

*BUILT ENVIRONMENT HEALTH
PROMOTION STRATEGY, PHASE 1:
Evidence Informed Recommendations
2011-2015*



Provincial Population & Public Health

February 2012

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Executive Summary

This brief discussion serves as an overview of the far more extensive Evidence Informed Recommendation report which was the work of Public Health Innovation and Decision Support team on behalf of the Provincial Population and Public Health: Built Environment, Health Promotion Strategy Steering Committee. The Built Environment Health Promotion Strategy (*Strategy*) is one of many health promotion initiatives being developed by the AHS. The *Strategy* addresses the Be Healthy, Stay Healthy strategic priority outlined in the joint Alberta Health Service's and Alberta Health & Wellness document, *Becoming the Best: Alberta's 5-Year Health Action Plan 2010:2015*¹.

The purpose of the Evidence Informed Recommendations report is to summarize the evidence identified in the built environment and health literature reviews and produce evidence-informed recommendations emerging from these reviews with reference to contextual information obtained from a limited environmental scan. The Evidenced Informed Recommendations report describes evidence and recommendations to improve population and public health through modifications to the built environments that emerged from the systematic promising practices review of literature on the five domains of interest and the systematic review of built environment and health literature reviews. Where possible, illustrations linking the research evidence to the Alberta context have been included via the environmental scan findings and examples provided by the Working Group. These

examples serve as illustrations of the Alberta context but have not been assessed and nor are they comprehensive. The report is not intended to be an exhaustive examination of the literature findings – a more thorough examination can be found in the State Of Evidence report– it is instead a concise, high level distillation of the findings into recommendations and potential actions for further AHS exploration and decision making in Phase 2.

Overview

Strategy Vision: Alberta's built environments support positive social and population health outcomes.

Strategy Goal: To improve population-level health outcomes with a concurrent emphasis on reducing health inequities through activities designed to support the creation of health-promoting built environments.

Strategy Objectives: By supporting the development of health promoting built environments, the specific objectives of the strategy will be to:

1. Decrease obesity and overweight by increasing physical activity and healthy eating choices;
2. Reduce unintentional injuries;
3. Decrease environmental and occupational exposures that play a role in the development of cancer and other types of adverse health conditions.

¹ Document may be obtained at <http://www.health.alberta.ca/initiatives/5-year-health-action-plan.html>

Methods: To capture and review the large body of available scientific literature, two systematic literature reviews were conducted. The first was a promising practices review, where information from recently published

intervention studies was synthesized. The second was an appraisal of recently published systematic reviews. Findings from both reviews were synthesized to develop recommendations and conclusions.

Table 1: Summary Recommendations Table

Author (Year)	Article Type	Scientific Merit	Certainty of Effectiveness	Potential for Population Impact	Overall Ranking
<i>Community Recreation (Land Use)</i>					
Heath et al. ^{1, 2}	Review	Moderate	-	-	Moderate
Kaczynski & Henderson ⁸¹	Review	Moderate	-	-	Moderate
Limstrand ³	Review	Moderate	-	-	Moderate
McCormack et al. ⁴	Review	Moderate	-	-	Moderate
Cohen et al. ⁵	Intervention	-	Low	High	Promising
Eyler et al. ⁶	Intervention	-	Mid	High	Very Promising
McCarthy ⁷	Intervention	-	Mid	High	Very Promising
Tester & Baker ⁸	Intervention	-	Mid	Low	Less Promising
<i>Playgrounds (Land Use)</i>					
Brink et al. ⁹	Intervention	-	High	Mid	Very Promising
Colabianchi et al. ¹⁰	Intervention	-	High	Mid	Very Promising
Dobbinson et al. ¹¹	Intervention	-	Mid	High	Very Promising
Dymont ¹²	Intervention	-	Mid	Mid	Promising
Dymont & Bell ^{13, 14}	Intervention	-	High	High	Most Promising
<i>Gardens (Land Use)</i>					
Alaimo et al. ¹⁵	Intervention	-	Mid	Mid	Promising
Parmer et al. ¹⁶	Intervention	-	Mid	Mid	Promising
<i>Food Retail Access (Land Use)</i>					
Brug et al. ¹⁷	Review	Low	-	-	Low
Cunradi ¹⁸	Review	Low	-	-	Low
Fraser et al. ¹⁹	Review	Low	-	-	Low
Larson et al. ²⁰	Review	Moderate	-	-	Moderate
Treuhart & Karpyn ²¹	Review	Low	-	-	Low
Cummins et al. ²²	Intervention	-	Mid	Mid	Promising
<i>Housing (Land Use)</i>					
Lindberg et al. ^{23, 24}	Review	Moderate	-	-	Moderate
Barton et al. ²⁵	Intervention	-	Mid	Mid	Promising
Johnson et al. ²⁶	Intervention	-	Low	Mid	Less Promising
<i>Crime Prevention (Land Use)</i>					
Cozens et al. ²⁷	Review	Low	-	-	Low
Foster & Gilles-Corti ²⁸	Review	Low	-	-	Low
Cozens & Love ²⁹	Intervention	-	Low	Mid	Less Promising
Saville ^{30, 31}	Intervention	-	Mid	High	Very Promising

Author (Year)	Article Type	Scientific Merit	Certainty of Effectiveness	Potential for Population Impact	Overall Ranking
<i>Mental Health (Land Use)</i>					
Abraham et al. ³²	Review	Moderate	-	-	Moderate
Mair et al. ³³	Review	Moderate	-	-	Moderate
Renalds et al. ³⁴	Review	Moderate	-	-	Moderate
Truong ³⁵	Review	High	-	-	High
<i>Rural Land Use (Land Use)</i>					
Frost et al. ⁸²	Review	Moderate	-	-	Moderate
Sandercock et al. ³⁶	Review	Moderate	-	-	Moderate
<i>Driving Environments (Transportation)</i>					
Beyer et al. ³⁷	Review	High	-	-	High
Elvik et al. ³⁸	Review	High	-	-	High
<i>Elder Driving (Transportation)</i>					
Bohr ³⁹	Review	High	-	-	High
<i>Crash Prevention Interventions (Transportation)</i>					
Aarts & van Schagen ⁴⁰	Review	Low	-	-	Low
Aeron-Thomas & Hess ⁴¹	Review	High	-	-	High
Blais & Dupont ⁴²	Review	Low	-	-	Low
Bunn et al. ⁴³	Review	High	-	-	High
Pilkinton & Kinra ⁴⁴	Review	High	-	-	High
Wilson et al. ⁴⁵	Review	High	-	-	High
<i>Proximity to Traffic (Transportation)</i>					
Boothe & Shendell ⁴⁶	Review	Moderate	-	-	Moderate
Clark & Stansfeld ⁴⁷	Review	Low	-	-	Low
Lipfert & Wyzga ⁴⁸	Review	Low	-	-	Low
Wier et al. ⁴⁹	Intervention	-	Low	High	Promising
<i>Active School Transport (Transportation)</i>					
Anderson et al. ⁵⁰	Review	Low	-	-	Low
Faulkner et al. ⁵¹	Review	Moderate	-	-	Moderate
Lee et al. ⁵²	Review	Low	-	-	Low
Lee & Zhu ⁵³	Review	Low	-	-	Low
Pont et al. ⁵⁴	Review	High	-	-	High
Eyler et al. ⁵⁵	Intervention	-	High	High	Most Promising
Vaughn et al. ⁵⁶	Intervention	-	Low	High	Promising
<i>Adult Active Transport (Transportation)</i>					
Hosking et al. ⁵⁷	Review	High	-	-	High
Panter & Jones ⁵⁸	Review	Moderate	-	-	Moderate
Shephard ⁵⁹	Review	Low	-	-	Low
Schuurman et al. ⁶⁰	Intervention	-	Low	Low	Least Promising
<i>Cycling (Transportation)</i>					
Pucher et al. ⁶¹	Review	Moderate	-	-	Moderate
Reynolds et al. ⁶²	Review	Moderate	-	-	Moderate
Jensen et al. ^{63, 64}	Intervention	-	Low	Mid	Less Promising

Author (Year)	Article Type	Scientific Merit	Certainty of Effectiveness	Potential for Population Impact	Overall Ranking
<i>Elevator or Stair Design (Building Design/Design Features)</i>					
Nicoll & Zimring ⁶⁴	Intervention	-	Mid	Mid	Promising
<i>Obesity Prevention</i>					
Booth et al. ⁶⁵	Review	Low	-	-	Low
Casagrande et al. ⁶⁶	Review	Low	-	-	Low
Khan et al. ⁶⁷	Review	Mid	-	-	Mid
Papas et al. ⁶⁸	Review	Moderate	-	-	Moderate
Sallis & Glanz ⁶⁹	Review	Low	-	-	Low
Townshend & Lake ⁷⁰	Review	Moderate-Low	-	-	Moderate-Low
Kramer et al. ⁷¹	Intervention	-	Mid	Mid	Promising
Kim et al. ⁷²	Intervention	-	Mid	High	Very Promising
Roof & Glandon ⁷³	Intervention	-	Low	Mid	Less Promising
de Silva-Sanigorski et al. ⁷⁴	Intervention	-	Low	Mid	Less Promising
<i>Overarching Approaches</i>					
Lees & Redman ⁷⁵	Intervention	-	Low	High	Promising

1.0 Introduction

The Built Environment Health Promotion Strategy is one of many health promotion initiatives being developed by the Population and Public Health portfolio. The Strategy addresses the Be Healthy, Stay Healthy strategic priority outlined in Alberta Health Service's *Becoming the Best: Alberta's 5-Year Health Action Plan 2010:2015*. The Built Environment Health Promotion Strategy addressed the following goals and health sector actions outlined in the *Health Plan*:

Goal:

Albertans will live longer and enjoy a high quality of life.

Action 1: Prevent injuries and disease by:

- i. Developing strategies to reduce the risk of death and injury in traffic accidents in rural Alberta. (Action 4.11, p.26)
- ii. Continuing to develop education and awareness tools to prevent chronic disease. (Action 4.17 p.27)

Action 2: Create healthier social and physical environments by:

- i. Advocating for policies that promote a healthier society.

action in organizing and developing a built environment program was the development of a strategy that would generate changes to the built environment which influence the modifiable risk factors of nutrition and physical activity. With the amalgamation of the Alberta Cancer Board into Alberta Health Services, and the Nutrition and Physical Activity Unit into Health Promotion, Disease and Injury Prevention (HPDIP), it was necessary to reconsider the aim, scope and development of the strategy. Given the organizational change, there was an opportunity to leverage the innovations, partnerships and tremendous knowledge across the province.

Between 2006 and 2009, the Population Health Unit within the former Capital Health Region focused their work on "Healthy Built Environments". The team conducted research, framed the issues relevant to the Capital region, and shared their findings with audiences both internal and external to health care. They linked with municipalities in the region, and with the City of Edmonton jointly led the development of the Walkability Strategy. In addition, they collaborated with the River Valley Alliance on three municipal projects: providing population health input on municipal development plans and transportation master plans, as well as a bicycle strategy.

Strategy Background

The impetus for the creation of a provincial strategy to address health through the built environment began in the Nutrition and Physical Activity Unit of the former Alberta Cancer Board's Department of Prevention. As identified by the Alberta Cancer Board, the first

In January of 2010, a HPDIP Built Environment Strategy Development & Consultation Planning Meeting was held with HPDIP directors, or their staff representatives. The result of the meeting was the desire to establish an AHS wide provincial strategy, extending beyond HPDIP, which would identify physical systems that influence and contribute to population health



outcomes, as well as make recommendations for AHS action. Two committees were struck to direct the Strategy development work. A Steering Committee comprised of directors and managers with interest in the built environment provided oversight and direction for strategy development. The first official meeting of the Steering Committee was June 1st, 2010. Prior to the Steering Committee meeting, each member selected a staff person from their respective units and areas to form a Working Group. The Working Group was tasked with the day-to-day development of the *Strategy*. The working group began meeting on a bi-weekly basis in

February of 2010. As the refinement of the AHS organizational structure and priorities continued, these changes altered the composition of the strategy committees. The AHS areas currently collaborating to develop the *Strategy* include Public Health and Innovation Decision Support; Health Promotion, Disease and Injury Prevention areas of Chronic Disease Prevention, Healthy Public Policy and Injury Prevention as well as input and engagement from other areas including Environmental Health; Nutrition and Food Services; and Environmental and Occupational Exposures.

2.0 The need for a Provincial *Population & Public Health* built environment health promotion strategy

The term *built environment* generally refers to an interdisciplinary area of focus that describes the design, construction, management and use of human-made surroundings as an interrelated whole, as well as their relationship to human activities over time. It encompasses land uses, transportation systems, buildings, parks, road systems, trails, housing and so forth^{1,1-3}. The potential importance of the built environment field to prevention of disease is elegantly underscored in the World Cancer Research Fund's (WCRF) *Policy and Action for Cancer Prevention*⁴, the WCRF notes that cancer prevention must extend

beyond what health ministries and health professionals can do, and cannot be achieved simply by relying on people making wise personal choices...[it] involves changes in...policies that determine food systems and supplies. Enabling safe and enjoyable day to day physical activity requires civil engineers and employers to construct and adapt cities, transportation systems, buildings and offices, in ways that will improve public health. (p. 108)

An estimated one third of all cancers could potentially be prevented through proper nutrition, physical activity and the maintenance of a healthy bodyweight⁵. Strategies for the prevention of cancer apply equally to the prevention of chronic diseases, such as cardiovascular disease and diabetes, where the same risk factors of poor nutrition, physical inactivity and being overweight or obese are estimated to contribute to 44 percent of mortality in the province (2005 Alberta estimates)⁶.

The “physical environment” is listed as the first of four dimensions for policy and action as outlined in the 2009 WCRF Policy and Action report. Furthermore, institutions such as the Public Health Agency of Canada acknowledge

the physical environment is an important determinant of health. At certain levels of exposure, contaminants in our air, water, food and soil can cause a variety of adverse health effects, including cancer, birth defects, respiratory illness and gastrointestinal ailments. In the built environment, factors related to housing, indoor air quality, and the design of communities and transportation systems can significantly influence our physical and psychological well-being⁷.

Population and public health strategies in Canada relate to the built environment and health primarily through influencing urban planning and transportation, land use and design related activities. In order to realize significant sustained changes in modifiable risk factors for cancer, chronic disease and injury, and positively impact population health, modifications to the built environment are likely required. These changes should be directed to limiting the unintentional negative health impacts of community design and foster environments that support healthy choices, such as being physically active, and reducing passive exposure to risks, such as air pollution.

There is an opportunity for AHS to stimulate or facilitate, though implementation of a built environment strategy, systemic changes that will affect social groups across Alberta, and to

be a catalyst for the removal of barriers in the environment that prevent healthy choices from being the easy choices.

Evidence-informed recommendations for action in the area of the built environment intended to promote population level changes in modifiable risk factors for cancer, chronic disease and injury are outlined in this Phase 1 document.

These recommendations are not necessarily intended to be AHS led, but are instead recommendations derived from the evidence reviewed, which demonstrate a potential for population health impact. This document will be used to inform the development of the *Provincial Population and Public Health: Built*

Environment, Health Promotion Strategy and Action Plan (referred to in this document as the *Strategy*) in Phase 2, scheduled to begin in the fall of 2011. Achievement of change in Alberta's built environments requires multi-sectoral collaboration and partnership. Phase 2 will determine the contribution and role of the AHS as a partner and change agent.

A state of the evidence report, along with an environmental scan of built environment initiatives in select Alberta municipalities, has informed the development of the recommendations outlined in the current document. Please see [Table 22](#) for a summary of Environmental Scan findings.

3.0 Goals and Objectives of the *Strategy*

Implementation of the *Strategy* will support AHS in decreasing the burden of disease, promoting healthy communities and in responding to the diverse needs of Albertans.

Strategy Vision: Alberta's built environments support positive social and population health outcomes.

Strategy Goal: To improve population-level health outcomes with a concurrent emphasis on reducing health inequities through activities designed to support the creation of health-promoting built environments.

By supporting the development of health promoting built environments, the specific objectives of the *Strategy* will be to

1. Decrease obesity and overweight by increasing physical activity and healthy eating choices;
2. Reduce unintentional injuries;

Decrease environmental and occupational exposures that play a role in the development of cancer and other types of adverse health conditions.

4.0 Purpose of Current Document

The purpose of this Phase 1 document is to outline recommendations for action around the built environment demonstrated by literature to potentially, positively affect population health outcomes. The recommendations are reflective of the evidence identified in the literature reviews undertaken by the Public Health Innovation and Decision Support team on behalf of the Provincial Population and Public Health: Built Environment, Health Promotion Strategy Steering Committee. The recommendations have been written without consideration for the role of the AHS in the

achievement of the recommendations, which will be determined in Phase 2 of the *Strategy* development. To provide contextual examples of programs being completed in the area of the built environment in Alberta, the State of the Evidence (SOE) findings are followed by select examples from the environmental scan of programs and initiatives, and/or by examples of relevant research in Alberta provided by the Provincial Population and Public Health: Built Environment, Health Promotion Strategy Working Group. The format is as follows:

Broad Built Environment Topic Area (e.g. Transportation)

Topic Area Sub-section (e.g. Active Transport)

Summary of Evidence from the SOE report

Context: Examples from Environmental Scan

Context: Examples of Relevant Research in Alberta

Recommendations

The intended audience for this document is the Provincial Population and Public Health: Built Environment, Health Promotion Strategy Steering Committee; the Health Promotion Disease and Injury Prevention Units involved in

Phase 2 of the *Strategy* development; and interested areas of the Population and Public Health portfolio. During Phase 2 of the *Strategy* development, this audience will consider the role of AHS within each recommendation.

5.0 Methods used to generate the evidence for Phase 1 Recommendations

In recognition of the necessity for the *Strategy* to be founded upon the most current and robust evidence available, an intensive investigation and targeted review of literature in the area of health and the built environment was conducted, along with an environmental scan of programs and initiatives in a select sample of Alberta communities. The three literature reviews included:

1. a narrative literature review of health sector actions related to the five targeted health domains (listed below),
2. a promising practices review of the five targeted health domains and evaluated built environment interventions/ programs within these domains, and
3. a systematic review of built environment and health review articles.

The narrative literature review, numbered one above, served to broaden the Working Group and Steering Committee members understanding of their health promotion content area's relationship to the built environment. The five health promotion content areas for the reviews, referred to as domains, included physical activity, nutrition, environmental hazards, ultra-violet radiation and injury prevention. If the literature identified in this narrative review met the inclusion criteria for the promising practice review or the systematic review, the articles were included. Publications within the systematic review and the promising practices review used pre-determined inclusion and exclusion criteria and were critically appraised using previously established methods⁸ which identify six primary

categories for appraisal: research question, search strategy, selection strategy, validity assessment, data extraction and combining of findings. To ensure consistent and objective appraisal of each review article, predetermined criteria were considered for each category. (See **Appendix B: Promising Practices Review: Appraisal of Scientific Rigour and Community Participation** for a detailed overview of Appraisal criteria).

To limit the potential for large content gaps and to reflect the standard conceptualization of the built environment, the Steering Committee directed the appraisal of systematic reviews to focus on land use, transportation and building design/design features. Elements of the built environment are generally encompassed by one or more of these three overarching themes. Land use can be understood as “the spatial distribution of human activities, in other words, what kinds of activities are located where.”⁹ Transportation is “the physical infrastructure and the services that make up the transportation system and that provide the spatial links—or ‘connectivity’— between activities.”⁹ Building design/design features are “the aesthetic qualities of the built environment and overlays both land use patterns and the transportation system, particularly in terms of the design of buildings and the design of streetscapes, respectively.”⁹

The findings of the literature reviews were synthesized to form a State of the Evidence (SOE) report. The findings from both intervention articles, numbered two above, and review articles, numbered three above, were

combined to develop the conclusions and recommendations of the SOE report. The strength of the conclusions and recommendations were based upon the level of evidence available as well as the scientific rigour and promise of the available evidence. The purpose of the State of the Evidence report and the current evidence-informed recommendations document differ; as such the documents, while related, vary in structure and organization. For the reader's convenience **Table 30** in **Appendix C** outlines the ranking of each article reviewed and directs the reader to the associated state of the evidence section for further investigation. Note some articles fall into more than one section area.

A search for individual studies to identify promising practices yielded 321 articles related to the five domains of interest (physical activity, nutrition, environmental hazards, ultraviolet radiation [UVR] and injury prevention). Of these, 31 were included and critically appraised for scientific rigour and potential for population impact. An additional 36 full text literature reviews were identified from the review of promising practices. Of the 155 full texts that were retrieved, 49 were included and

appraised. A systematic review of reviews search strategy generated 3,776 systematic review articles. Of these, 119 full texts were retrieved and considered for their potential inclusion. See **Table 22** in **Appendix A**.

An environmental scan was also completed of programs and initiatives in seven Albertan cities and two First Nations communities: Calgary, Edmonton, Grande Prairie, Medicine Hat, Red Deer, Lethbridge, Fort McMurray, Enoch and Frog Lake. Initiatives that influenced any of the five domains through the built environment were considered relevant and recorded. Select examples from the scan are used throughout this document to illustrate the local built environments in Alberta. A database was created to collect and organize the results of the scan but evaluation of the programs and initiatives was not completed. The impact of each program and initiative is therefore unclear. We have chosen examples that are most related to each topic area or that highlight the content area reviewed. The contextual information gained from the environmental scan will be used more extensively in Phase 2: Strategy and Action Plan Development.





6.0 Phase 1 Evidence Informed Recommendations

The remainder of this document is devoted to describing evidence and recommendations to improve population and public health through modifications to the built environments that emerged from the AHS conducted systematic promising practices review of literature on the five domains of interest and the systematic review of built environment and health literature reviews (numbers 2 and 3). Where possible, illustrations linking the research evidence to the Alberta context have been identified via the environmental scan findings and examples provided by the Working Group. The present report is not intended to be an exhaustive examination of the literature findings, a more thorough examination can be found in the SOE report; it is instead a concise, high level distillation of the findings into recommendations, and potential actions for further AHS exploration and decision-making in Phase 2.

Identification of specific health sector actions in the area of the built environment that would promote population level changes in modifiable risk factors for cancer and chronic disease, as well as actions to reduce the rate of injury and exposure to environmental and occupational toxins will follow in Phase 2 of the *Strategy* development.

6.1 Transportation

6.1.1 Active Transport

Active transport (AT, active travel, active school transport) is one mechanism to increase routine physical activity and to establish healthy lifestyle patterns early in life, which has cardiovascular¹⁰ and mental health benefits¹¹ and protects against osteoporosis^{12,11}, obesity¹³ and associated illnesses. For this reason interventions to increase active transport are of interest from a health perspective.

Table 2: Studies Contributing to Recommendations for Active Transport

Citation	Quality of Evidence
<i>Promising Practices Review</i>	
(24) Eyler, AA; Brownson, RC; Doescher, MP; Evenson, KR; Fesperman, CE; Litt, JS; Pluto, D; Steinman, LE; Terpstra, JL; Troped, PJ; Schmid, TL (2008). Policies Related to Active Transport to and from School: A Multisite Case Study. Health Education Research , 23(6), pp 963-975	Most Promising
(23) Vaughn AE, Ball SC, Linnan LA, Marchetti LM, Hall WL, Ward DS. (2009). Promotion of Walking for Transportation: A Report From the Walk to School Day Registry. Journal of Physical Activity and Health , 6, pp 281-288.	Promising
<i>Systematic Reviews</i>	
(18) Point K, Ziviani J, Wadley D, Bennett S & Abbott (2009). Environmental Correlates of Children's Active Transportation: A systematic literature review. <i>Health & Place</i> , 15, pp 849-862.	High
(28) Truong KD & Ma S (2006). A Systematic Review of Relations between Neighborhoods and Mental Health. <i>The Journal of Mental Health Policy and Economics</i> , 9, pp 137-154.	High
(21) Faulkner GEJ, Buliung RN, Flora PK & Fusco C (2009). Active School Transport, Physical Activity Levels and Body Weight of Children and Youth: A Systematic Review. <i>Preventive Medicine</i> , 48, pp.3-8.	Mid
(26) Mair C, Diez Roux AV & Galea S (2008). Are Neighborhood Characteristics Associated with Depressive Symptoms? A review of evidence. <i>J Epidemiol Community Health</i> , 62, pp. 940-946.	Mid
(14) Panter JR & Jones A (2010). Attitudes and the Environment as Determinants of Active Travel in Adults: What Do and Don't We Know? <i>Journal of Physical Activity and Health</i> , 7, pp 551-561.	Mid

Citation	Quality of Evidence
(3) Papas MA, Alberg AJ, Ewing R, Heizisouer KJ, Gary TL & Klassen AC (2007). The Built Environment and Obesity. <i>Epidemiologic Reviews</i> , 29, pp 129-143.	Mid
(30) Renalds, A, Smith, TH & Hale, PJ (2010). A Systematic Review of Built Environment and Health. <i>Family Community Health</i> , 33(1), pp 68-78.	Mid
(27) Abraham A, Sommerhalder K & Abel T (2010). Landscape and Well-being: A Scoping Study on the Health-promoting Impact of Outdoor Environments. <i>International Journal of Public Health</i> , 55, pp 59-69.	Mid-Low
(19) Khan LK, Sobush K, Keener D, Goodman K, Lowry A, Kakietek J & Zaro S (2009). Recommended Community Strategies and Measurements to Prevent Obesity in the United States. <i>Morbidity and Mortality Weekly Report (MMWR)</i> , 58(RR-7), pp 1-26.	Mid-Low
(15) Townshend T & Lake AA (2009). Obesogenic urban form: Theory, policy and practice. <i>Health and Place</i> , 15, pp 909-916.	Mid-Low
(25) Anderson PM & Butcher KF (2006). Childhood Obesity: Trends and Potential Causes. <i>The Future of Children</i> , 16(1), pp. 19-45.	Low
(16) Booth KM, Pinkston MM & Poston WSC (2005). Obesity and the Built Environment. <i>American Dietetic Association</i> , 105(5), pp S110-S117.	Low
(22) Lee MC, Orenstein MR & Richardson MJ (2008). Systematic Review of Active Commuting to School and Children's Physical Activity and Weight. <i>Journal of Physical Activity and Health</i> , 5(6), pp 930-949.	Low
(1) Sallis JF & Glanz K (2009). Physical Activity and Food Environments: Solutions to the Obesity Epidemic. <i>The Milbank Quarterly</i> , 87(1), pp 123-154.	Low
(20) Shephard RJ (2008). Is Active Commuting the Answer to Population Health? <i>Sports Medicine</i> , 38(9), pp751-758.	Low

Neighbourhood characteristics that correlate favourably with physical activity include pedestrian-friendly infrastructure: quality sidewalks, sidewalk continuity; travel distance to a variety of walkable destinations including recreation facilities, sporting venues and parks; and a high perceived attractiveness and safety of the area^{2,14-16,17,18,19}. Walkable neighbourhoods where leisure-time activities or destinations of interest are closer, is also associated with greater physical activity compared to less walkable neighbourhoods^{2,15,20}. Indeed, an inverse relationship appears between distance to destinations and child and adolescent rates of active travel; the farther the distance of a destination, for example school, the greater the decrease in reported use of an active mode of transport^{17,18}.

The body of evidence suggests that active school transport is a viable mechanism to increase habitual physical activity in children; where instituted, these programs appear to have strong uptake^{21,22,23}. A Walk to School (WTS) program, originating in Great Britain in 1995, has been adopted by schools in every state in the United States²³. Approximately 35% of U.S. WTS program coordinators report that participation in the program or a walk to school event, increased active school transport in their students²³. While the presence of a WTS program appears to increase active transport among children, there is however a need to consider environmental, demographic, infrastructural and financial factors that may influence the success of active school transport initiatives^{21,22}. A survey of representatives from schools with Active School Transport (AST) initiatives identified policies, funding and the



surrounding environment as important to the success of programs²⁴. There is sufficient evidence of a positive association between increased physical activity and active school transport, but not a corresponding population level decrease in children's body weight^{21,22,25}.

In a limited number of the reviewed studies, after controlling for individual characteristics and other confounders, a protective effect against depression was found to be linked to neighbourhood features that support active transport, walkability, neighbourhood design and neighbourhood perception²⁶.

Furthermore, urban landscape may be a platform for activities that promote mental health and well-being such as social integration, social engagement and participation, social support and perceptions of safety^{2,26-28}.

Conversely, urbanicity is also considered a possible risk factor for psychosis. On the whole, designing urban environments/landscapes for the promotion of physical activity, through the construction of walkable spaces, may be associated with better protection from

depression, greater social well-being and the development of communities that facilitate social integration, all of which are important for mental health and overall well-being.

Potential environmental and policy strategies include modifications to the built environment that would promote active transport by developing infrastructure for cycling and walking, building schools close to residential areas, improving access to public transit, increasing safety in public areas where individuals could engage in physical activity and increasing traffic safety¹⁹. However, the political environment, which is necessary to bring about these changes, as a determinant of active transport, is inconsistently and infrequently studied²⁴.

Of note, there are also very strong socio-cultural determinants of children's levels of active transport found in the literature. Household income and car ownership, higher mean family income and a higher number of household vehicles are associated with a lower rate of children's active transport^{17, 18}.

Context: Examples from Environmental Scan

Safety Patrol Program, Alberta-wide

The Alberta Motor Association sponsors over 16,000 Grades Five and Six students from almost five hundred schools. These school safety patrollers act to keep students actively commuting to and from school safe from traffic related injury.

Edmonton Sidewalk Strategy, City of Edmonton

A City of Edmonton initiative, the Sidewalk Strategy, is concentrated on creating a comprehensive pedestrian infrastructure. Missing sidewalk segments are identified and prioritized by seriousness of need and a plan for construction is developed. In addition, a plan for sidewalk repair or replacement exists to ensure the sidewalk network is maintained.

Recommendations:

Research in AT is mired in methodological challenges. Large variances in the way researchers operationalize and measure the built environment, as well as their use of metrics, out of convenience, are a few of the challenges^{1, 14, 20, 63}. Nonetheless, the reviewed evidence suggests a correlation between characteristics of the built environment and

individual active transport behaviour. It is important to observe that no research scientifically or specifically addressed interventions to improve mental well-being^{2, 26-28}. And with regard to the mental health literature, each built environment variable was only considered in a single study, reducing the strength of the evidence presented.

1. Create walkable neighborhoods that facilitate ease of active transport by enhancing and expanding pedestrian infrastructure, promoting mixed-use development, providing communities with access to destinations, such as parks and schools, in close proximity to their residences.
2. Implement and evaluate the impact of local programming that facilitates active school transport, such as the Walk to School program. Consider and address infrastructure, policies and environments surrounding schools when developing the active school programming.
3. Use measured mental health outcomes in assessments of neighborhood-level interventions.
4. Where possible, conduct longitudinal experimental and/or quasi-experimental research to explore the pathways through which neighborhood characteristics influence mental health.

6.1.2 Active Travel - Cycling

Existing evidence suggests comprehensive multi-component bicycling infrastructure

strategies increase rates of cycling and decrease crash risk and rates of injury^{29, 30}.

Table 3: Studies Contributing to Recommendations for Cycling

Citation	Ranking
<i>Promising Practice Reviews</i>	
(37) Jensen SU (2008). Safety Effects of Blue Cycle Crossings: A Before and After Study. Accident Analysis and Prevention, 40 (742).	Less Promising
<i>Systematic Reviews</i>	
(30) Reynolds CCO, Harris MA, Teschke K, Crompton PA & Winters M (2009). The Impact of Transportation Infrastructure on Bicycling Injuries and Crashes: A Review of the Literature. Environmental Health, 8(47).	Mid
(29) Pucher J, Dill J & Handy S (2010). Infrastructure, Programs, and Policies to Increase Bicycling: An International Review. Preventive Medicine, 50, S106-S125.	Mid
(19) Khan LK, Sobush K, Keener D, Goodman K, Lowry A, Kakietek J & Zaro S (2009). Recommended Community Strategies and Measurements to Prevent Obesity in the United States. Morbidity and Mortality Weekly Report (MMWR), 58(RR-7), pp 1-26.	Mid-Low

Comprehensive packages of pro-bicycle interventions, including infrastructural and policy interventions aimed to encourage cycling

such as bike paths, bike parking, end-of-trip facilities and integration into public transit, along with appropriate programming to



compliment strategies, result in increases in the number of bicycle trips and the proportion of individual cycling^{29, 19}. Examples of end-of-trip facilities include secured and sheltered bicycle parking for cyclists and the availability of shower facilities at bicycle travel destinations. The comprehensive quality of the intervention, as opposed to the development of a single component or few individual components, appears to be important to behaviour change; the sum is greater than the individual parts. International case studies highlight the potential effectiveness of a more comprehensive system of interventions for increasing bicycle use, with cities that have implemented bicycle-sharing initiatives to enhance access to bicycles demonstrating increased rates of bicycling²⁹.

Although increased cycling can have positive health impacts by increasing rates of physical activity, improving cardiovascular health, reducing obesity and morbidity^{20, 31-36}, there is also a potential for increased injury and

associated morbidity and mortality³⁰. Indeed, cyclists are at particular risk when they use the same infrastructure as other travel modalities (i.e., pedestrians or motorists)³⁰. Sidewalks and multi-use trails pose risk for injury and crashes for cyclists, as do major road ways. In contrast, bicycle lanes serve to separate travel modalities and as a result decrease the overall risk of injury and crashes. Safe cycling can be supported by bicycle facilities, which include separate bicycle lanes. However, not all transportation infrastructure interventions designed to improve cycling safety are supported by research. There is insufficient evidence that blue-cycle crossing, where roadways are marked in blue to heighten the attention of motorists, increase road safety³⁷. Conversely, evidence indicates that transportation engineering techniques encompassed under the umbrella term “traffic-calming” measures, which intentionally reduce the speed of motor-vehicles, offer protection. Common examples of these measures include speed bumps and raised crosswalks³⁰.

Context: Example from Environmental Scan

Employee bicycle-sharing program, Edmonton

This pilot project from Active Edmonton allows workers to sign out a bicycle for a leisure ride over a lunch break or as a way of commuting to meetings downtown. The target is employees who do not currently bicycle or bicycle infrequently.

Recommendations:

1. Develop and employ a comprehensive suite of interventions that includes building bicycle paths, bicycle parking, end-of-trip facilities, traffic-calming devices and extending pro-bicycle policy to increase bicycle usage and decrease injury and crash risk.
2. Explore bicycle programs, such as bicycle-sharing, as a method of encouraging more habitual physical activity.

6.1.3 Organizational Travel Plans

Organizational Travel Plans (OTPs) are behaviour change programs developed by schools and businesses with the objective of

reducing car use and encouraging active transport alternatives (walking, cycling and use of public transit)³⁸.

Table 4: Studies Contributing to Recommendations for Organizational Travel Plans

Citation	Quality of Evidence
<i>Systematic Review</i>	
(38) Hosking J, Macmillan A, Connor J, Bullen C & Ameratunga S (2010). Organizational Travel Plans for Improving Health. The Cochrane Library, 3.	High

Overall, OTPs do not demonstrate an effect on health outcomes, although they have been shown to increase walking among adults already considering active travel to work³⁸. Therefore, OTPs may encourage a shift in travel mode. However, at present the evidence is inadequate to draw any conclusions about the

effectiveness of OTPs on health or travel behaviour. OTPs can only be regarded as a potential intervention and until more conclusive evidence is available. Therefore OTPs ought to be implemented strictly as a part of a strongly designed empirical research project.

Recommendations:

1. By partnering with business, school or community groups, design a rigorous research study to examine the effectiveness of OTPs. Include in the study the investigation of individual and environmental factors and their interactions on the choice to use active transport.

6.1.4 Air Pollution and Traffic Exposure

Transportation planning, by way of controlling exposure to traffic, may have important public health and social justice ramifications^{39,40}. It is important to note that accurately determining the health effects of traffic exposure is challenging given the wide array of other potentially influencing factors, including social, physical and environmental contributors to health, for example socioeconomic status (SES).

The authors of the systematic reviews listed below did not appraise the quality or validity of the air pollution studies they included in their research; this limits the reviewer's ability to determine if these other factors were adequately controlled. Therefore caution should be used when examining the evidence below.

**Table 5: Studies Contributing to Recommendations for Air Pollution**

Citation	Quality of Evidence
<i>Promising Practices Review</i>	
(42) Wier, M., Sciammas, C., Seto, E., Bhatia, R. & Rivard, T. (2009). Health, Traffic, and Environmental Justice: Collaborative Research and Community Action in San Francisco, California. American Journal of Public Health , 99, Suppl. 3, S499-S504.	Very Promising
<i>Systematic Reviews</i>	
(41) Boothe VL & Shendell DG (2008). Potential Health Effects Associated with Residential Proximity to Freeways and Primary Roads: Review of Scientific Literature, 1999-2006. <i>Journal of Environmental Health</i> , 70(8), pp. 33-41.	Mid
(39) Clark C & Stansfeld SA (2007). The Effect of Transportation Noise on Health and Cognitive Development: A Review of Recent Evidence. <i>International Journal of Comparative Psychology</i> , 20(2-3), pp 145-158.	Low
(40) Lipfert FW & Wyzga RE (2008). On Exposure and Response Relationships for Health Effects Associated with Exposure to Vehicular Traffic. <i>Journal of Exposure Science and Environmental Epidemiology</i> , 18(6), pp 588-599.	Low

Associations between adverse health effects and residential proximity to, and density of, traffic have been identified ⁴¹. Indeed, traffic exposure is associated with air and noise pollution, symptoms of poor respiratory functioning, childhood cancers, preterm birth, low birth weight and poor heart health ^{39,40}. One major criticism outlined by the study researchers was the use of research models that force researchers to make decisions that result in difficulty comparing and analyzing results across studies. Examples of these methodological judgments made by researchers include the selection of residential distance of interest, metric of traffic flow, definition of a major roadway, duration of exposure, and if and how to control for co-pollutant confounders ^{39,40}. Additional research that more specifically defines and measures confounding factors is needed.

Researchers, whose work was appraised in this review, endorsed the need for further research on air quality and health effects to determine the contribution of air pollutants and the relative contribution of discrete air pollutants to

the pathogenesis of diseases. They suggest that future research include an examination of the possible influences of type of traffic, heavy truck, freeways, and stop and go, and bus traffic on health conditions, including respiratory diseases ^{39,40}. There is a need to move away from self-reported measures and replace those measures with the use of improved metrics for capturing disease symptoms and exposure to pollutants ⁴¹. Future studies should also be broadened to include environments outside residential neighborhoods where participants spend time, at work or school for example, as well as the investigation of sources and effects of indoor air pollution. Furthermore, a participatory action research approach holds promise for achieving two objectives. First, it would facilitate engaging public health, community residents, transportation officials and decision-makers to improve their understanding of the health consequences of transportation design. Second, such an approach would assist in finding ways to lower residents' risk of exposure, thereby diminishing health disparities and the disproportionate burden of illness on certain communities ⁴².

Context: Example from Environmental Scan**'Top of the Lot' Carpool Program, University of Calgary, Calgary**

A carpool incentive program that offers large discounts to vehicles arriving at the pay per entry lots with three or more occupants. These vehicles are also awarded the preferential parking stalls in all pay per entry lots.

Context: Examples of Relevant Research

The Canadian Population Health Institute (CPHI) released **Urban Physical Environments and Health Inequalities** report in 2011 outlining the negative health implications of outdoor air pollution and heat extremes⁴³. This report indicated that populations with existing vulnerability to poor health may be at elevated risk after exposure to air pollution and heat extremes, and thereby risk further poor health outcomes if they live close to sources of air pollution or in neighborhoods without protection from heat extremes. Edmonton is one of the cities used in CPHI's comparative analyses.

Recommendations:

While there is some evidence that traffic exposure influences health outcomes or mediates risk factors for chronic disease, the

existing evidence is insufficient to allow for intervention-oriented conclusions or recommendations.

1. Conduct further research, controlling for confounding factors, to better articulate the relationship between traffic, air pollution and health.
2. Consider participatory research approaches when conducting research in the area of air quality and health outcomes.

6.1.5 Driving Environment – Functionally Impaired Drivers

The driving environment can create unique challenges for individuals experiencing functional impairments. Deficits associated with visual, auditory, cognitive and psychomotor

abilities diminish one's capacity to quickly and accurately assess and respond to traffic situations in the driving environment elevating the risk of having a traffic collision⁴⁴.

Table 6: Studies Contributing to Recommendations for the Driving Environment – Functionally Impaired Drivers

Citation	Quality of Evidence
<i>Systematic Review</i>	
(45) Bohr PC (2008). Critical Review and Analysis of the Impact of the Physical Infrastructure on the Driving Ability, Performance, and Safety of Older Adults. The American Journal of Occupational Therapy, 62(2), pp. 159-172.	High
(46) Stav WB, Arbesman M & Lieberman D (2008). Background and Methodology of the Older Driver Evidence-Based Systematic Literature Review. The American Journal of Occupational Safety, 62(2), pp. 130-135.	



Older adults are often faced with functional impairments which affect their ability to drive. To compensate for older adults' declining functional performance a number changes can be made to the driving environment. These changes include larger sized text on road signage to increase the ability to detect and decipher messages, larger (six inch in comparison to four inch) and well-maintained lane divisions, and possibly the use of *Clearview* fonts for road signage, but further research is required for the latter ^{45,46}.

Although the systematic review listed above was ranked high for scientific rigour, the author's findings predominantly reflect the recommendations proposed in the Highway Design Handbook for Older Drivers and Pedestrians ^{45,47}; a non-evidence oriented report that was not retrieved from Bohr's search strategy ⁴⁵. Given the author's focus on this report there was potential to be biased away from the evidence. As such, the literature review focused only on the findings obtained from the author's scientific research.

Recommendations:

1. Increase visibility of road lane markings and signs to increase the ability of functionally-impaired drivers to detect them.
2. Conduct further research to determine if the *Clearview* font increases visibility of road signs.

6.1.6 Driving Environment - Road Lightening

The important role of road lightening in the prevention of injury and fatality collisions is

considered standard practice in most high-income countries ⁴⁸.

Table 7: Studies Contributing to Recommendations for Road Lightening in the Driving Environment

Citation	Quality of Evidence
<i>Systematic Review</i>	
(48) Beyer FR & Ker K (2010). Street Lighting for Preventing Road Traffic Injuries (Review). The Cochrane Library, 9.	High

A high quality Cochrane review evaluated research on the effects of street lightening for the prevention of traffic crashes ⁴⁸. According to the authors of the review, research on lightening interventions for the reduction in incidences of traffic injury and mortality from collisions has been scarce for the last thirty years. The majority of studies reviewed were published between 1948 and 1990. Given the possible changes in traffic and transportation design, the age of the studies was a noted limitation, as was the general methodological rigour of most included studies. The authors,

however, concluded that street lighting is likely to enhance a drivers' ability to detect and avoid hazards and it therefore may prevent traffic crashes, injury and death. Indeed, total crashes were reduced by 55% and total injury crashes were reduced by 22% with the installation or improvement of street lighting. The study authors expressed uncertainty about the utility of these findings in high income countries given the present extensive acknowledgement of lighting in transportation planning and design. Nevertheless the review's finding may be applicable to communities where reducing

street lightening is being proposed as a means of reducing municipal costs and advancing

environmental stewardship.

Recommendations:

Street lightening is a relatively economical intervention for preventing road traffic injuries and fatalities⁴⁸. However, this intervention may

be of limited applicability to the Alberta context.

1. Determine the potential need for lightening interventions by reviewing current transportation engineering standards on street lightening in Alberta.
2. The outcome of the above recommendation will establish if exploration of lightening interventions is required. (Example: identification of differences between rates of road crashes in the daytime versus the night-time on high collision street segments to determine the potential value of additional lightening).

6.1.7 Driving Environment – Road Material

One solution to improving road safety includes altering the composition of the materials used

to pave the roadways; porous asphalt has been proposed⁴⁹.

Table 8: Studies Contributing to Recommendations the Driving Environment – Road Material

Citation	Quality of Evidence
<i>Systematic Review</i>	
(49) Elvik R & Greibe P (2005). Road Safety Effects of Porous Asphalt: A Systematic Review of Evaluation Studies. Accident Analysis and Prevention, 37, pp 515-522.	High

Evidence in support of porous asphalt as an intervention for improving the safety of roadways is inconclusive⁴⁹. It is hypothesized that the permeable quality of porous asphalt, being composed of approximately 20-25% air-filled pores, draws water away from the surface of the road and lessens the road's thermal conductivity, both of which, in theory, increase road safety. A quality systematic review ranked high for methodological rigour did not find conclusive evidence to support this supposition. Based on the systematic review listed above, there is insufficient evidence to suggest that

porous asphalt reduces road traffic crashes. Furthermore, there is insufficient evidence to recommend that changes to Albertan road composition are warranted to include greater use of porous asphalt. However, given other noted benefits, including improved road surface water drainage and noise reduction, there may be an opportunity to consider porous asphalt as a means to encourage active transport by providing safer and more pleasant sidewalks, with the implicit understanding that a strong evaluative component would be required.



Context: Example from Environmental Scan

Rubber Sidewalks, Calgary

The addition of rubber sidewalks in three Calgary locations is anticipated to improve the water absorption of sidewalk soil, reducing water run-off in, and pressure on storm drains. Furthermore, it is hypothesized that the rubber material will be sound-absorbing, reducing noise levels of pedestrian and skateboarding traffic. This is a City of Calgary pilot project that began in 2010.

Recommendations:

At present there are no recommendations for action concerning the use of the porous asphalt material in Alberta's roadways. Stakeholders who may be interested in the evidence

reviewed include the Ministry of Transportation, Department of Highway Design and Construction and the municipal transportation divisions.

6.1.8 Crash Prevention Strategies

Red light cameras and area-wide traffic calming measures reduce traffic speed and increase adherence to traffic regulations, thereby decreasing traffic collisions and associated

morbidity and mortality^{50, 55}. In addition to speed, other modifiable factors that influence rates include lane width, junction density and traffic flow.

Table 9: Studies Contributing to Recommendations for Crash Prevention Strategies

Citation	Quality of Evidence
<i>Systematic Reviews</i>	
(55) Aeron-Thomas A & Hess S (2009). Red-light Cameras for the Prevention of Road Traffic Crashes. The Cochrane Library, 2009 (1).	High
(54) Bunn F, Collier T, Frost C, Ker K, Steinbach R, Roberts I & Wentz R (2009). Area-wide Traffic Calming for Preventing Traffic Related Injuries. The Cochrane Library, 2009 (4).	High
(53) Pilkington P & Kinra S (2005). Effectiveness of Speed Cameras in Preventing Road Traffic Collisions and Related Casualties: Systematic Review. BMJ, 330, pp. 331-334.	High
(52) Wilson C, Willis C, Hendrikz JK, Le Brocq R & Ballamy N (2010). Speed Cameras for the Prevention of Road Traffic Injuries and Deaths (Review). The Cochrane Library, Issue 10.	High
(51) Aarts L & van Schagen I (2006). Driving Speed and the Risk of Road Crashes: A Review. Accident Analysis and Prevention, 38, pp. 215-224.	Low
(50) Blais E & Dupont B (2005). Assessing the Capability of Intensive Police Programmes to Prevent Severe Road Accidents: A systematic review. British Journal of Criminology, 45, pp. 914-937.	Low

Three systematic reviews, all ranked high in their scientific merit, addressed camera use, and all three identified significant reductions in collisions in areas of camera use^{52, 53, 55}; though the magnitude of this effect was less clear.

Studies identified a 5-69% reduction in collisions, a 12-65% reduction in injuries, and a 7-71% reduction in deaths^{53, 55}.

Although traffic cameras are effective at reducing collisions, they may not be appropriate for all settings. Indeed, while cameras may be beneficial in high risk, localized intersections, when traffic collisions are scattered through a larger, often residential area, area-wide traffic calming measures may be more optimal⁵⁴. Area-wide traffic calming measures, which include speed bumps, raised crosswalks, blocking of roads and reduced speed requirements, discourage the use of residential

streets for through traffic thereby increasing the safety of residential roads⁵⁴. Such measures are effective at reducing crashes and associated injuries and deaths⁵⁴. Another strategy for reducing collisions and increasing road safety are man-powered police programs⁵⁰. Police programs, including breath testing, checkpoints, cameras and photo-radar, tend to reduce crashes causing injuries. The magnitude of effect of policing programs ranged between a 23-31% reduction in crashes that cause injuries.

Context: Example from Environmental Scan

The Capital Region Intersection Safety Partnership (CRISP) – Edmonton

CRISP is a partnership between the former Capital Health, Edmonton Police Service, St. Albert RCMP Detachment, Strathcona County RCMP Detachment, Alberta Motor Association, City of Edmonton, City of St. Albert and Strathcona County. The CRISP team shares resources and expertise to implement on-going, collaborative, and integrated intersection safety initiatives to reduce the frequency and severity of intersection collisions in the Capital Region. Initiatives involve integration of education, engineering, and enforcement strategies, and target four priorities: red light violations, pedestrian safety, speed and high crash locations.

Recommendations:

1. Install red-light cameras, speed cameras and area-wide traffic calming measures on street segments with proportionally higher numbers of traffic collisions.
2. Support concurrent policing programs to encourage drivers to comply with regulations and posted speeds to reduce injury crashes.

6.2 Building Design and Design Features

Building design and design features are, “the aesthetic qualities of the built environment and overlay both land use patterns and the transportation system, particularly in terms of the design of buildings and the design of streetscapes, respectively⁹.” Of the articles reviewed, only one met the inclusion criteria.

6.2.1 Building Design

Similar to active transportation, stair use is considered a habitual form of exercise that may increase overall physical activity and associated health benefits. However, many building stairwells are inaccessible, inconvenient or aesthetically unpleasant, reducing their use⁵⁶.



Table 10: Studies Contributing to Recommendations for Elevator and Stair Design

Citation	Quality of Evidence
<i>Promising Practice Reviews</i>	
(56) Nicoll, G & Zimring, C (2009). Effect of Innovative Building Design on Physical Activity. Journal of Public Health Policy , 30, S111-S123.	Promising

A single eligible and applicable study was identified on building design and health in our literature review. The promising practice review reported on an effort to increase physical activity and shift attitudes towards stair use through a “push” strategy to increase stair usage among office employees via a “skip-stop” elevator design⁵⁶. The skip-stop elevator, intended for able-bodied employees, only stopped on every third floor of the building. Located adjacent to the skip-stop elevator was an open staircase connecting employees to the skipped floors. A second, standard operating elevator was available with a special pass to individuals unable to use stairs. This second elevator was located next to an enclosed stairwell that complied with building fire code regulations. While stair use did increase, 72% of

building users reported stair use on a daily basis, reasons for use indicated that attitudes towards stair use had not shifted. Respondents articulated that increased stair use resulted from requirements and convenience rather than inclinations towards physical activity. Overall, positive outcomes suggest that elevators and stairwell design may influence stair use in the workplace. The authors reported that this was an innovative and cost effective intervention to encourage more physical activity in the workplace, but cautioned a that number of factors should be considered before adopting this strategy to practice (building code requirements, options for disabled persons and security issues as the design permits open access for multiple floors).

Context: Example from Environmental Scan

The Green Roof Project, Lakeland College

With the assistance of community members, Lakeland College’s Environmental Club is building a green roof on campus to foster sustainability and environmental stewardship. Taking inspiration from green roof models in Toronto, the environmental club hopes the green roof will decrease energy use, collect water, improve air quality, and is an attractive feature for humans and a habitat for insects and birds.

Construction and planting of the Roof began in the spring of 2011.

Recommendations:

1. Explore further how to utilize 'push-strategies' to increase stair use through elevator skip-stops and other stair design.
2. While the study did find increases in stair use by employees, the decision to implement this strategy may be premature given only a single study, reviewing one skip-stop intervention was identified. Replication of findings and an understanding of the cost implications would be necessary before consideration of implementation.

6.3 Land Use

6.3.1 Food Environment

A healthy diet, and in particular the consumption of fruits and vegetables, has been associated with reduced risk of obesity and overweight⁵⁷, and diet-related disease such as cardiovascular disease^{58,59}, certain forms of cancer^{60,61} and ischemic stroke⁶². Given the importance of healthy eating in the prevention of cancer and chronic disease, the food environment is an important element of the built environment to consider in health promotion and disease prevention practice and policy^{1, 3, 15, 16, 19}.

At times the food environment is commonly conceptualized as including four domains¹:

1. The community food environment, which includes the number, type, location and accessibility of food outlets;
2. The consumer food environment, which is the environment within and around stores and restaurants that affects consumer behaviour. This may include the availability and price of healthful food, quality of food, portion sizes,

promotions and point-of-choice nutrition information;

3. The organizational environment, which includes foods available at schools, worksites and homes; and
4. The information environment, pertaining to the information available about the nutrition and safety of food choices.

The community food environment is the focus of the present review but it is noted that the consumer food environment may be an important target for intervention¹. While community food environments require extensive involvement of decision-makers at all levels of government and across multiple sectors, if motivated to change, food retailers and store owners in the consumer food environments have the autonomy to transform their practice quickly; more quickly than change could ever realistically occur in the community food environment. This earns the consumer food environment an important place in health promotion, disease prevention strategies.

**Table 11: Studies Contributing to Recommendations for the Food Environment**

Citation	Quality of Evidence
<i>Promising Practices Review</i>	
(66) Cummins, S., Petticrew, M., Higgins, C., Findlay, A. & Sparks, L. (2005). Large Scale Food Retailing as an Intervention for Diet and Health: Quasi-Experimental Evaluation of a Natural Experiment. Journal of Epidemiology and Community Health , 59, pp 1035-1040.	Promising
<i>Systematic Reviews</i>	
(3) Papas MA, Alberg AJ, Ewing R, Heizisouer KJ, Gary TL & Klassen AC (2007). The Built Environment and Obesity. <i>Epidemiologic Reviews</i> , 29, pp 129-143.	Mid
(19) Khan LK, Sobush K, Keener D, Goodman K, Lowry A, Kakietek J & Zaro S (2009). Recommended Community Strategies and Measurements to Prevent Obesity in the United States. <i>Morbidity and Mortality Weekly Report (MMWR)</i> , 58(RR-7), pp 1-26.	Mid-Low
(57) Treuhaft S & Karpyn A (2010). The Grocery Gap: Who Has Access to Healthy Food and Why it Matters. The Food Trust, Policy Link.	Mid-Low
(65) Brug J, Kremers SP, van Lenthe F, Ball K & Crawford D (2008). Environmental Determinants of Healthy Eating: In Need of Theory and Evidence. <i>Proceedings of the Nutrition Society</i> , 67, 307-316.	Low
(64) Fraser LK, Edwards KL, Cade J & Clarke GP (2010). The Geography of Fast Food Outlets: A Review. <i>International Journal of Environmental Research and Public Health</i> , 7, pp 2290-2308.	Low
(1) Sallis JF & Glanz K (2009). Physical Activity and Food Environments: Solutions to the Obesity Epidemic. <i>The Milbank Quarterly</i> , 87(1), pp 123-154.	Low
(63) Larson NI, Story MT & Nelson MC (2009). Neighborhood Environments Disparities in Access to Healthy Food in the US. <i>American Journal of Preventive Medicine</i> , 36(1), pp 74-81.	Low

A disparity in access to healthful and affordable quality food across neighbourhoods exists in the United States^{57,63}. The concept of accessibility to nutritious foods, and the comparison in accessibility with other neighbourhoods or communities, is frequently referred to in the literature as a “food desert”⁶⁴. Better access to nutritious food options does correlate with healthier food choices, greater fruit and vegetable consumption, and lower rates of adult obesity⁵⁷, but may need to be accompanied by efforts to change individual behaviour and social norms regarding an acceptable, appropriate and desirable diet to produce the greatest effect⁶⁵. It should be noted that one promising practice article outlining the findings of a natural experiment where a large food retailer was introduced into

a deprived area of Glasgow, Scotland did not demonstrate increases in healthy food consumption⁶⁶. However, supermarket use was inconsistent across community members and of those reporting shopping at the supermarket, there was a reduction in the prevalence of poor mental health and non-significant increases in fruit and vegetable consumption⁶⁶.

Supermarkets provide the best availability of healthy food choices, as compared to smaller stores or convenience stores, and carry the largest selection of fruits and vegetables at the lowest costs⁶³. However, the geography of access to supermarkets in the United States varies⁵⁷. Lower-income, minority and rural communities do not enjoy ease of, or equal access to nutritious foods from supermarkets,

farmers markets and other retail outlets offering healthy food options enjoyed by higher-income, white, urban communities⁵⁷. This appears to contrast sharply with the availability of nutritionally poor foods which can be easily obtained in less affluent neighbourhoods, be it from fast food restaurants or neighbourhood convenience stores⁶⁴.

Body Mass Index (BMI) is correlated with a number of food environment features including density of residents per fast-food outlet; the number of fast food outlets per a certain number of square mile; food price; and availability and accessibility of supermarkets³. Higher BMI scores are found in neighbourhoods with a high density of fast food restaurants and where healthy food is relatively more

expensive³, but some studies have found this only for self-reported measures of weight⁶⁴. There is some evidence to suggest that limited access to fast food restaurants contributes to healthful diets⁶³ but the associations between the availability and accessibility of fast food and weight status is inconsistent within the literature^{64 3}.

An expert panel process together with a systematic review identified 24 strategies for obesity prevention¹⁹. Of these, two recommendations pertained to the larger food environment. The recommendations included improving accessibility of supermarkets in underserved communities and providing incentives for food retailers, like supermarkets, to open stores or to offer healthier choices in underserved communities¹⁹.

Context: Examples from Environmental Scan

Calgary Co-op Bus Program, Calgary

Once a week Co-op grocery stores across Calgary offer a free bus transportation service from seniors complexes to the local Co-op store.

Context: Examples from Relevant Research in Alberta

Food environment research has been completed in Edmonton and other Canadian municipalities⁶⁷⁻⁶⁹ but was not identified by the search strategy employed for the State of the Evidence document. University of Alberta researchers report results that differ from the prevalent disparity in healthy food access illustrated in the United States^{57,63,67-69}. Supermarket accessibility is high across the City of Edmonton with many inner-city and lower socioeconomic neighbourhoods actually enjoying better supermarket access than affluent neighborhoods⁶⁷⁻⁶⁹. However, a small number of food deserts do exist within the city⁶⁷⁻⁶⁹. Similar to research outlined in the appraised evidence⁶⁴, the density of fast-food outlets in Edmonton is also greater in lower-income neighborhoods when compared to higher income areas⁶⁷. This suggests the food environment in many lower income areas of Edmonton may be more plentiful in both healthy and unhealthy food. Interestingly, an exploration of the relative availability of food as measured by a ratio of unhealthy to healthy food retailers found the obesogenic environments to be independent of indicators of socioeconomic status in Edmonton⁶⁸, suggesting no association between obesogenic food environments and neighbourhood income-levels.



Recommendations:

1. Conduct a targeted and scientifically rigorous review of all four domains (community, consumer, organization, and information) of the food environment using an established systematic literature review methodology to identify the current state of science and opportunities for programming, practice, policy and research (e.g., incentives for healthy food retailers, work and land use planning and zoning bylaws). This review should include an investigation into the environmental determinants of food choice and overall dietary intake.
2. Current evidence on the food environment is plagued by methodological inconsistencies and design challenges, as demonstrated by the number of low scientifically ranked systematic reviews. Conduct additional methodologically sound research to explore the influence of the food environment (for example access to fast-food or supermarkets) on food consumption habits and patterns in Alberta^{68,67}; interventions to change obesogenic food environments; and the efficacy of macro-level food environment interventions on health and weight outcomes⁶⁷.
3. Complete a detailed examination of disparities in food access, which would complement existing food desert research completed in Edmonton⁶⁷⁻⁶⁹, to determine if the concept of 'food desert' applies differently across the province of Alberta. If the concept of food deserts is more salient in certain areas of Alberta, determine the best means to increase availability and access of healthy food options for these underserved areas. Particular emphasis needs to be given to rural locations and geographies where vulnerable populations reside (e.g., Aboriginal communities) and where little research has been conducted.

6.3.2 Food Environment - School and Community Gardens

School and community gardens may offer a promising and cost effective intervention for increasing consumption of fruits and vegetables

in children and adults, and also enhance overall mental well-being and social connectedness^{70,71}.

Table 12: Studies Contributing to Recommendations for School and Community Gardens

Citation	Quality of Evidence
<i>Promising Practices Review</i>	
(83) Bell, AC & Dymment, JE (2006). Grounds for Action Promoting Physical Activity through School Ground Greening in Canada. Evergreen, Canada	Very Promising
(70) Alaimo, K; Packnett, E; Miles, RA & Kruger, DJ (2008). Fruit and Vegetable Intake among Urban Community Gardeners. Journal of Nutrition Education and Behavior , 40(2), pp 94-101.	Promising
(71) Parmer, SM; Salisbury-Glennon, J; Shannon, D & Struempfer, B (2009). School Gardens: An Experimental Learning Approach for a Nutrition Education Program to Increase Fruit and Vegetable Knowledge, Preference, and Consumption among Second-grade Students. Journal of Nutrition Education and Behavior , 41(3), pp 212-217.	Promising

While the number of studies reviewed is modest, gardening interventions are positively associated with increased fruit and vegetable intake^{70,71}. Adults with a household member participating in a community garden program are 1.4 times more likely to consume fruits and vegetables daily and 3.5 times more likely to consume at least five servings per day⁷⁰. Among children participating in school gardening programs, knowledge of food groups, taste for fruits and vegetables, and selection of fruits and vegetables in school lunches increased⁷¹. Of note, children participating only in a nutrition education program, also demonstrate increased

knowledge of food groups and taste preference; although this increase is not as substantial as those who also participate in the gardening experience⁷¹.

Nutritional interventions of this nature may be especially relevant in areas with less access to fresh produce – food deserts⁷⁰. School gardens may operate synergistically with nutrition education to develop life long healthy nutritional habits⁷¹. Furthermore, urban landscapes that include community gardens and natural elements may increase social capital and community connectedness^{70,71}.

Context: Examples from Environmental Scan

Community Orchard Project, Calgary

In 2009, this five-year City of Calgary pilot project set out to investigate the feasibility and the effectiveness of different models of orchard management in the production of local food, in fostering community engagement, and in encouraging nutrition and healthy eating education. After the conclusion of the pilot project an evaluation will be made available to external stakeholders and the general public.

Community Garden Network of Edmonton and Area - Edmonton

This is an initiative of the Edmonton Horticultural Society with the goal to strengthen and promote community gardening as well as to grow food self-reliance, increase physical activity, and opportunities for social interaction. According to the Network, a community garden plot grows approximately \$100 worth of fresh produce each year, translating into an approximate \$287,000 contribution to food self-reliance for the Edmonton area.

Recommendations:

1. Increase fruit and vegetable consumption in children and adults by promoting the development of school and community gardens and corresponding programming to accompany intervention (e.g., field trips to community gardens and orchards, creation of clubs for various cohorts, designated to the treatment of gardens).
2. Complete a rigorously designed longitudinal study of the effects of community and school gardens in Alberta.



6.3.3 Community Recreation - General

The presence of recreational opportunities in community neighbourhoods has long been assumed to increase levels of physical activity of

community residents, but research is only now evaluating this link ^{72,73}.

Table 13: Studies Contributing to Recommendations for General Community Recreation

Citation	Quality of Evidence
<i>Promising Practices Review</i>	
(79) McCarthy, D (2010). Perceptions About and Use of a New Scenic Bridge Path Among Walkers, Runners, and Cyclists in Low Country South Carolina. Preventive Medicine , 51, pp 94-95.	Very Promising
(76) Cohen, DA, Sehgal, A, Williamson, S, Marsh, T, Golinelli, D & McKenzie, TL (2009). New Recreational Facilities for the Young and Old in Los Angeles: Policy and Programming Implications. Journal of Public Health Policy , pp S248-S263.	Promising
(75) Tester, J & Baker, R (2009). Making the Playfields Even: Evaluating the Impact of An Environmental Intervention on Park Use and Physical Activity. Preventive Medicine , 48, pp 316-320.	Less Promising
<i>Systematic Reviews</i>	
(78) Heath GW, Brownson RC, Kruger J, Miles R, Powell KE & Ramsey LT (2006). The Effectiveness of Urban Design and Land Use and Transport Policies and Practices to Increase Physical Activity: A Systematic Review. <i>Journal of Physical Activity and Health</i> 3(Suppl 1), S55-S76.	Mid
(77) Briss PA, Zaza S, Pappaioanou M, Fielding J, Wright-De Aguerro L, Turman BI, Hopkins DP, Mullen PD, Thompson RS, Woolf SH, Carance-Kulis VG, Anderson L, Hinman AR, McQueen DV, Teutsch SM & Harris JR (2000). Developing an Evidence-Based Guide to Community Preventive Services- Methods. <i>American Journal of Preventive Medicine</i> , 18(1S), pp 35-43.	
(72) Kaczynski AT & Henderson KA (2007). Environmental Correlates of Physical Activity: A Review of Evidence about Parks and Recreation. <i>Leisure Sciences</i> , 29(4), pp 315-354.	Mid
(73) McCormack GR, Rock M, Toohey AM & Hignell D (2010). Characteristics of Urban Parks Associated with Park Use and Physical Activity: A review of qualitative research. <i>Health & Place</i> , 16, pp 712-726.	Mid
(19) Khan LK, Sobush K, Keener D, Goodman K, Lowry A, Kakietek J & Zaro S (2009). Recommended Community Strategies and Measurements to Prevent Obesity in the United States. <i>Morbidity and Mortality Weekly Report (MMWR)</i> , 58(RR-7), pp 1-26.	Mid-Low
(74) Limstrand T (2008). Environmental Characteristics Relevant to Young People's Use of Sports Facilities: A Review. <i>Scandinavian Journal of Medicine and Science in Sports</i> , 18, pp 275-287.	Mid
(1) Sallis JF & Glanz K (2009). Physical Activity and Food Environments: Solutions to the Obesity Epidemic. <i>The Milbank Quarterly</i> , 87(1), pp 123-154.	Low

Findings are mixed but overall there is evidence of positive associations between physical activity and the presence of recreational facilities including parks and greenspaces, and outdoor sports fields and facilities ^{19,72}.

Adolescent physical activity is positively associated with the presence of nearby parks, playgrounds, and sports facilities; access to sports equipment; type, condition, features or

improvements to recreation; safe roads; and perceived safety ⁷³. As previously mentioned in the section on active transportation, a consistent, negative correlation is found between distance from recreational opportunities and physical activity; the farther children must travel to use the recreational opportunity, the less likely they are to be physically active ^{19,74}. Furthermore, renovations

to parks in low income neighbourhoods, used primarily for field sports, such as soccer and baseball, increases park use by both children and adults for the purpose of physical activity^{17, 18}. When artificial turf, fencing, lighting and picnic benches are added to low income neighbourhood parks, accompanying increases in light, moderate and vigorous physical activity are observed¹⁹.

Overall parks and open spaces, called greenspaces, display more consistent, positive associations with physical activity than sports facilities, recreational amenities or fitness centres⁷⁵. Evidence also suggests the presence of parks alone is insufficient to produce community physical activity. Increases in community physical activity levels are demonstrated when residents feel safe in the park and neighbourhood community, when the parks are in good condition, and when the parks and greenspaces have a variety of amenities and features which attract a broad range of users⁷⁵. And while quality appears important, and updates to recreational facilities are

associated with increased use, it may not be the renovation and quality improvements solely that account for changes in usage. Other elements that accompany renovations such as programming, staff, hours of operation, user-fees and other human factors likely affect attendance and use of recreational facilities⁷².

The impact of parks likely extends beyond increasing physical activity to the construction of supportive social environments that enhance children and adults' sense of well-being and overall health and physical activity patterns^{72,73}.

Researchers indicate that there is strong evidence for building opportunities for physical activity in the neighbourhood environment, or increasing access to existing opportunities, in combination with outreach, as a population level health promotion intervention⁷³.

Furthermore, researchers consider there to be sufficient evidence for the use of urban design and land use policies aimed at making communities more liveable, including zoning regulations, building codes or transit oriented development⁷⁶.

Context: Examples from Environmental Scan

Adopt-a-Space, Coaldale

An initiative of the Tourism/Economic Development Committee (T/EDC), the town beautification project was created to increase community spirit and pride in Coaldale. Individuals and groups assume responsibility for a space in Coaldale and work to keep it clean and attractive.

Recommendations:

1. Provide communities with access to quality recreational opportunities, including greenspaces that offer a variety of quality amenities.
2. Promote urban design and land use policies that make communities more livable: provide communities with access to community recreation destinations in close proximity to their residences via mixed land use and zoning changes.



6.3.4 Community Recreation - Trail Development

Multiuse trail development demonstrates promise as both an environmental and policy strategy to foster more leisure-time physical activity and more active transport^{77,78}. New or improved trails significantly increase physical activity, lack of which is a risk factor for chronic

disease and other adverse health outcomes. However, the successful development of multiuse trails requires collaboration among stakeholder groups and supportive policy environments^{77,78}.

Table 14: Studies Contributing to Recommendations for Trail Development

Citation	Quality of Evidence
<i>Promising Practices Review</i>	
(24) Eyler, AA, Brownson, RC, Evenson, KR, Levinger, D, Maddock, JE, Pluto, D, Troped, PJ, Schmid, TL, Carnoske, C, Richards, KL, & Steinman, LE (2008). Policy Influences on Community Trail Development. Journal of Public Health Politics, Policy and Law , 33(3), pp 407-427.	Very Promising
(82) Kramer, L, Schwartz, P, Cheadle, A, Borton, JE, Wright, M, Chase, C & Lindley, C (2010). Promoting Policy and Environmental Change Using Photovoice in the Kaiser Permanente Community Health Initiative. Health Promotion Practice , 11(3), pp 332-339.	Promising
(81) Lees, E & Redman, H (2009). Bring Health to the Planning Table: A Profile of Promising Practices in Canada and Abroad. Public Health Agency of Canada (PHAC), Canada.	Promising
<i>Systematic Reviews</i>	
(72) Kaczynski AT & Henderson KA (2007). Environmental Correlates of Physical Activity: A Review of Evidence about Parks and Recreation. <i>Leisure Sciences</i> , 29(4), pp 315-354.	Mid

A very promising practice study from the United States identified the intricacies involved in the development of land for recreational trail use and greenways⁷⁹. Master plans, which determine how and where future development occurs, are situated locally, as are a large number of operational policies. However, funding and regulatory mechanisms are often legislated at other governmental levels (e.g., compliance with mandates for accessibility and environmental protection policies). Successful trail and greenway initiatives must manage the regulatory complexity, as well as the politics of development. Obtaining support from advocacy groups, the community, government representatives or officials and engaging community leaders appear to positively influence the outcome of trail and greenway development. Local policies are considered the most substantial contributor to successful trail

development²⁴. Similar conditions around generating buy-in and establishing partnerships appear equally pertinent in Canada²⁴.

The transdisciplinary efforts and the cooperation required to advance trail development may require creative techniques to induce the necessary stakeholders to participate²⁴. One promising practice explored the technique of Photovoice in engendering support for trail development action in a Kaiser Permanente community health initiative. Photovoice is a community-based participatory research approach that combines photography with social action. Community members use a camera to record their concerns. The resulting photographs facilitate critical discussion on community-identified issues and ideally reach decision-makers who then work with the community to address their concerns.

*****Important contraindicative element***.** Mixed trail use has been associated with elevated rates of injury and was explicitly not recommended in the bicycle infrastructure literature.

Context: Examples from Environmental Scan

Ribbon of Steel, Transportation Planning, City of Edmonton

The Ribbon of Steel trail is a multi-use trail for pedestrians, cyclists and inline skaters. It is the primary non-motorized transportation corridor in Edmonton's downtown area and extends along the former Canadian Pacific Rail track.

Recommendations:

1. Encourage the development of community trails and greenway master plans, regardless of community size.
2. Study and understand policy structure, funding and governance before recreational trail planning and development begins.
3. Where possible, use a community development approach and trans-disciplinary collaboration in trail development and greenway interventions.

6.3.5 Community Recreation - Schoolyard Greening and Playground Renovation

Very promising practice evidence demonstrates that "greening" and renovation of schoolyards and playgrounds foster opportunities for quality physical activity, active and imaginative play, as

well as improving children's social and cognitive development, learning, quality of life and environmental stewardship^{24, 81}.

Table 15: Studies Contributing to Recommendations for Schoolyard Greening and Playground Renovation

Citation	Quality of Evidence
<i>Promising Practices Review</i>	
(83) Bell, AC & Dymont, JE (2006). Grounds for Action Promoting Physical Activity through School Ground Greening in Canada. Evergreen, Canada	Very Promising
(86) Brink, LA; Nigg, CR; Lampe, SM; Kingston, BA; Mootz, AL & van Vliet, W (2010). Influence of Schoolyard Renovations on Children's Physical Activity: The Learning Landscapes Program. American Journal of Public Health , 100(9), pp 1672-1678.	Very Promising
(87) Colabianchi, N; Kinsella, AE; Coulton, CJ & Moore, SM (2009). Utilization and Physical Activity Levels at Renovated and Un-renovated School Playgrounds. Preventive Medicine , 48, pp 140-143.	Very Promising
(85) Dymont, JE (2005). Gaining Ground: The Power and Potential of School Ground Greening in the Toronto District School Board. Evergreen, Canada.	Very Promising
(84) Dymont, JE & Bell, AC (2008). Grounds for Movement: Green School Grounds as Sites for Promoting Physical Activity. Health Education Research , 23(6), pp 952-962.	Less Promising

The term 'greening' in the context of schoolyards denotes changing the school

environment to include more natural (green) features. This redesign occurs via habitat



restoration, the planting of trees and shrubs, developing gardens and other interventions that add natural elements to the physical environment of the school. Greener schoolyards create a landscape diversity that offers a larger number and varieties of play options compared to conventional school grounds⁸². It is hypothesized that the accommodation of more student interests and abilities is likely a factor in the demonstrated greater rates of student participation in light, moderate and vigorous physical activity found in greener schools (Kindergarten through Grade Eight)⁸³. A pan-Canadian survey of parents, teachers and administrators in schools participating in the *Learning Grounds* school greening projects, where grounds are redesigned to include natural elements, such as trees, shrubs, ponds or rock amphitheatres in combination with more typical turf, asphalt and play structures, indicates increased light and moderate physical activity, more active play, better integration of physical activity into school routine, and more diverse play activities.

Along with the aforementioned benefits, greening school interventions also offer opportunities for enriched education and may promote prosocial behaviours allowing for greater inclusiveness of all students in physical activity opportunities, regardless of intellectual or physical abilities^{83,84}. Moreover, greened

Toronto schools report increases in student engagement in learning, the ability of students to retain knowledge and their ability to think more creatively⁸⁵. However, these benefits are generally not reflected in performance measures, such as mastery of curriculum or standardized testing.

Renovations to school grounds including new playground equipment, outdoor learning gardens, as well as safety and site improvements, similar to greening, is associated with increases in learning, community physical activity, play by children during and outside of school hours, and potentially higher rates of energy expenditure in children^{86,87}. In one study statistically significant differences were found in energy expenditure between renovated and un-renovated playgrounds⁸⁶, while no statistically significant differences were found in another study^{83,84}.

Greening schoolyards encourages physical activity across the community, especially if the community participates in school gardening, and may be of particular importance for lower income areas. Interestingly, for communities of lower socio-economic status the importance of green elements in the school landscape is rated higher, and the adequacy of their current school grounds lower, than schools in higher socio-economic status areas⁸⁵.

Context: Examples from Environmental Scan

~~~~~ Natural Playscape, Grande Prairie ~~~~~

Grande Prairie Regional College's preschool playground employed an ecological approach to playground design. It used trees, flowers, bushes, grasses and plants native to the area to create a green, developmentally appropriate playground for children aged three to five.



Recommendations:

While the qualitative survey components of the reviewed research rank high for scientific rigour, the quantitative components rank low. Based on the qualitative reviews, school greening

programs are very promising; however, additional research with indicator outcomes would increase the evidence available on school greening⁸⁵.

1. Conduct additional research that includes indicator outcomes to further the existing evidence on school greening and the impact of playground renovations.
2. Investigate the current policies and practices around schoolyard greening and playground renovations in Alberta.

6.3.6 Shade

Ultraviolet radiation (UVR) is a known risk factor in the development of skin cancer and should be considered in environmental design^{86,87}. According to the research in this review, the weight of evidence indicates that exposure to UVR in childhood and adolescence places

individuals at greater risk for cancer in adulthood^{86,87}. While research in the area of environmental design and UVR protection is not new to countries such as Australia and New Zealand, its salience is only beginning to be recognized in Canada⁸⁵.

Table 16: Studies Contributing to Recommendations for Shade

Citation	Quality of Evidence
<i>Promising Practices Review</i>	
(88) Dobbinson, SJ; White, V; Wakefield, MA; Jansen, KM; White, V; Livingston, PM; English, DR & Simpson, JA (2009). Adolescents' Use of Purpose Built Shade in Secondary Schools: Cluster Randomized Controlled Trial. <i>British Medical Journal</i> , 338.	Very Promising
(83) Bell, AC & Dymont, JE (2006). Grounds for Action Promoting Physical Activity through School Ground Greening in Canada. <i>Evergreen</i> , Canada	Very Promising

The prioritization and identification of the importance of sun protection extends beyond academia and population health practice. Participants in a pan-Canadian study of school ground greening identified lack of shaded areas as a limiting factor for participation in physical activity on school grounds⁸³. Research appraised as a very promising practice from Australia

determined that shade sails overtop of a school's passive activity areas, such as picnic tables, are an effective means of protecting adolescents from UVR^{83,84}. Importantly the shaded areas were used by high school students, a population where uptake of other sun protection strategies, such as wearing hats, has been less successful.

Recommendations:

The promotion of physical activity through active modes of transport and greater play in the outdoor school environment may directly oppose public health promotion best practice in the area of sun protection. Concomitant

interventions to protect individuals, especially children and adolescents, from UVR exposure should be a priority consideration in environmental design.

1. Further research in Alberta and Canada is required to determine locally relevant factors in UVR exposure and potential environmental design solutions. At this time however, it seems prudent that changes in policies and designs of built environments intended to encourage passive and active outdoor activity be accompanied by UVR protection strategies both in the form of design and programming.

6.3.7 Housing

It is important to distinguish between the universal understanding of the importance of being housed as a prerequisite for individuals to be healthy and housing interventions which seek to change a participants' housing

environment to improve their health outcomes. At present there is only mixed support for the use of housing interventions to improve health outcomes in the United States and the United Kingdom⁸⁵.

Table 17: Studies Contributing to Recommendations for Housing

Citation	Quality of Evidence
<i>Promising Practices Review</i>	
(94) Barton, A; Basham, M; Foy, C; Buckingham, K & Somerville, M (2007). The Watcombe Housing Study: the Short Term Effect of Improving Housing Conditions on the Health of Residents. Journal of Epidemiology and Community Health , 61, pp 771-777.	Promising
(93) Johnson, J, Ciaccio, C, Barnes, CS, Kennedy, K, Forrest, E, Gard, LC, Pacheco, F, Dowling, P & Portnoy, JM. Low-cost Interventions Improve Indoor Air Quality and Children's Health. Allergy and Asthma Proceedings , 30, pp 377-385.	Less Promising
<i>Systematic Reviews</i>	
(91) Jacobs DE, Brown MJ, Baeder A, Sucusky MS, Margolis S, Hershovitz J, Kolb L & Morley RL (2010). A Systematic Review of Housing Interventions and Health: Introduction, Methods, and Summary Findings. <i>Journal of Public Health Management and Practice</i> , 16(5), pp S5-S10.	Mid
(92) Lindberg RA, Shenassa ED, Acevedo-Garcia D, Popkin SJ, Villaveces A & Morley RL (2010). Housing Interventions at the Neighborhood Level and Health: A Review of the Evidence. <i>Journal of Public Health Management and Practice</i> , 16(5), pp S44-S52	Mid

Housing interventions provide a few respiratory and other health benefits⁸⁸. Upgrades to low income housing in the United Kingdom, including re-roofing, full central heating, rewiring, ventilation systems, double glazed doors, and cavity wall and roof insulation, resulted in statistically significant improvements in asthma symptoms and non-asthma related chest problems among housing residents⁸⁸. However, no statistically significant differences were observed in self-reported rates of asthma, rheumatism, angina or bronchitis between residents of upgraded and control housing

^{88,89,90}. Interior household interventions to reduce common indoor allergens were associated with a reduction in respiratory symptoms such as coughing, breathing problems and allergy attacks among asthmatic children aged 2-17 years^{91,92}. A housing rental voucher program used in the U.S., where low-income residents were given vouchers for subsidized housing, demonstrated a trend towards reduction in adverse health consequences associated with food insecurity^{93,94}.

Context: Examples from Environmental Scan

Lead Service Lines, Lethbridge

This City of Lethbridge initiative seeks to upgrade water pipes in houses built before 1955 to reduce the leaching of lead into residents' tap water.

Recommendations:

The impact of housing interventions, such as relocation of residents to low poverty neighbourhoods and demolition of dilapidated

public housing, on health outcomes requires additional field evaluation or formative research^{91,92}.

1. Complete field evaluation or formative research on the effect of housing interventions on health outcomes, specifically in an Albertan and Canadian context.



6.3.8 Crime Prevention Through Environmental Design (CPTED)

Perception of safety is correlated with physical activity and healthy weights^{93,94}. Place-based crime prevention, also known as crime prevention through environmental design (CPTED), is of increasing interest to researchers and community planners^{93,94}. The CPTED

construct suggests that careful urban design and consideration of social factors in design reduces the incidence of crime and the fear of crime, and increases the quality of life for residents overall^{91,92}.

Table 18: Studies Contributing to Recommendations for Crime Prevention through Environment Design

Citation	Quality of Evidence
<i>Promising Practices Review</i>	
(97) Saville, G (2009). SafeGrowth: Moving Forward in Neighbourhood Development. Built Environment , 35(3), pp 386-402.	Very Promising
(98) Cozens, P & Love, T (2009). Manipulating Permeability as a Process for Controlling Crime: Balancing Security and Sustainability in Local Contexts. Built Environment , 35(3), pp 346-365.	
<i>Systematic Reviews</i>	
(95) Cozens PM, Saville G & Hillier D (2005). Crime Prevention Through Environmental Design (CPTED): A Review and Modern Bibliography. <i>Property Management</i> , 23(5), pp 328-356.	Low
(96) Foster S & Giles-Corti B (2008). The Built Environment, Neighborhood Crime and Constrained Physical Activity: An Exploration of Inconsistent Findings. <i>Preventive Medicine</i> , 47(3), pp 241-251.	Low

CPTED holds promise as a public health intervention. This area of study still requires more research and evaluation; however, work to-date demonstrates positive preliminary results^{93,94}.

SafeGrowth principles, which correspond to CPTED, may produce and sustain crime prevention^{91,92}. SafeGrowth is a new extension of SmartGrowth, which is a series of land use and development principles in urban planning, aimed to ensure community growth is cost-effective, ecologically aware and socially responsible. Similar to SmartGrowth, SafeGrowth's foundation for designing safer communities is a commitment to the process of planning and implementation by working with residents and planners to maximize community assets and address community safety concerns. The SafeGrowth model includes five steps: community engagement, neighbourhood profiling, local priority-setting, SafeGrowth planning and assessing the impacts². The process has been used with reported success in

a low-income, high crime area of Toronto, San Romanoway, and is currently being implemented across Saskatoon. In the San Romanoway complex changes included refurbishment of foyers, removal of entrapment areas, development of community gardens and a playground, improvement of lighting, as well as the creation of active gathering spaces⁹⁵. A significant reduction in break and enter crimes and perceived improvements in vandalism, substance use in public places, teen loitering, youth gangs, graffiti, littering, noise, drug dealing, armed robbery, burglary, violent or sexual assault, family violence, theft and drug availability was reported⁹⁵.

The issues of crime prevention and personal safety also influence active transport programs and design. The safety of active transportation routes is an important element to consider in the promotion of this type of physical activity. Neighbourhood features may increase street surveillance, perceptions of safety and promote active transport and physical activity in

neighbourhoods, but further research with sound methodological approaches is required⁹⁵. The importance of safety in active transportation is underscored by the experience of pedestrian access ways (PAWs) in Western Australia. Developed to provide access for pedestrians and cyclists to the street networks, their narrow design and lack of necessary

surveillance failed to generate feelings of personal safety for users; PAWs are perceived by residents to be dangerous. As a result local governments are considering their closure despite the evidence that there is no higher crime or incidents of antisocial behaviour in PAWs⁹⁵.

Context: Examples from Environmental Scan

CPTED Incentive Funding Initiative, Red Deer

This is a \$50,000 pilot project from Red Deer City Council to encourage downtown business owners and social agencies to upgrade their properties and businesses. To be eligible for the \$2,500 matched funds, the project must involve one or more CPTED design principles.

Recommendations:

The identified evidence highlights a need for methodologically sound synthesis of research and evaluation of CPTED to better understand its effect. Worthy of note, much of the

discussed research is conducted by advocates of CPTED, this further emphasizes the need for rigorous methods to reduce potential for biased findings.

1. Complete a CPTED specific systematic review to synthesize existing evidence and identify meaningful opportunities for future research regarding CPTED.
2. Complete additional research to determine the effect of street lighting or surveillance promoting measures on the prevalence of neighbourhood walking and other physical activities.
3. Additional methodologically rigorous research and evaluation is required to assess changes in incidence of crime after the comprehensive implementation of the SafeGrowth principles.
4. Investigate Saskatoon's CPTED initiatives to determine success of SafeGrowth principles for non-metropolitan municipalities.

6.3.9 Rural Land-use

Physical inactivity is well established as a modifiable risk factor for the development of cancer, chronic disease, and associated morbidity or mortality^{96,96}. Given this understanding, there is a considerable focus in the health promotion field on increasing physical activity at the population level. To date,

research on physical activity and the built environment is concentrated on urban and suburban settings; discussion in the literature on environmental correlates of physical activity in rural populations is either limited in quality or largely absent⁹⁷.

**Table 19: Studies Contributing to Recommendations for Rural Land-use**

Citation	Quality of Evidence
<i>Promising Practices Review</i>	
(99) Frost SS, Goins RT, Hunter RH, Hooker SP, Bryant LL, Kruger J & Pluto D (2010). Effects of the Built Environment on Physical Activity of Adults Living in Rural Settings. <i>American Journal of Health Promotion</i> , 24(4), pp 267-283.	Mid
(100) Sandercock G, Angus C & Barton J (2010). Physical Activity Levels of Children Living in Different Built Environments. <i>Preventive Medicine</i> , 50(4), pp 193-198.	Mid

A systematic review of first generation research demonstrated a positive correlation between physical activity in rural geographies and attractiveness of area; safety from crime and traffic; and presence of trails, parks, and recreational facilities⁹⁶. Results are mixed but there does appear to be evidence that sidewalks or shoulders on roads are also positively correlated with physical activity in rural populations. The review did not appraise the quality of the included studies; as such, it was not possible to determine the quality of available evidence, limiting the usability of the results.

Among children and adolescents, physical activity levels are comparable across

geographies (urban, suburban and rural), with the suburban environment being identified as possibly the most favorable for physical activity⁹⁸. However, comparisons of physical activity across different settings are difficult due to varying definitions of urban, suburban and rural. Additionally, study methodologies and designs differ, sometimes quite substantially, thus limiting confidence in the findings and generalizability of the results. It is also widely acknowledged in the studies reviewed that children and adolescents across all geographies are not participating in sufficient physical activity for optimal health, suggesting a need to continue work to foster healthy environments that promote fitness and physical activity^{5 6}.

Context: Examples from Environmental Scan

“This coalition is just one of many projects started by Healthy Alberta Communities at the University of Alberta. The fundamental goal of CAAT was to promote sustainable opportunities for healthy living in Medicine Hat. The CAAT project works with city planners, the public, and elected officials to bring awareness, support and change for the use of active and alternative forms of transportation. For ongoing

Recommendations:

The articles ranked as mid in scientific rigour, due in part to the search and selection

strategies, creating a risk for bias and the lack of critical appraisal of included studies.

1. Conduct further research on the effects of the built environment on the health outcomes of rural and small town populations in Alberta.
2. Conduct additional synthesis of existing research to identify opportunities for actionable programs and practices with a specific focus on rural populations.
3. Foster the development of trails, parks, sidewalks and attractive surroundings to increase physical activity in rural populations.

6.3.10 Measurement Tools

Two assessment tools, one for fostering healthy living and another for predicting the health impact of land use decisions, were identified;

one was evaluated as very promising⁹⁹, and the other as less promising⁹⁹.

Table 20: Studies Contributing to Recommendations for Measurement Tools

Citation	Quality of Evidence
<i>Promising Practices Review</i>	
(101) Kim S, Adamson C, Balfanz K, Brownson D, Ross C., Wiech JL, Shepard D, & Alles, WF (2010). Development of the Community Healthy Living Index: A Tool to Foster Healthy Environments for the Prevention of Obesity and Chronic Disease. <i>Preventive Medicine</i> , 50, S80-S85.	Very Promising
(102) Roof K & Glandon, R (2008). Tool Created to Assess Health Impacts of Development Decisions in Ingham County, Michigan. Journal of Environmental Health , 71(1), pp 35-38.	Less Promising

The *Community Healthy Living Index* (CHLI) assesses opportunities for fostering healthy environments and galvanizing cross-sectoral support for sustained change in six community settings: afterschool child care, early childhood programs, neighbourhoods, schools, worksites and the larger community¹⁰⁰. Using a three step process, the CHLI first completes a community assessment that asks questions about a setting's healthy living policies and practices. Then based on the assessment, a community team offers targeted improvement strategies and best practice ideas. The final step is the creation of an implementation plan directed at affecting sustained change. The CHLI demonstrates promise as an asset-based, community development approach to community assessment. Published pilot test results of the CHLI demonstrate strong face validity and high inter-rater reliability on

individual items¹⁰⁰. As a result, the tool is now being tested nationally in the United States.

Prompted by a series of negative health status trends in the region, the Ingham County Health Department (ICHHD) in Michigan developed their own health impact assessment (HIA) tool to assess potential health consequences of land development decisions on residents of differing geographies (urban, suburban and rural)⁸³. The tool contains three components: a previously used checklist; a matrix that expands the checklist to assist planners and developers in understanding the health concepts contained within the checklist, for example injury prevention, health equity etc; and a Geographic Information System (GIS). The GIS maps a number of data points, including grocery stores, radon and zoning decisions, to visually illustrate the land use and health relationship. The intent of the GIS component is to influence local decision-making practices by assisting decision



makers in better understanding present conditions and the potential health consequences of a decision. Using a participatory research approach, the HIA tool was pilot tested in the Meridian Township of Michigan¹⁰¹. The limited information provided

on the pilot testing methodology resulted in the research being ranked as less promising. A stronger, more detailed evaluation is needed to validate the positive preliminary process findings.

Recommendations:

1. Consider trial use of the *Community Healthy Living Index* (CHLI) to determine its feasibility in Alberta and further assess the validity and reliability of the CHLI and the Ingham County Health Department's health impact assessment.

6.3.11 Overarching Approaches

The importance of forging partnerships between the health and planning sectors is well

recognized by population and public health practitioners in Canada¹⁰².

Table 21: Studies Contributing to Overarching Approaches Recommendations

Citation	Quality of Evidence
<i>Promising Practices Review</i>	
(81) Lees, E & Redman, H (2009). <i>Bring Health to the Planning Table: A Profile of Promising Practices in Canada and Abroad</i> . Public Health Agency of Canada (PHAC), Canada.	Promising

A pan-Canadian report profiling thirteen case studies, one for each province and territory, where collaborative approaches were used to modify the built environment and to improve health outcomes, was evaluated as a promising practice¹⁰¹. This Public Health Agency of Canada (PHAC) report shares each project's successes and lessons learned. Although the case studies addressed different components of the built environment, PHAC's qualitative interviews with key informants identified three recurrent themes or lessons learned among the

projects. The first is the need to cultivate effective partnerships with all major stakeholders early in the project. These relationships are invaluable in advancing the health promotion agendas later in the process¹⁰¹. Next, to increase the sustainability of the project, a project must be community owned and driven; a community development approach is best¹⁰². And lastly, successful projects focus on the end results throughout implementation in an effort to build enthusiasm, excitement and engagement¹⁰².

Recommendations:

1. Develop built environment stakeholder partnerships early on in a project.
2. Use a community development approach when possible.
3. Built environment projects are lengthy, sometimes spanning many years. To sustain engagement and commitment focus on end goals.

7.0 Next Steps in the *Strategy Development*

The purpose of this document was to summarize the evidence identified in the AHS built environment and health literature reviews, and produce evidence-Informed recommendations emerging from these reviews with reference to contextual information currently available to AHS. The document was not intended to be an exhaustive examination of the literature findings, but instead a concise, high level distillation of the findings and recommendations for further AHS exploration and decision making in Phase 2. Achievement of change in Alberta's built environments requires multi-sectoral collaboration and partnership. Phase 2 will determine the AHS contribution and role as a partner in producing change.

Completion of Phase 2 – Strategy and Action Plan Development

Equity: Social epidemiological factors are important in a comprehensive approach to health promotion and disease prevention. The inclusion of these factors in the Strategy will be explored by Healthy Public Policy in Phase Two of the Strategy development.

Consultation: Internal and external stakeholder consultations will be conducted. Findings/recommendations from Phase One will be shared, questions related to the policy context will be addressed and recommendations on opportunities for action will be sought.

Policy scanning: Analysis of the policy context will identify relevant policies, principles, legal precedents and historical forces that shape the

built environment in Alberta. A targeted scan of specific policies will also be completed.

Measures of Achievement: A Built Environment Indicators Committee was struck in the fall of 2010 to oversee the development of the following: strategy-specific performance indicators, health status assessment indicators associated with the built environment, and indicators of Alberta's health-promoting built environments relevant to population health and health equity. Areas for consideration in establishing scope of indicators include geographies (e.g., urban, suburban, rural, semi-rural), populations (e.g., adult, senior, children, community level), and dimensions of environment (e.g., physical, social).

The following methods will be used in the development of a suite of built environment indicators. This work is scheduled to begin in November 2011.

1. Systematic literature review of built environment indicators
2. Development of criteria for indicator selection and selection by committee
3. Development of indicator definitions, methods and reference documents

Knowledge Exchange/Capacity-Building: Educational initiatives related to the built environment and health will be developed and delivered as part of building internal capacity and to generate opportunities for internal partnerships and collaboration in creating appropriate structures within AHS that support implementation of Strategy recommendations.

Synthesis and Generation of Final Strategy

Document: Results from the consultation and policy scans will be synthesized with evidence identified in Phase One to complete the

Population and Public Health: Built Environment Health Promotion Strategy. An implementation plan will also be developed.

Appendices

Appendix A: Summary of Environmental Scan Findings

Table 22: Number of initiatives by location, sector, health domain and funder (n=59)

Location	Number
Calgary	16
Mount Royal University	2
ACAD	1
St. Mary's University	1
University of Calgary	2
Alberta Food Bank Network Association	1
Edmonton	9
King's University College	1
University of Alberta	2
Active Edmonton	1
Fort McMurray	3
Grande Prairie	1
Lethbridge	3
Medicine Hat and Area	3
Medicine Hat College	2
Healthy Alberta Communities	1
Red Deer	6
Province-Wide	4

Table 23: Number of articles identified and included in review

	Number Retrieved	Number Reviewed	Number Included
<i>Promising Practices Review</i>			
Physical Activity	40,257	96	13
Nutrition	15, 641	95	6
Environmental Hazards	Unknown	45	2
Ultraviolet Radiation	Unknown	31	5
Injury Prevention	Unknown	54	5
Systematic Reviews	3, 776 + 36	155	49
Total Articles Reviewed			80



Appendix B: Promising Practices Review: Appraisal of Scientific Rigour and Community Participation

Table 24: Detailed quantitative appraisal criteria with considerations for reviewers.

Selection Bias	
Sample was population based	<ul style="list-style-type: none"> Was the sample and sampling strategy appropriate to obtain a representative sample given the target population? Was the sample selected from the whole target population?
Eligibility criteria were specified	<ul style="list-style-type: none"> Listed inclusion, exclusion, or eligibility criteria
Random Selection	<ul style="list-style-type: none"> Participants were selected for inclusion in the study randomly Selection of participants was not targeted or was appropriately targeted Not a convenience sample
Dropout rates/reasons reported	<ul style="list-style-type: none"> Attrition was identified and considered Where available, reasons for drop out were requested and identified
Reasons for loss same in each group	<ul style="list-style-type: none"> Did the attrition differ between experimental and control groups? If so, were the reasons for drop out different?
Subjects were randomly allocated	<ul style="list-style-type: none"> Each participant had an equal likelihood of being in the experimental or control groups If yes, this is an RCT
Follow up > 80%	<ul style="list-style-type: none"> At least 80% of the sample were included in follow-up data
Intent to treat if RCT	<ul style="list-style-type: none"> In many studies, participants will not have followed the protocol, either deliberately or accidentally or may not comply. Further, sometimes individuals who were not eligible to participate are accidentally included in the study. To address these situations, all participants must be kept in the study. The policy that analysis will be based upon all participants in each group as randomized is known
Information Bias	
All groups assessed in the same manner	<ul style="list-style-type: none"> Were the same tools and approaches used to assess all participants?
Blinding for outcome/exposure measurement	<ul style="list-style-type: none"> Were the investigators responsible for collecting data on outcomes or exposures blind to the participants' allocation?
Blinding for caregivers	<ul style="list-style-type: none"> Were individuals involved in the care or intervention of participants blind?
Blinding for participants/subjects	<ul style="list-style-type: none"> Was the patient blind to their exposure or treatment group?
Concealed allocation for RCT	<ul style="list-style-type: none"> Did the investigators blind themselves to who was in which group?
Baseline assessments valid/reliable	<ul style="list-style-type: none"> Were the assessment measures or tools used to assess exposure or prognostic factors reliable or valid? Were existing tools used?
Outcome assessments valid/reliable	<ul style="list-style-type: none"> Were the assessment measures or tools used to assess outcome measures valid and reliable? Were existing tools used?
Confounding	
Differences in prognostic factors described	<ul style="list-style-type: none"> Are prognostic factors in each group described (e.g., Age, gender, etc.) Often in Table 1 of the manuscript
Groups comparable on prognostic factors	<ul style="list-style-type: none"> Were the differences between groups tested? T-tests/Chi2? Were these listed? Also see Table 1 or 2
Confounding factors taken into consideration during analysis	<ul style="list-style-type: none"> Was analysis stratified based on differences? Was regression used to control or adjust for covariates? Did the analysis account for confounding factors?

Table 25: Detailed qualitative appraisal criteria with considerations for reviewers.

Reflexivity	
Investigator background or perspective described	<ul style="list-style-type: none"> In a qualitative study, the research contributes and influences the construction of meanings throughout the research process. Given this, the investigators background or perspective may influence how they see meaning in the data. We are looking for a description of their background or perspective.
Influence on study clearly stated	<ul style="list-style-type: none"> Given that as stated above, there will be an element of subjectivity, the investigators influence on the study and its meanings is described or stated.
Credibility	
Theoretical Framework	
Adequate given the aims of the study?	<ul style="list-style-type: none"> Does the method fit the research question?
Role in interpretation of data is clear	<ul style="list-style-type: none"> Does the method influence the way the data will be considered?
Sampling	
Approach is clearly stated and appropriate with the aim	<ul style="list-style-type: none"> How the sample was recruited is described and fits with the research question. A targeted selection may be appropriate and reasonable given the aim and theoretical framework of a study.
Biases in selection are articulated	<ul style="list-style-type: none"> Do the authors discuss potential bias that occurs during selection? Including bias based on individuals willing/unwilling to participate.
Is theoretically justified	<ul style="list-style-type: none"> Does the sampling strategy fit with the theoretical framework?
Data Collection	
Activities clearly described	<ul style="list-style-type: none"> Are the activities or approaches stated?
Limitations discussed	<ul style="list-style-type: none"> Do the authors acknowledge limitations? Are any listed?
Analysis Approach	
Systematic	<ul style="list-style-type: none"> Is the approach to understanding the data systematic?
Transparent	<ul style="list-style-type: none"> Is the approach described? Do they tell you enough that you could understand what they did and potentially replicate it?
Consistent with qualitative tradition and aims?	<ul style="list-style-type: none"> Does the approach align with the tradition selected for the study design? E.g., if phenomenology is the tradition used, then phenomenological analysis should be used, not grounded theory.
Trustworthiness of the data is checked? Interpretation emerges from the data?	<ul style="list-style-type: none"> Do the authors check that the findings are reflective of the participants experiences and meanings? This means taking the findings back to the participants for verification. Does the data determine the findings or did the perspective of the researcher have potential to overshadow the data?
Transferability	
The context of the study is understandable given the description of sample characteristics and site	<ul style="list-style-type: none"> Is there enough information about the sample characteristics to gauge whether their sample is comparable to your population of interest? This is not about whether the target populations are similar, but rather is about the amount of information provided.

Detailed Information Regarding Assessment of Community Participation

The scale appraised a community's knowledge, participation, and/or leadership of the initiative based on the available information within each publication. Where there was no indication that the community involved had knowledge of the initiative or where the community only had knowledge (but no participation) the article was scored zero, low community involvement. Where there was indication that the community was able to participate in the initiative, the article was scored one, mid community involvement. Finally, where there was indication that the community was able to lead, guide, or provide direction to the initiative, the article was scored two, high community involvement. Articles that did not provide an indication of the community's involvement were assumed low community involvement (community participation score of zero).

Critical Appraisal: Promising Practices Review

Each included article was appraised by the research team for scientific rigour, community involvement, and program characteristics. Both quantitative and qualitative studies were included.

Scientific rigour was appraised using previously developed scales designed for use within systematic reviews⁸¹. Quantitative studies were assessed in three broad categories: selection bias, information bias and confounding using 18 criteria and were also categorized by study design. Level I study designs included experimental studies (randomized controlled trials with random allocation); Level II study designs included quasi-experimental studies (without random allocation and/or blinding);

and Level III study designs including cohort, case-control, and observational studies.

Qualitative studies were appraised in three categories: reflexivity, credibility and transferability using 14 criteria. For both quantitative and qualitative studies, each criterion equated to a single point, allowing articles to be categorized as having high, mid or low scientific rigour using tertiles to divide the total possible scores into one of the three categories.

All articles were assessed for the level of community participation in the intervention. Community participation was assessed using a three point scale (zero to two) developed specifically for this promising practices review and included an assessment of community knowledge, participation and/or leadership.

In order to assess program characteristics, each initiative's logic and reach were appraised. Program logic was determined based on whether the article provided sufficient rationale or suggestion that the program would influence the indicator of interest and that a link existed between the indicator, program and outcome. Program reach was based on whether the initiative impacted at least 500 people. Each program then received a score for program characteristics ranging from zero to two based on whether they had none, one or both program logic and reach.

Finally, the outcomes of the program or initiative were considered to identify whether the program impacted the health or modifiable risk factors for health via the built environment. As such, the reviewer considered whether the articles' relevant outcomes were positive, neutral, negative or unknown. Both process and indicator outcomes were considered and weighted equally.

Reviewer & Training: Promising Practices Review

A single reviewer completed the selection and appraisal of each article. A second reviewer verified scores during the synthesis of evidence. All reviewers received training on all scales. The project lead verified a sample of reviewer appraisals to ensure accuracy. Discrepancies were resolved by discussion between the first and second reviewers. In addition, a third content expert was involved in discussions and the senior scientist was consulted as needed. Discussions were focused on referencing exact statements in the article that indicated whether a point be awarded to the article.

Determining Level of Promise

In order to determine the level of promise of a program or initiative, several factors were considered in identifying a programs' *potential promise*. To have high scientific rigour alone, would not warrant an intervention to be considered promising, as this would disregard the intervention's effectiveness, logic, reach and level of community involvement. As such, for the purpose of our review, programs were classified from least to most promising, considering their scientific rigour, effectiveness (outcomes), program characteristics and community involvement.

A program's promise was determined using a series of tables, adapted from the work of McNeil et al.⁸¹. Initially the programs' *Certainty of Effectiveness* was determined by plotting its scientific rigour and outcomes in a table (**Table 26**). Based on this table, each program received a score of low, mid or high for *Certainty of Effectiveness*.

Next, the programs' *Potential for Population Impact* was determined by plotting program characteristics and community involvement in a table (**Table 27**). Based on this table, each program received a score of low, mid or high for *Potential for Population Impact*.

Finally, a programs' ranking for *Certainty of Effectiveness* and *Potential for Population Impact* were plotted in a table to determine *Level of Promise*.

For the purposes of this review, all programs were included in data analysis, synthesis, and in the development of recommendations and conclusions. However, only programs that were ranked as promising, very promising, or most promising were used in the development of recommendations for use by Alberta Health Services.

Table 26: Determination of *Certainty of Effectiveness*⁷⁹

		Outcomes			
		Negative	Neutral	Positive	Unknown
Scientific Rigour	High	Low	Mid	High	Mid
	Mid	Low	Low	Mid	Low
	Low	Low	Low	Low	Low

**Table 27: Determination of *Potential for Population Impact***⁷⁹

		Program Characteristics (N=2 logic and reach)		
		0	1	2
Community Participation	High	Low	Low	High
	Mid	Low	Mid	High
	Low	Low	Mid	Mid

Table 28: *Level of Promise*⁷⁹

		Potential for Population Impact		
		Low	Mid	High
Certainty of Effectiveness	High	Promising	Very Promising	Most Promising
	Mid	Less Promising	Promising	Very Promising
	Low	Least Promising	Less Promising	Promising

Table 29: Detailed appraisal criteria for the assessment of systematic reviews.

	Considerations
Research Question	<ul style="list-style-type: none"> ▪ defined population ▪ defined intervention ▪ defined outcome(s) ▪ considered study design
Search Strategy	<ul style="list-style-type: none"> ▪ clearly stated databases searched ▪ clearly stated search terms used ▪ stated years reviewed ▪ methods comprehensive ▪ methods replicable ▪ included non-published (grey) literature
Selection Strategy	<ul style="list-style-type: none"> ▪ defined inclusion and exclusion criteria ▪ multiple (2+) judges for selection ▪ replicable
Validity Assessment	<ul style="list-style-type: none"> ▪ criteria reported ▪ assessed bias
Data Extraction	<ul style="list-style-type: none"> ▪ multiple (2+) extractors ▪ attempts made to retrieve missing data from included articles ▪ agreement between extractors reported
Combining of Findings	<ul style="list-style-type: none"> ▪ methods reported ▪ methods appropriate given outcomes, homogeneity, etc.

Critical Appraisal & Analysis: Appraisal of Literature and Systematic Reviews

A single reviewer completed the primary appraisal of all systematic reviews; a second reviewer verified the results during data synthesis. The approach to appraising systematic reviews was based on the work of Flynn et al.^{8,103,104}. Systematic reviews were appraised in six appraisal categories: research question, search strategy, selection strategy, validity assessment, data extraction and combination of findings. To ensure consistent and objective appraisal of each review article, predetermined criteria were identified for each category.

Articles were ranked as low, moderate or high based on the absence of major flaws in four of the six appraisal categories. Articles satisfactory in all four categories (research question, search strategy, selection strategy, and validity assessment) were ranked as having high scientific rigour. Articles satisfactory in two or three were ranked as having moderate scientific rigour. Articles satisfactory in one or fewer categories were ranked as having low scientific

rigour. Articles were also appraised on data extraction, combination of findings, and whether their conclusions were supported methodologically; however, these factors did not influence the articles' overall ranking.

Included articles were grouped by content area (land use, transportation and building design). Within each of these content areas, themes were identified and articles were further grouped into themes. As all themes were not mutually exclusive, articles could be placed in multiple groups. Agreement between articles was then considered and quantified within each theme.

While the results of the appraisal of systematic reviews were analyzed independently, the more salient synthesis involved combining the findings from the promising practices review and the appraisal of systematic reviews. This synthesis was important to ensure that the findings were based on all of the literature available for review.



Appendix C: Title

Please see **Appendix B: Promising Practices Review: Appraisal of Scientific Rigour and Community Participation** for full description of rankings and terminology used in **Table 30**.

Table 30: Articles appraised by document section, in alphabetical order

Document Section Number	Author (Year)	Article Type	Scientific Merit	Certainty of Effectiveness	Potential for Population Impact	Overall Ranking	Corresponding State of Evidence Review Section	Article used Multiple Sections
TRANSPORTATION								
1.1	Active Travel							
	Abraham et al. (2010)	Review	Moderate	-	-	Moderate	Mental Health	
	Anderson et al. (2006)	Review	Low	-	-	Low	Active School Transport	
	Booth et al. (2005)	Review	Low	-	-	Low	Obesity Prevention	
	de Silva-Sanigorski et al. (2010)	Intervention	-	Low	Mid	Less Promising	Obesity Prevention	
	Eyler et al. (2008b)	Intervention	-	High	High	Most Promising	Active School Transport	
	Faulkner et al. (2009)	Review	Moderate	-	-	Moderate	Active School Transport	
	Khan et al. (2009)	Review	Mid	-	-	Mid	Obesity Prevention	Yes (1.1, 1.2, 3.1, 3.3)
	Larson et al. (2010)	Review	Moderate	-	-	Moderate	Food Retail Access	Yes (1.1, 3.1)
	Lee & Zhu (2008)	Review	Low	-	-	Low	Active School Transport	
	Lee et al. (2008)	Review	Low	-	-	Low	Active School Transport	
	Mair et al. (2008)	Review	Moderate	-	-	Moderate	Mental Health	
	Panter & Jones (2010)	Review	Moderate	-	-	Moderate	Adult Active Transport	
	Papas et al. (2007)	Review	Moderate	-	-	Moderate	Obesity Prevention	Yes (1.1, 3.1)
	Pont et al. (2009)	Review	High	-	-	High	Active School Transport	
	Renalds et al. (2010)	Review	Moderate	-	-	Moderate	Mental Health	
	Sallis & Glanz (2009)	Review	Low	-	-	Low	Obesity Prevention	Yes (1.1, 3.1, 3.3)
	Schuurman et al. (2009)	Intervention	-	Low	Low	Least Promising	Adult Active Transport	
	Shephard (2008)	Review	Low	-	-	Low	Adult Active Transport	
	Townshend & Lake (2009)	Review	Moderate-Low	-	-	Moderate-Low	Obesity Prevention	
	Truong (2006)	Review	High	-	-	High	Mental Health	
	Vaughn et al. (2009)	Intervention	-	Low	High	Promising	Active School Transport	
1.2	Active Travel – Cycling							
	Jensen et al. (2008)	Intervention	-	Low	Mid	Less Promising	Cycling	
	Khan et al. (2009)	Review	Mid	-	-	Mid	Obesity Prevention	Yes (1.1, 1.2, 3.1, 3.3)
	Pucher et al. (2010)	Review	Moderate	-	-	Moderate	Cycling	
	Reynolds et al. (2009)	Review	Moderate	-	-	Moderate	Cycling	

Document Section Number	Author (Year)	Article Type	Scientific Merit	Certainty of Effectiveness	Potential for Population Impact	Overall Ranking	Corresponding State of Evidence Review Section	Article used Multiple Sections
1.3	Organizational Travel Plans							
	Hosking et al. (2010)	Review	High	-	-	High	Adult Active Transport	
1.4	Air Pollution							
	Boothe & Shendell (2008)	Review	Moderate	-	-	Moderate	Proximity to Traffic	
	Clark & Stansfeld (2007)	Review	Low	-	-	Low	Proximity to Traffic	
	Lipfert & Wyzga (2008)	Review	Low	-	-	Low	Proximity to Traffic	
	Wier et al. (2009)	Intervention	-	Low	High	Promising	Proximity to Traffic	
1.5	Driving Environments - Older Adults							
	Bohr (2008)	Review	High	-	-	High	Elder Driving	
1.6	Driving Environments - Road Lightening							
	Beyer et al. (2010)	Review	High	-	-	High	Driving Environments	
1.7	Driving Environments - Asphalt							
	Elvik et al. (2005)	Review	High	-	-	High	Driving Environments	
1.8	Crash Prevention Strategies							
	Aarts & van Schagen (2006)	Review	Low	-	-	Low	Crash Prevention Interventions	
	Aeron-Thomas & Hess (2009)	Review	High	-	-	High	Crash Prevention Interventions	
	Blais & Dupont (2005)	Review	Low	-	-	Low	Crash Prevention Interventions	
	Bunn et al. (2009)	Review	High	-	-	High	Crash Prevention Interventions	
	Pilkinton & Kinra (2005)	Review	High	-	-	High	Crash Prevention Interventions	
	Wilson et al. (2010)	Review	High	-	-	High	Crash Prevention Interventions	
DESIGN								
2.1	Building Design							
	Nicoll & Zimring (2009)	Intervention	-	Mid	Mid	Promising	Elevator or Stair Design	
LAND USE								
3.1	Food Environment							
	Brug et al. (2008)	Review	Low	-	-	Low	Food Retail Access	
	Cummins et al. (2007)	Intervention	-	Mid	Mid	Promising	Food Retail Access	
	Cunradi (2010)	Review	Low	-	-	Low	Food Retail Access	
	Fraser et al. (2010)	Review	Low	-	-	Low	Food Retail Access	
	Khan et al. (2009)	Review	Mid	-	-	Mid	Obesity Prevention	Yes (1.1, 1.2, 3.1, 3.3)
	Larson et al. (2010)	Review	Moderate	-	-	Moderate	Food Retail Access	Yes (1.1, 3.1)
	Papas et al. (2007)	Review	Moderate	-	-	Moderate	Obesity Prevention	Yes (1.1, 3.1)
	Sallis & Glanz (2009)	Review	Low	-	-	Low	Obesity Prevention	Yes (1.1, 3.1, 3.3)
	Treuhart & Karpyn (2010)	Review	Low	-	-	Low	Food Retail Access	
3.2	Food Environment - School and Community Gardens							
	Alaimo et al. (2008)	Intervention	-	Mid	Mid	Promising	Gardens	
	Bell & Dymont (2006)	Intervention		High	Mid	Very Promising	Playgrounds	Yes (3.2, 3.5, 3.6)



Document Section Number	Author (Year)	Article Type	Scientific Merit	Certainty of Effectiveness	Potential for Population Impact	Overall Ranking	Corresponding State of Evidence Review Section	Article used Multiple Sections
	Parmer et al. (2009)	Intervention	-	Mid	Mid	Promising	Gardens	
3.3	Community Recreation							
	Cohen et al. (2009)	Intervention	-	Low	High	Promising	Community Recreation	
	Heath et al. (2006)	Review	Moderate	-	-	Moderate	Community Recreation	
	Kaczynski & Henderson (2007)	Review	Moderate	-	-	Moderate	Community Recreation	Yes (3.3, 3.4)
	Khan et al. (2009)	Review	Mid	-	-	Mid	Obesity Prevention	Yes (1.1, 1.2, 3.1, 3.3)
	Limstrand (2008)	Review	Moderate	-	-	Moderate	Community Recreation	
	McCarthy (2010)	Intervention	-	Mid	High	Very Promising	Community Recreation	
	McCormack et al. (2010)	Review	Moderate	-	-	Moderate	Community Recreation	
	Sallis & Glanz (2009)	Review	Low	-	-	Low	Obesity Prevention	Yes (1.1, 3.1, 3.3)
	Tester & Baker (2009)	Intervention	-	Mid	Low	Less Promising	Community Recreation	
3.4	Community Recreation- Trail Development							
	Eyler et al. (2008a)	Intervention	-	Mid	High	Very Promising	Community Recreation	
	Kramer et al. (2010)	Intervention	-	Mid	Mid	Promising	Obesity Prevention	
	Kaczynski & Henderson (2007)	Review	Moderate	-	-	Moderate	Community Recreation	Yes (3.3, 3.4)
	Lees & Redman (2009)	Intervention	-	Low	High	Promising	Overarching Approaches	Yes (3.4, 3.11)
3.5	Community Recreation- Schoolyard Greening and Playground Recreation							
	Bell & Dymont (2006)	Intervention		High	Mid	Very Promising	Playgrounds	Yes (3.2, 3.5, 3.6)
	Brink et al. (2010)	Intervention	-	High	Mid	Very Promising	Playgrounds	
	Colabianchi et al. (2009)	Intervention	-	High	Mid	Very Promising	Playgrounds	
	Dymont (2005)	Intervention	-	Mid	Mid	Promising	Playgrounds	
	Dymont & Bell (2008)	Intervention	-	High	High	Most Promising	Playgrounds	
3.6	Shade							
	Dobbinson et al. (2009)	Intervention	-	Mid	High	Very Promising	Playgrounds	
	Bell & Dymont (2006)	Intervention		High	Mid	Very Promising	Playgrounds	Yes (3.2, 3.5, 3.6)
3.7	Housing							
	Barton et al. (2007)	Intervention	-	Mid	Mid	Promising	Housing	
	Johnson et al. (2009)	Intervention	-	Low	Mid	Less Promising	Housing	
	Lindberg et al. (2010)	Review	Moderate	-	-	Moderate	Housing	
3.8	Crime Prevention Through Environmental Design							
	Cozens et al. (2005)	Review	Low	-	-	Low	Crime Prevention	
	Cozens & Love (2009)	Intervention	-	Low	Mid	Less Promising	Crime Prevention	
	Foster & Gilles-Corti (2008)	Review	Low	-	-	Low	Crime Prevention	
	Saville (2009)	Intervention	-	Mid	High	Very	Crime Prevention	

Document Section Number	Author (Year)	Article Type	Scientific Merit	Certainty of Effectiveness	Potential for Population Impact	Overall Ranking	Corresponding State of Evidence Review Section	Article used Multiple Sections
						Promising		
3.9	<i>Rural Land-use</i>							
	Frost et al. (2010)	Review	Moderate	-	-	Moderate	Rural Land Use	
	Sandercock et al. (2010)	Review	Moderate	-	-	Moderate	Rural Land Use	
3.10	<i>General- Tools</i>							
	Kim et al. (2010)	Intervention	-	Mid	High	Very Promising	Overarching Approaches	
	Roof & Glandon (2008)	Intervention	-	Low	Mid	Less Promising	Overarching Approaches	
3.11	<i>General - Overarching Approach</i>							
	Lees & Redman (2009)	Intervention	-	Low	High	Promising	Overarching Approaches	Yes (3.4, 3.11)
3.12	<i>Articles Reviewed in State of Evidence but Not Included in Document</i>							
	Casagrande et al. (2009)	Review	Low	-	-	Low	Overarching Approaches	



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