. The 10-minute videos integrated exercise breaks (aerobic, strength, and stretching) and topics such as healthy snacking and restaurant/fast food dining. Items with the project logo were distributed as incentives to participate (e.g., pedometers, t-shirts, and lunch bags). The 6-week program was an adaptation of the 12-week program, with only 6 of the original 12 weekly sessions selected for implementation.	Among the 6-week program participants, there was a significant increase in the reported number of days/week of engaging in at least 10 minutes/day of vigorous physical activity (1.6 days/week at baseline to 1.9 days/week at post-intervention). There were no significant changes from baseline to post-intervention in walking, F&V intake, or BMI. No data were reported for the 6-month and 1-year follow-ups.	control group, the non-randomized design, low participation rates in the organizations overall (6-week program) and high attrition rates (12-week program), and self-reported measures (Yancey et al., 2006).

Table 8. Summary of reviews – workplace and community interventions

Author(s) and date	Scope	Key results	Comments
Workplace intervention reviews (peer-reviewed literature)			
Anderson et al. (2009) [AJPM]	The purpose of this systematic review was to evaluate the effectiveness of worksite physical activity or nutrition interventions aiming to promote healthy weight among employees. Forty-seven articles published between 1966 and 2005 were included. Study designs included RCTs, cluster randomized trials, non-randomized trials, cohort studies, and a time series study. The target population was adult employees of any weight status, regardless of pre-existing risk factors or conditions. Outcomes included weight, BMI, and percent body fat.	Results indicated a modest reduction in weight, with a consistent loss of about 3 lb at 6 to 12 months post-intervention. There was also a reduction in BMI of approximately 0.5 kg/m^2 at 6 to 12 months post-intervention and a reduction in percent body fat of approximately 1% at 12 months post-intervention. The results were consistent for males and females and across various worksite settings. There was insufficient evidence to make conclusions about the effectiveness by program focus (physical activity or nutrition) or program components (behavioural skills, informational, and environment and policy changes). The intervention impact generally increased with more intensive modes of the intervention.	Only 8 of the 47 interventions included an explicit environmental component (as determined by the authors). Many interventions combined strategies (behavioural, information, and environmental), making it difficult to determine the differential effect of program components. The review was not able to determine whether some employee groups might benefit more or less from a worksite health promotion intervention (e.g., overweight and obese employees). Limited data were available on white- or blue-collar status of the worksites and studies that included this information examined mostly white-collar employees. Data on race/ethnicity, SES, religion, and educational level were also limited.
Brownson et al. (2006) [Ann Rev Pub Hlth]	This narrative review focused on effective and promising interventions that addressed tobacco use, physical activity, and healthy eating through environmental or policy approaches. Seventeen interventions were reviewed that targeted the physical environment/access, economic environment, and/or communication environment. The review covered interventions that were implemented in a variety of settings, including worksites and the community. A specific population was not targeted. Outcomes were physical activity and healthy eating.	*Physical activity:* Strong evidence was found for the effectiveness of increasing access to facilities for physical activity, and sufficient evidence was found for the effectiveness of urban planning and policy (e.g., creating infrastructure that favours physical activity) and point of decision prompts (e.g., signs promoting stair use). Strategies that use economic incentives appear promising (e.g., giving employees who do not drive to work a cash-out for the value of parking). Transportation policy changes (e.g., increased or subsidized public transit) do not appear to influence physical activity. *Healthy eating:* There was sufficient evidence to support the use of nutrition labelling and information at the point of purchase to increase healthy eating. Increasing access to healthy ready-to-eat foods (e.g., in worksites and restaurants) and using food pricing and incentives (e.g., reduced pricing of healthy vending machine items) appear to be promising strategies. Media and marketing campaigns (e.g., promoting F&V intake) were not shown to be effective.	Some studies that were included in the review used cross-sectional designs. "Promising" strategies were those for which there was high face validity, but clear evidence for effectiveness had not yet been documented.
Brug et al. (2006) [AJPM]	This article summarized six recent systematic reviews regarding environmental factors and obesity-related behaviours. The reviews examined a total of 297 observational studies and 112 intervention studies and examined children, adolescents, and adults. Micro-environment (e.g.,	Interventions using the physical environment seemed to positively influence physical activity behaviour among adults. The reviews also support "socio-cultural environmental" and "economic environmental" approaches to changing obesity-related behaviours. The following specific conclusions were made: social support is important for physical activity; the availability and accessibility of healthy/non-healthy foods influences eating behaviours; improving opportunities for walking can influence physical activity; and worksites are a good setting for making environmental changes to improve obesity-related behaviours.	Though addressed in the article, the results for children and adolescents were not reported in this table. Micro-level factors were studied more often than macro-level factors. Most studies included in the systematic reviews used weak designs and measurement tools and many did not use a control group.

Author(s) and date	Scope	Key results	Comments
	home, workplace, and neighbourhood) and macro-environment (e.g., transport infrastructure and food distribution) characteristics were examined. Nutrition behaviours and physical activity were the outcomes of interest.		However, the authors conclude that, compared to the cross-sectional studies included in the reviews, the evidence from the intervention studies was more consistent and positive regarding an association between the environment and nutrition and physical activity.
Brug et al. (2008) [Pro Nutr Soc]	This narrative review focused on the results of several systematic reviews that examined the association between the environment and nutrition behaviours (the same as those used in Brug et al., 2006).	After reiterating the findings from the Brug et al. (2006) review, the authors suggest that, based on the results, the following areas should be addressed: the interplay between individual level factors (e.g., motivation) and environmental level factors in the prediction and determination of health behaviours; that socio-cultural environments may be more important than physical environments; objective versus self-reported assessments of the environment; the need for intervention studies to examine environmental determinants of health behaviour; and the specificity of behaviour and environments.	The authors suggest that social environments may be more important than physical environments and that the impact of environmental factors on behaviour may be mediated by individual-level factors, such as motivation or habits, but these assertions are based on cross-sectional evidence.
Conn et al. (2009) [AJM]	This meta-analysis synthesized the available evidence regarding the health and physical activity outcomes associated with worksite physical activity programs. The review included 138 published and unpublished interventions studies between 1967 and 2007. Various study designs were included (e.g., RCTs, pre-experimental studies, and single-group studies). Relevant outcomes were physical activity behaviour, fitness (maximal oxygen consumption), and anthropometric measurements (BMI, weight, waist circumference, and percent body fat).	For physical activity, there was a significant positive effect of approximately 0.2, which, when transformed into steps/day, corresponded to +612 steps/day for intervention participants compared to control participants. Fitness showed a significant positive effect of approximately 0.6, corresponding to a difference of +3.5 ml/kg/min in VO_{2max} for intervention participants compared to control participants. Anthropometric effect sizes were smaller, but still significantly positive, at approximately 0.08. For BMI, this corresponded to a mean difference of –0.3 kg/m^2 for intervention participants compared to the control participants. Other anthropometric effect sizes were not reported.	There was considerable heterogeneity in the studies and, as such, results should be interpreted with caution. Physical activity was rarely objectively measured. Separate analyses were conducted for two-group and single-group studies; effect size results of the two-group studies were reported in this table.
Engbers et al. (2005) [AJPM]	This systematic review examined the ability of worksite health promotion programs with environmental modifications to improve physical activity, eating behaviours, and health indicators. Thirteen articles (RCTs and quasi-experimental studies) published up to 2004 were included. Relevant outcomes included physical activity, dietary intake, and BMI.	*Physical activity:* The evidence was inconclusive for the effectiveness of worksite health promotion programs with environmental modifications in improving physical activity. Of the three studies that evaluated physical activity, one found positive changes in general physical activity, one found no change in physical activity, and one found an increase in physical activity among both the intervention and control conditions. *Diet:* There was strong evidence for the effectiveness of worksite health promotion programs with environmental modifications in improving F&V and fat intake. All six studies that measured F&V intake found positive changes in the intervention group compared to the control group and five of the six studies that measured fat intake found positive changes in the intervention group compared to the control group. One study evaluated the impact of	All of the studies described multi-component interventions. The methodological quality of most of the included studies was rated as poor (only four studies qualified as high quality). In all but one of the studies, randomization/allocation was performed at the worksite level. Most outcome measures were self-reported and limited information on the reliability and validity of the measures was provided.

Author(s) and date	Scope	Key results	Comments
		a worksite health promotion program on fiber intake and found no significant changes. *BMI:* There was no evidence for a positive effect of worksite health promotion programs with an environmental modification on BMI. Of the three studies that evaluated changes in BMI, two found no significant changes and one found a small but significant increase in BMI in the intervention group.	
Eves & Webb (2006) [Prev Med]	This narrative review focused on studies that examined point-of choice prompts in relation to stair use in public settings (typically stairs vs. escalators) and in worksites (typically stairs vs. elevators).	Consistent positive results were found for the effectiveness of point-of-choice prompts to increase stair climbing relative to escalator use in a public setting (e.g., shopping mall). However, the authors suggest reasons for a more cautious approach when implementing a point-of-choice intervention in a worksite. Most of the studies reviewed provided some support for point-of-choice prompts in increasing stair use in the workplace, particularly when paired with improved aesthetics, music, or encouragement from an email. However, stair "use" did not always indicate stair ascent (which uses more energy than stair descent and is thus a more desirable outcome) and some studies reported no change or even a decrease in stair use during a point-of-choice intervention. The inconclusive worksite results contrast with the consistently positive results found in public settings. Observational data suggest that this may be related to building height, as the number of stories in a building is inversely associated with baseline stair use. Stair use may also be related to the behavioural context: worksites typically show higher baseline rates of stair use than do public settings, possibly due to the choice between an elevator (which requires waiting) and the stairs instead of an escalator (which does not require waiting) and the stairs. This time pressure factor would be distributed randomly across conditions and could dilute the effect of an intervention.	The authors caution that the positive results found for stair use in public settings may not generalize to worksites, but that some activity is better than none, and suggest that further research should be conducted to resolve the discrepancy.
Faith et al. (2007) [Psyc Bul]	This narrative review examines the evidence to support three environmental approaches to reducing obesity: taxing/subsidizing foods, manipulating the accessibility of food, and restricting access to certain foods. Focus groups, observational studies, quasi-experimental studies, experimental studies, and RCTs were included (23 studies were included in total). All age groups were included. Outcomes were food acquisition or purchasing behaviour, reported or weighed food intake, and body weight or composition.	*Taxing/subsidizing foods:* The reviewed studies provided strong and consistent evidence that manipulating food prices influences food purchases in worksite samples. Specifically, reducing the price of healthier items led to an increase in the purchase of those items in a dose-dependent manner. However, all of the studies examined subsidization and not taxation. There was no evidence to indicate that manipulating food prices influences food intake or body weight outcomes. Therefore, while manipulating food prices may change food purchasing behaviour, it is not clear whether this extends to actual food intake or energy balance. *Manipulating the accessibility of food:* There was minimal evidence to suggest that manipulating the accessibility of food was associated with food purchasing, food intake, or body weight/composition among the general population. There was, however, relatively consistent evidence to support manipulating the accessibility of food among obese individuals seeking weight loss, with studies showing that obese individuals who received food provisions experienced greater weight loss than did those who did not receive food provisions. *Restricting access to certain foods:* There was no evidence to suggest that restricting access to certain foods had any influence on food purchasing, food intake, or body weight outcomes.	Results were summarized and presented for all age groups together, sometimes making it difficult to interpret the results for adults only. The authors note that due to the varied study designs and samples, the results may have limited generalizability.

Author(s) and date	Scope	Key results	Comments
Foster & Hillsdon (2004) [J Sp Sci]	This systematic review examined studies that used environmental interventions to increase health-enhancing physical activity among adults. Studies either changed an aspect of the environment to create new physical activity facilities/policies/support or used an environmental point-of-choice to promote physical activity (i.e., stair climbing). Seventeen articles published up to 2001 were included. Studies employed experimental or pre-post single group designs, the samples were ≥ 18 years old, and the outcomes were health-enhancing physical activity and/or physical fitness.	*Interventions that changed the environment:* Three studies examined the impact of changes to the environment on physical activity, including changes to working practices, policies, and the physical environment. There was evidence of small changes in the behaviour of some participants (e.g., improvements in fitness and an increase in the percentage of participants who regularly engaged in vigorous physical activity). *Stair interventions:* Sixteen studies examined the influence of written media (e.g., posters and banners) on stair use relative to elevator or escalator use. Most of the studies demonstrated a short-term improvement in stair use. However, large differences in settings (e.g., shopping center, train station, airport, workplace, and library) and in the messages contained in the written media made it difficult to compare the results. The authors suggest that the potential impact of stair use is unlikely to have a long-term impact on health.	Only two studies used a comparison or control group. All studies were conducted in field settings and were subject to selection and measurement bias.
Glanz & Hoelscher (2004) [Prev Med]	This narrative review examined the effect of restaurant-based environmental, policy, and pricing interventions on F&V intake. Information was retrieved from published scientific articles, government documents, the internet, and from experts in the field. "Restaurants" was broadly defined and included full-service restaurants, fast food restaurants, food courts, cafeterias, lunch wagons, deli counters, take-out food sources, vending machines, bars, coffee shops, and food service and catering businesses. The outcome of interest was F&V consumption.	*Increasing availability:* Interventions to increase the availability of healthy foods on menus have included components such as nutrition training programs for chefs, modifying recipes, providing nutrition information, and identifying and promoting healthier items on menus. Available results are limited, but increasing the number of healthier menu items seems to be more effective than providing nutrition information on the menu. One study reported that a healthy restaurant program generated a high level of interest from customers and managers. *Increasing access:* Limited information was available, but one study found that manipulating the effort required to obtain a certain food (e.g., chips and candy) influenced the consumption of that food, such that increasing the effort to obtain the food reduced its consumption. How this manipulation was performed was not described. *Reduced prices and coupons:* Reducing the price of low-fat snack foods has been associated with an increase in consumption of those foods in worksites. However, no interventions have yet targeted price modifications for F&Vs in full-service restaurants or cafeterias. *Catering policies:* Catering policies (e.g., at a worksite) that require healthy preparation and healthy foods to be used for at least a proportion of the available food choices have been associated with an increased awareness of healthy eating among employees and with having an easier time eating a healthy diet at work. *Point-of-purchase information:* Many studies have examined the influence of point-of-purchase information in	Though each strategy was described fully, there was not always evidence pertaining to each strategy for the effectiveness of increasing F&V consumption specifically (i.e., some results related to low-fat or low-calorie choices and in some instances there were no relevant results to report). Results for strategies targeting other foods may not generalize to increasing F&V intake. Most restaurant interventions lasted less than 6 months, limiting the conclusions that could be drawn regarding sustainability.

Author(s) and date	Scope	Key results	Comments
		restaurants and cafeterias and most have been successful in increasing the sales of the target foods. However, most focused on reducing fat and calories rather than increasing F&Vs. *Promotion and communication:* Advertising, posters, and table tents have been employed to promote the consumption of healthy foods in restaurants, but the review did not report any specific interventions or results. *Community-driven health promotion programs in restaurants:* Programs are typically multi-component, usually include both increased availability of healthy foods and promotion and communication, and focus on other health behaviours as well as diet. However, there are no available consumer data with which to evaluate the programs.	
Goldgruber & Ahrens (2010) [J Pub Hlth]	This narrative review synthesized results of 3 meta-analyses and 14 systematic reviews regarding the effectiveness of workplace health promotion and primary prevention interventions. Articles published between 2004 and 2008 were included. Relevant outcomes were physical activity, nutrition, and weight-related measures.	Seventy-eight percent of the physical activity and nutrition workplace interventions showed evidence of effectiveness. Combined physical activity and nutrition interventions were successful in preventing morbidity and mortality related to being overweight. Relatively simple approaches were employed to improve physical activity and eating behaviours, such as information strategies and motivational prompts to increase activity. The greatest success was seen with interventions that were comprehensive, included both individual and environmental components, considered the organizational culture, and were theory-based.	Not all of the interventions included in the review had an environmental component, but the results for all interventions were presented together. Though comprehensive programs were generally shown to be more effective than singular interventions (e.g., just education), it is not clear which components should be implemented in which dose for maximum results.
Kremers et al. (2010) [Obes Rev]	This review qualitatively and quantitatively analyzed interventions aimed at preventing overweight and obesity. Forty-six articles published between 1990 and the onset of the review were included. Studies examined adult samples. Outcomes were weight, BMI, and skin-fold thickness.	Just less than half (46%) of the studies found a significant positive intervention effect for change in BMI. Effect sizes for changes in BMI ranged from -0.09 to 0.45 (mean of 0.06). Interventions seemed to be more successful when aimed specifically at weight loss rather than at preventing cardiovascular disease or improving general health.	Thirty-one of 46 studies included in the review used environmental approaches in the intervention, but the results were presented for all types of interventions together. Intervention components were generally not examined in isolation and thus it is difficult to evaluate the impact of single components. Few studies reported using a theoretical model to guide the intervention.
Marcus et al. (2006) [Circ]	This comprehensive narrative review synthesized the evidence regarding physical activity interventions. The review was qualitative rather than exhaustive or quantitative. Existing reviews and well-designed individual intervention studies were used.	Evidence for the ability of worksite interventions to increase physical activity has been inconsistent in the literature. More recent reviews indicate that theory-based, individually-tailored, motivational programs and environmental prompts to encourage stair use were generally effective, whereas programs that provide fitness facilities at the worksite were generally ineffective and only showed promise among those who were already physically active. Studies of environmental interventions are limited and most have employed weak designs that introduced multiple sources of bias. Small increases in physical activity have been associated with providing facilities in which to be physically active and offering time and incentives to use them, as well as with prompts to encourage stair use rather than elevator or escalator use. However, results were primarily short-term and relatively weak.	Interventions for different target populations and delivered in different delivery modalities were reviewed in the article; only those relevant to this review were reported in this table. Most studies only measured short-term outcomes.

Author(s) and date	Scope	Key results	Comments
Matson-Koffman, et al. (2005) [AJHP]	The purpose of this narrative review was to conduct a site-specific evaluation of selected and recent environmental and policy interventions designed to increase physical activity and improve nutrition in order to promote cardiovascular health. The review included 129 articles published between 1970 and 2003. Outcomes of interest included behavioural changes (e.g., physical activity and F&V intake), physiological changes (e.g., weight), or organizational changes (e.g., increased availability of healthy foods).	On the basis of experimental or quasi-experimental studies reviewed, the interventions providing the strongest evidence for influencing relevant behaviours included prompts to increase stair use (both community and workplace sites); access to places for and opportunities for physical activity; comprehensive worksite approaches including education, employee and peer support for physical activity, incentives, and access to exercise facilities; availability of nutritious foods; and point-of-purchase strategies. The authors concluded that policy and environmental strategies may promote physical activity and sound nutritional practices.	There were fewer studies of policy and environmental interventions to increase physical activity than to enhance nutrition. Moreover, experimental and quasi-experimental studies were more prevalent in relation to nutrition interventions than for physical activity interventions. In terms of limitations, the effectiveness of individual components of comprehensive interventions were frequently not assessed. Interventions to increase F&V consumption were found to be enhanced with media approaches.
Muller-Reimenschneider et al. (2009) [BJSM]	The purpose of this systematic review was to evaluate the cost-effectiveness of physical activity interventions for healthy adults and to determine which components might be most cost-effective. Eight articles published up to 2008 were included. The outcome of interest was cost per increase in physical activity measure (e.g., fitness, energy expenditure, becoming more active).	The studies generally reported positive intervention effects for physical activity. However, the methodological quality of some of the studies was low, limiting the ability to draw conclusions. Of the five studies classified as good or high quality, three found sufficient evidence to support the effectiveness of the interventions to increase physical activity compared to a control group. Overall, it seems that interventions that use environmental approaches are more cost-effective than those employing strategies that target individual behaviour directly. The authors concluded that physical activity interventions may produce meaningful changes in physical activity at a reasonable cost, but there is not currently enough evidence to confidently compare the cost-effectiveness of individual studies.	Not all interventions used environmental components, but the results were presented for all intervention types together in the review. Some of the reviewed studies lacked rigorous designs and results must be interpreted with caution. Overall, the studies reported positive intervention effects, contrasting with other research that has been more inconclusive. Identifying studies with primarily positive results may have led to an overestimation of the cost-effectiveness of the interventions. The broad range of outcome measures used in the studies may have affected the results.
Ni Mhurchu et al. (2010) [BMC PH]	This systematic review assessed the effect of worksite health promotion interventions on employees' diets. Sixteen studies published between 1995 and April 2009 were included. All study designs were eligible and the interventions had to be at least 8 weeks long. Outcomes were diet-related and included energy, fat, and F&V consumption; weight was also assessed in a limited number of studies. Diet was assessed most often with food frequency questionnaires or eating habits/dietary practices questionnaires. Other methods of	Among the studies that reported F&V intake, mean daily increases ranged from +3% to +16% in the intervention conditions compared to -2% to +4% in the control conditions. Most of the studies that reported fat intake found decreases in the intervention condition compared to the control condition. Mean daily reductions ranged from -2% to -9% in the intervention conditions compared to -2% to +1% for the control conditions. Of the three studies that reported weight changes, two showed reductions in weight and one showed an increase in BMI, making it difficult to draw conclusions regarding the ability of the worksite interventions to influence weight-related outcomes. The eight environmental interventions generally showed improvements to employees' diets, but the effect sizes were small. Overall, individual interventions seemed to have a slightly greater effect on diet than did the environmental interventions.	Ten studies were RCTs, one was quasi-experimental, and five were uncontrolled pre-post intervention studies. Eight out of 16 studies targeted the worksite environment. Dietary outcomes were mostly self-reported, which may have led to an over-estimation of the intervention effects. The lack of control group and randomization in many studies made it difficult to attribute the changes in diet directly to the intervention.

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	assessment included a 24-hour recall, 7-day recall, food diary, worksite cafeteria sales, and weighed measurement of worksite lunches.		
Novak et al. (2007) [NZMJ]	The purpose of this narrative review was to evaluate worksites as settings for cardiovascular health promotion for blue-collar workers in New Zealand. Articles published up to 2006 were included. One systematic review and three primary studies were included. To meet inclusion criteria, the study must have used randomization and included a control group. Outcomes varied across studies and included a range of cardiovascular risk indicators (e.g., BMI, F&V intake, and physical activity).	Overall, there was an association between the workplace interventions and reduction in cardiovascular risk behaviours. However, the results were generally not maintained long-term. The authors suggest that environmental components are more clinically effective and cost-effective than interventions that focus only on individual behaviour change. Environmental changes may be particularly effective in blue-collar worksites.	Not all studies included an environmental component, but the results for all studies were combined in the review. The systematic review covered studies with environmental components, but the primary RCT articles did not.
Pronk (2009) [JPAH]	This narrative review evaluated the effectiveness of physical activity promotion in the workplace. The review included 28 systematic review articles that described both physical activity-targeted interventions and comprehensive, multi-component interventions that aimed to improve multiple health behaviours. Physical activity was the primary outcome of interest.	The majority of articles reported that interventions (particularly comprehensive multi-component interventions) were successful in increasing physical activity and other health outcomes. A few articles reported no impact of the intervention on physical activity. Key contextual factors that were particularly important to the effectiveness of interventions included: top management support, supportive environment/social norms, employee advisory boards, engaged management at all levels, links to business objectives, and integration of physical activity interventions into broader health promotion. The author suggests developing physical activity interventions that target multiple levels of influence and aim to make physical activity relevant for all of the stakeholders involved.	What the "other health outcomes" were was not explicitly discussed. Only relevant environmental contextual factors were reported in this table.
Sahay et al. (2006) [HPP]	The purpose of this narrative review was to assess the effectiveness of nutrition interventions to improve diet, with the intention of developing a nutrition and healthy body weight strategy for Ontario. Fifteen randomized and non-randomized controlled trials published between 1994 and 2000 were included. The review covered the general population in all settings (e.g., school, worksite, and community). Outcomes were F&V, fat, fiber, and grain consumption.	Most interventions aimed at adults resulted in some positive changes in dietary outcomes. Overall, the following components were associated with positive dietary change in a controlled trial in any setting: having a theoretical basis (e.g., social cognitive theory), using family support, using participatory models for intervention planning and delivery (e.g., employee advisory boards), delivering clear messages (i.e., simplifying complicated messages), and providing adequate training and ongoing support to the persons implementing the intervention.	Not all interventions included an environmental component and results were not separated by type of intervention. Eight of the 15 studies that were reviewed examined adults only (at a workplace or in the community) and two additional studies examined adults and children together. Weight and BMI were not reported as outcomes in the review.

Author(s) and date	Scope	Key results	Comments
Sallis & Glanz (2009) [MQ]	This narrative review summarized recent reviews and studies that addressed the relationship between the environment and physical activity and nutrition, including the evidence for the effectiveness of interventions that target the physical activity and food environments. Articles used in the review were mostly published between 1998 and 2008.	Interventions that targeted physical activity environments were limited in number. Changing the environment by creating facilities for physical activity, such as walking and cycling trails, has stimulated an increase in physical activity in some cases. Based on all available data, the authors suggest that there is sufficient evidence to recommend changes to urban planning, transportation, and recreation policies as a means of increasing physical activity. In terms of food environments, interventions have included adding nutrition information to some restaurant menus in cities in the US, a practice that has shown promising results in a health assessment. Changes to worksites (e.g., adding more healthy choices in cafeterias and vending machines) have been shown to positively influence food intake. There is little evidence to suggest that changes to the home food environment are successful in improving eating patterns, but research is ongoing. The authors speculate that policies that affect community food environments (e.g., food pricing and proximity to food stores) may influence the home environment which, in turn, may affect eating behaviours.	The review presented primarily cross-sectional evidence, with some intervention research reported when available. There was slightly more evidence available on interventions to change food environments than there was on interventions to change physical activity environments.
Seymour et al. (2004) [Prev Med]	The purpose of this systematic review was to evaluate the effect of nutrition interventions that changed the food environment through food availability, access, pricing, or information at the point of purchase. Thirty-eight articles published between 1970 and 2004 were included. The interventions were implemented in worksites, universities, grocery stores, and restaurants and were aimed at adults. No policy-based interventions were found. Outcomes included changes in food sales data and dietary intake.	Worksite interventions used informational strategies (e.g., nutrition labelling and signage), changes to the availability of foods, price changes, and incentives to promote healthy eating. Overall, most of the 10 worksite interventions showed significant positive changes in eating behaviours, though a few studies showed no impact as a result of the intervention. Grocery store interventions used informational strategies, increases in availability and access (e.g., changes in size and location of produce displays), and incentives to promote healthy eating. Overall, 5 of the 10 studies that examined grocery store interventions found no changes and 5 found positive changes in sales for at least one of the targeted food items. The greatest changes were observed in the studies with the longest intervention durations (approximately 2 years). Restaurant interventions were implemented in sit-down restaurants, cafeterias, and fast food restaurants. The intervention strategies included various forms of signage and labelling. Most of the nine restaurant intervention studies reported significant increases in sales, but there was no consistent pattern in terms of what was promoted (e.g., salads or low-fat entrees) or how exactly it was promoted. Simply intervening to promote healthy food, regardless of the target item or strategy, seems to be associated with increased sales. The authors concluded that worksite interventions seem to be the most effective at improving sales of healthy foods or dietary intake, while grocery store interventions are the least promising.	Many of the reviewed studies had strong or moderately strong research designs. Few studies reported details of the study sample or population. The authors note that, because so many different foods and food types were promoted, it is difficult to determine which nutrients or foods are most susceptible to manipulation. Studies often focused on specific food groups or nutrients rather than on the overall healthfulness of the food items (i.e., low-fat items may still be high in energy and sugar). Dietary data were mostly self-reported. Most interventions lasted only a few weeks and did not address sustainability. The university interventions were aimed at young adults and thus the results were not reported in this table.
Sorensen et al. (2004) [Prev Med]	This narrative review examined how comprehensive worksite health promotion programs with an environmental or organizational intervention component influenced	Strategies that target the physical or information environment (e.g., nutrition labelling, increases in the availability of healthy food, and price reductions) have shown potential for increasing F&V intake, but results have been limited by methodological flaws. Organizational support from all levels of management has been found to be important to the implementation of worksite interventions to increase F&V intake. For comprehensive	The authors suggest that process evaluations are needed to clarify the most effective components of interventions, help explain variability in the results of existing studies, and help

Author(s) and date	Scope	Key results	Comments
	F&V consumption. The review was not exhaustive. The outcome of interest was F&V consumption.	approaches to worksite health promotion, various strategies have contributed to successful interventions, such as: using a social ecological framework to guide the intervention, using participatory strategies (e.g., employee advisory boards and peer-led interventions), accounting for the social context (e.g., worksite culture, family influences, and neighbourhood), targeting multiple health behaviours at once, and tailoring the intervention as much as possible to the individual.	develop future interventions in similar areas.
Verweij et al. (2010) [Obes Rev]	The purpose of this meta-analysis was to critically examine the effect of workplace physical activity and dietary interventions on weight outcomes. Forty-three articles published between 1980 and 2009 were included in the review, but only 22 had sufficient data to be examined in the meta-analysis. Only RCTs were included. No limits were set on workplace characteristics, follow-up time, intervention characteristics, or the type of control group. Outcomes were body weight, BMI, body fat, waist circumference, sum of skin-folds, and waist-to-hip ratio.	*Body weight:* There was moderate quality evidence (see next column for an explanation of "quality evidence") that interventions targeting physical activity and diet led to a mean reduction in body weight of -1.2 kg. There was low quality evidence that interventions targeting only physical activity led to a mean reduction in body weight of -1.1 kg. No available studies targeted diet only. *BMI:* There was moderate quality evidence that interventions targeting physical activity and diet led to a mean decrease in BMI of -0.3 kg/m^2. There was low quality evidence that interventions targeting only physical activity led to a mean decrease in BMI of -0.5 kg/m^2. No conclusion could be made regarding dietary interventions, as only one study was available. *Body fat percentage:* There was moderate quality evidence that interventions targeting physical activity and diet led to a mean decrease in body fat (calculated by skin-folds) of -1.1%. There was very low quality evidence that interventions targeting only physical activity led to reductions in body fat (calculated by bioelectrical impedance or hydrostatic weighing) of -0.6%. No available studies targeted diet only. *Waist circumference:* There was low quality evidence that interventions targeting physical activity and diet reduced waist circumference by a mean of -1.1 cm. There was low quality evidence that interventions targeting only physical activity reduced waist circumference by -1.3 cm. No available studies targeted diet only. *Sum of skin-folds:* There was low quality evidence that interventions targeting only physical activity led to a mean decrease in skin-fold thickness of -0.01 mm. No available studies targeted physical activity and diet or diet only. *Waist-to-hip ratio:* There was low quality evidence that interventions targeting only physical activity did not have any effect on waist-to-hip ratio. No available studies targeted physical activity and diet or diet only. Subgroup analyses by intervention type showed that interventions which targeted physical activity and diet had a greater effect on body weight when an environmental component	Twenty-six interventions targeted physical activity and diet together, 14 targeted only physical activity, and 3 targeted only diet. The interventions generally consisted of one or more of the following: a health risk assessment, an educational/informational component, a behavioural component, an exercise program, or an environmental component. The main results of the review were not separated by type of intervention, but the authors subsequently presented a subgroup analysis by intervention type (see last paragraph of Key Results column). From the limited information given about the interventions, it appeared that at least 9 of the 43 studies included an environmental component. Thirty-two of the 43 studies had follow-up assessments that were considered long-term (≥ 6 months). The quality of evidence was determined by a combination of methodological quality, consistency of results, generalizability, sufficiency of data, and publication bias of the reviewed studies. There were four levels of evidence quality: high, moderate, low, and very low. Thirty-one of the 43 studies were of fair or poor quality. Due to a lack of studies, no conclusions could be made regarding diet only interventions.

Author(s) and date	Scope	Key results	Comments
		was included in the intervention than when no environmental component was used (-1.5 kg versus -1.0 kg, respectively).	
Workplace intervention reviews (grey literature)			
BC Ministry of Health (2006)	This narrative review was meant to support the development of an evidence-based public health program in British Columbia and focused on effective approaches to promoting physical activity and healthy eating. It was prepared using academic journal articles, government reports, and observational and anecdotal reports from community-based publications. Outcomes of interest were physical activity, healthy eating, and obesity.	Based on the available evidence, the review concluded that many single-target interventions seem to be effective in improving physical activity and dietary intake, and may be effective in reducing BMI. In addition, comprehensive, multi-component interventions with multiple target audiences also appear to be effective. Overall, successful interventions seem to include: an integrated, multi-disciplinary, comprehensive approach; a complementary range of strategies; and a focus on individual, community, environmental, and policy levels. In terms of sustainability, strong support at all levels, well-integrated programs, and community participation are important considerations. For community interventions specifically, the following approaches have been successful in improving physical activity: large-scale, community-wide campaigns; building and maintaining social networks (e.g., buddy systems); and new or improved access to places to be physically active. Increasing the number of grocery stores and the availability of fresh produce that they sell may be effective in increasing healthy eating in low-income communities. For workplace interventions specifically, the following approaches have been successful in improving employees' physical activity and eating behaviours: interdisciplinary efforts involving many different stakeholders (e.g., employees and all levels of management); participation and cooperation of all stakeholders; a comprehensive approach that combines individual and organizational strategies; and ensuring benefits for both employees (i.e., health benefits) and the company itself (i.e., economic benefits).	Various factors related to physical activity and healthy eating were discussed; only the relevant environmental factors were reported in this table. The review used both cross-sectional and longitudinal (intervention) results. Every attempt was made to summarize only intervention-related results in this table.
Micucci & Thomas (2007) [Ministry of Health and Long-Term Care; City of Hamilton]	This systematic review focused on the effectiveness of multi-faceted health promotion interventions in the workplace to reduce chronic disease through changes in physical activity, nutrition, and tobacco use. Eleven studies and two sub-studies (embedded in a larger study and treated as separate studies) published between 1990 and 2006 were included in the review. All studies were RCTs. Three studies targeted nutrition and physical activity, two targeted nutrition and smoking cessation, and eight targeted nutrition, physical activity, and smoking cessation. Relevant outcomes included BMI, weight, percent body fat, nutrition (e.g., F&V and fat consumption), and physical activity.	*BMI, weight, and percent body fat:* Of the five studies that examined BMI, two showed significant decreases in BMI, one showed a significant increase in BMI, and two showed no change as a result of the intervention. All three studies that measured weight reported significant weight reductions. Two of the three studies that examined percent body fat reported significant reductions, whereas one showed no change. *Nutrition:* Of the seven studies that measured F&V consumption, three reported significant increases at the end of the intervention. Of the six studies that examined fat consumption, three studies and one intervention arm of a fourth study reported significant decreases. *Physical activity:* Six studies measured physical activity or exercise and three studies plus one intervention arm of a fourth study reported significant increases at the end of the intervention. At the individual level, the distribution of educational materials and professional instruction were the strategies most commonly associated with significant improvement in the study outcomes. There were no environmental/organizational strategies common to improvements in study outcomes and thus there was insufficient evidence to make a	Not all interventions used environmental components; 6 of the 13 interventions reported employing changes to either environmental policies or organizational culture. Results were presented together, but the authors noted which strategies were common to positive outcomes (all were individual strategies, not environmental). All studies were rated as weak for methodological quality and all but one study used volunteer worksites, potentially limiting the generalizability of the results to other worksites. The worksite populations and settings varied widely across studies, as did the outcome measures and the interventions themselves.

Author(s) and date	Scope	Key results	Comments
		conclusion about the effectiveness of strategies that target the workplace environment. Studies that reported results 9 months or less from the start of the intervention were more successful than the rest of the studies, which reported results 12 months or more after the start of the intervention. Longer studies often showed a return to baseline levels for most outcome measures.	
Mulvihill & Quigley (2003) [Health Development Agency]	This review synthesized information from selected systematic reviews and meta-analyses that examined diet, physical activity, and behavioural interventions shown to be effective in managing overweight and obesity. Thirteen articles published between 1996 and 2002 were included. The outcomes of interest were overweight and obesity (the studies looked at prevention and reduction).	The evidence was inconclusive regarding the effectiveness of community-based interventions (e.g., mass media participation) for the prevention of overweight and obesity among adults. Worksite health promotion programs were reviewed and there was evidence to support their effectiveness in reducing overweight and obesity among employees. Plant reorganization was the only environmental factor related to favourable outcomes. Various individual factors were associated with favourable outcomes, but were not summarized in this table.	The review covered all age groups, but only the results for adults were reported in this table. Similarly, the review covered various types of interventions, but only the results for interventions with an environmental component were reported in this table. The authors highlighted a need for "upstream" interventions with policy changes and strategies at the national or regional level.
Reeder & Katzmarzyk (2006) [Canadian Task Force on Preventive Health Care]	The purpose of this systematic review was to examine strategies used for weight gain and obesity prevention among non-obese adults (BMI < 30 kg/m^2). Community-level and individual-level interventions were assessed. Seventeen quasi-experimental studies and RCTs published up to 2004 were included (5 community-level intervention articles and 12 individual-level intervention articles). Outcomes were body weight and BMI.	The five community-level interventions included combinations of public education by mass media, targeted programs at worksites, CVD risk factor screening, smoking cessation programs, and community activation. All of the community-level interventions included mass media campaigns that promoted healthy eating and physical activity. The effect of the interventions on body weight and BMI was inconsistent across studies. One study observed a secular increase in BMI in the intervention and control cities, with no intervention effect. Two studies found no intervention effect using a cohort analysis, but independent cross-sectional surveys indicated that the intervention cities experienced a significantly smaller increase in BMI than did the control cities. Another study saw positive intervention effects on body weight, but the effects were only significant for women. Lastly, one study reported a significant difference in the prevalence of overweight in the intervention city compared to the control city, such that the control city experienced a 3% increase in the prevalence of overweight while the prevalence of overweight in the intervention city remained stable. Based on the available studies, the authors concluded that there was insufficient evidence to recommend for or against community-level programs to prevent CVD or obesity and suggest that future research be directed at community prevention of obesity.	The authors only included papers considered to be of good or fair quality in the review (all community-level studies were of fair quality). As the individual-level interventions did not include an environmental component, the results of the individual-level intervention studies were not summarized in this table. All of the community-level interventions were designed to reduce cardiovascular disease (CVD) or CVD risk, and were not specifically aimed at preventing weight gain. The study populations were followed for 3 to 13 years.
World Health Organization (2009)	This report summarized the evidence on effective interventions to improve diet and physical activity and thereby reduce the risk of chronic non-communicable diseases. The report included 395 peer-reviewed journal articles published between 1995 and 2006. All study designs were accepted and articles focusing on both adults and children were included. The relevant intervention categories	*Policy and environment interventions:* The following interventions were effective (see next column for an explanation of "effective") in improving diet and/or physical activity: government policies to support a healthier composition of staple foods; interventions targeting the built environment; policies to reduce barriers to physical activity; transport policies; policies to increase space for recreational activity; and point-of-decision prompts to increase stair use. Moderately effective interventions included: pricing strategies; point-of-purchase prompts in grocery stores, vending machines, cafeterias, and restaurants; and multi-targeted approaches to encourage healthier commuting and leisure activities. Relatively few policy and environment interventions have been evaluated in peer-reviewed studies.	When possible, only results pertaining to adults were reported in this table. High-, medium-, and low-income countries were covered in the studies, but evidence was limited for middle- and low-income countries. The effectiveness of the interventions was based on methodological quality and the outcomes. "Effective" interventions generally had a robust experimental design, sufficient sample size, significant

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	examined in the report were policy and environment interventions, mass media interventions, workplace interventions, and community interventions. Outcomes of interest were diet and physical activity.	*Mass media interventions:* Mass media interventions that were effective in improving diet and/or physical activity included: campaigns promoting physical activity with community-based, supportive activities and interventions associated with policies to address environmental barriers to participation. Mass media interventions that were moderately effective included: campaigns that used one simple message; national "health brands" or logos to assist consumers in making healthy choices; and long-term intensive campaigns that promoted a healthy diet. *Workplace interventions:* Workplace interventions that were effective in improving diet and/or physical activity included multi-component programs that: provided healthy foods and beverages at the workplace (e.g., in the cafeteria and vending machines); provided space for fitness and encouraged stair use; involved employees in intervention planning and implementation; involved the family; and included behaviour change strategies and self-monitoring. No workplace intervention components were classified as moderately effective. *Community interventions:* Community interventions that were effective in improving diet and/or physical activity included: multi-component diet education programs; community development campaigns with intersectoral cooperation; and group-based physical activity classes for a homogeneous group of people. Community interventions that were moderately effective included: interventions that used an existing phone-in service for diet advice; community-wide interventions as part of a national or global campaign in a homogeneous community; programs targeted at low-income groups that included diet education; computer-based programs that provided personalized feedback and targeted high-risk groups; and supermarket tours that promoted healthy eating. Across intervention types, characteristics of successful interventions included having multiple components, adapting to the local context, using existing social structures, and involving participants (e.g., employees and community members) in the planning and implementation of the intervention.	effects on the outcome variables, met most or all of the planned objectives, were applicable in other settings, and were feasible and sustainable. "Moderately effective" interventions lacked at least one of the components mentioned above, but were still sufficiently robust. Most studies were judged to be of medium or high methodological quality (190 and 121 of the 395 reviewed studies, respectively). Grey literature was used to supplement the 395 peer-reviewed articles.
Community intervention reviews (peer-reviewed literature)			
Brownson et al. (2006) [Ann Rev Pub Hlth]	See workplace intervention reviews (above) for details.		
Brug et al. (2006) [AJPM]	See workplace intervention reviews (above) for details.		
Brug et al. (2008) [Pro Nutr Soc]	See workplace intervention reviews (above) for details.		

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Dolan et al. (2006) [Obes Rev]	This qualitative and quantitative review examined the effect of motivational prompts on stair use versus escalator use in public settings. Eight articles published between 1980 and 2004 were included; all were observational. The outcome of interest was change in stair use. Various settings were used to observe stair use (e.g., shopping mall, airport, and office building).	Across the articles, introducing motivational prompts significantly increased stair use by a mean of 2.8%. The increase was twice as large among females (4.8%) than among males (2.4%) and was significant for both groups. Each additional week of intervention was associated with a 0.1% increase in the number of stair users. Baseline stair use was significant and inversely associated with the change in stair use at the end of the intervention. Using a real city (Houston, Texas) as a hypothetical case, the increase was estimated to correspond to weight loss/weight gain prevention of approximately 300 g/person/year among those people increasing stair use.	All studies included a large number of observations (mean of 45,000). The studies did not include direct measurements of energy expenditure. The potential clinical benefits may have been over- or under-estimated, as the calculations made in the review assumed equal proportions of stair ascent and descent. It was also impossible to formally estimate weight loss without knowing the initial BMI distribution of those who hypothetically increase stair use.
Eves & Webb (2006) [Prev Med]	See workplace intervention reviews (above) for details.		
Faith et al. (2007) [Psyc Bul]	See workplace intervention reviews (above) for details.		
Foster & Hillsdon (2004) [J Sp Sci]	See workplace intervention reviews (above) for details.		
French et al. (2001) [Ann Rev Pub Hlth]	This narrative review summarized the evidence for environmental influences on physical activity and eating behaviours. The review was selective rather than exhaustive and was meant to explore the literature rather than draw firm conclusions. Scientific, government, and industry sources were included. All age groups were included. Relevant outcomes were eating behaviours and physical activity (including stair use).	*Eating:* The national "5-A-Day For Better Health" campaign to promote F&V consumption in the US included mass media messages, point-of choice activities in grocery stores, and community interventions in worksites. Over 3 to 5 years, national survey data showed an increase in the percent of people who were aware of the message to eat five servings of F&Vs a day (from 8% to 38%) and an increase in adults meeting the 5-A-Day goal. Food pricing strategies, such as subsidization, have also been effective in encouraging the purchase of nutritionally dense foods (e.g., F&Vs), even with minimal advertising or promotion. *Physical activity:* Environmental interventions have successfully promoted walking and cycling as modes of transportation by providing policy and financial support for bike path development and education/safety programs. Example programs in Minnesota and Oregon have increased bike use with stable funding and the development of bike paths. Various studies have supported the effectiveness of point-of-choice prompts in increasing stair use relative to escalator or elevator use in public settings. Both positive prompts	Much of the review focused on trends in eating over the past few decades (e.g., F&V and fat consumption) and cross-sectional research. Only the relevant intervention research was reported in this table.

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		(encouraging stair use) and negative prompts (discouraging escalator or elevator use) have been shown to be effective. National mass media campaigns to increase physical activity have generally been successful in increasing the public's awareness of the message, but have been unsuccessful in eliciting actual behaviour change.	
Glanz & Hoelscher (2004) [Prev Med]	See workplace intervention reviews (above) for details.		
Glanz & Yaroch (2004) [Prev Med]	This narrative review examined environmental, policy, and pricing strategies employed in grocery stores and the community to increase F&V consumption. Information was obtained from published journal articles, reports, and from experts in the field. "Grocery store" was broadly defined and included supermarkets, convenience stores, farmer's markets, snack shops, and internet groceries. The outcome of interest was F&V consumption.	*Point-of-purchase strategies:* Point-of-purchase information in grocery stores generally signifies shelf labels or signage that identifies healthy choices. Most studies have focused on decreasing high-fat food items. Point-of-purchase programs have been shown to influence knowledge, but have limited effects on actual food purchasing behaviour. *Reduced prices and coupons:* Strategies that reduce prices or provide coupons for healthy foods (e.g., F&Vs) at grocery stores or farmer's markets seem promising. However, price reductions and coupons may primarily assist those people who would have bought F&Vs even without the reduction, as only those people who actually used the coupons were measured. *Increased availability, variety, and convenience:* There is some evidence to indicate that increasing the availability and convenience of healthy food items by improving their location in stores may be associated with an increase in the purchases of such items. *Promotion and advertising:* Advertising through posters, games, and multimedia to increase F&V intake, as well as grocery store tours focusing on healthy shopping have been widely implemented, but no data exist regarding their effectiveness.	Most point-of-purchase studies did not use a control group and outcomes primarily addressed knowledge and self-reported behaviour. Not all studies specifically addressed F&V intake (e.g., some focused on fat intake) and thus the results may not be generalizable.
Heath et al. (2006) [J PA Hlth]	This systematic review addressed the effectiveness of environmental and policy strategies aiming to increase physical activity. Community-scale urban design and land use policies, street-scale urban design and land use policies, and transportation and travel policies were examined. Articles were published between 1987 and 2003 (12 for community-scale urban design, 6 for street-scale urban design, and 1 for transportation and travel policies). Physical activity was the outcome of	*Community-scale urban design and land use policies:* These interventions included zoning regulations and building codes, as well as environmental changes made by government, such as transit development, policies addressing street layouts, the density of development, and locating stores, jobs, and schools within walking distance of residential areas. The interventions that used these strategies were generally associated with higher levels of physical activity (e.g., walking and biking) than comparison groups, with a median improvement of 161%. Mixed land use (i.e., integrated residential and commercial land) and sidewalk quality and connectivity were examples of characteristics of the environment that seem to be helpful in promoting physical activity in the community.	All the study designs used in the community-scale urban design interventions relied on cross-sectional cohorts. As such, behavioural differences were measured rather than behavioural change. The studies were conducted in urban and suburban areas, and therefore it is unclear whether these results extend to rural areas. The street-scale urban design interventions employed quasi-experimental, pre-post, or cross-

Author(s) and date	Scope	Key results	Comments
	interest (typically referring to walking and cycling).	*Street-scale urban design and land use policies:* These interventions used strategies that were applied to a smaller area than the above interventions (generally a few blocks) and included street light or infrastructure projects to increase safety, sidewalk continuity, raised crosswalks to slow traffic, adding bike lanes, and landscaping. The interventions were all related to issues of access, aesthetics, and/or safety. There was sufficient evidence to support physical activity interventions targeting street-scale urban design and land use policies. Across the studies in this category, the median increase in physical activity was approximately 35%. Redesigned streets, improved lighting, and increased aesthetics were examples of helpful strategies used to increase physical activity in the community. *Transport and travel policies:* These interventions aimed to improve pedestrian, transit, and light rail access; increase pedestrian and cyclist activity and safety; decrease car use; and enhance air quality. Strategies included creating or improving bike lanes, requiring mandatory sidewalks, lowering prices on transit passes, encouraging car pooling, increasing the cost of parking, and adding bike racks on buses. Based on the single study that met inclusion criteria, there was insufficient evidence to indicate that such intervention strategies increase physical activity among community members.	sectional designs. The studies were carried out in various countries and in diverse settings and population groups. Only one study that addressed transport and travel policies was included. It employed a time series design. The relationship between the objective community and community members' perception of their community may be discrepant. At any rate, the nature of the relationship is unclear and the authors suggest it should be addressed in future studies. The authors also suggest developing longitudinal designs to measure how the environmental "exposure" influences behaviour change. When implementing a community- or street-scale urban design intervention, the local context of the community should be taken into account.
Hosking et al. (2010) [Cochrane]	This Cochrane review evaluated studies that looked at organizational "travel plans" or interventions to reduce car use while increasing alternatives such as walking, cycling, or taking public transit. Though travel plans are not health interventions (typically they are implemented to reduce traffic congestion), they may increase physical activity (as well as decrease air and noise pollution) and thereby affect health outcomes. Seventeen relevant publications up to 2008 were included and used RCT or controlled pre-post designs. The interventions were implemented in schools, universities, and workplaces. The outcome of interest was change in travel mode, and one study also measured changes in health as a result of travel plans (health-related quality of life, measured using the Short Form-36 (SF-36) instrument).	Of the five studies set in a workplace, one study showed significant improvements in walking (but not cycling) in the intervention group compared to the control group, one study reported a decrease in weekly household car usage in the intervention group compared to the control group, and the other three studies reported changes in car use during the intervention, but it was unclear whether the changes were significant. The evidence is thus inconclusive for the effectiveness of travel plans in eliciting a change in travel mode among employees. In the study that measured health outcomes, the relevant subscale "general health" was found to have improved significantly during the study in the intervention group relative to the control group. The other subscales did not represent outcomes relevant to this review. The authors conclude that there is very limited evidence that travel plans are effective in changing either travel mode or health outcomes. Thus, the authors suggest that travel plans should be implemented in the context of well-designed research until there is more evidence to support their effectiveness.	For changes in travel mode, results in the review were reported for school, university, and workplace settings. Only the workplace results are reported in this table. The study that reported health outcomes used a sample of employees who were already considering or preparing for active transport, thus limiting generalizability. Many studies potentially had a high level of bias. None of the studies reported the long term impact of the interventions.

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Kahn et al. (2001) [MMWR]	This narrative article discussed various community interventions to increase physical activity. The interventions focused on informational, behavioural and social, and environmental and policy approaches to increasing physical activity. Ninety-four relevant articles published between 1980 and 2000 were included. All studies included some type of control or comparison group, whether concurrently or using a pre-post design. Outcomes were physical activity and fitness.	The Task Force on Community Preventative Services strongly recommended three environment-related interventions based on evidence from the various systematic reviews used to evaluate community interventions to increase physical activity. Two informational approaches were recommended: community-wide campaigns and point-of-decision prompts to promote stair use. One environmental/policy approach was recommended: the creation of or improved access to places to engage in physical activity, coupled with informational outreach activities. There was insufficient evidence to make a conclusion regarding the effectiveness of mass media interventions to increase physical activity due to an inadequate number of studies.	Some recommendations refer to multi-component interventions (e.g., community-wide campaigns, which are usually comprised of mass media messages as well as other components such as community health fairs, the creation of walking trails, and worksite risk screenings). Non-environmental interventions and interventions targeted at children or adolescents were not reported in this table.
Kahn et al. (2002) [AJPM]	This systematic review built on Kahn et al.'s (2001) review by adding evidence regarding the effectiveness of the interventions, their applicability, and other related information. The scope is the same as for Kahn et al. (2001), except some relevant outcomes beyond physical activity were reported (e.g., weight). Ninety-nine articles were included.	*Informational approaches:* The relevant strategies that were reviewed were point-of-decision prompts to increase stair use relative to elevators or escalators, community-wide education campaigns, and mass media campaigns. Across the studies examining point-of-decision prompts, the median increase in stair use was 54%. Applicability results suggest that the intervention is likely to be effective in diverse settings and population groups. Point-of-decision prompts were deemed an effective strategy to increase physical activity. In the community-wide campaigns, messages were directed at the general population through various media outlets, such as television, radio, and newspapers. The campaigns were also typically combined with other intervention components and often targeted other health-related behaviours in addition to physical activity. Across studies measuring the relevant outcomes, there was a 4% median increase in the percentage of people who reported being active and a 16% median increase in change in energy expenditure. There was also a 1% median decrease in weight across the studies. Applicability results indicate that this type of intervention is likely to be effective in a wide range of settings and populations. The authors concluded that strong evidence exists to support the effectiveness of community-wide campaigns to increase physical activity. Mass media messages included those delivered by newspapers, television, radio, and billboards to a relatively undifferentiated population. A small number of studies suggested a modest trend toward increases in physical activity. It was concluded that there was insufficient evidence to assess the effectiveness of mass media messages in increasing physical activity. *Environmental and policy approaches:* The creation of or increased access to places for physical activity combined with informational outreach activities was the only environmental strategy that was reviewed. The interventions were directed toward physical and organizational structures rather than	See comments for Kahn et al. (2001).

Author(s) and date	Scope	Key results	Comments
		individuals and were typically implemented by worksites, coalitions, agencies, or communities. Across studies, there was a 5% median increase in aerobic capacity, an 8% median increase in energy expenditure, a 3% median increase in leisure-time physical activity, a 14% median increase in exercise score, and a 48% median increase in the frequency of physical activity. Some studies also reported decreases in weight and body fat. Applicability results suggest that this strategy is likely effective in diverse settings and populations. The authors conclude that there is strong evidence to support the effectiveness of this environmental approach to increase physical activity.	
Kremers et al. (2010) [Obes Rev]	See workplace intervention reviews (above) for details.		
Marcus et al. (2006) [Circ]	See workplace intervention reviews (above) for details.		
Matson-Koffman, et al. (2005) [AJHP]	See workplace intervention reviews (above) for details.		
Muller-Reimenschneider et al. (2009) [BJSM]	See workplace intervention reviews (above) for details.		
Sahay et al. (2006) [HPP]	See workplace intervention reviews (above) for details.		
Sallis & Glanz (2009) [MQ]	See workplace intervention reviews (above) for details.		
Seymour et al. (2004) [Prev Med]	See workplace intervention reviews (above) for details.		
Soler et al. (2010) [AJPM]	This systematic review provided an update on an earlier version (Kahn et al., 2002) that examined point-of-decision prompts to increase stair use.	*Point-of-decision prompts:* In terms of absolute change in stair use, the baseline rate of stair use among the studies ranged from 2% to 40% and the rate during the interventions ranged from 4% to 42%. The median change in stair use was an increase of 2.4%. The intervention effect in the majority	Of the 11 studies that examined point-of-decision prompts, only 2 were rated as having good methodological quality; the other 9 were rated as fair. The two

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	The current review also examined the effect of enhancements to stairwells on stair use. Sixteen articles published between 2000 and 2005 were included; six were included in the original systematic review. Settings for the interventions included shopping malls, train and bus stations, airports, and office and university buildings, among others. The outcome of interest was change in stair use.	of studies (in 15 of 21 intervention arms) was significant, but absolute changes were small. In terms of relative change in stair use, there was a median increase in stair use of 50% during the intervention compared to baseline. The results seem to be applicable across a diverse range of settings and population groups. The authors concluded that there is strong evidence that point-of-decision prompts contribute to modest increases in stair use. *Stairwell enhancements combined with point-of-decision prompts:* Modifications to stairwells included painting walls, adding carpet, adding artwork, and playing music. With only two studies examining this intervention strategy, there was not enough evidence to reach conclusions about its effectiveness. However, both studies reported increases in stair use during the intervention period.	studies examining stairwell enhancements were also rated as fair for methodological quality. The duration of the interventions was typically short, with a maximum time of observation of 12 weeks. The differential effects of type, size, and placement of messages remain unclear.
Community intervention reviews (grey literature)			
BC Ministry of Health (2006)	See workplace intervention reviews (above) for details.		
Mulvihill & Quigley (2003) [Health Development Agency]	See workplace intervention reviews (above) for details.		
Raine et al. (2008) [CIHI]	This systematic review synthesized the existing evidence on the structural and community-level characteristics of urban environments that influence weight management, as well as the evidence for the effectiveness of environmental interventions that aim to assist urban populations in achieving a healthy weight. The review examined environments at the physical, economic, political, and socio-cultural levels. The review included 355 articles published up to 2005. The studies covered all age groups. Relevant outcomes were obesity/healthy weight, diet, and physical activity.	*Obesity:* Very few articles examined environmental interventions to reduce obesity. The results of those that did suggested that environmental interventions (e.g., mass media messages) were not successful in reducing obesity or promoting a healthy weight. *Diet:* One study used shelf labels in food outlets to promote healthier choices and reported positive changes in food purchase behaviour. The findings were inconsistent for interventions that manipulated pricing to promote healthy eating: some reported increases in the consumption of healthy foods and others reported no effect. *Physical activity:* None of the studies explicitly discussed environmental interventions for adults. The authors summarized the findings and concluded that the experimental evidence supported a *probable* environmental effect on diet at the physical and economic levels, a *possible* effect at the socio-cultural level, and *no effect* at the political level. The experimental evidence supported a *possible* environmental effect on physical activity at the physical, economic, and socio-cultural levels, but found *no effect* at the political level. The experimental evidence to support an environmental effect on body weight was insufficient to make a conclusion or no effect was found.	As very little evidence existed for the effectiveness of interventions in an urban context, much of the review focused on cross-sectional results. Only the available intervention-related results were reported in this table. Additionally, only the results relating to adults were reported in this table. In terms of limitations, studies often contributed more than one "finding" or outcome to the review (e.g., reporting both diet and physical activity outcomes), but each single outcome was analyzed without accounting for possible associations among outcomes from the same study. Therefore, though they were treated as independent, some outcomes from the same study may have been related and could have skewed the results (i.e., a large number of findings could have come from two or three studies).

Author(s) and date	Scope	Key results	Comments
Reeder & Katzmarzyk (2006) [Canadian Task Force on Preventive Health Care]	See workplace intervention reviews (above) for details.		
World Health Organization (2009)	See workplace intervention reviews (above) for details.		

Public Health Ontario
PARTNERS FOR HEALTH

Santé publique Ontario
PARTENAIRES POUR LA SANTÉ

480 University Avenue, Suite 300, Toronto, Ontario M5G 1V2
647 260 7246 www.oahpp.ca

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Agency for Health Protection and Promotion
Agence de protection et de promotion de la santé