



HASTINGS PRINCE EDWARD
Public Health

Building Complete and Sustainable Communities: Healthy Policies for Active Transportation

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Introduction

Over the last century conventional approaches to transportation planning have prioritized the movement of motor-vehicles as the primary means of transporting people and goods. This emphasis has resulted in the design of communities that make it hard to travel by modes other than motor-vehicles. There is now a significant body of scientific evidence that demonstrates that the physical design of a community influences whether or not people choose to walk or bicycle as a mode of transportation (1; 2). This has resulted in a paradigm shift in transportation planning. Rather than planning only for the movement of motor-vehicles, transportation planning must also have a strong emphasis on creating easily accessible and safe opportunities for people to use modes of active transportation including walking, cycling as well as public transit.

Active transportation refers to any form of human-powered transportation – walking, cycling, using a wheelchair, in-line skating or skateboarding. (75)

To support this approach to transportation planning, Hastings Prince Edward Public Health (HPEPH) has been working together with municipalities and community organizations, to create complete and sustainable communities that improve opportunities for active transportation. This work has been guided by a shared

commitment among municipalities and community organizations in Hastings and Prince Edward counties to a “Health in All Policies” approach which establishes policies and programs that create equitable opportunities for health and quality of life (3).

Municipal decision-makers have a role in planning and designing communities for optimal health. This role includes prioritizing funding for infrastructure improvements that support non-motorized modes of transportation, creating comprehensive transportation plans to ensure the safe movement of people and goods, engaging citizens to participate in the planning and design of their community, reviewing municipal bylaws to determine whether they encourage or discourage healthy behaviours, and enacting policy changes at the local level to create a supportive environment for the health of all residents.

This document is intended to support municipal planners, engineers, elected officials and community groups throughout Hastings and Prince Edward counties in considering the health implications of policy and program decisions related to active transportation. Based on the most current public health evidence, strategic objectives are offered that are shown to have a positive impact on the health of the community. Each objective is supported by key actions and is intended to guide the development of active transportation policies and programs in small urban areas of the region. An info graphic of the following recommendations is found in Appendix A, and the methods and data used to identify and prepare this document are found in Appendix B and C.

Active Transportation and Health

The World Health Organization identifies transportation as an important determinant of health (4). Transportation that emphasizes sustainability and accessibility over reliance on motor-vehicles, provides more opportunities for walking and cycling, reduces the impact on air quality and the environment, and provides mobility options for people without motor-vehicles to access employment, education, and community services among other resources for daily living and personal growth. Regardless of geographical context, increased uptake of active transportation provides substantial net health benefits to community populations (5; 6), and provides common points of interaction on factors that influence population health including chronic disease, injuries, urban-planning, and environmental protection (7).

Chronic Disease

The design of urban built environments to facilitate walking and cycling has positive effects on physical activity behaviour, particularly when implemented in conjunction with promotional and skill-building activities (1; 7; 8). As a result, comprehensive multi-component active transportation initiatives have the potential to address many of today's most pressing public health concerns associated with physical inactivity and the associated cardiovascular health risks (9; 10; 11).

Walking and cycling for transportation has moderate to strong positive associations with cardiovascular fitness and overall health outcomes. Commuter cycling-specific research shows consistent inverse relationships between the amount of cycling and the risk of numerous health outcomes including, all-cause mortality, cardiovascular risk factors, and incidence of overweight and obesity (12). While research focusing on all modes of active transportation finds consistent positive impacts on cardiovascular health, there is insufficient evidence to determine an effect on body weight outcomes (11; 13; 14).

When environmental interventions that shape urban settings are prioritized and integrated into a comprehensive health promotion strategy to promote walking and cycling (1; 8; 7), they have the "potential to encourage large numbers of people to integrate physical activity into their day" (9).

Injury Prevention

Safety concerns keep one in five Canadians from walking or cycling (15). Effective multi-modal transportation planning has the potential to create safer streets for all road users, and improve perceptions of safety. Land-use planning and community design features are effective at

"Health in All Policies" is fundamental to building healthy communities. It is a collaborative approach to policy decision-making where:

- governments share responsibility and work across sectors to support the health of a community;
- community leaders, businesses, interest groups and residents place value on health for all; and
- combined efforts create synergy for achieving mutual benefits.

reducing motor-vehicle traffic volumes and speeds to mitigate risks of traffic collisions not only between cars, but between motor-vehicles and pedestrians and cyclists (16). Although a number of studies demonstrate that walking and cycling pose increased risks of injury and fatality due to traffic collisions, health benefits from physical activity strongly outweigh possible negative health impacts (5).

Environmental Health

Improving opportunities for active transportation and reducing reliance on motor-vehicles is a key strategy of Ontario's Climate Change Action Plan (17). Reducing the number of vehicle miles travelled by designing communities to encourage walking, cycling, and public transit use will reduce traffic volumes and result in a decrease in exposure to air pollution and reduce greenhouse gas emissions associated with climate change. The Canadian Medical Association estimates that as many as 21,000 Canadians die each year as a result of air pollution (18). High per capita motor-vehicle miles of travel and number of motor-vehicle trips is associated with higher levels of air pollutants that can have adverse respiratory health effects, increased risk of cardiovascular disease, cancer, and mortality (18; 19).

Health Equity

A multi-modal transportation system has the potential to offer more choice in transportation and more equitable access to community services, employment, healthy food options, and opportunities for active recreation by diverse populations. A strong active transportation system that is integrated with public transit allows youth, seniors, people with disabilities, and people living on a low income to rely less on motor-vehicles for transportation to maintain and enhance their quality of life (20).

Yet, the impact of active transportation on different socio-demographic populations remains unclear (5; 21). Results from one single study has shown more socio-economically advantaged people are more likely to use new walking and cycling infrastructure (22), while other studies have found that children from lower income households and disadvantaged ethnic sub-populations benefit from improvements in design features that encourage active transportation (23; 24; 25; 26).

Policy Objectives and Key Actions

The establishment and implementation of municipal Active Transportation Master Plans is a critical policy action that guides the development of infrastructure for walking and cycling. Active Transportation Master Plans establish land use and urban design policies that support walking, cycling and other forms of non-motorized transportation, allocate strategic investments in cycling and pedestrian infrastructure, and guide community-wide active transportation promotion activities. Based on the most current public health evidence, we identify five core objectives and specific policy and program actions municipalities can move forward to shape the physical and social environments within their communities, thus making active transportation a more viable and sustainable option for residents.

Objective 1 - Communities have connected pedestrian and bicycle networks.

Cycling and walking routes need to be linked to the places that people want to go. A connected, well maintained system of high quality pedestrian and cycling infrastructure encourages people to use active modes of transportation (7; 21; 27). Complete active transportation networks should offer people of all ages, including people whose mobility is impaired, with convenient, safe and attractive access to workplaces, homes, schools and public facilities by walking, cycling, use of wheelchairs, or other modes of active travel. This can be achieved by prioritizing the needs of people using active transportation ahead of planning for the efficient movement motor-vehicles when designing transportation systems (1).

Action 1.1 - Develop a city-wide network of bicycle specific infrastructure.

The presence of a continuous network of cycling infrastructure encourages people to travel more by bicycle. Seamless infrastructure that is easy to navigate and that ideally provides separation between walking, cycling and driving enhances perceptions of security and may reduce collisions between cyclists and motorists. Streets used by cyclists at night should have good lighting, road services should be paved and well maintained, and bike routes should avoid excessive grade wherever possible (28).

Action 1.2 - Prioritize the development of paved shoulders on municipally managed rural roads.

Many of the municipalities in Hastings and Prince Edward counties are characterized by small urban centres mixed with rural agricultural settings and settlement areas. As such, urban centres, villages and hamlets within municipalities can benefit from ensuring municipally managed rural roads are designed to accommodate cyclists with a minimum 1.2 m paved shoulder, and appropriate “Share the Road” signage.

This policy action has become standard throughout Ontario after the Office of the Chief Coroner released a review of cycling deaths in 2012, and identified that paving the shoulders of rural highways would improve safety for Ontario cyclists (29). In response, the Province has established legislation that ensures provincial highways include paved shoulders to improve safety and encourage cycling throughout the Province (30). Many Ontario municipalities have followed this trend. For example, Renfrew County and Sault Ste. Marie have instituted paved shoulder policies to improve safety and reduce maintenance costs associated with grading and deterioration (31; 32).

Action 1.3 Establish a municipal sidewalk policy that closes the gaps in the pedestrian transportation network.

As an alternative to relying on ad hoc suggestions and public complaints, clear criteria should guide decision-making with regard to pedestrian infrastructure improvements. Sidewalk infill policies have been used successfully across Ontario to establish a ranking system to prioritize the development of new sidewalks in existing developments to enhance the connectivity of the pedestrian network (33; 34). Furthermore, sidewalk policies should establish ordinances that require sidewalks on both sides of residential, collector and arterial streets in new developments (35). Likewise, it is beneficial to ensure pedestrian and bicycle route analysis is included in all subdivision, site and building design processes. Such an analysis examines how pedestrians and cyclists will access a site and assesses the features of new development plans that are conducive to active transportation.

Action 1.4 - Ensure all access points to the public transit system are connected by pedestrian infrastructure, including sidewalks, crosswalks, benches and shelters.

Walking goes hand-in-hand with transit use as most transit trips begin and end with walking. More people will use the transit system if it is easy to access, convenient, and safe for people of all ages and abilities. People who regularly use transit are more likely to meet the recommended levels of physical activity (36).

Action 1.5 Provide supportive community environments for active school travel.

Research suggests that children who walk or bicycle to school regularly are more physically active than those who do not, and in effect, programs that increase young people's active travel to school have positive impacts on child health outcomes (37). Currently, only 9% of Canadian children aged 5 to 17 meet the recommended levels of physical activity (38). Considering that only 24% of children and youth use active modes of transportation to and from school, the need for active and safe routes to schools is an important strategy to increase the rates of physical activity among young people (39).

While school-based programs are effective at increasing active school travel (40; 41; 42), municipalities are responsible for ensuring safe and walkable communities that provide sidewalks, cycling infrastructure and crossings that connect residential areas to schools. Therefore, municipalities should consider working with school boards to identify and prioritize schools in need of infrastructure to support active school travel.

Objective 2 - Municipal plans and policies are integrated to support multi-modal urban form and street design.

Support for active transportation must be consistent throughout municipal land-use and urban design policies. High level strategic policies such as municipal Official Plans, area specific development plans, community improvement plans, and complementary bylaws should support both walking and cycling.

Action 2.1 - Prioritize increased density and mixed land-uses in neighbourhoods and rural settlement areas.

Complete communities offer places to live, work, learn and play for people regardless of their ability and stage of life. A key feature of complete communities is that opportunities for education, employment, and community services are easily accessed from where people live. This can be achieved through planning policies that encourage increased density and that provide for an appropriate range of mixed-use lands that can be accessed by walking, cycling or public transit. Compared to suburban communities which can be spread out, complete communities encourage people to drive less, walk and cycle more, and reduce driving speeds making roads safer (1; 16). Narrow traffic lanes, traffic calming design features, and tree-lined streets are more commonplace, and thus enhance safety and reduce the severity of collisions between pedestrians, cyclists and motor-vehicles (16).

Ontario specific frameworks have been created to facilitate the review of municipal plans to evaluate their potential influence on public health. *Building Complete and Sustainable Communities: Healthy Policies of Official Plans* was produced by HPEPH to assist member municipalities in developing Official Plan policies that are shown to positively influence community health (43). Included in this document are specific policies that can be integrated into Official Plans to reduce motor-vehicle dependency and promote active transportation. In addition, Middlesex-London Health Unit (2013) has produced the *Active Community Toolkit for Reviewing Development Plans*, which is designed for assessing the health implications of area, site and subdivision plans (44), and provides an assessment checklist of key built environment features that support and encourage active living.

Official Plans set out general policies that guide municipal development; municipal zoning bylaws put these general community design policies into action. Zoning bylaws regulate changes to the built environment and guide decisions related to use, location, size, character and off-street parking requirements. They can promote land use patterns that permit a mix of uses in specified areas and regulate densities and lot sizes for more compact neighbourhoods (45). Municipalities in Hastings and Prince Edward counties can look to innovative zoning bylaws throughout Ontario that support design features that encourage active transportation. For example, the City of London uses their zoning bylaw to specify bicycle parking requirements at public and commercial destinations throughout the city (46), and the City of Hamilton has zoning bylaw provisions that establish neighbourhood commercial zones to meet the everyday needs of residents within walking distance (47).

Action 2.2 - Create beautiful and safe neighbourhoods and streets.

One of the most consistent factors that appear to increase physical activity is the quality of neighbourhood environment. Urban design policies and practices that improve accessibility, aesthetics and safety of a neighbourhood are shown to increase physical activity (2; 8; 48).

Features such as trees, grass boulevards, benches, public washrooms and water fountains encourage more walking. Sidewalks that are congested, narrow, uneven, have high curbs, or have obstructions present hazards and restrict accessibility to those with limited mobility.

When considering micro-scale improvements to existing streets, consider conducting an assessment of key features that support active transportation. Validated tools are available to assess features of the built environment which can help to identify elements that need improvement and facilitate decision-making and priority setting (49; 50).

Community Improvement Plans used by municipalities address “growth management challenges, intensification, energy efficiency, mixed-use and transit/bicycle oriented development, accessibility, and the emerging needs of an aging baby-boom generation” (51). With the aim of enhancing the features of public realm that contribute to active transportation, municipal community improvement policies and plans should include provisions for (52):

- redevelopment, infill and mixed use development;
- maintenance and improvement of public space, pedestrian linkages, and active transportation;
- complementing the measures and design guidelines with regard to pedestrian and cycling provisions;
- facilitating the movement of children, including walk-to-school programs;
- building guidelines to help conserve historic buildings;
- supporting façade improvement incentive programs and streetscape improvements; and
- ensuring universally accessible built form.

Action 2.3 - Adopt a Complete Streets policy.

Complete Streets are designed to consider the mobility needs of pedestrians, cyclists, motorists and transit users of all ages and abilities. It is a fundamental measure to facilitate universal access by people of all ages and physical abilities, and by people living on a low-income who require affordable and safe transportation options. Complete Streets policy has been applied throughout North America to ensure that transportation practices and designs consistently enable access for all users.

Ten Elements of a Complete Streets Policy

1. **Language & Intent:** Uses strong policy language such as “must implement” or “will implement” when referring to Complete Streets elements.
2. **Users & Modes:** Must mention, at minimum, that “all users” includes pedestrians, bicyclists and transit users of all ages and abilities.
3. **Applies to all Projects:** Must apply to all projects including new projects, retrofit/reconstruction projects, and repair/maintenance and/or other projects for the entire right-of-way.
4. **Exceptions:** Exceptions to the policy are clear and require a procedure for approval.
5. **Encourage Connectivity:** Aims to create a comprehensive, integrated, connected network to benefit all users and modes.
6. **Jurisdictions:** Is adoptable by all agencies to cover all roads at the municipal, regional/county/district, and provincial level.
7. **Design Criteria:** Cites the use of the latest and best design criteria and guidelines to aid in implementation.
8. **Community Context:** States the context of the roadway and the surrounding community context dictates what Complete Streets elements will be accommodated.
9. **Performance Measures:** Establishes performance standards with measurable outcomes.
10. **Implementation Plan:** Includes specific next steps for policy implementation.

(55)

Complete Streets offer attractive sidewalks and cycling lanes, facilitate access to public transit, and improve safety. They are often less expensive than traditional infrastructure and have been shown to increase sales for local businesses, increase land and property values and reduce individual transportation costs (53). Complete Streets policy is best realized through an integrated set of mutually-supportive municipal policy documents (54). Municipal Official Plans can include supportive language for Complete Streets and municipal Transportation Master Plans should expand on specific transportation planning goals to action the vision for street design that accommodates all road users. The Toronto Centre for Active Transportation has adapted a tool from the U.S.-based National Complete Streets Coalition for the Ontario policy context to assist municipalities in developing Complete Streets policies and guidelines specific to their local context (55).

Objective 3 - Municipal policies and infrastructure prevents and reduces the severity of collisions between cars and bicycles or pedestrians.

Perceived safety concerns are a significant barrier that keeps people from walking or cycling for transportation. In effect, it is reported that safety concerns keep one in five Canadians from walking and cycling (56). Addressing these barriers by improving safety of the transportation system is vital for encouraging people to use active transportation (1; 37).

While not all types of infrastructure prevent collisions between motor-vehicles and pedestrians and cyclists (27), there are several design interventions that are upheld by strong evidence as being effective in decreasing collisions and reducing the severity of injuries among cyclists and pedestrians.

Action 3.1 - Reduce motor-vehicle travel speeds.

Motor-vehicle speed reductions are consistently demonstrated as having the most dramatic impact on safety for all road users. The results of moderate to strong quality systematic reviews establish that reduced speeds impact both the number and severity of crashes (28; 27).

To further support this recommendation, speed has been implicated in the deaths of both pedestrians and cyclists in Ontario (29; 57). The Office of the Chief Coroner of Ontario recommends reducing speed limits to 30 km/h on residential streets and adopting speed limits of 40 km/h on other streets unless otherwise noted, as a critical intervention for improving safety of pedestrians.

According to Parachute Canada, a pedestrian struck by a car travelling at 50 km/h is eight times more likely to be killed than a pedestrian struck at 30 km/h and even small reductions in speed can be significant. At a speed of 30 km/h, vehicles and pedestrians are able to co-exist with relative safety, which means that drivers have sufficient time to stop for pedestrians, and pedestrians can make better crossing decisions (58).

Action 3.2 - Efficiently design complex parts of the cycling network.

When streets with high volumes and complex traffic movements are specifically designed to accommodate interactions between cyclists and motor-vehicles, collisions are reduced (27) and cycling is encouraged (48). Areas of a cycling network that require complex movements by cyclists hinder a motorist's ability to predict where a cyclist is travelling, increasing the potential for conflict. People with less proficient cycling skills and confidence may be unsure of how to safely navigate complex traffic situations, thus decreasing their motivation to cycle and increasing their risk for collision and injury.

Action 3.3 - Ensure the safe design of roundabouts.

The design of roundabouts is of particular concern for cycling safety, as the conversion of intersections to roundabouts has been shown to increase the number of cycling collisions at these sites. In particular, roundabouts with cycle lanes marked only with paint as part of circulating carriageway increased cycle collisions (27; 28). Therefore, conversions of intersections with and without signals to roundabouts with separated cycle paths are recommended to reduce the odds of collisions (27; 28).

Although it may be prudent to avoid installing roundabouts in areas with the expectation of high bicycle traffic volumes (28), the Ontario Traffic Manual Book 18 identifies two options for integrating cycling infrastructure for roundabouts (59). Infrastructure treatments for multilane roundabouts should provide appropriate separation of travel modes, and single lane roundabout infrastructure, where a shared roadway is assumed, should be accompanied by the recommended shared roadway signage and stencils directing motorists to take a single file behind cyclists. Although shared lane approaches are recommended in Ontario in single lane roundabouts, consideration should be given to separating bicycle and motor-vehicle traffic on all roundabouts (27; 28).

Objective 4 - Multiple approaches are used to increase walking, cycling and other active transportation behaviours.

Effective interventions for increasing active transportation require multiple strategies and approaches. Policies need to be implemented that change the built environment, infrastructure improvements need to be publicized, and people require the knowledge, skills and motivation to use them. In fact, no single strategy alone appears to be effective, but when combined, positive changes in active transportation behaviour can be achieved (1; 7; 8; 60; 61).

Action 4.1 - Participate in community-wide activities that build a culture of walking and cycling.

Events such as the Bay of Quinte Bike Month are important community engagement initiatives that create a supportive culture for active transportation. Encouraging people to walk and bike with the Commuter Challenge, Bike to Work Day programs and community social rides provide opportunities for residents to try active commuting, learn about new infrastructure and programs, and celebrate community investments. Furthermore, a complete walking and cycling network must include maps, way-finding aids and signage that provides details of the distances and times in both directions to key destinations throughout the municipality.

Action 4.2 - Educate motorists, cyclists, and pedestrians with regard to their respective responsibilities for ensuring a safe transportation system for all users.

Effective, evidence-based public education campaigns that promote safety and encourage mutual respect for all road users are necessary to complement changes in the walking and cycling environment. The *Be Respectful. Be Courteous. Share the Road.* campaign is a local example of a campaign led by HPEPH, and supported by local police services, organizations and municipalities (62). Public education efforts should be complemented by appropriate traffic enforcement measures (1).

Public education campaigns should consider the follow topics:

Motorists

- Legislated traffic responsibilities (e.g. 1m passing of cyclists, dooring, rights of cyclists and pedestrians);
- distracted driving; and
- speed reduction.

Cyclists

- helmet use and fit for people of all ages;
- visibility;
- bicycle maintenance;
- appropriate route choices for age and ability; and
- legislated traffic responsibilities (e.g. sidewalk travel, safety equipment, signalling).

Pedestrians

- safe crossing practices;
- visibility; and
- distractions.

Action 4.3 - Increase access to cycling skill development programs.

Increasing access to educational programs for cyclists should be explored and integrated into local recreation and community services (1), and be tailored to motivated sub-groups of the population (60). CAN-BIKE is Canada's national standardized cycling education program. It provides evidenced-based cycling skills training that can be tailored to people of all ages and abilities (63). Children, in particular, need special consideration when teaching pedestrian and cycling safety skills. Between ages 7 and 14 years the physical and cognitive abilities of children change dramatically, and as a result, education needs to adapt to reflect these changes (64). CAN-BIKE provides a range of training programs, taught by certified instructors, that takes into account the unique needs of different populations.

Collaborating with recreation providers, cycling groups, and police services to train instructors and establish accessible programs are important components of increasing confidence and motivation for cycling transportation. Another example of cycling education is EcoSuperior and their partners in Thunder Bay which have established a vibrant cycling education program that reaches hundreds of people each year. They have created a step-by-step guide for setting up cycling education programs in communities across Ontario (65).

While there is limited research on the effect of cycling education on injuries, the evidence to date suggests that cycling education and skills training programs may increase knowledge of cycling safety among children and youth, but does not decrease injury rates or improve bicycle handling abilities and attitudes (66). However, cycling skills education is nonetheless an important component of a comprehensive approach to improving population health outcomes by increasing physical activity through active transportation among all age groups (1).

Objective 5 - Build capacity for planning, evaluation and collaboration on active transportation policy and program development.

Collaboration across sectors is at the foundation of a “Health in All Policies” approach to policy development, and this coordinated approach is fundamental for creating walk and bike-friendly communities. As a result, processes should be put in place to facilitate the development, evaluation and continuous improvement of the municipal active transportation system that builds on the knowledge, capacities and assets across community sectors (1).

Action 5.1 - Ensure active transportation projects are driven by local data and research.

Walking and cycling projects should be rigorously evaluated and include assessments of their impacts on health inequalities (1). Assessment of active transportation investments can take many forms to ensure projects are effectively planned, implemented, and to make certain the desired outcomes are being achieved. Evaluation can include pre/post assessments for walking and cycling demand at key locations, changes in mode share over time and should include measures to better understand perceptions of the active transportation environment among different population sub-groups.

Assessment data can also include regular communication of collision data involving pedestrians and cyclists to identify safety concerns and appropriate engineering, education, and enforcement solutions to reduce collisions and improve safety for all road users.

Automated pedestrian and cycling counters and manual counts, in addition to intercept surveys, provide valuable insights into the effectiveness of projects. The National Bicycle and Pedestrian Demonstration Project offers active transportation manual count protocols, sample intercept surveys and modelling tools to assess demand, characteristics of cycling trips and perceptions

of the cycling environment (67).

Action 5.2 - Explore opportunities to work across sectors to adopt a Vision Zero approach to traffic safety.

Imagine a multi-modal transportation system that has no collisions resulting in injuries or death. Sweden set their sights on this vision and now has successfully reduced pedestrian fatalities by 50% in 5 years, reduced fatalities among children, and reduced traffic fatalities by 35% over 12 years (68). Sweden's Vision Zero initiative takes a systemic, data-driven approach to developing engineering, enforcement and education solutions to improve traffic safety. Because of its proven success, it is now considered as a best practice approach to preventing traffic-related injuries and fatalities (69).

At the core of Vision Zero is fostering a shared responsibility among politicians, planners, police, community organizations, vehicle manufacturing companies, and all road users for traffic safety. While many of Canada's major municipalities such as Edmonton, Toronto and Vancouver have initiated Vision Zero initiatives, small urban municipalities should begin to consider how this approach can be applied to prevent traffic injuries and deaths among all road users.

Action 5.3 - Establish an Active Transportation Advisory Committee.

Transforming a well-designed Active Transportation plan into sustainable changes in the community takes a long-term commitment and ongoing community involvement in establishing coordinated, cross sector programs that promote walking and cycling (1). This should include establishing structures to facilitate implementation of active transportation objectives, such as an Active Transportation Advisory Committee. Establishing a diverse municipal committee will ensure that policies and programs are responsive to the emerging needs of the community, allow municipalities to strengthen partnerships with community organizations, and facilitate communication of grassroots concerns. The City of Stratford has an example of an Active Transportation Advisory Committee that works with the City on education, policy and bylaw development, and infrastructure design (70).

Action 5.4 - Participate in the Bike Friendly Community and Walk Friendly Community Awards programs.

The Bicycle Friendly Community Award Program, managed by the Share the Road Cycling Coalition (71), and the Walk Friendly Community Award Program, managed by Green Communities Canada (72), provides incentives, hands-on assistance, and award recognition for communities that actively support walking and cycling.

Build Capacity for Active Transportation Planning

The Ontario Bike Summit

This annual conference held by the Share the Road Cycling Coalition brings professionals and advocates together from across North America to exchange knowledge and advance the development of bicycle-friendly communities throughout Ontario. Website: <http://bit.ly/2lZ9luq>

Public Health and Planning 101

The Ontario Public Health Association, the Ontario Professional Planners Institute, and the Public Health Agency of Canada have collaborated to create an online course designed to bridge the gaps between professions, as well as to provide greater opportunities for developing collaborative partnerships to help create and foster healthy built environments. Website: <http://bit.ly/2lrUyFD>

Association of Pedestrian and Bicycle Professionals (APBP)

This North American organization aims to grow the pedestrian and bicycle profession and its influence by facilitating the exchange of professional and technical knowledge and skills. APBP Ontario Chapter website: <http://bit.ly/2mwSnSe>

These programs provide opportunity for municipalities and community partners to come together to inventory the engineering, enforcement, education, planning and evaluation initiatives that are currently contributing to improving the walking and cycling environment. Along with recognition and expert feedback received on each application, the process provides a framework for setting community goals and continuous progress toward creating safe and active communities.

Action 5.5 - Develop local expertise in active transportation planning.

Best practices in planning for active transportation are continually evolving, particularly when planning in small urban and rural contexts. Municipalities should ensure engineering and planning professionals have a realistic understanding of the scale of built environment changes required to increase active transportation behaviour (1), and this should be harmonized with the expertise available from economic development, recreation, and public health to establish effective, complementary active transportation promotion initiatives. There are numerous ongoing opportunities in Ontario to connect with professionals across sectors to share knowledge, research and best practices in active transportation planning.

Conclusion

Multi-modal approaches to transportation planning require a strong and deliberate emphasis on creating easily accessible and safe opportunities for people to walk, cycle, and use other active modes of travel. The residents in Hastings and Prince Edward counties will benefit from increased investments in active transportation. These investments support health, mitigate climate change, support aging in place, and create sustainable, accessible and liveable communities for residents today and for future generations.

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Appendix A – Summary of Recommendations Infographic

Complete and Sustainable Communities Make it Easy for People to Walk, Bike and Roll

Active transportation systems improve the health of the community when they include:



COMPLETE BICYCLE AND PEDESTRIAN NETWORKS

- Seamless connections to major destinations, including residential, school and commercial areas
- Paved shoulders on rural roads
- Build sidewalks on all streets

INTEGRATED MUNICIPAL POLICIES AND PLANS

- Increased density and mix of land uses
- Beautiful street and neighbourhood design
- Complete Streets Policy to guide street design for all road users



POLICIES AND INFRASTRUCTURE THAT PREVENT AND REDUCE THE SEVERITY OF COLLISIONS BETWEEN PEOPLE AND CARS

- Reduce traffic speed to 30 km/h on residential and 40 km/h on collector roads
- Separate travel modes on high volume streets and complex intersections

MULTIPLE APPROACHES TO CHANGE TRANSPORTATION BEHAVIOUR

- Build a culture of cycling and walking with community-wide events
 - Educate all road users on legislated responsibilities
 - Increase access to safe cycling skills training



INCREASED CAPACITY AND COLLABORATION FOR PLANNING & EVALUATION

- Collect and use local data to make decisions
- Municipalities work with police, public health, schools, and workplaces to promote active transportation and road safety
- Become a designated Bike and Walk Friendly Community
- Develop local expertise in active transportation planning

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Appendix B - Methodology

Literature Review Question

What interventions positively or negatively influence walking or cycling behaviour, and the associated health outcomes, in urban communities among general populations?

The PISO framework was used to develop the research question.

P	Population	General populations (adults and children)
I	Intervention	Any intervention that positively or negatively influence active transportation
S	Setting	Urban or small urban communities
O	Outcome	Walking or cycling behaviour and/or associated health outcomes

Academic Data Sources and Search Strategy Results

In January of 2017, seven public health evidence databases were searched including: The Centre for Reviews and Dissemination, Evidence for Policy and Practice Information, the Community Guide, Health Evidence, CINAL, MEDLINE, National Institute for Health Care Excellence. The main search terms were “active travel”, “active transport*”, “commut*”, “walk*”, “cycl*”, “infrastructure”, “built environment”, “transportation policy”, “urban planning”, “physical activity”, “injury”, “air quality”, “air pollution”, “health outcomes”, “cardiovascular health”. The search was limited to systematic reviews, synthesis of reviews and practice guidelines published between 2006 and 2016. The search resulted in 35 review studies, and a further 4 studies identified as a result of a review of selected bibliographies.

The research included in this review assessed the effect of urban planning and design, built environment, transportation and/or behavioural interventions on changes in active transportation, active commuting, walking and cycling behaviour and/or health outcomes associated with physical activity, injury, or exposure to air pollution. Eleven studies were rejected for lack of relevancy.

Twenty-eight evidence synthesis reviews were critically appraised for their quality using the Health Evidence Quality Appraisal Tool by two independent reviewers, and conflicting appraisals were resolved through discussion. One study was rejected due to low quality rating, and a total of 26 papers rated as moderate or strong were retained. The final 27 papers to be reviewed included 2 practice guidelines, 2 syntheses of systematic reviews, and 23 systematic reviews.

Policy, Program & Expert Opinion Review

An important objective of this report was to identify innovative active transportation policy solutions that can be applied locally in the small urban centres of Hastings and Prince Edward counties. To accomplish this, a scan of Government of Ontario and provincial stakeholder websites, including the Share the Road Cycling Coalition, Green Communities Canada, Toronto Centre for Active Transportation, Canadian Medical Association, the Ontario Professional

Planners Institute, and the Canadian Physicians for the Environment was completed to identify provincial policy frameworks, programs and expert opinions that supported and added context to the research evidence. In addition, the Canadian Partnership Against Cancer's Prevention Policies Directory was used to identify municipal level policies that demonstrated how the recommendations offered in this report are being implemented in municipalities across Canada.

Data Synthesis

A thematic summary approach was used as the basis for formulating recommendations and supporting actions. Findings from the literature review were grouped and summarized by themes to identify active transportation related policy issues, and approaches to increasing active transportation behaviour and health outcomes. Within each emergent theme the findings were ranked according to the level of evidence and strength of quality appraisal. Emergent policy issues were supplemented by relevant expert opinions from the fields of land-use planning, public health, and from active transportation advocacy stakeholders, in addition to examples of provincial and municipal policies and programs that reinforced and highlighted how the findings from the research evidence are being put into action.

Appendix C – Data Tables

Issue: Pedestrian and Bicycle Networks					
Research Evidence					
Citation	Findings	Health/Risk Factor Outcome	Population/Setting	Level of Evidence	Quality Rating
National Institute for Health and Care Excellence, 2008 (2)	Ensure pedestrians, cyclists and users of other modes of transport that involve physical activity are given the highest priority when developing and maintaining streets and roads (this includes people whose mobility is impaired). Use the following methods: <ul style="list-style-type: none"> ▪ Reallocate road space to support physically active modes of transport; ▪ Restrict motor-vehicle access; and ▪ Introduce road-use charging schemes. 	Population levels of physical activity	Urban	Guideline	Strong
	Infrastructure and walking and cycling routes should be maintained to a high standard.				
	Comprehensive walking and cycling networks should offer everyone (including people whose mobility is impaired) convenient, safe and attractive access to workplaces, homes, schools and public facilities.				
	Plan and provide a comprehensive network for routes for walking, cycling and using other modes of transport involving physical activity.				
Heath, et al., 2012 (7)	Walking and biking trails can be created or enhanced to promote physical activity.	Population levels of physical activity	Not limited/ Not specified	Synopsis of Systematic Reviews	Moderate

Research Evidence (cont'd)					
Citation	Findings	Health/Risk Factor Outcome	Population/ Setting	Level of Evidence	Quality Rating
Fraser & Lock, 2010 (21)	Transport strategies that encourage the development of cycle routes may appear promising but the socio-demographic distribution of their effects on physical activity remains unclear.	Population levels of physical activity	Not limited/ Urban	Systematic Review	Strong
Mulvaney, et al., 2015 (27)	Cycle routes and connected networks encourage more cycling.	Cycling or walking behaviour	Not limited/ Urban	Systematic Review	Strong
Heath, Brownson, Kruger, Miles, & Powell, 2006 (48)	Redesigning complex parts of a cycle route and network encourages more cycling.	Cycling or walking behaviour	Not limited/ Urban	Systematic Review	Strong
Reynolds, Harris, Teschke, Cipton, & Meghan, 2009 (28)	Streets used by cyclists at night should have good lighting, road services should be paved and well maintained and bike routes should avoid excessive grade wherever possible.	Collision and injury prevention	Not limited/ Urban	Systematic Review	Moderate
Rissel, Curac, Greenaway, & Bauman, 2012 (36)	People who regularly use transit are more likely to meet the recommended levels of physical activity.	Population levels of physical activity	Not limited/ Urban	Systematic Review	Moderate

Issue: Pedestrian and Bicycle Networks

Policies, Programs & Expert Opinions

Citation	Key Element	Type	Level of Government
Government of Ontario, 2016 (17)	Support walking and cycling by improving commuter cycling networks, grade separated routes, infrastructure and signals, revise provincial road and highway standards to require commuter cycling infrastructure on all road and highway construction projects. Includes \$150 to \$225 in funding from the Greenhouse Gas Reduction Account.	Climate Change Action Plan	Provincial
Bill 137, Paved Shoulder Construction and Bicycling Act, 2013 (30)	Legislation that ensures provincial highways include paved shoulders.	Legislation	Provincial
Cronkite, 2015 (33)	Sidewalk infill policy establishes a ranking system to prioritize the development of new sidewalks in existing developments to connect the municipal pedestrian network.	Municipal sidewalk policy	Municipal
Sauve & Schleifer, 2012 (34)	Sidewalk infill policy establishes a ranking system to prioritize the development of new sidewalks in existing developments to connect the municipal pedestrian network.	Municipal sidewalk policy	Municipal
McCabe, Yong-Lee, & Inrig, 2012 (35)	Establish ordinances that require sidewalks on both sides of the street on residential, collector and arterial roads in new developments.	Municipal sidewalk policy	Municipal
Renfrew County, 2014 (31)	Paved shoulder policy for rural roads.	Rural road policy	Municipal
Office of the Chief Coroner of Ontario, 2012 (29)	Prioritized the development of paved shoulders on provincial highways	Paved shoulder policy	Provincial
City of Sault Ste Marie, n.d. (32)	Paved shoulder policy for rural roads	Rural road policy	Municipal

Issue: Land-Use and Urban Design Policies

Research Evidence

Citation	Research Findings	Health/Risk Factor Outcome	Population/Setting	Level of Evidence	Quality Rating
National Institute for Health and Care Excellence, 2012 (1)	Ensure high level strategic policies and plans support both walking and cycling. This includes a commitment to invest sufficient resources to ensure more walking and cycling – and recognition of this will benefit individuals and the wider communities.	Cycling or walking behaviour	Urban	Guideline	Strong
	Ensure walking routes are integrated with public transport to support longer journeys.				
	Assess the impact of relevant policies and decisions on people's ability to walk and cycle. Where necessary, amend them to ensure support for walking and cycling.				
	Ensure bicycle parking and residential storage needs are addressed.				
National Institute for Health and Care Excellence, 2008 (2)	Urban design and land use policies and practices that improve access, aesthetics and safety (e.g. lighting, traffic calming) of a neighbourhood are shown to increase levels of physical activity.	Population levels of physical activity	Urban	Guideline	Strong
Dobbins & Tirilis, 2011 (8)	Urban design and land use policies and practices that improve access, aesthetics and safety (e.g. lighting, traffic calming) of a neighbourhood are shown to increase levels of physical activity.	Population levels of physical activity	Not limited/Urban	Synopsis of Synthesis	Strong

Issue: Land-Use and Urban Design Policies (cont'd)

Research Evidence (cont'd)

Citation	Research Findings	Health/Risk Factor Outcome	Population/Setting	Level of Evidence	Quality Rating
Heath, Brownson, Kruger, Miles, & Powell, 2006 (48)	Urban design and land use policies and practices that improve access, aesthetics and safety (e.g. lighting, traffic calming) of a neighbourhood are shown to increase levels of physical activity.	Population levels of physical activity	Not limited/Urban	Systematic Review	Strong
Ewing & Dumbaugh, 2009 (16)	Dense urban areas appear to be safer than lower-volume environments of the suburbs. This is likely due to fewer miles travelled per capita, and the driving speeds are lower as narrow lanes, traffic calming measures, and tree lined streets are more commonplace. These features enhance safety due to reduced speeds and resulting severity of collisions.	Collision and injury prevention	Urban	Systematic Review	Strong
Heath, Brownson, Kruger, Miles, & Powell, 2006 (48)		Population levels of physical activity	Not limited/Urban	Systematic Review	Strong

Issue: Land-Use and Urban Design Policies (cont'd)

Policies, Programs and Expert Opinions

Citation	Key Element	Type	Level of Government
Toronto Centre for Active Transportation, 2015 (55)	Embed the 10 elements of a complete streets policy in land-use planning documents, including the Municipal Official Plan and transportation plans.	Complete Streets Policy	Municipal
Office of the Chief Coroner of Ontario, 2012 (57)	Adoption of a complete streets approach – focused on the safety of all road users – to guide the redevelopment of existing communities and the design of new communities throughout Ontario.	Complete Streets Policy	Municipal
City of Hamilton, 2015 (47)	Zoning bylaws that establish neighbourhood commercial zones to meet the everyday needs of residents within walking distance. “The purpose of this zone is to provide for neighbourhood oriented retail commercial and personal service uses located individually or collectively on a site, and designed primarily to serve the day to day convenience needs of residents living within walking distance”.	Zoning Bylaw	Municipal
MMM-Group, 2014	Community improvement plans to enhance aesthetic neighbourhood features of the community and should include investment in projects that focus on: <ul style="list-style-type: none"> ▪ Redevelopment, infill and mixed use opportunities; ▪ Maintenance and improvement public space, pedestrian linkages, and active transportation; ▪ Complementing the measures and design guidelines with regard to pedestrian and cycling provisions; ▪ Facilitating the movement of children, including a walk-to-school program; ▪ Building guidelines to help conserve historic buildings; 		

Issue: Land-Use and Urban Design Policies (cont'd)

Policies, Programs and Expert Opinions (cont'd)

Citation	Key Element	Type	Level of Government
MMM Group, 2014	<p>Community improvement plans to enhance aesthetic neighbourhood features of the community and should include investment in projects that focus on:</p> <ul style="list-style-type: none"> ▪ Redevelopment, infill and mixed use opportunities; ▪ Maintenance and improvement public space, pedestrian linkages, and active transportation ▪ Complementing the measures and design guidelines with regard to pedestrian and cycling provisions; ▪ Facilitating the movement of children, including a walk-to-school program; ▪ Building guidelines to help conserve historic buildings; ▪ Supporting façade improvement incentive programs and streetscape improvements; ▪ Improving community energy efficiency through incentive programs; and ▪ Ensuring universally accessible built form. 	Community Improvement Plans	Municipal
City of London, 2015 (46)	<p>This bylaw outlines the City of London as a site plan control area and delegate's powers or authorities under Section 41 of the Planning Act R.S.O. 1990, C.P. 13. Section 14 of Schedule 1 of this bylaw outlines that bicycle parking facilities shall be provided at the residential base and at destination locations such as the workplace, convenience and destination and commercial and institutional facilities in order to encourage bicycle use as an alternative means of transportation. Table 14.1 outlines the design and characteristics of these bicycle parking facilities.</p>	Site Plan Control Bylaw	Municipal

Issue: Land-Use and Urban Design Policies (cont'd)

Policies, Programs and Expert Opinions (cont'd)

Citation	Key Element	Type	Level of Government
National Center for Chronic Disease Prevention and Health Promotion, 2016 (50)	Toolkit for assessing features of the built environment to guide decision-making.	Health Community Design Framework	Municipal
Hastings Prince Edward Public Health, 2012 (43)	Framework for healthy policy review of Municipal Official Plans in HPE.	Health Community Design Framework	Municipal
Middlesex-London Health Unit, 2013 (44)	Framework for healthy policy review of Area Plans, Site Plans, and Subdivision Plans	Health Community Design Framework	Municipal
Toronto Centre for Active Transportation, 2015 (55)	Policy resources to facilitate the development of Complete Streets policies	Complete Streets Policy	Municipal

Issue: Infrastructure design

Research Evidence

Citation	Research Findings	Health/Risk Factor Outcome	Population/ Setting	Level of Evidence	Quality Rating
Heath, Brownson, Kruger, Miles, & Powell, 2006 (48)	Redesigning complex parts of a cycle route and network encourages more cycling.	Cycling or walking behaviour	Not limited/ Urban	Systematic Review	Strong
National Institute for Health and Care Excellence, 2012 (1)	Address infrastructure issues that may discourage people from walking, for example, motor traffic volume and speed, lack of convenient road crossings, poorly maintained footways or lack of dropped curbs, where needed.	Cycling or walking behaviour	Urban	Guideline	Strong
Mulvaney, et al., 2015 (27)	<p>The reduction of speed to 30 km/h in urban areas may be effective in reducing cycling casualties. Speed reductions have an important impact on reducing the severity of injuries among child cyclists, and the number of collisions that result in death or severe injuries among cyclists of all ages.</p> <p>There is a lack of high quality evidence to be able to draw firm conclusions as to the effect of cycling infrastructure on cycling collisions and injuries.</p> <p>When streets with high volumes and complex traffic movements designed to accommodate interactions between cyclists and motor-vehicles can reduce collisions.</p> <p>The conversion of intersections to roundabouts can increase the number of cycle collisions. In particular, conversion of intersections to roundabouts with cycle lanes marked as the circulating carriageway increased cycle collisions.</p>	Collision and injury prevention	Not limited/ Urban	Systematic Review	Strong

Issue: Infrastructure design (cont'd)

Research Evidence (cont'd)

Citation	Research Findings	Health/Risk Factor Outcome	Population/Setting	Level of Evidence	Quality Rating
	<p>The conversions of intersections with and without signals to roundabouts with separated cycle paths may reduce the odds of collisions.</p> <p>There is evidence that continuing a cycle lane across the mouth of a side road with a 'give way' line onto a main road, and cycle tracks may increase the risk of injury collisions with cyclists.</p> <p>The introduction of advance stop lines may reduce severity of injuries with collision with cyclists.</p>				
<p>Reynolds, Harris, Teschke, Cipton, & Meghan, 2009 (28)</p>	<p>The conversion of intersections to roundabouts can increase the number of cycle collisions. In particular, conversion of intersections to roundabouts with cycle lanes marked as the circulating carriageway increased cycle collisions.</p> <p>The conversions of intersections with and without signals to roundabouts with separated cycle paths may reduce the odds of collisions.</p> <p>It may be prudent to avoid installing roundabouts in areas with the expectation of high bicycle traffic volumes.</p> <p>Clearly marked, bike-specific facilities (i.e. cycle tracks at roundabouts, bike routes, bike lanes and bike paths) were consistently shown to provide improved safety for cyclists compared to on-road</p>	<p>Collision and injury prevention</p>	<p>Not limited/Urban</p>	<p>Systematic Review</p>	<p>Moderate</p>

Issue: Infrastructure design (cont'd)

Policies, Programs and Expert Opinions

Citation	Key Element	Type	Level of Government
	cycling with traffic or off-road with pedestrians and other users. Marked bike lanes and bike routes were found to reduce injury or crash rates by about half compared to unmodified roadways.		
Office of the Chief Coroner for Ontario, 2012 (29) Office of the Chief Coroner of Ontario, 2012 (57)	Municipalities in developing their Complete Streets approach, should consider: <ul style="list-style-type: none"> ▪ The introduction of speed reduction strategies where speed has been implicated in the deaths of pedestrians ▪ Reducing speed limits to 30 km/h on residential streets ▪ Adopting speed limits of 40 km/h on other streets unless otherwise noted ▪ Installing leading pedestrian signals intervals in intersections where there have been excess collisions between pedestrians and collisions. 	Complete Streets	Municipal
Government of Ontario, 2014 (59)	Roundabout design guidelines	Infrastructure design guidelines	Provincial
Parachute, n.d. (64)	The effect of motor-vehicle speed on pedestrian injury severity.	Expert opinion	Provincial

Issue: Effective approaches for active transportation behaviour change

Research Evidence

Citation	Research Findings	Health/ Risk Factor Outcome	Population	Level of Evidence	Quality Rating
National Institute for Health and Care Excellence, 2012 (1)	<p>Ensure programs include communications strategies to publicize available facilities and motivate people to use them.</p> <p>Implement town-wide programmes to promote cycling for both transport and recreational purposes. (Information, social rides, bike to work week, car-free days)</p> <p>Ensure skills training is available for those who are interested in cycling, either for transport or as a recreational activity (Can-Bike).</p> <p>Encourage walking and cycling by providing maps and way finding aids. Signage should give details of the distance and/or walking and cycling time, in both directions.</p>	Cycling or walking behaviour	Urban	Guideline	Strong
Dobbins & Tirilis, 2011 (8)	<p>Single focused behavioural interventions do not improve travel behaviour change programs.</p> <p>Social marketing campaigns to increase bike path usage are effective at increasing the number of cyclists on the facility, but have not resulted in population level increases of physical activity.</p> <p>There is limited evidence available to determine with any certainty cycling promotion activities promote sustained cycling that achieves health benefit.</p> <p>Community level interventions to promote leisure-time walking and commuter cycling show positive effects on behaviour, particularly when combined with infrastructure improvements, mass media and education interventions.</p>	Cycling behaviour Population level physical activity	Not limited/ Urban	Synopsis of Synthesis	Strong

Issue: Effective approaches for active transportation behaviour change (cont'd)

Research Evidence (cont'd)

Citation	Research Findings	Health/ Risk Factor Outcome	Population	Level of Evidence	Quality Rating
Heath, et al., 2012 (7)	Environmental and policy approaches can create or enhance access to places for physical activity with outreach programs that train individuals, provide social support for physical activity and integrate these structures into communities.	Population level physical activity	Not limited/ Not identified	Synopsis of Synthesis	Moderate
	The promotion of active transport (particularly walking and bicycle use) provides many mutual points of interest that are in common with the transportation, injury reduction, energy use, urban planning, and environmental protection agendas.				
Yang, Sahlqvist, McMinn, Griffin, & Ogilvie, 2010 (61)	Community-wide promotional activities and improving infrastructure for cycling have the potential to increase cycling by modest amounts. Individualized marketing report consistent positive effect but should be confirmed with more robust study designs.	Commuting cycling behaviour	Not limited/ Urban	Systematic Review	Strong
	Community-wide promotional activities and improving infrastructure for cycling have the potential to increase cycling by modest amounts. Individualized marketing report consistent positive effect but should be confirmed with more robust study designs.				
Ogilvie, et al., 2007 (76)	There is inadequate evidence to determine with certainty if promotion of walking as a mode of transport is effective.	Walking behaviour	Not limited/ Not identified	Synopsis of Synthesis	Moderate

Issue: Effective approaches for active transportation behaviour change (cont'd)

Research Evidence (cont'd)

Citation	Research Findings	Health/Risk Factor Outcome	Population/Setting	Level of Evidence	Quality Rating
Ogilvie, Petticrew, & Hamilton, 2004 (60)	<p>Targeted behaviour change interventions aimed at motivated sub-groups of the population that offer advice tailored to specific needs attributes or issues can be effective in changing active commuting behaviour.</p> <p>Car share and telecommute programs are ineffective and can have negative impacts on commuting behaviour.</p> <p>Single focused behavioural interventions do not improve travel behaviour change programs.</p>	Cycling or walking commuting behaviour	Not limited/Urban	Systematic Review	Moderate
Audrey & Batista-Ferrer, 2015 (37)	Interventions to reduce road traffic injuries and interventions to increase young people's active travel to school may have a positive impact on child health outcomes.	Overall health	Children/Urban	Systematic Review	Moderate
Stewart, Anokye, & Pokhrel, 2015 (9)	Environmental interventions appear to have more public health significance than individual/group based interventions, as they reach out to many more people (through often harder to define populations) to encourage integration of physical activity into everyday life via commuter cycling.	Population level physical activity	Not limited/Urban	Systematic Review	Moderate
Richmond, Zhang, Howard, & Macarthur, 2014 (66)	There is a paucity of high-quality research in the areas of bicycle skills training programs. Educational and skills training programs may increase knowledge of cycling safety, but this does not seem to translate into a decreased injury rate or improved handling ability and activities.	Collision and injury prevention	Children/Not limited	Systematic Review	Moderate

Issue: Effective approaches for active transportation behaviour change (cont'd)

Policies, Programs and Expert Opinions

Citation	Key Element	Type	Level of Government
City of London, 2013 (74)	<p>Promote Active Transportation and TDM</p> <p>Education and Outreach Raising awareness of travel issues and the benefits of sustainable transportation and changing attitudes about available options.</p> <p>Incentives and Disincentives Offering incentives for workplaces, schools, and households to encourage sustainable travel, or introducing pricing initiatives for other modes of travel.</p> <p>Transportation Supply improving local transit services or pedestrian and cycling infrastructure.</p> <p>Supportive Land Use Policies Prioritizing transit oriented development (TOD) or new parking policies.</p>	Transportation Master Plan	Municipal
Office of the Chief Coroner of Ontario, 2012 (29)	Enforcement, education and public safety activities targeted to the specific issues of cycling safety in a given community.	Expert opinion	Provincial
Hastings Prince Edward Public Health, 2017 (62)	Public education campaign for cyclists and motorists.	Education Program	Municipal
EcoSuperior, n.d.(65)	Can-Bike cycling skills education program planning guide.	Education Program	Municipal
Cycling Canada, 2014 (63)	National standardized cycling skills education program taught by certified instructors.	Education program	Municipal
Parachute (n.d.) (64)	Childhood cognitive development and active transportation.	Expert opinion	Provincial

Issue: Capacity for active transportation policy and program development

Research Evidence

Citation	Research Findings	Health /Risk Factor Outcome	Population/ Setting	Level of Evidence	Quality Appraisal
National Institute for Health and Care Excellence, 2012 (1)	Work across sectors (public health, education, policing, and businesses) to continue to assess needs and grow support and motivation for active transportation.	Cycling or walking behaviour	Urban	Guideline	Strong
	Ensure walking and cycling projects are rigorously evaluated, and include evaluation of their impact on health inequalities.				
	Develop coordinated, cross sector programs that promote walking and cycling for recreation and transport.				
	Ensure local expertise is available so that programmes are based on a realistic understanding of the scale of changes needed to encourage the population to change its behaviour.				
	Ensure programs are evaluated. Assess how much walking and cycling people are doing; mode share; differences among groups, etc. Recommends the use of the HEAT tool.				

Issue: Capacity for active transportation policy and program development (cont'd)

Policies, Programs and Expert Opinions

Citation	Key Element	Type	Level of Government
Alta Palnning + Design, 2016 (67)	Data gathering and analysis tools for planning and evaluation of active transportation projects	Assessment tool	N/A
World Health Organization, 2014 (68)	Health Economic Assessment Tools for walking and cycling	Assessment tool	N/A
Parachute, 2014 (69)	Vision Zero program description	Expert opinion	N/A
City of Stratford, 2014 (71)	Active transportation committee terms of reference	Committee	Municipal
Share the Road Cycling Coalition, 2017 (72)	Bicycle friendly community awards program	Recognition program	N/A
Green Communities Canada, 2014 (73)	Walk friendly community awards program	Recognition program	N/A

Issue: School Travel Planning

Research Evidence

Citation	Research Findings	Health or Risk Factor Outcome	Population/ Setting	Level of Evidence	Quality Rating
National Institute for Health and Care Excellence, 2008 (2)	Interventions that are shown to be effective at encouraging children to walk or bicycle to and from school include: Walking school bus; Safe routes to school programs; Cycling programs; Walk to school day programs.	Population levels of physical activity	Urban	Guideline	Strong
Stasiuk, Dubinski, Pope, & Paterson, 2013 (42)	Interventions that are shown to be effective at encouraging children to walk or bicycle to and from school include: Walking school bus; Safe routes to school programs; Cycling programs; Walk to school day programs.	Cycling or walking behaviour	Children/ Not identified	Synopsis of synthesis	Strong
Carlin, Murphy, & Gallagher, 2016 (41)	Walking interventions delivered in school settings may be effective in increasing physical activity behaviour in the short-term.	Walking behaviour	Children/ Not identified	Systematic Review	Strong
Chillon, Evenson, Vaughn, & Ward, 2011 (40)	The most successful active school travel interventions have appropriate school, parent and community involvement and that work toward the specific goal of increasing active transportation to school.	Cycling or walking behaviour	Children/ Urban	Systematic Review	Moderate

Issue: Active Commuting Effects Health

Research Evidence

Citation	Research Findings	Health/ Risk Factor Outcome	Population/ Setting	Level of Evidence	Quality Appraisal
Oja, Titza, Bauman, de Geus, Reger-Nash, & Kohlberger, 2011 (12)	The strength of evidence is strong that cycling has a strong association with fitness, moderate cardiovascular benefits, and inconclusive for all-cause mortality, coronary heart disease morbidity and mortality, cancer risk and overweight and obesity.	Overall health	Not limited/ Not identified	Systematic Review	Strong
Xu, Wen, & Rissel, 2013 (11)	Active transport to work or school was significantly associated with improved cardiovascular health and lower body weight. The evidence was weak for mental health and cancer, moderate for body weight and strong for cardiovascular health.	Overall health	Not limited/ Not identified	Systematic Review	Strong
Saunders, Green, Petticrew, Steinbach, & Roberts, 2013 (13)	Active travel may have positive effects on health outcomes, but there is little robust evidence to suggest active transport interventions for reducing obesity. (Review of Trials and Cohort Studies)	Cycling or walking behaviour	Not limited/ Urban	Systematic Review	Strong
Mueller, et al., 2015 (5)	<p>Effects of increased physical activity contributed the most to estimated health benefits, which strongly outweighed detrimental effects of traffic incidents and air pollution exposure on health.</p> <p>Air pollution exposure was estimated to have small health impacts with small benefits to the general population and small risks to the active traveller. While population health benefits emerge from reductions in motorized traffic volume and associated emission reductions, the risk to the active traveller is more complex.</p>	<p>Cycling or walking behaviour</p> <p>Air Quality</p> <p>Physical activity</p>	Not limited/ Urban	Systematic Review	Strong

Issue: Active Commuting Effects Health (cont'd)

Research Evidence (cont'd)

Citation	Research Findings	Health/ Risk Factor Outcome	Population/ Setting	Level of Evidence	Quality Appraisal
	Estimated gains in PA from AT constituted at least half of the total health impact. Uncertainties remain regarding the relationship between AT PA and total PA, where active travellers substitute AT PA for other forms of leisure-time PA.				
Ogilvie, Petticrew, & Hamilton, 2004 (60)	Active commuting has a moderate positive effect on physical and mental health. Publicity campaigns, engineering measures and charging road users have not been effective in improving health when implemented as a single intervention. Single focused interventions to encourage active commuting do not have an impact on health. No positive population level health impacts from population level campaigns alone.	Physical and mental health	Not limited/ Urban	Systematic Review	Moderate
Mayne, Auchincloss, & Michael, 2015 (6)	Active transportation interventions that promote active means of travel such as walking and biking are found to have positive results on health (7 studies).	Overall health	Not limited/ Urban	Systematic Review	Moderate
Wanner, Gotschi, Martin-Diener, Kahlmeier, & Martin, 2012)	There is limited evidence that active transport is associated with more physical activity and lower body weight in adults, due to study designs that cannot determine causality.	Physical activity and weight	Adults/ Urban	Systematic Review	Moderate
Hamer & Chida, 2008 (10)	Active commuting is associated with an overall 11% reduction in cardiovascular risk in a review of prospective cohort and case-control studies.	Cycling or walking behaviour	Not limited/ Urban	Systematic Review	Moderate

Issue: Active Commuting Effects Health (cont'd)

Policies, Programs and Expert Opinions

Citation	Key Element	Type	Level of Government
Canadian Medical Association, 2008 (18)	21,000 Canadians die each year as a result of air pollution.	Expert Opinion	N/A
Canadian Medical Association, 2013 (19)	Per capita miles travelled and number of trips are associated with higher levels of chronic disease.	Expert Opinion	N/A