BIKEABILITY AND CYCLIST SAFETY IN THUNDER BAY

CITY OF Thunder Bay
Superior by Nature

Lakehead UNIVERSITY

Thunder Bay District Health Unit

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INTRODUCTION **1**
Barriers to Cycling 1
Facilitators to Cycling 2
Purpose 3

THUNDER BAY IN CONTEXT **4**
Transportation Trends 4
Demographics and Population Health 7
Bikeability and Cyclist Safety Initiatives in Thunder Bay 8
Commuter Cyclist Experiences in Thunder Bay 10
Rolling in the Right Direction 12
Engineering 12
Education and Encouragement 14
Enforcement 16
Evaluation 16
Planning 17

CYCLIST-VEHICLE COLLISION ANALYSIS **21**
Data 21
Key Findings 22
When are collisions happening? 22
Where are collisions happening? 26
Who is involved in collisions? 30
Why and how are collisions happening? 33

COMMUNITY PERCEPTIONS OF BIKEABILITY AND CYCLIST SAFETY **42**
Data 42
Key Findings 43
Respondent demographics and cycling behaviour 43
Facilitators and barriers to cycling 52
Perceptions of cycling infrastructure and safety 55
Satisfaction with bikeability and safety 59
Priority municipal government action 60

CONCLUSIONS **63**

RECOMMENDATIONS **67**

CLOSING REMARKS **71**

REFERENCES **72**

INTRODUCTION

Bikeability is a measure of how easy, safe, and enjoyable it is to use a bicycle for transportation.

Cycling is a healthy, affordable, and sustainable mode of transportation which has benefits for both individual cyclists and the broader community.[1] Choosing to cycle instead of using motor vehicles for transportation can help community members to increase physical activity levels, decrease the risk of obesity and related chronic diseases, while also reducing noise and air pollution caused by automobile transportation.[2,3,4] Along with other forms of physical activity, cycling can be an effective strategy for preventing cardiovascular disease and type 2 diabetes in the general population[5] and can minimize the risk of cardiovascular diseases, cancer, and morbidity due to obesity in middle aged and elderly populations.[6] For children, cycling to school is associated with improved fitness,[7] and can help children who are sedentary to increase their physical activity levels and improve their cardiovascular health.[8] Cycling as a form of physical activity can also improve mental health.[9] Overall, increases in community levels of cycling and related positive effects on population health outcomes decrease the burden on the public health system.[10]

When cities invest in safe, convenient, and well-connected cycling infrastructure, it can encourage community members to choose cycling as a viable option for transportation. Other community benefits of cycling facilities include reducing wear and tear on roads, decreasing the rate of traffic collisions,[11] and contributing to the local economy.[12] Due to the significant social, environmental, and public health impacts of cycling many cities across Canada and worldwide have committed to improving conditions for this form of active transportation.[13]

Barriers to Cycling

Despite the numerous benefits associated with cycling, there are still barriers that prevent individuals from choosing this mode of transportation. Cyclists are considered vulnerable road users[14] and are more likely to sustain serious injuries in a traffic collision than automobile drivers.[15] Bicycle use is influenced by numerous factors such as the built environment, social factors, natural environment, and personal perceptions of safety. Barriers related to the physical environment include lack of bicycle lanes, paths, and bike parking, as well as distance to travel.[16,17] Barriers related to the social environment include crime rates and lack of support from family, friends, and workplaces.[18] Barriers presented by the natural environment include rain, snow, and wind.[19] Other factors that may discourage individuals to actively commute include lack of neighbourhood safety, fear of being involved in a collision, and poor cycling conditions.[20,21]

Facilitators to Cycling

Two main factors which have a large impact on improving the conditions for cycling and increasing cycling levels include infrastructure and policy. Research suggests that a well-connected cycling network, including low traffic roads along with bike paths, supports higher rates of cycling.[22] Investment in cycling infrastructure can also reduce injury rates.[23] Furthermore, bicycle lanes which improve access to green spaces allow cyclists to benefit from exposure to the natural environment. Several studies have shown that interventions that aim to decrease vehicular volume and speed can encourage active transportation, including cycling.[24,25] In addition, the presence of street lighting and a reduction in motorized vehicle lanes are associated with reduced injury severity among bicyclists.[26] Overall, cycling infrastructure and changes to the built environment that promote perceived and actual safety for cyclists have the potential to encourage modal shifts towards cycling.

Public policy and programming play an important role in promoting cycling.[27] Policy and programming interventions include transportation planning policies, bicycle friendly programs, land use planning policies, and limitations of car use.[28] Public policies may differ in each community. In order to create successful public policy that facilitates behaviour change and encourages cycling, it is important to first gain a better understanding of the barriers that prevent people from engaging in active transportation.[29]

> **"The bicycle is a curious vehicle. Its passenger is its engine."**
>
> John Howard,
> The Cyclist's Companion

Purpose

Although cycling is commonly perceived as a popular form of recreational physical activity, it is not as often considered a mode of transportation. The use of utilitarian cycling is still overshadowed by the use of faster, gas-powered automobiles. Cities need an evidence-based understanding of cycling and cyclist safety issues to support community planning, policy and programming aimed at promoting cycling, and improving safety. Currently, this evidence is very limited in the context of Thunder Bay. The Bikeability and Cyclist Safety in Thunder Bay report aims to address this evidence gap. Specifically, this report aims to examine bikeability and cyclist safety in the context of Thunder Bay and to identify the key issues and opportunities to improve the bikeability and cyclist safety in our community. First, an analysis of reported cyclist-vehicle collisions that occurred in Thunder Bay between 2004 and 2013 was conducted. This collision analysis examines who was involved in reported cyclist-vehicle collisions, when and where collisions had occurred, and explores factors that could explain why and how collisions occur. Second, a survey examining bikeability and perceptions of safety was conducted to capture the perspective of cyclists and to provide a more in-depth understanding of priority issues and opportunities to improve bikeability and address safety issues in Thunder Bay. Third, interviews were conducted with a diverse group of Thunder Bay cyclists to more fully understand perceptions of bikeability and safety and to gather lived experiences and stories. Together, key findings from the collision analysis, the community survey, and the interviews provide a comprehensive overview of bikeability and cyclist safety issues in the City of Thunder Bay, and a foundation for identifying strategies to promote cycling and improve safety.

> **“The bicycle is the most efficient machine ever created: converting calories into gas, a bicycle gets the equivalent of three-thousand miles per gallon.”**
>
> Bill Strickland
> The Quotable Cyclist

THUNDER BAY IN CONTEXT

Transportation Trends

In 2016, the total population of the Thunder Bay census metropolitan area was 121,621. The city proper had a population of 107,909. The land area of Thunder Bay is 2556.81km^2 and the population density is 47.6 per square km.[30] Thunder Bay has one of the lowest population densities of any Canadian city and often faces the challenge of limited funding available to maintain the current active transportation infrastructure. As a part of the province of Ontario's 2016-2020 Climate Change Action Plan, the municipality of Thunder Bay received $900,000 in funds to use towards an active transportation infrastructure project.

89.4%
Car, truck or van

4.4%
Active transportation

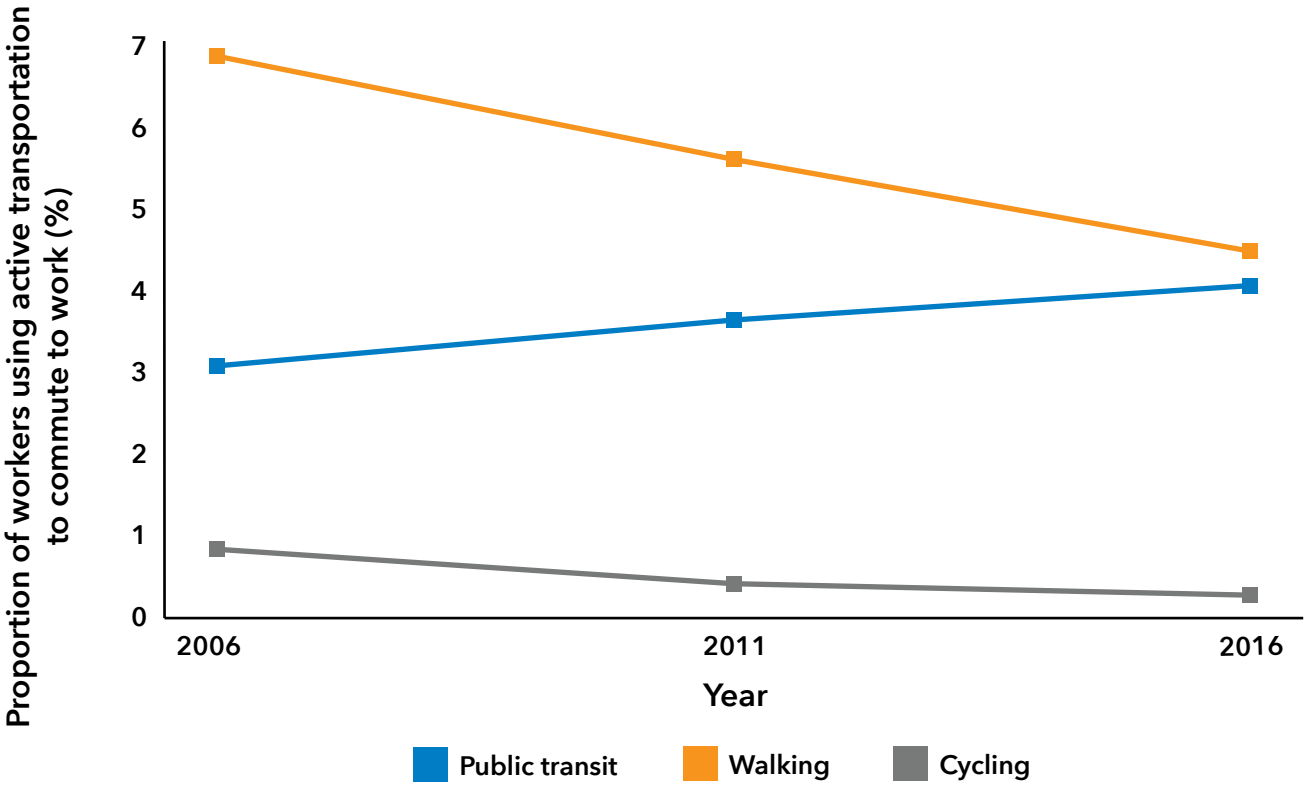
3.9%
Public transit

Figure 1: Proportion of Thunder Bay workers commuting to their usual place of work or no fixed workplace location by main mode of commuting, 2016 (Source: Statistics Canada)

Despite the numerous benefits of bicycling, driving motorized vehicles remains the primary mode of transportation throughout most cities across Canada, including Thunder Bay (Figure 1). Historically, Thunder Bay has been an automobile centric city with a transportation system oriented towards automobiles. Thunder Bay's pattern of infrastructure development can be attributed to the plans laid out in the municipality's 1987 Transportation Master Plan (TMP). The TMP is a major planning and policy document that guides infrastructure investments for the transportation system. A TMP typically has a horizon of 20 years; however, until the completion of a new TMP in 2019, the city relied on a document that was written in 1987, which was later updated in 1989. The 1987 TMP was largely automobile-centric, overlooked the safety of cyclists and operated under the prediction that the population of Thunder Bay would increase by between 0.23% and 0.37% each year over a 25-year horizon. It also predicted a large growth in the labor force population, decrease in the household size, and ongoing urban sprawl. The TMP prioritized widening roads and expanding the road network to accommodate increasing automobile traffic due to predicted demographic changes. However, since the 1980's the population of Thunder Bay has decreased rather than increased.

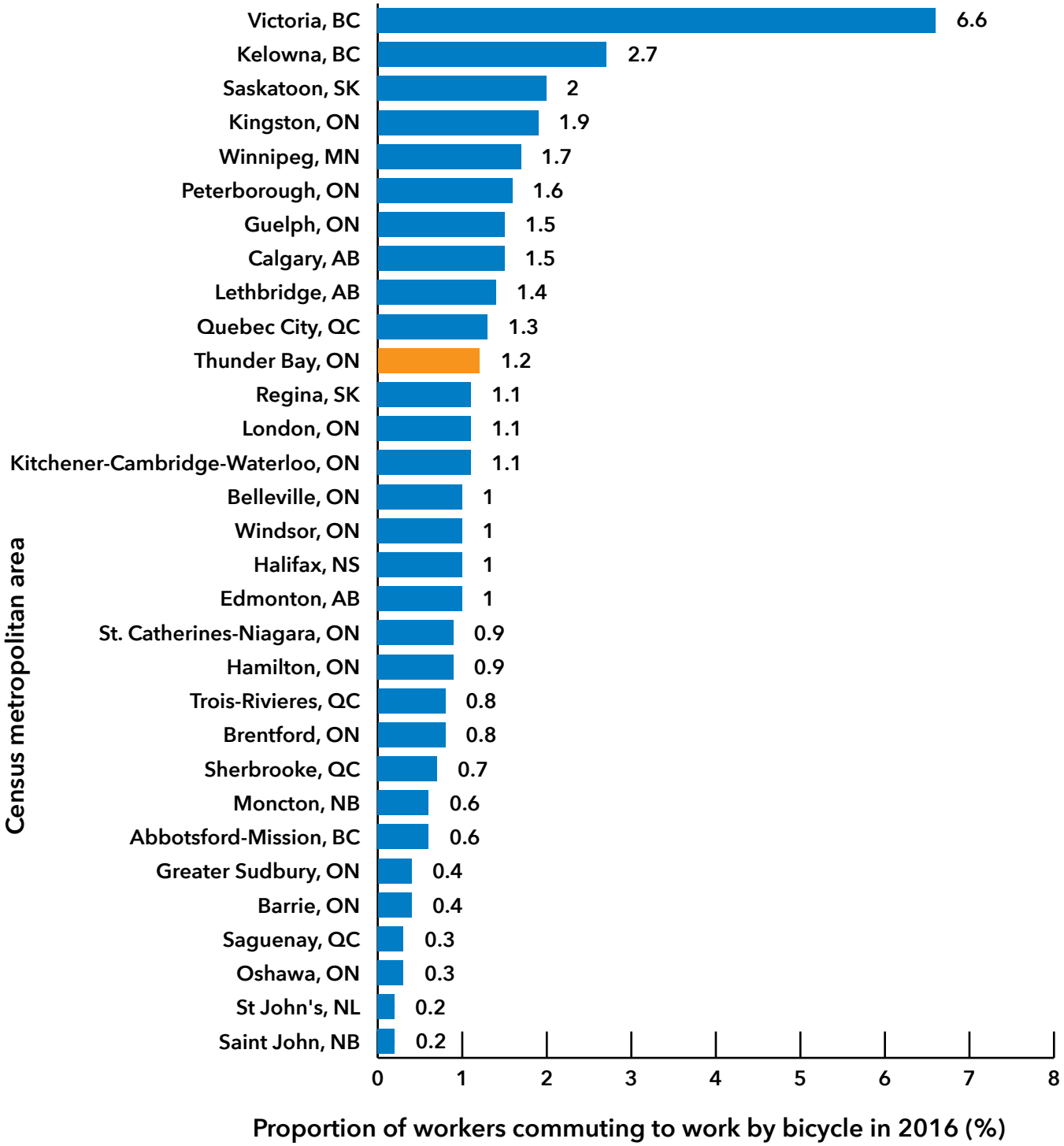
Due to low population density and the automobile-oriented transportation network, Thunder Bay residents continue to rely heavily upon personal motor vehicles; and thus, the use of active transportation such as cycling and walking are low compared to many other Canadian cities. From 2006 to 2016 there was a slight decline in bicycle use among people commuting to work in Thunder Bay, as depicted in Figure 2. In the same time frame, there was also a decreasing trend of walking to work, however, the use of public transit for commuting increased.

Figure 2: Comparison of proportion of workers using active transportation to commute to work in the years 2006, 2011 and 2016 in Thunder Bay (Source: Statistics Canada[31,32])



In 2016, only 1.2% of commuters cycled to work in Thunder Bay compared to the Canadian average of 1.4%. As depicted in the Figure 3, Victoria (BC) had the highest proportion of people cycling to work (6.6%) and St. John's (NL) and St. John (NB) had the lowest proportions of commuter cycling to work at 0.2%.

Figure 3: Proportion of workers commuting to work by bicycle by census metropolitan areas, 2016 (Source: Statistics Canada[33])



Demographics and Population Health

Dependence on motor vehicles for daily transportation has reduced physical activity levels of Canadians, and has contributed to negative health impacts nation-wide.[34] Canadians are recommended to engage in 150 minutes of moderate-to-vigorous physical activity per week to reduce the risk of diabetes, heart disease, and some cancers.[35] From the 2015/2016 Canadian Community Health Survey, 62.8% of respondents in Thunder Bay reported meeting the recommended 150 minutes of moderate-to-vigorous physical activity whereas 37.2% reported being inactive in the same survey period.[36]

Due to decreasing levels of physical activity in countries like Canada and USA, obesity has emerged as an epidemic. The prevalence of obesity in Canada has increased by over 200% since 1985, and in the year 2019 it is assumed that about 21% of the Canadian adult population will be obese.[37] 71.3% of adults (18 years and above) in Thunder Bay were overweight or obese (based on self-reported body mass index) in the year 2015/2016.[38]

38.8% of Thunder Bay residents are overweight and 32.5% are obese.

Canadian Community Health Survey (2015/2016)

Available health data suggests that residents of Thunder Bay generally experience higher rates of health problems, compared to provincial averages. In 2012, cardiovascular disease was one of the leading causes of death in Thunder Bay at a rate of 223.8 incidences per 100,000 people, which was higher than the provincial rate of 180.7 per 100,000 population.[39] In 2016, hospitalization rate due to cardiovascular disease in Thunder Bay was 1,248.8 per 100,000 people compared to 916.9 per 100,000 people provincially.[40] Finally, in 2012 Thunder Bay had the second highest rate of mortality from diabetes in the province (37.1 deaths per 100,000 people).[41]

Demographically, Thunder Bay has a large proportion of older adults who may be at risk of developing preventable chronic diseases. As of July 1st, 2017, 20% of the population of Thunder Bay was at least 65 years of age, compared 16.9% at the national level.[42] This proportion of the population will likely increase, as the cohort of baby boomers become senior citizens.

Given the current transportation trends, population health outcomes, and demographic trends in Thunder Bay, encouraging cycling by enhancing bikeability and cyclist safety is more important than ever.

Bikeability and Cyclist Safety Initiatives in Thunder Bay

In 2015, the municipality of Thunder Bay applied for a **Bicycle Friendly Community** designation from **Share the Road Cycling Coalition**. The Share the Road Cycling Coalition is a provincial cycling advocacy organization created to unite cycling organizations from across Ontario and to work with municipalities to create bicycle-friendly communities. The Bicycle Friendly Community designation is a recognition program that encourages municipalities to create and improve the conditions for cycling by awarding Bronze, Silver, or Gold designations. The program uses a framework to assess 5 dimensions: **Engineering, Education and Encouragement, Enforcement, Evaluation**, and **Planning**.

As a result of the 2015 application, Thunder Bay received a Bronze Bike Friendly Community designation, which was presented to City Council and announced at Thunder Bay's inaugural Bike Summit in April of 2015. The judgement panel was impressed by some progress made in Thunder Bay, but emphasized additional infrastructure for cycling must be created to get people on bikes to their destinations efficiently and comfortably. These changes would make cycling more accessible to a larger percentage of the population. Share the Road provided specific feedback for improving bikeability in Thunder Bay and achieving a higher designation.

Feedback from Share the Road: Key Steps to a Gold Bicycle Friendly designation

- Adopt a complete streets policy to ensure all roads serve all road users
- Create a safe North-South route along the May-Memorial-Algoma corridor to connect Thunder Bay's two historic cores
- Introduce more educational programs in schools to get more students biking safely
- Consider launching a public bike share system
- Conduct an economic impact study on cycling in Thunder Bay, perhaps by partnering with Lakehead University
- Enhance bicycling infrastructure across the city to promote and support cycling

In Thunder Bay, 37.2% of the population are not meeting the recommended 150 minutes of physical activity per week.

Canadian Community Health Survey (2015/2016)

Ontario cities with a bicycle friendly designation:

GOLD

Ottawa, Toronto, Waterloo

SILVER

Ajax, the Town of Blue Mountains, Burlington, Guelph, Hamilton, Kitchener, Pelham, Peterborough

BRONZE

Belleville, Brampton, Caledon, Cambridge, Cobourg, Collingwood, Cornwall, Greater Sudbury, Grimsby, Halton Hill, Ingersoll, London, Kingston, Markham, Milton, Mississauga, Mississippi Mills, Newmarket, Niagara Falls, Oakville, Oshawa, Richmond Hill, St. Catharine's, St. Thomas, Temiskaming Shores, Thorold, Thunder Bay, Wasaga Beach, Welland, Whitby, Windsor

CycleON: Ontario's Cycling Strategy

Ontario's Cycling Strategy provides a road map to support and encourage growth in cycling over the next 20 years. The strategy supports Ontarians adopting healthier and more active lifestyles, the tourism industry, as well as the achievement of environmental and economic objectives.

To support the development of cycling-friendly communities, the province will:

- Enhance cycling provisions when planning policies, guidelines and legislating are reviewed
- Partner with municipalities to implement complete streets policies and develop cycling or active transportation plans as applicable
- Partner with municipalities and transit agencies to integrate cycling with transit
- Ensure that bicycles are better accommodated in institutional, residential and commercial buildings

Each of these key areas for action should be supported by specific projects, programs and initiatives.

Commuter Cyclist Experiences in Thunder Bay

The following vignettes represent experiences of diverse cyclists in Thunder Bay. These vignettes are based on interviews which capture input from commuter cyclists in our community, including the experiences of those who do not have access to a vehicle. Thirty-two interview participants were recruited through posters at key locations across the community and through connections at a local bicycle cooperative. Names have been changed to protect participant identities. Quotes from the cyclists interviewed are included throughout this report.

Marc

Marc does not have access to a car. He lives in the East End but has to commute to Lakehead University everyday for school. He could take the bus there, but chooses to cycle instead because it is cheap and fast – a 15-minute bike ride compared to an hour-long bus ride. Marc used to be a nervous cyclist. He would ride close to the edge of the road and even sometimes on the sidewalk. He found that vehicles would often try to pass him dangerously, and was in a few collisions when riding on the sidewalk because cars did not expect him to be there. He now makes an effort to cycle a metre from the edge of the road to ensure drivers give him space, and he never rides on the sidewalk anymore. Since changing these habits, he rarely has problems with drivers. Marc would like to have some reflective clothing to make him more visible while cycling, but can't afford to buy any at the moment.

Laura

Laura is a young professional and has been cycling in Thunder Bay for several years. From spring to fall, she bikes to work every day. She has access to a shared vehicle, but prefers to commute actively. The quickest route to her place of work involves cycling on Memorial Avenue at peak times in very high traffic. There are no cycling facilities on Memorial and the edge of the road is often full of gravel, debris, and potholes. Laura is an experienced cyclist, but feels uneasy cycling on this road and will often take long detours to avoid it. The bike paths are great, but definitely take longer to get from point A to point B. She really wishes some of the main arterial roads in Thunder Bay would have bike lanes – separated bike lanes would be the best! If the cycling network were more connected, she would feel safer cycling on major roads, and thinks that more people would be encouraged to try cycling as well.

Susan

Susan is retired and cycles about 2 or 3 times per week to run errands or get to activities. She doesn't cycle in the winter. She plans her route so she can use bike paths and bike lanes on the road whenever possible – she feels safer that way. If she does have to ride on the road, she does her best to claim her space, be visible, and be predictable. Despite her efforts, she feels frustrated being a cyclist in the midst of Thunder Bay's "car culture." She feels that the Intercity area – which is full big box stores without bike racks, huge parking lots, and no trails at all – is clearly a part of the city that was entirely designed for cars. Susan feels the most at risk of a collision when crossing at intersections, and is disappointed that the bike lanes always end when travelling through intersections. For example, she enjoys using the bike lanes on Victoria Avenue, but the bike lane disappears at every intersection and cyclists are left to fend for themselves.

Ashley

Ashley is almost 40 years old. She doesn't have a car so she cycles every day, in all seasons, to run errands and to get to school. She enjoys cycling for transportation as it has helps her stay healthy, both physically and mentally. Ashley has only been riding for a year and a half, but she recently read the Ministry of Transportation manual on cycling to learn the rules and expectations. Even though she cycles every day and feels confident doing so, Ashley does feel unsafe when cycling in Thunder Bay. Ashley self-identifies as an indigenous woman, and often feels negatively stereotyped. She has experienced anger and aggression from drivers when cycling. One time, she was involved in a collision with a vehicle and was knocked off her bike. The driver fled the scene and nobody stopped to help her.

Dan

Dan is in his 50s and cycles daily to work. He has cycled for over 30 years, but after taking a Safe Cycling course a few years ago is much more confident in his abilities. Dan bikes for many reasons, including his health, the environment, affordability, and fun. He enjoys the sense of comradery between cyclists. Dan thinks Thunder Bay is great for recreational cycling, but to get from one side of town to the other can be challenging. Many important services and amenities along major arterials are not easily accessible if Dan is travelling by bike. He sees a need for more inclusive infrastructure. Dan has also noticed that many of the roads he cycles on are very wide – so wide that cars often exceed the posted speed limit – making it even more dangerous for cyclists.

Rolling in the Right Direction

Although there are still many opportunities for the City of Thunder Bay to improve bikeability and cyclist safety, positive progress has been made over the past decade. Recognizing that bikeable and safe streets are key to Thunder Bay's vision of becoming a vibrant, healthy, safe, and connected community; the City, with the support of organizations like the Thunder Bay District Health Unit, Thunder Bay Police Services, and EcoSuperior Environmental Programs, has taken steps to create an environment that promotes biking and improves safety for cyclists. Key steps have included: expanding the network of bike lanes, traffic calming measures, appointment of a dedicated Mobility Coordinator to work on active transportation initiatives, new municipal policies that support cycling, and the dedication of Safe Cycling Thunder Bay to assist with education, training, encouragement, and advocacy initiatives. The Thunder Bay Police Service also plays a role in improving safety for cyclists through education and awareness. In this section, recent progress towards improving bikeability and cyclist safety is summarized in the categories of engineering, education and encouragement, enforcement, evaluation, and planning.

Engineering

Engineering strategies improve the built environment through infrastructure enhancements such as improvements to the roadway, cycling facilities, etc. Thunder Bay has made investments in numerous built environment initiatives in the past several years. Initiatives have included:

- First phase of **multi-use trail** completed along Balmoral Street in 2016.
- First separated **cycle track** installed on Court Street in 2017.
- An Environmental Assessment and Open House for **Carrick-Vickers active transportation bridge** to connect the north and south ends of city began in 2018.
- A new **multi-modal bridge** at Confederation College to be complete spring 2019.
- **High-visibility bike lanes** (green) on Vickers Street and Victoria Ave.
- **High-visibility crossrides*** on Balmoral Street, Golf Links Road, Court Street, Arundel Street, Wardrope Avenue, and Hudson Avenue.

*A **crossride** is dedicated space at an intersection, identified by unique pavement markings, for cyclists to legally ride their bicycle through an intersection without dismounting. A crossride may appear alongside a pedestrian crosswalk as a separate facility or may be combined with a crosswalk to save space in some areas.

COMMUNITY HIGHLIGHT:

NORTH-SOUTH CYCLING ROUTE

One of the key recommendations in the City's first Active Transportation Plan (2008) was to develop a north-south cycling route to connect Thunder Bay's two historic cores. This need was further highlighted when Thunder Bay received feedback from its Bicycle-Friendly Community (BFC) application, which reiterated the need for a north-south cycling corridor as a key recommendation. When the City began developing a new Active Transportation Plan (to be complete in 2019), the need for a north-south cycling corridor was once again identified as a key action item.

While the 2008 Plan identified Carrick-Vickers as the recommended route and the BFC recommended May-Memorial-Algoma, the proposed Active Transportation Plan is taking a phased approach. It recognizes that both routes provide value but that they have different challenges to implementation. It recommends focussing on establishing the Vickers-Carrick route in the short-term for quick implementation (a 5-year period). It recommends the May-Memorial-Algoma as a longer-term project that is completed as portions of the right-of-way are being rehabilitated or changed. This approach recognizes the value of both routes as transportation corridors but also takes into consideration the municipality's fiscal constraints.

In October of 2018, the municipality held an Open House to help determine the best location for the Vickers-Carrick multi-use bridge, which will be partially funded through one-time funding from the Province of Ontario.

Education & Encouragement

Education and encouragement related strategies improve awareness and understanding. This may be achieved through signage, media, safety campaigns, classes, and advocacy. Current educational and encouragement focused initiatives include:

- Yearly participation in the national **Commuter Challenge**. In 2018, Thunder Bay had the highest participation of mid-size communities in Ontario with 80 workplaces registered and 713 participants logging active and sustainable commutes.

- **Youth Earn-a-Bike** program offered by EcoSuperior in partnership with Community Spokes, Dennis Franklin Cromarty High School, and Evergreen A United Neighbourhood. The program is targeted at vulnerable populations and helps participants learn skills to repair bikes as well as receive safe cycling education.

- Thunder Bay District Health Unit and the City of Thunder Bay have hosted two **Bike Summits**:
  - 2015: Biking Means Business
  - 2017: Family Bike Summit (combined with TMP consultations)

- The city-run **Bike Racks for Business Program** helps businesses install bike racks on their property. The program offers a free site visit and site assessment, high-quality, custom 'Thunder Bay' bike racks, all mounting hardware, free bike rack delivery and bulk purchase pricing.

- Thunder Bay District Health Unit works with organizations to encourage **active transportation to work**, including promoting workplace bike fleets.

- Strong **social media presence** on Facebook and Twitter. The City's Mobility Coordinator maintains two active transportation sections on the City website, as well as supports the Safe Cycling Thunder Bay website.

- **Safe Cycling Thunder Bay** has been providing cycling training in Thunder Bay since 2010. The organization has also been running bike light givaways since 2017 to help equip riders with appropriate (and law-required) lighting for their bicycles.

- **Walk or Wheel (WOW) Thunder Bay** is an active School Travel Initiative started in 2018 after EcoSuperior Environmental Programs received funding from Green Communities Canada.

SAFE CYCLING
THUNDER BAY

COMMUNITY HIGHLIGHT:
SAFE CYCLING THUNDER BAY

When the City began implementing on-road cycling facilities in 2010, the City's partners quickly realized that there would be demand for cyclist training. Some informal training existed in the form of bike rodeos and one-on-one coaching but no program existed using professionally-training instructors and standardized curriculum. Through an Ontario Trillium Foundation grant received in 2011, the City, Health Unit, and EcoSuperior were able to establish the Safe Cycling Thunder Bay program. Using the national CAN-BIKE curriculum, instructors were trained and courses developed and offered. The program now has 38 active certified cycling instructors, offers approximately 80 courses each year including approximately 40 Bike Rodeos. More than 1800 participants were trained in 2018 alone. The program is financially supported by the City of Thunder Bay and run by EcoSuperior.

COMMUNITY HIGHLIGHT:
WOW TBAY

Walk or Wheel TBay (WOW TBay) is part of the province-wide Ontario Active School Travel project. This project is made possible through financial support from Green Communities Canada and the Government of Ontario. In 2018, WOW TBay received $86,000 to deliver active school travel initiatives to elementary-aged students from May 2018-June 2020. The purpose of WOW TBay is to encourage families to choose active transportation for the trip to and from school. Active transportation refers to any form of human-powered (non-motorized) travel such as walking, cycling, using a wheelchair, scooter, or skateboard. Students who are bused can also be encouraged to use active transportation to get to the bus stop. Active transportation increases physical activity, improves physical, mental and emotional health while also benefiting our environment.

WOW TBay is a committee co-chaired by staff at EcoSuperior Environmental Programs and the Thunder Bay District Health Unit. The committee also includes staff from Lakehead Public Schools, Thunder Bay Catholic District School Board, Student Transportation Services, the City of Thunder Bay, and Thunder Bay Police. The role of WOW TBay is to connect partners and to work closely with schools to develop and implement active school travel plans. WOW TBay also helps schools access resources that will support their active transportation initiatives. In working together, school administrators, teachers, parents, other school board staff, public health departments and municipalities can implement an Active School Travel Program focused on promoting active transportation. Schools will be able to leverage resources of all partners (Health Unit, City, Police, school board offices, Student Transportation Services, EcoSuperior), as well as staff resources from Facilitators, to create an effective program.

Enforcement

Enforcement refers to initiatives that reinforce existing laws or policies and reduce negative behaviours such as speeding, double parking, or disobeying traffic signals in collaboration with local law enforcement. Enforcement activities are most effective when implemented in conjunction with education. Enforcement efforts in Thunder Bay include:

- The City of Thunder Bay has a strong relationship with **Thunder Bay Police Service** regarding road safety and actively enforcing bylaws to make streets safer for vulnerable road users, including cyclists. The Thunder Bay Police Service has committed to working closely with City Engineers as they plan and implement infrastructure changes to accommodate greater safety for alternate forms of transportation.

- Thunder Bay Police are members of the City of Thunder Bay's Traffic Safety Committee and the Thunder Bay District Health Unit's Community Traffic Awareness Committee.

- In recent years, Thunder Bay Police has undertaken targeted enforcement at new pedestrian crossovers and participated in light giveaways for cyclists.

Evaluation

Data, surveillance, and monitoring are essential to produce an evidence-based understanding of bikeability and safety issues and evaluate the impacts of existing initiatives. Evaluation activities include:

- In partnership with the Thunder Bay Police Services, the City of Thunder Bay has maintained a **Collision Database** of collisions that have occurred in Thunder Bay since 2004.

- City Engineering Division has been integrating **pedestrian/cyclist counters** into some new active transportation infrastructure throughout the city.

- City Engineering Division has integrated **cyclist counts** into all traffic counts.

- City Engineering Division conducts periodic **evaluations of new cycling infrastructure**, including measures of traffic volume, traffic speed, and cyclist-vehicle collisions to determine how well the facilities function.

- TBDHU and the City Mobility Coordinator have been working on incorporating a cycling category into **Pingstreet** application so residents can "Report a Problem" with cycling infrastructure.

Planning

Planning-related strategies focus on community plans, land use planning, and zoning policies that create more bikeable and safe communities. Examples of planning and policy developments that have been adopted by the City of Thunder Bay are listed below:

- The City Council-approved **EarthCare Sustainability Plan 2014-2020** which includes the following objectives under its Mobility section:

  A. Public and private infrastructure are both strategically used to create seamless, barrier-free options for bicycling, walking, and transit use in order to create a cleaner, greener, more beautiful Thunder Bay.

  B. Citizens of all ages and abilities are inspired to adopt more active modes of transportation, leading to a higher quality of life.

  C. Thunder Bay is a leader in developing policies to support sustainable modes of transportation in order to be recognized as a best-run City.

  D. Support and facilitate the development of a city-wide wayfinding system, including maps and signage for active transportation routes to key destinations.

- The **2015-2018 Corporate Strategic Plan** identifies several supportive goals, including:

  - *Goal 7, Strategy 7.1*: Give priority to integration of 'complete streets' guidelines on key corridors.

  - *Goal 10, Strategy 10.2*: Continue to implement the Active Transportation Plan and Develop funding and implementation plan for a waterfront trail.

  - *Goal 12, Strategy 12.2*: Develop and implement a multi-year wayfinding signage strategy in conjunction with the Business Improvement Areas and business areas.

  - *Goal 13, Strategy 13.1*: Develop a Wayfinding Plan.

- Many City policy documents, guidelines, and plans reference a Complete Streets philosophy as a recommended action for corporations, including:
    - The **2018 Official Plan**:
        - Classifications of Roads and Right-of-Way Widths
            - Roads under the City's jurisdiction will incorporate a Complete Streets approach and be designed to balance the needs and priorities of the various users and uses within the right-of-way. The intent of the deemed right-of-way is to accommodate: i) The safe and efficient movement of pedestrians of all ages and abilities, cyclists, transit vehicles and users, goods and services vehicles, emergency vehicles, and motorists across the network.
    - The **EarthCare Sustainability Plan 2014-2020**:
        - Establish and maintain linkages between neighbourhoods, with emphasis on walking and bicycling pathways, as part of the City's Active Transportation Plan and relating to the concept of Complete Streets.
    - The 2012 **Image Route Guidelines and Detailed Streetscape Designs**:
        - A new balance based on the concept of 'Complete Streets' – providing space for all of the street's functions – is critical to improving the quality of the Image Routes. Complete Streets are defined as "...roadways designed to ensure safe, attractive and comfortable access and travel for all users including pedestrians, bicyclists, motorists and public transportation users of all ages and abilities."
- The new **Thunder Bay Transportation Master Plan** and **Active Transportation Plan** emphasizes complete streets, multi-modal transportation, and a higher density cycling network. These plans will be presented to City Council by early 2019.
- An Active Transportation (pedestrian and cyclist) **Wayfinding Plan** was approved by City Council in 2018.
- Conceptual plans for new **subdivision developments** in the northwest end of the city (Wenscott Developments Ltd.) which integrates multi-use trails and cycling facilities into the active transportation network.

COMMUNITY HIGHLIGHT:

ACTIVE TRANSPORTATION PLAN

The City of Thunder Bay approved its first Active Transportation Plan in 2008. This Plan served as the foundation for hiring a dedicated Mobility Coordinator, having a dedicated annual budget for active transportation infrastructure, implementation of bike lanes and cycletracks, the establishment of the Safe Cycling and Bike Racks for Business programs, and many educational campaigns.

The City of Thunder Bay is developing a new Transportation Master Plan, and in conjunction, creating a new Active Transportation Plan. By developing both plans concurrently, future vehicle, pedestrian, and cyclist infrastructure projects can be better coordinated, connected, and user-friendly.

Photo source: IBI Group

While the City of Thunder Bay has made advances in each of the areas of planning, engineering, education and encouragement, enforcement, and evaluation, there are many opportunities to improve the cyclist environment and cyclist safety in our community. This report serves to investigate the current state of bikeability and cyclist safely and provide recommendations for improving bikeability in Thunder Bay.

CYCLIST-VEHICLE COLLISION ANALYSIS

In the following section, the data that were used for the cyclist-vehicle collision analysis are described. Key findings are summarized in terms of **when** and **where** cyclist-vehicle collisions occurred, **who** was involved in the collisions, and **why** and **how** the collisions may have occurred in Thunder Bay.

Data

The cyclist-vehicle collision data used for this report were obtained from the City of Thunder Bay collision records database. Collision data were originally collected using Motor Vehicle Accident report forms and entered into the database. All reported collisions involving at least one cyclist and one motor vehicle, resulting in property damage, injury or fatality that occurred between January 1st 2004 and December 31st 2013 were extracted from the collision records database by the City of Thunder Bay Traffic Technologist. The collision records dataset included numerous attributes describing the collision itself, environmental conditions at the time of the collision, and driver and cyclist characteristics. Although collision data were available for 2014, 2015, and 2016, a third party completed data input at this time and there were concerns about missing data. As such, these years were not included in the analysis.

ArcGIS software and the collision address variable were used to geocode each collision (i.e., converting addresses into geographic coordinates) enabling collision mapping and a more in-depth spatial analysis. Additional spatial datasets were also gathered and utilized in the collision analysis including a dataset of city wards and a road network file (all provided by the City of Thunder Bay). Information on estimated ward level population was also acquired from the City of Thunder Bay Archives. Prior to analyzing the collision dataset, data were cleaned in an effort to amend incorrect, incomplete or duplicated information.

There are limitations of the collision data and analyses that should be acknowledged when interpreting the findings presented in this report. First, some of the variables in the collision dataset had large amounts of missing data. Some variables (e.g., traffic control function) were excluded due to high amounts of missing data. Second, detailed information on typical number of cycling trips and cycling traffic volume are not available for this time period in Thunder Bay. To accurately capture the underlying population at risk of being involved in a cyclist-vehicle collision, additional data on cycling trips and traffic volumes are needed. Finally, the collision data obtained from the Thunder Bay Police Services only capture reported collisions. The data presented in this report may not capture all cyclist-vehicle collisions that occurred in Thunder Bay from 2004-2013 as under-reporting is common with vehicle-cyclist collision data.

Key Findings

From 2004 to 2013, a total of 490 reported cyclist-vehicle collisions occurred in Thunder Bay. Two of these collisions involved 2 cyclists. The majority of collisions (70.1%) resulted in non-fatal injuries. Two cyclists were fatally injured as a result of a collision with a motor vehicle.

490
collisions involving cyclists were reported between 2004-2013 in Thunder Bay

2
of those collisions resulted in a fatal injury

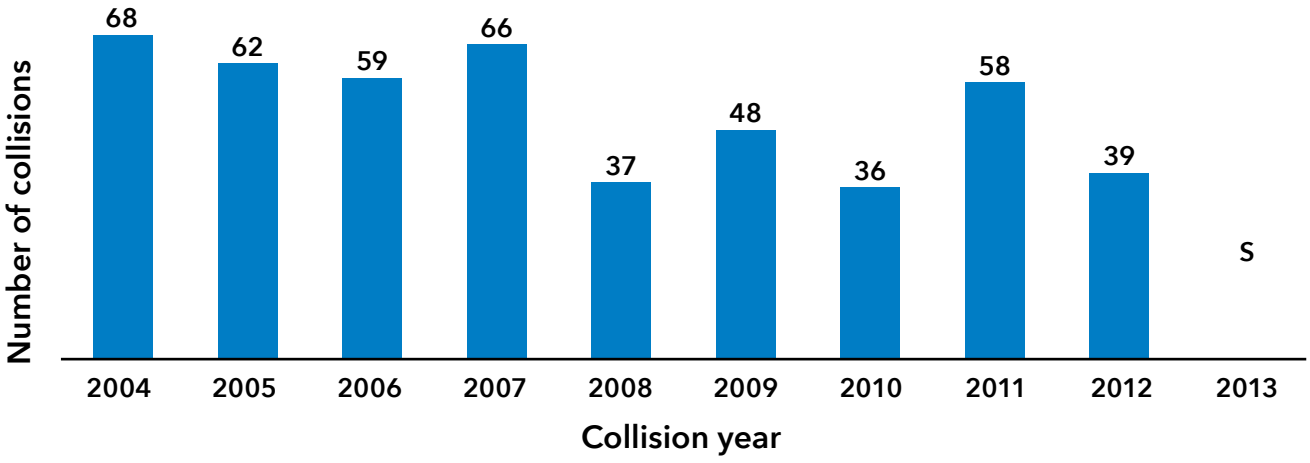
When are collisions happening?

This section summarizes temporal trends in reported cyclist-vehicle collisions in Thunder Bay at various time scales.

Annual trends

On average, 53 reported cyclist-vehicle collisions occurred each year between 2004 and 2013. Figure 4 depicts the number of collisions that occurred each year and illustrates that there is no clear increasing or decreasing trend over the ten-year period. The largest number of cyclist collisions occurred in 2004 (n=68) while the fewest number of cyclist collisions occurred in 2010 (n=36).

Figure 4: Total number of reported cyclist-vehicle collisions by year (2004-2013)



S= Supressed due to missing or incomplete data

Seasonal and monthly trends

Reported cyclist-vehicle collisions were most common during the summer (45.1%), when more people are cycling, as depicted in Figure 5. There was an average of approximately 49 reported cyclist-vehicle collisions per month over the ten-year study period between 2004 and 2013. As shown in Figure 6, cyclist-vehicle collisions occurred most frequently in June (n=79), followed by July (n=72) and the lowest number of collisions occurred in January (n=4), February (n=6) and December (n=10). It might be expected to see a greater number of collisions in the summer months due to higher volumes of cyclist traffic when weather conditions are more favourable for cycling, which was observed in Thunder Bay.

Figure 5: Proportion of cyclist-vehicle collisions by season (2004-2013)

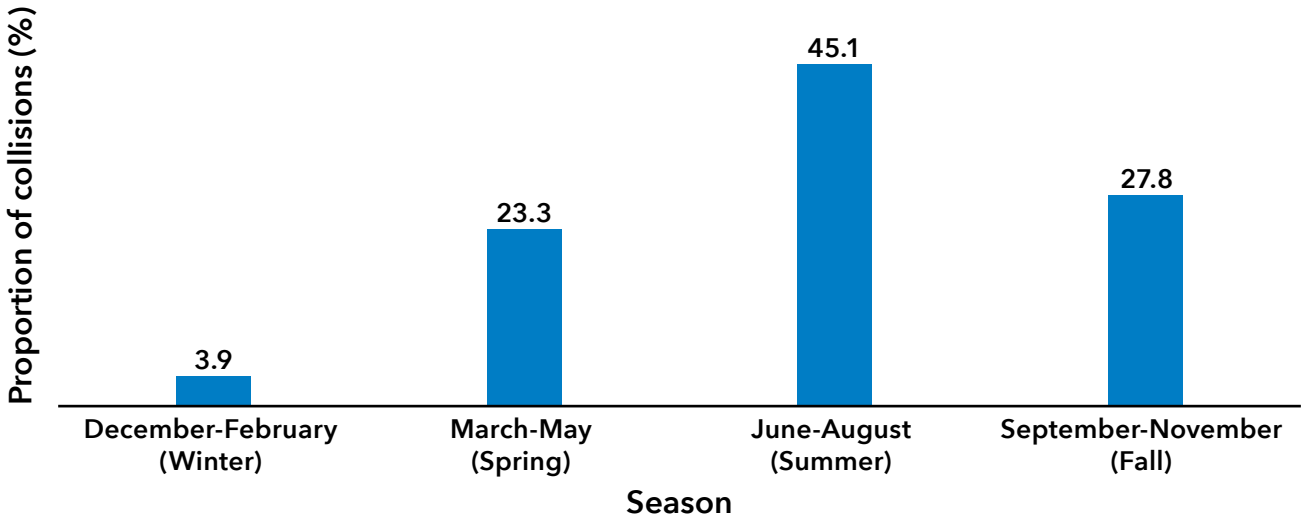


Figure 6: Total number of reported cyclist-vehicle collisions by month

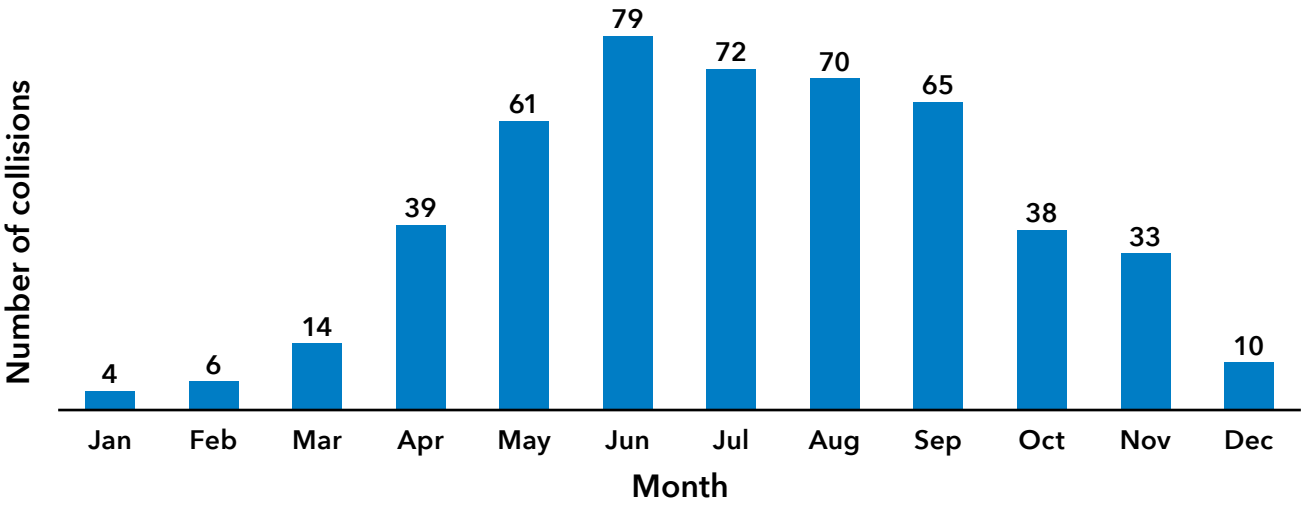
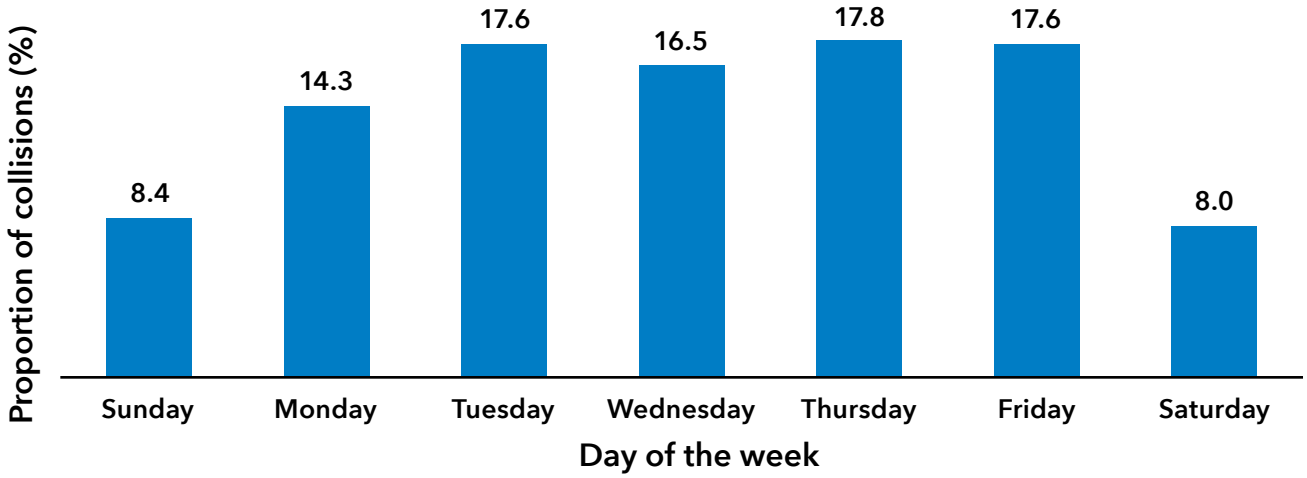


Figure 7 illustrates that the majority (83.6%) of the reported cyclist-vehicle collisions occurred on weekdays. This may reflect increased vehicular and cyclist traffic on weekdays when people commute to work and school as compared to weekends. The lowest number of collisions occurred on Saturdays (8%). These data suggest that targeted enforcement initiatives to reduce collisions could be most effective on weekdays compared to weekends.

Figure 7: Proportion of reported cyclist-vehicle collisions by day of the week (2004-2013)



Time of day

Time of day could not be analyzed for cyclist-vehicle collisions as the 'Time of Accident' variable did not include an AM or PM identifier, nor was it based on the 24 hour clock. As such, the collisions times based on the time of the day couldn't be differentiated (even when considering 'Light'). Future reporting would benefit from using a 24 hour clock.

Where are collisions happening?

This section describes the most common locations of reported cyclist-vehicle collisions and illustrates the spatial distribution of collisions using maps created in ArcGIS mapping software.

Collision location

Information on collision location was available for 488 (99.6%) of reported cyclist-vehicle collisions and is summarized in Table 1. Of these collisions, more occurred at intersections (68.2%) than at non-intersections (13.1%). Almost 16% occurred at/near a driveway, and the remaining 3% occurred in other locations such as parking lots and overpasses or bridges.

Table 1: Reported cyclist-vehicle collisions by collision location (2004-2013)

Collision Location	Frequency	Percent*
Intersection	333	68.2%
At/near driveway	76	15.6%
Non-intersection	64	13.1%
Parking lot/other	15	3.1%
Total	**488**	**100.0%**

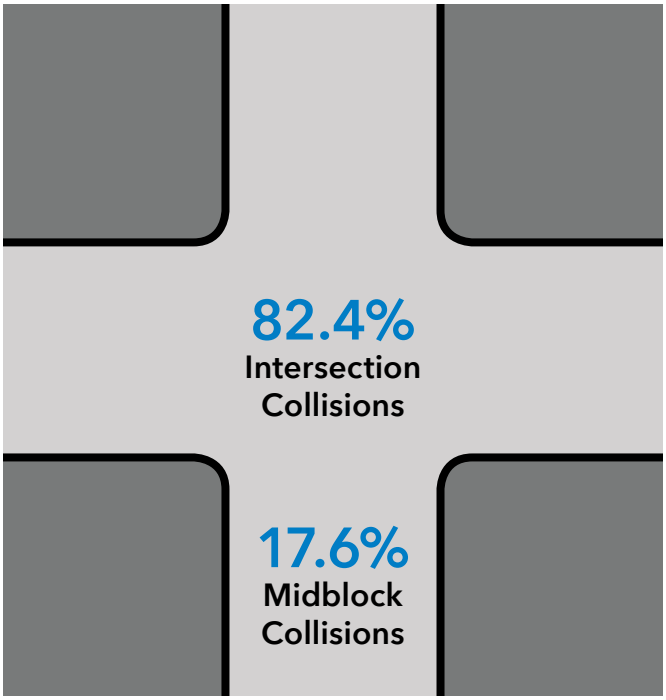
*Missing values were removed before calculating percentages.

> **"...every driveway is an intersection."**
>
> Interview participant

Intersection versus midblock collisions

Looking at those cyclist-vehicle collisions that occurred at either an intersection or midblock location, a large majority of collisions occurred at intersections. As shown in Figure 8, approximately 82.4% of these collisions occurred at an intersection compared to 17.6% at a midblock location.

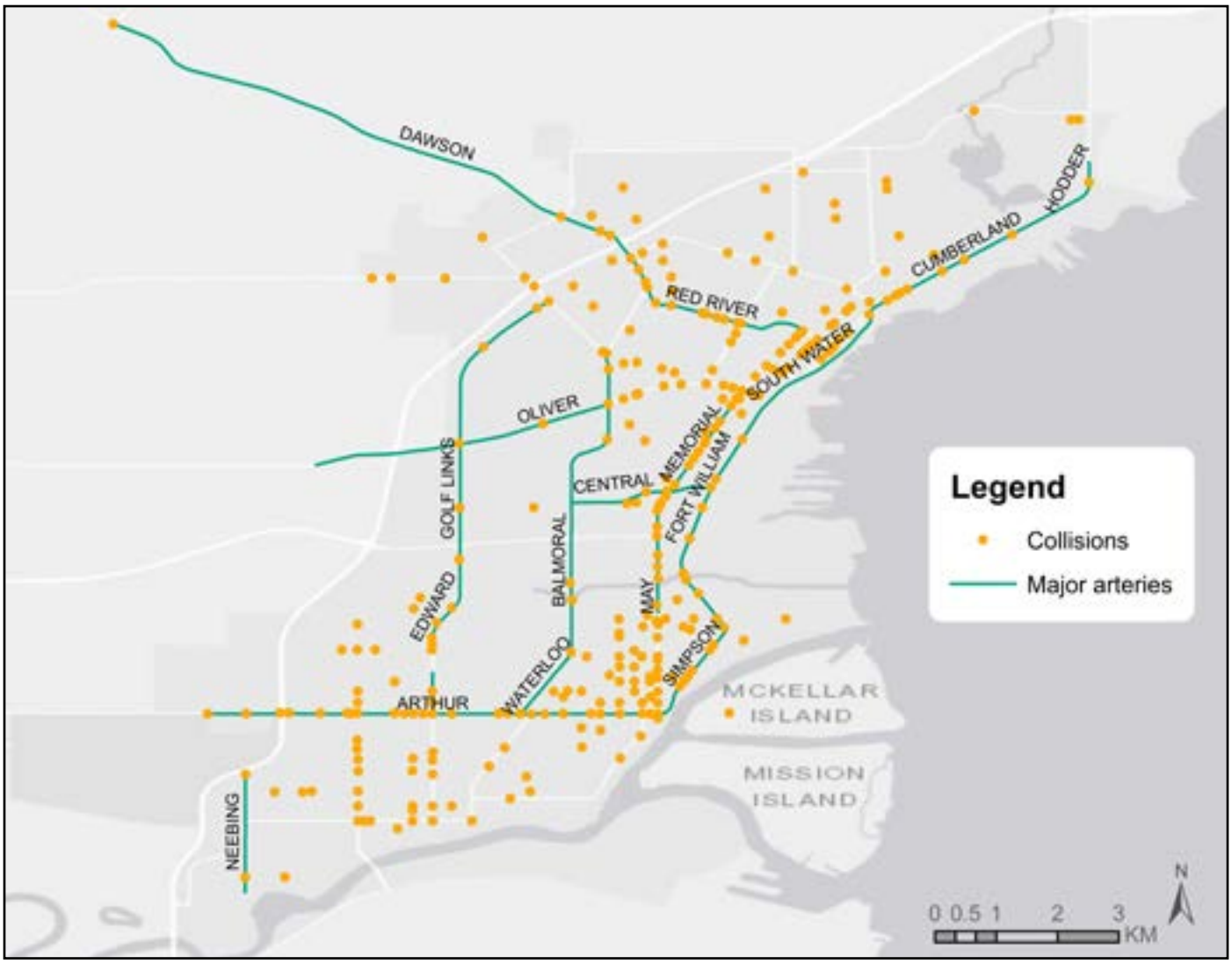
Figure 8: Proportion of reported cyclist-vehicle collisions by midblock or intersection location (2004-2013)



City-wide patterns

The collision address variable was used to map each collision and create a map illustrating spatial patterns across the City. As shown in Figure 9, reported cyclist-vehicle collisions were distributed throughout the City, with a higher concentration in the North and South downtown areas as well as along Memorial Avenue.

Figure 9: Spatial distribution of reported cyclist-vehicle collisions in Thunder Bay (2004-2013)



> **"So there's no direction to anybody on how to safely use an intersection, which has got to be the most dangerous place [for cyclists]…the bike lane disappears at every intersection."**
>
> Interview participant

City ward

Information on 'ward' was available for 482 of reported cyclist-vehicle collisions and is shown in Table 2. Of these collisions, 50.4% occurred in the McKellar ward followed by 15.2% in the Westfort ward and 11.4% in the Red River ward. McKellar ward includes both the North and South downtown areas, as well as two of the main North-South corridors (Water Street-Fort William Rd and Algoma St-Memorial Ave-May St) and it is reasonable to suspect that there is more cyclist activity in those areas. This suggests that McKellar ward is a priority area for future engineering, education and encouragement, and enforcement strategies.

Table 2: Reported cyclist-vehicle collisions by ward (2004-2013)

Ward	Total number of collisions	Percent (%)*	Population
McKellar	243	50.41%	16,784
Westfort	73	15.15%	16,005
Red River	55	11.41%	18,536
Northwood	48	9.96%	13,134
Current River	43	8.92%	13,405
McIntyre	15	3.11%	16,284
Neebing	5	1.04%	8,911
Total	**482**	**100%**	**103,059**

*Missing values were removed before calculating percentages.
NB: For those cases that occurred on ward boundaries, 50% of cases were assigned to each bordering ward.
NB. Estimated population counts by ward are derived from eligible voter data in 2018.

Collision hotspots

Collision hotspots, locations where more than 3 reported cyclist-vehicle collisions occurred over the ten-year period, are depicted in Figure 10. Priority collision hotspots - locations where more than 5 cyclist-vehicle collisions occurred - are summarized in Table 3. Almost all of the hotspots are along major arteries. Notably, 3 priority hotpot locations were located along Memorial Avenue (and one additional location on Algoma Street) as well as hotspot locations on Arthur Street and Fort William Road. Memorial Avenue, Arthur Street and Fort William Road are all considered "Image Routes" and are key corridors connecting the North and South cores where many businesses and services are located. Oliver Road and Balmoral Street also serve as the main corridors for students travelling to Lakehead University. There is likely to be higher levels of cyclist traffic and vehicle traffic along these streets, increasing the risk of cyclist-vehicle collisions. These areas could benefit from dedicated cycling facilities, lowered speed limits, or other traffic calming measures. These collision hotspots could be the subjects of more in-depth analysis of collisions, conditions, and other factors, and could serve as ideal locations to focus engineering, enforcement and/or education campaigns.

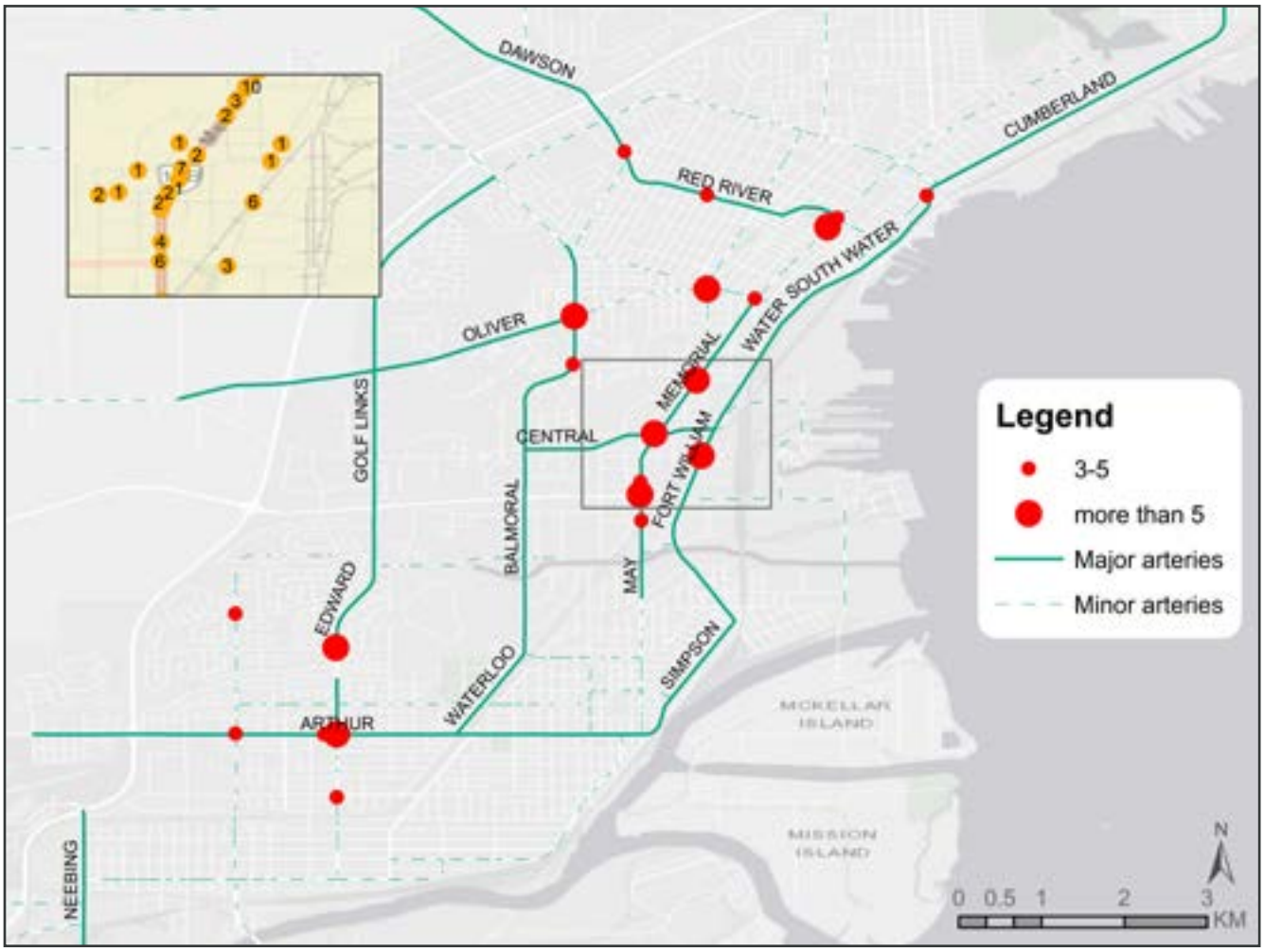
> **"…any time you want to bike down Fort William Road, or Memorial Avenue…you kind of do have to gear up for like you're going to battle in a way."**
>
> Interview participant

Table 3: Reported cyclist-vehicle collision hotspots

Priority Hotspots (defined as more than 5)	Number of collisions
Memorial St & 2nd Ave	10
Arthur St & Edward St	8
Memorial St & Central Ave	7
Edward St & Churchill St	6
Memorial St & Harbour Expressway	6
Oliver St & Balmoral St	6
Oliver St & High St	6
Algoma St & Park Ave	6
11th Ave & Fort William Rd	6

> **Memorial is scary. And it wouldn't deter me from biking it but I can see a lot of people not wanting to go on Memorial because there are no bike lanes, it's real bumpy … A lot of Thunder Bay roads are real bumpy."**
>
> Interview participant

Figure 10: Spatial distribution of cyclist-vehicle collision hotspots in Thunder Bay (2004-2013)



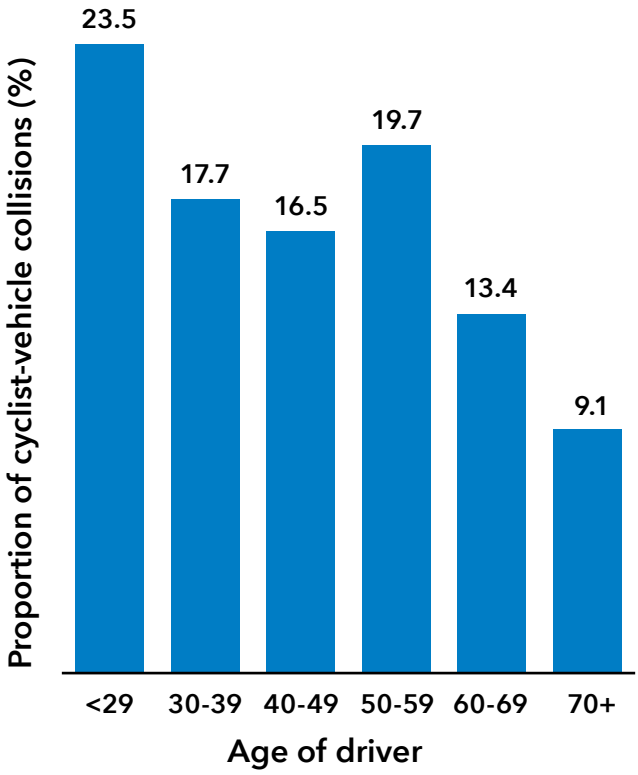
Who is involved in collisions?

This section describes available demographic information about the drivers and cyclists involved in reported cyclist-vehicle collision that occurred between 2004 and 2013.

Driver age

The average age of the drivers involved in reported cyclist-vehicle collision during the ten-year study period was 44.9 years. Young drivers aged 29 and younger represented the highest proportion of drivers involved in cyclist-vehicle collisions (23.5%), followed by drivers between the ages of 50 to 59 years of age (19.7%) as seen in Figure 11.

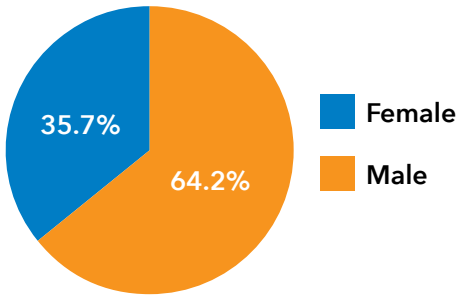
Figure 11: Proportion of reported cyclist-vehicle collisions by age of driver (2004-2013)



Driver gender

Male drivers were more commonly involved in reported cyclist-vehicle collisions in Thunder Bay. Figure 12 shows that 64.2% of collisions involved a male driver compared to 35.7% involving a female driver.

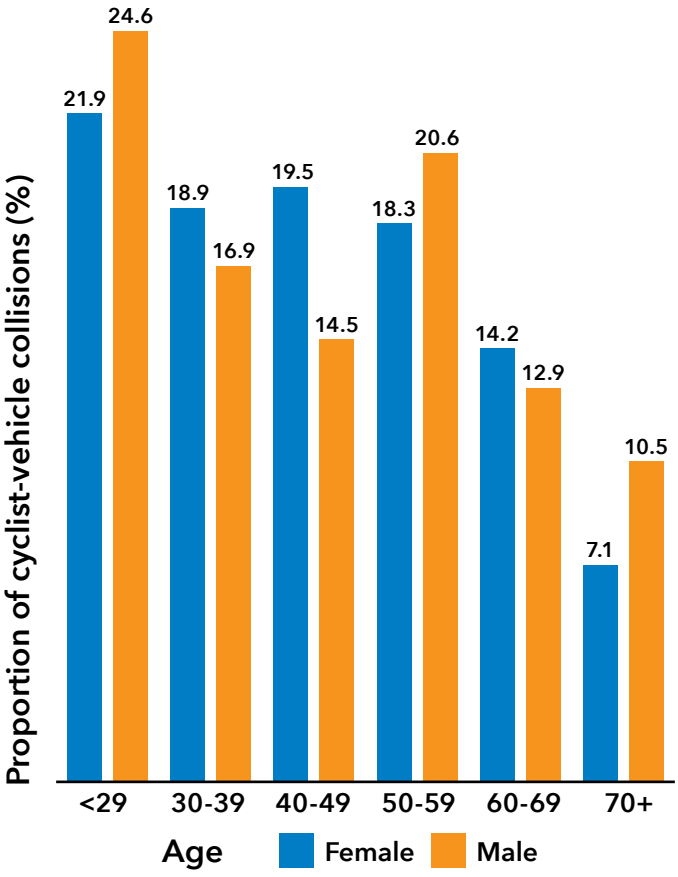
Figure 12: Proportion of reported cyclist-vehicle collisions by gender (2004-2013)



Driver age and gender combined

Information on age and gender for 417 drivers was known. Figure 13 illustrates that male drivers age 29 and under were involved in the greatest proportion of cyclist-vehicle collisions (24.6%), followed by females aged 29 and under (21.9%). This indicates a trend among drivers with less experience, and could suggest that more education about sharing the road with cyclists for young drivers.

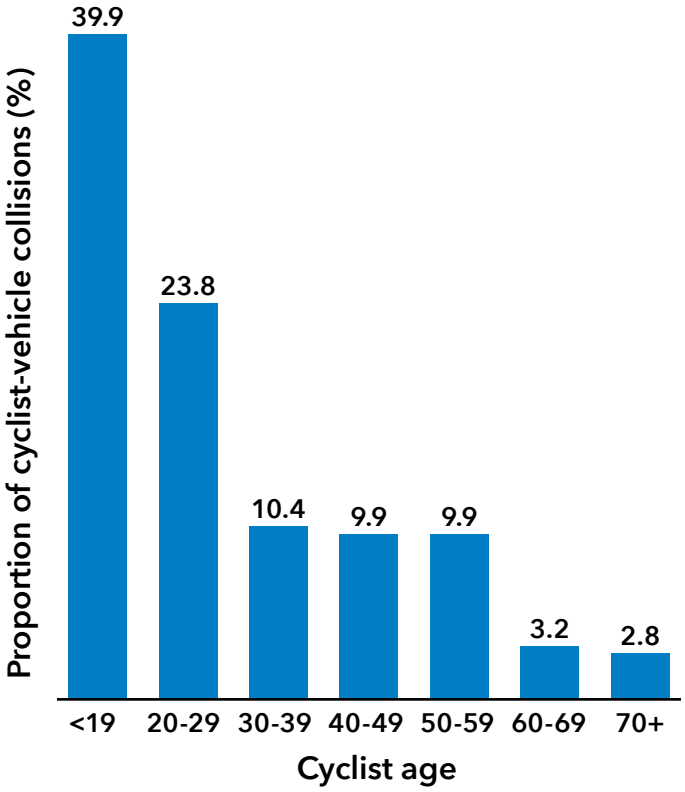
Figure 13: Reported cyclist-vehicle collisions by driver age and gender (2004-2013)



Cyclist age

For cyclists with available 'age' information, the average age of cyclists involved in reported cyclist-vehicle collisions was 28.9 years. The highest number of cyclists involved in the collisions were 19 years and younger (39.9%), as shown in Figure 14.

Figure 14: Proportion of reported cyclist-vehicle collisions by cyclist age (2004-2013)

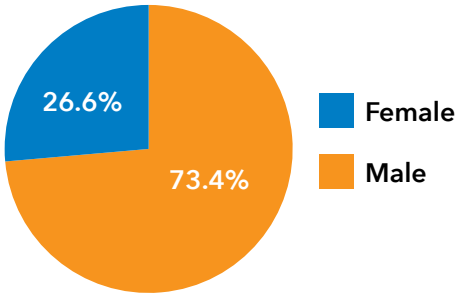


> **Thunder Bay's really sprawled out, so a lot of people just feel it makes more sense for them to have a vehicle and even drive two blocks to a store instead of walking there."**
>
> Interview participant

Cyclist gender

For the cyclists with available 'gender' information, a total of 482 cyclists were identified. In Figure 15 it is demonstrated that more cyclists involved in reported cyclist-vehicle collisions were male (73.4%) than female (26.6%).

Figure 15: Proportion of reported cyclist-vehicle collisions by cyclist gender (2004-2013)

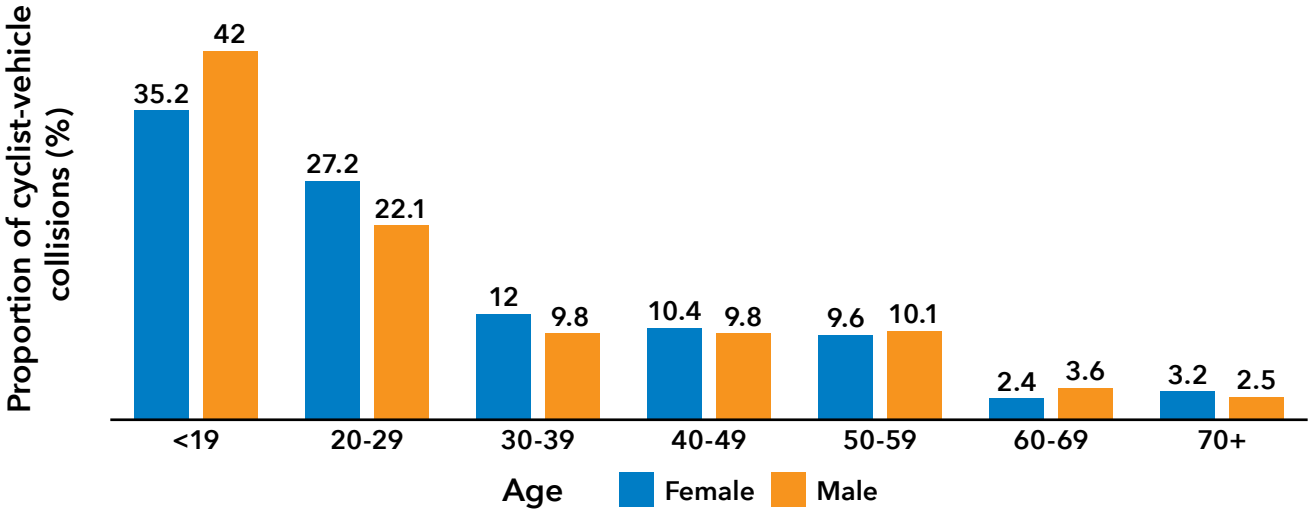


> **Yeah, the drivers need to look. A lot of times they just don't look. They're only looking for other cars or not … just not respecting cyclists as having a space on the road."**
>
> Interview participant

Cyclist age and gender combined

A total number of 432 cyclists were identified by their age and gender. Figure 16 shows that males and females under the age of 19 were involved in the greatest proportion of cyclist-vehicle collisions when compared to than any other age groups; 42.0 % and 35.2% for males and females cyclists respectively.

Figure 16: Reported cyclist-vehicle collisions by cyclist age and gender (2004-2013)



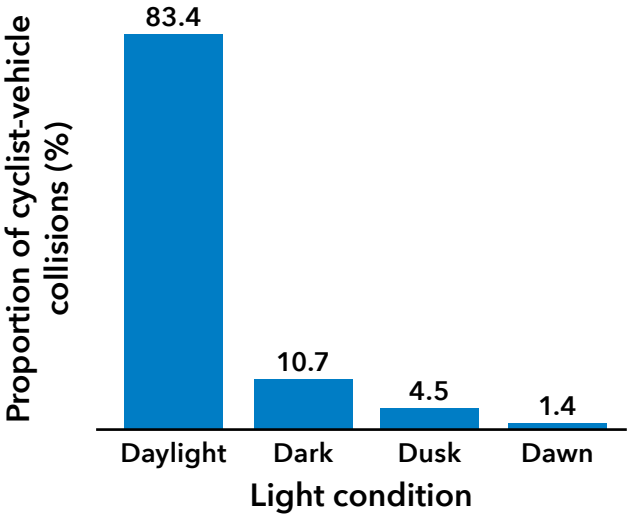
Why and how are collisions happening?

Cyclist-vehicle collisions are influenced by many factors, including driver and cyclist actions, infrastructure, and the environment. This section describes the conditions and actions surrounding reported cyclist-vehicle collisions between 2004 and 2013. It is important to note that these data are descriptive and without accurate data about the underlying population at risk (i.e. number of cyclist trips and cycling traffic volume data), findings must be interpreted with caution.

Light condition

Information on 'light condition' was available for 488 (99.6%) of reported cyclist-vehicle collisions. As depicted in Figure 17, most of these collisions happened during daylight (83.4%), followed by in the dark (10.7%).

Figure 17: Proportion of cyclist-vehicle collision by light condition (2004-2013)

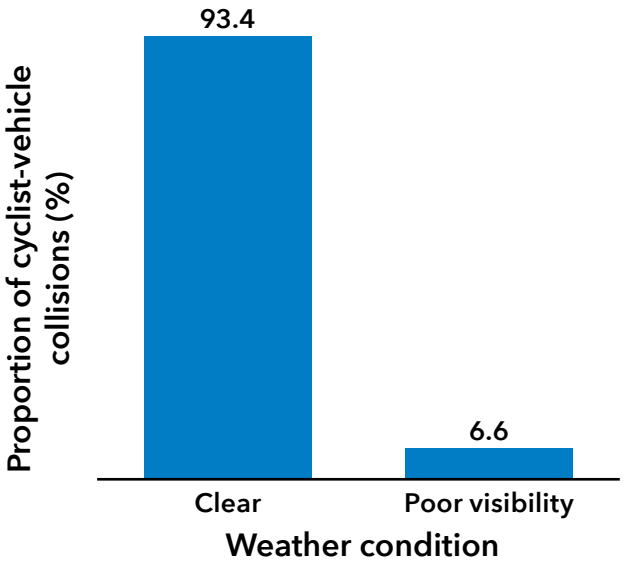


> **"…in the springtime there's a lot of sand and guck on the road like once the snow all melts which is pretty sketchy… and then if you're going a good speed and you hit some of that it's pretty dangerous."**
>
> Interview participant

Weather condition

Information on 'weather' was available for 484 (98.8%) of reported cyclist-vehicle collisions. As depicted in Figure 18, most of the collisions (93.4%) occurred when the weather was reported as good, compared to when the weather created poor visibility (6.6%; this variable includes rain, snow, freezing rain, drifting snow, strong wind, fog, mist, smoke, and dust). It is likely that fewer people are cycling in poor visibility and rain/snow conditions, contributing to a lower risk of collision.

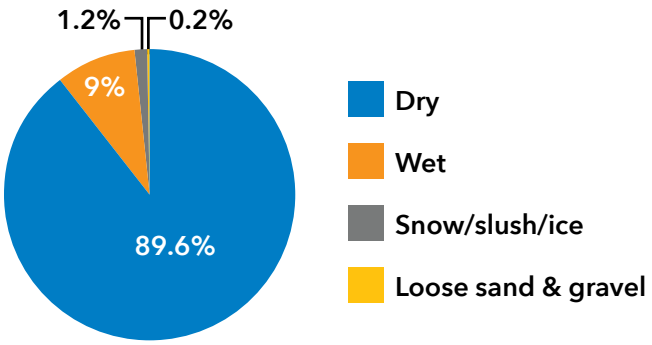
Figure 18: Proportion of reported cyclist-vehicle collisions by weather condition (2004-2013)



Road surface

Information on 'road surface' was available for 479 (97.8%) of reported cyclist-vehicle collisions and is shown in Figure 19. Of these collisions, most (89.6%) happened on dry roads, compared to wet roads (9.0%) and the least occurred on unpaved roads comprised of loose sand and gravel (0.2%). It is important to note that this does not include paved roads that have excess loose sand and gravel on the surface.

Figure 19: Proportion of reported cyclist-vehicle collisions by road surface (2004-2013)



Road surface condition

Information on 'road surface condition' was available for 479 (97.8%) of reported cyclist-vehicle collisions. Table 4 depicts that almost all (98.7%) happened on roads that were in good condition. Only 0.4% of these collisions occurred in poor road conditions and 0.8% collisions occurred in roads that were under repair or under construction.

Table 4: Reported cyclist-vehicle collision by road condition (2004-2013)

Road Condition	Frequency	Percent*
Good	472	98.7%
Under repair or construction	4	0.8%
Poor	2	0.4%
Total	**479**	**100.0%**

*Missing values were removed before calculating percentages.

Driver action

For reported cyclist-vehicle collisions where information about driver action was available, 62.4% of the drivers were driving properly; 30.9% of drivers were not driving properly (failed to yield right-of-way, improper turn, disobeyed traffic signal, etc.). Driver actions are described in Table 5.

Table 5: Reported cyclist-vehicle collisions by driver action (2004-2013)

Driver Action	Frequency	Percent*
Driving properly	290	62.4%
Failed to yield right-of-way	95	20.4%
Improper turn	22	4.7%
Disobeyed traffic signal	15	3.2%
Speeding	5	1.1%
Improper passing	4	0.9%
Following too close	3	0.4%
Improper lane change	1	0.2%
Lost control	1	0.2%
Other	29	6.2%
Total	**465**	**100.0%**

*Missing values were removed before calculating percentages.

Cyclist action

For those collisions with available 'cyclist action' information, 22.7% of cyclists were driving properly; 26.1% were not cycling properly (failed to yield right-of-way, disobeyed traffic signal, improper passing, etc.). As indicated in Table 6, for the majority (48.8%) of collisions cyclist action was classified as "other," however it is not clear what actions are considered in this category such that these data must be interpreted with caution.

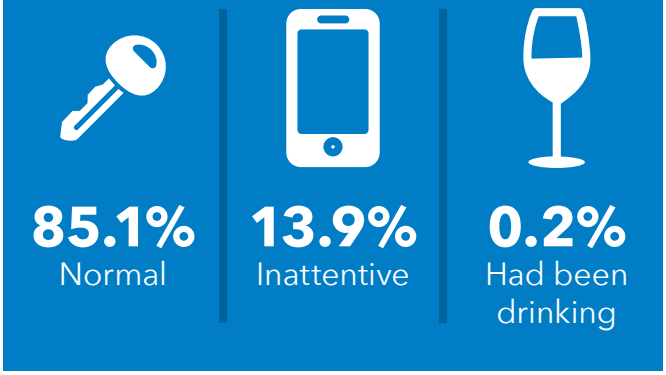
Table 6: Proportion of cyclist-vehicle collisions by cyclist action (2004-2013)

Driver Action	Frequency	Percent*
Driving properly	106	22.7%
Failed to yield right-of-way	71	15.2%
Disobeyed traffic signal	31	6.6%
Lost control	11	2.4%
Improper passing	7	1.5%
Improper turn	5	1.1%
Improper lane change	5	1.1%
Speeding	2	0.4%
Wrong way on one-way road	1	0.2%
Other	228	48.8%
Total	467	100.0%

Driver condition

Information on driver condition is depicted in Figure 20. For drivers with available 'driver condition' information, 13.9% of drivers were distracted and 0.2% had been drinking or were impaired by alcohol and 85.1% of drivers were reported as 'normal'.

Figure 20: Proportion of reported cyclist-vehicle collisions by automobile driver condition (2004-2013)



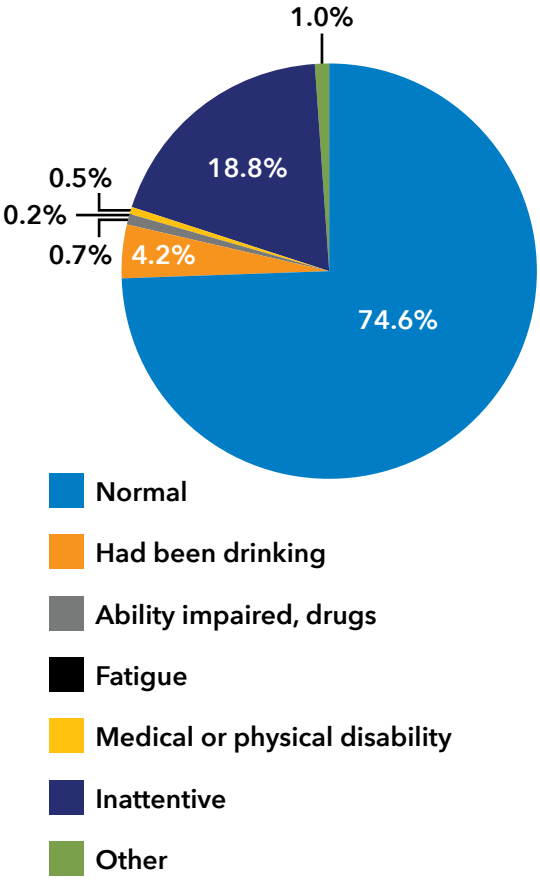
We should make it more difficult for cars and easier for bicycles and pedestrians."

Interview participant

Cyclist condition

Cyclist condition at the time of the collision is depicted in Figure 21. For cyclists with available 'driver condition' information, 74.6% of cyclists were normal, 18.8% of cyclists were inattentive, and 4.2% had been drinking.

Figure 21: Proportion of reported cyclist-vehicle collisions by cyclist condition (2004-2013)

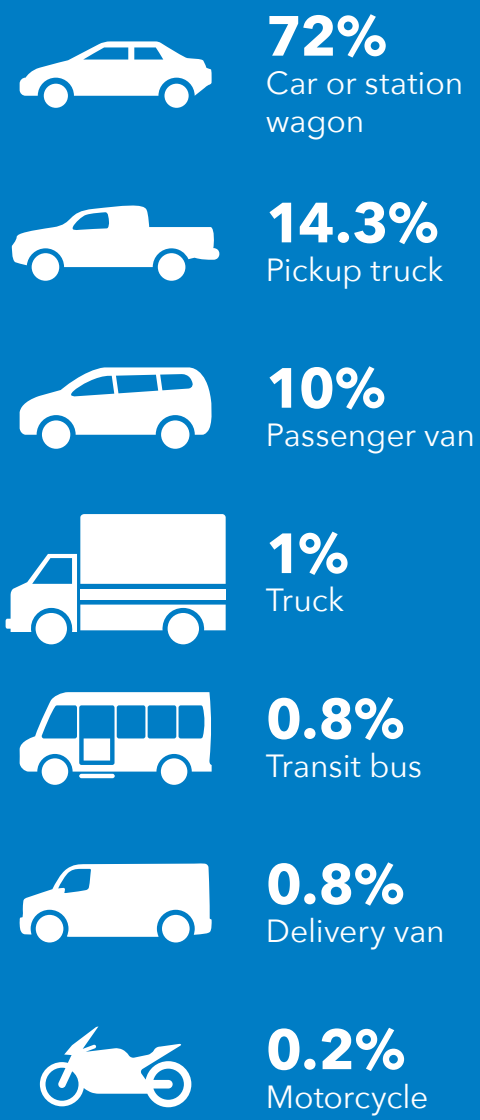


> **Don't let anyone that you love listen to music while they're cycling."**
>
> Interview participant

Vehicle type

Information on 'vehicle type' was available for 482 vehicles involved in reported cyclist-vehicle collisions and is described in Figure 22. In these collisions, the majority of vehicles involved (72.0%) were automobiles/station wagons, followed by pickup trucks (14.3%).

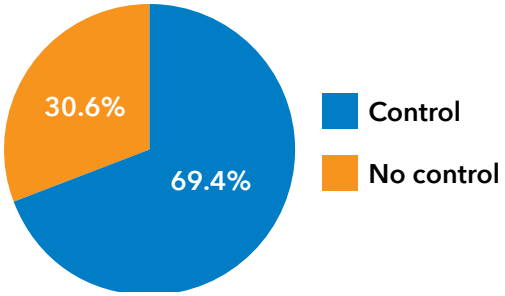
Figure 22: Proportion of cyclist-vehicle collisions by vehicle type (2004-2013)



Traffic Control

Information on 'traffic control' was available for 460 (93.9%) of reported collisions and is shown in Figure 23. Of these collisions, more happened when there was a traffic control present (69.4%; traffic signal, stop sign, yield sign, pedestrian crosswalk) compared to when a control was not present (30.6%).

Figure 23: Proportion of reported cyclist-vehicle collisions by traffic control (2004-2013)

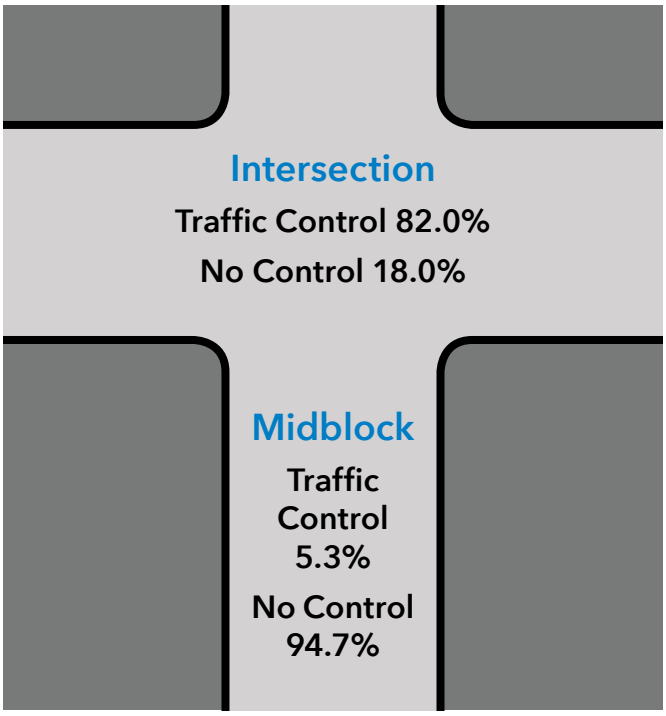


> **"I think Thunder Bay people drive too much, I think everybody has a pick-up truck and I think there should be more carpooling… especially with the buses too, like there's hardly anybody on the buses other than when school term's on."**
>
> Interview participant

Collision location type by traffic control

Information on 'location type' and 'traffic control' was available for 460 (93.9%) of reported cyclist-vehicle collisions and is depicted in Figure 24. Of these collisions, the most occurred at intersections that had some form of traffic control (68.4%); 18.0% of the collisions occurred at intersections that did not have a traffic control. Almost all of the reported cyclist-vehicle collisions that occurred midblock did not have a traffic control (94.7%). This is not surprising given that nearly all midblock locations lack a traffic control.

Figure 24: Proportion of reported cyclist-vehicle collisions by location and traffic control (2004-2013)



Vehicle (automobile) manoeuver

Information on 'vehicle manoeuver' was available for 479 vehicles involved in reported cyclist-vehicle collisions and is described in Table 7. Of these collisions, the majority of vehicles involved were going ahead (39.5%) or turning right (33.4%).

Table 7: Proportion of reported cyclist-vehicle collisions by vehicle manoeuver (2004-2013)

Vehicle Manoeuver	Frequency	Percent*
Going ahead	189	39.5%
Turning right	160	33.4%
Turning left	52	10.9%
Stopped	25	5.2%
Slowing or stopping	19	4.0%
Reversing	12	2.5%
Parked	10	2.1%
Overtaking	6	1.2%
Changing lanes	3	0.6%
Making "U" Turn	1	0.2%
Total	**479**	**100.0%**

Collision location type by vehicle manoeuver

Information on 'location type' and 'vehicle manoeuver' was available for 479 vehicles involved in reported cyclist-vehicle collisions and is shown in Table 8. Of the vehicles that were involved in a collision at an intersection, the majority were going ahead (38.9%) or turning right (36.1%). Of the vehicles that were involved in a collision midblock, the majority were going ahead (41.9%).

Table 8: Reported cyclist-vehicle collisions by location type and vehicle manoeuver (2004-2013)

Collision Location Type	Intersection		Midblock	
Vehicle Manoeuver	**Frequency**	**Percent***	**Frequency**	**Percent***
Going ahead	153	38.9%	36	41.9%
Turning right	142	36.1%	18	20.9%
Turning left	45	11.4%	7	8.1%
Stopped	18	4.6%	7	8.1%
Slowing or stopping	17	4.3%	2	2.3%
Overtaking	5	1.3%	1	1.2%
Parked	4	1.0%	6	7.0%
Reversing	3	0.8%	9	10.5%
Changing lanes	3	0.8%	0	0%
Merging	2	0.5%	0	0%
Making "U" Turn	1	0.2%	0	0%
Total	**393**	**100.0%**	**86**	**100.0%**

*Missing values were removed before calculating percentages.

Cyclist Manoeuver

Information on 'manoeuver' was available for 479 cyclists involved in reported collisions. In these collisions, the majority of bicycles involved were going ahead (90.3%) as shown in Table 9.

Table 9: Reported cyclist-vehicle collisions by cyclist manoeuver (2004-2013)

Cyclist Manoeuver	Frequency	Percent*
Going ahead	427	90.3%
Turning left	18	3.8%
Turning right	6	1.3%
Slowing or stopping	4	0.8%
Changing lanes	4	0.8%
Pulling away from shoulder or curb	3	0.6%
Overtaking	2	0.4%
Reversing	1	0.2%
Stopped	1	0.2%
Other	7	1.5%
Total	**473**	**100.0%**

*Missing values were removed before calculating percentages.

Collision location type by cyclist manoeuver

Information on 'location type' and 'manoeuver' was available for 479 bicycles involved in reported cyclist-vehicle collisions and is shown in Table 10. Of the bicycles that were involved in a collision at an intersection, the majority were going ahead (90.5%). Of the bicycles that were involved in a collision midblock, the majority were going ahead (89.3%).

Table 10: Reported cyclist-vehicle collisions by location type and cyclist manoeuver (2004-2013)

Collision Location Type	Intersection		Midblock	
Cyclist Manoeuver	**Frequency**	**Percent***	**Frequency**	**Percent***
Going ahead	352	90.5%	75	89.3%
Turning left	13	3.3%	5	6.0%
Turning right	5	1.3%	1	1.2%
Slowing or stopping	4	1.0%	0	0%
Changing lanes	4	1.0%	0	0%
Pulling away from shoulder or curb	3	0.8%	0	0%
Overtaking	1	0.3%	1	1.2%
Reversing	1	0.3%	0	0%
Stopped	1	0.3%	0	0%
Other	5	1.3%	3	2.4%
Total	**389**	**100.0%**	**84**	**100.0%**

*Missing values were removed before calculating percentages.

COMMUNITY PERCEPTIONS OF BIKEABILITY AND CYCLIST SAFETY

This section summarizes the results of a community survey that was conducted to examine perspectives on bikeability and cyclist safety among cyclists in the context of Thunder Bay. Key findings related to respondent demographics and cycling behaviour, factors encouraging cycling, perceptions of cycling infrastructure and safety, satisfaction with cycling infrastructure, and priorities for change are summarized in the following sections.

Data

A cyclist intercept survey was carried out to examine perceptions of bikeability and cyclist safety in Thunder Bay. A convenience sampling strategy was used to recruit cyclists to participate in the survey at 23 pre-selected locations across the City of Thunder Bay. The 23 locations were selected by the research team as locations where cyclists typically ride (including locations along the cycling network, common intersections and cyclist generator locations). Data collectors were instructed to all approach cyclists and to document the number of refusals to participate. Only those cyclists 18 years of age or older who reside and/or cycle in Thunder Bay were eligible to participate. Data were gathered on different days of the week and at different hours of the day between 8:00 am and 8:00 pm between September and November 2017 by a team of two researchers. One hundred and twenty-six cyclists completed the community survey.

The data collection instrument was developed to examine perceptions of bikeability and cyclist safety among residents of Thunder Bay. The instrument contained a total of 50 questions pertaining to i) demographics and cycling behaviour, ii) perceptions of cycling infrastructure and safety, iii) satisfaction with cycling infrastructure and priorities for municipal government action. The instrument was reviewed by members of Safe Cycling Thunder Bay, pre-tested with Lakehead University students and is available from the Thunder Bay District Health Unit.

Limitations of the cyclist survey data should be acknowledged when interpreting the findings presented in this report. Importantly, a convenience sample was used. However, it was a sufficiently large sample of commuter cyclists with experience cycling in Thunder Bay. Additionally, the data were collected at a large number of diverse locations across the City, on different days, and at different times of the day. As with all survey research, when reviewing these data, care must be taken to drawing inferences beyond the sampled population.

Key Findings

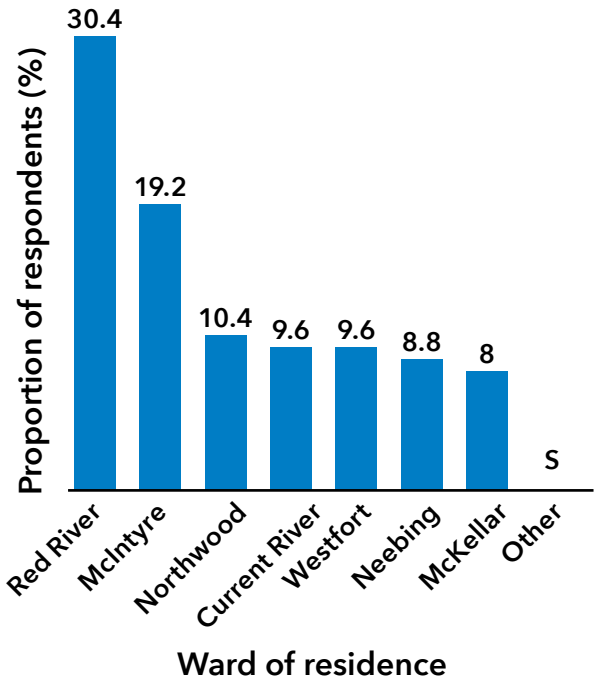
Respondent demographics and cycling behaviour

This section provides a description of the sample in terms of key demographic information and cycling behaviour. Because survey participants were intercepted while cycling, these data describe important characteristics of Thunder Bay cyclists.

Ward of residence

The ward of residence is illustrated in Figure 25 for 125 survey respondents. The top three wards represented for the survey were: Red River (30.4%), McIntyre (19.4%), and Northwood (10.4%).

Figure 25: Proportion of respondent residence by ward

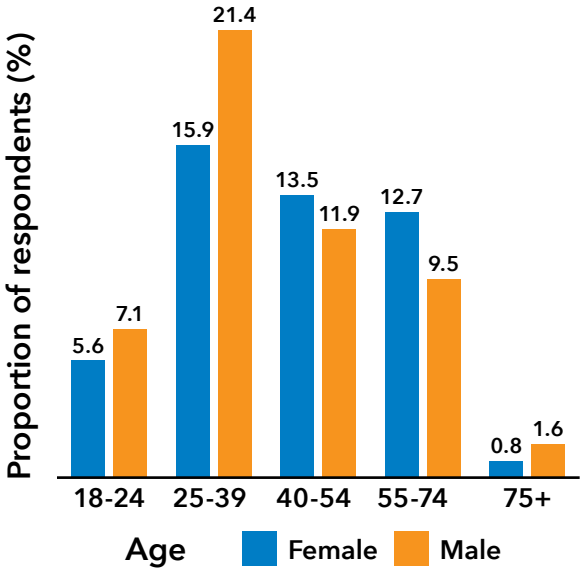


S= Supressed to limit release of potentially identifiable information

Age and gender

The top three age groups represented by survey respondents who reported their age were: 25-39 years (37.3%), 40-54 years (25.4%), and 55-74 years (22.2%). Slightly more males than females responded to the survey. Figure 26 shows the distribution of respondent age by gender.

Figure 26: Proportion of respondents by age and gender

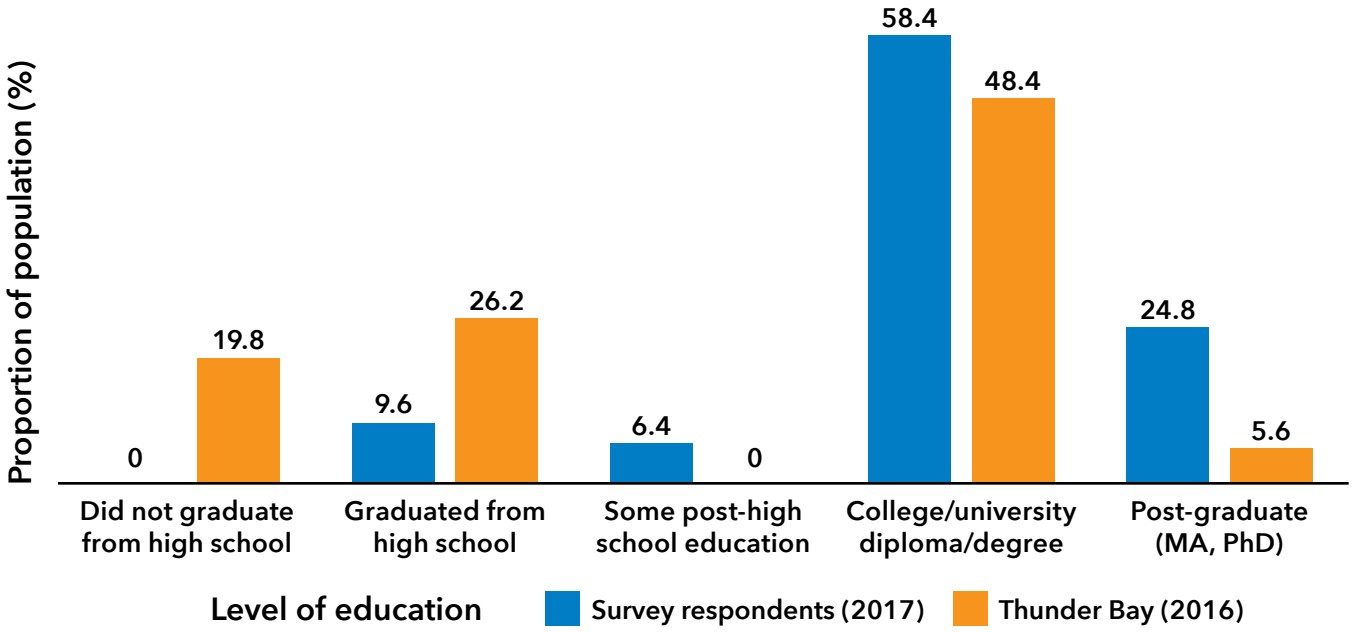


> **I wish that I felt like drivers didn't hate me so much…"**
>
> Interview participant

Education level

Over half (58.4%) of survey participants that reported their highest level of education was completed a college/university diploma/degree. Furthermore, 24.8% of the respondents reported having completed post graduate study. Educational level is compared to totals for Thunder Bay from the 2016 Census,[43] and is depicted in Figure 27. Note that the 2016 Census did not measure an equivalent to "some post-high education" and this was a variable specific to the research survey. One interpretation of this variable could be that individuals who cycle in Thunder Bay tend to have higher education and income levels. This trend has been shown in other research settings as well.[44] Alternatively, the community survey may not have captured the perceptions of the almost 20% of Thunder Bay's population who did not obtain a high school diploma, and may be over representing the perceptions of those who have obtained a college/university diploma/degree or higher.

Figure 27: Proportion of survey respondents and Thunder Bay population (2016) by education level

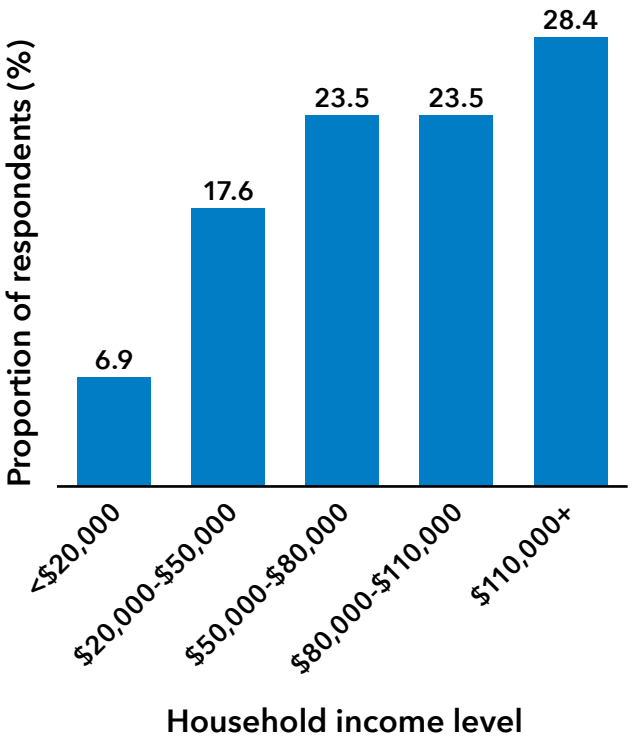


> **"If you don't seem like you know what you're doing [drivers] kind of bully you it feels like, or they get hostile and aggressive."**
>
> Interview participant

Household income

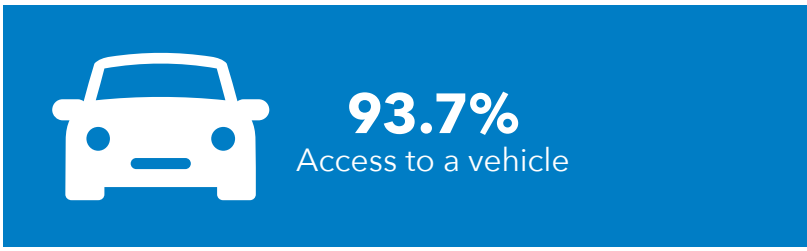
Interestingly, more than half (51.9%) of the survey respondents reported their household income (before taxes and from all sources) of greater than $80,000 per year. Figure 28 shows that the largest proportion of respondents (28.4%) reported having a total household income of greater than $110,000 per year. From the 2016 Census, the median total income of households in Thunder Bay in 2015 was $66,163.[45] The research team recognizes that the community survey may not capture the perceptions of individuals who cannot afford an automobile and therefore rely on cycling as their main mode of transportation. To address this possible gap in the survey data, the research team explicitly recruited and conducted interviews with a sub-set of 11 cyclists without access to an automobile to capture this perspective.

Figure 28: Proportion of respondents by total household income



Access to an automobile for transportation

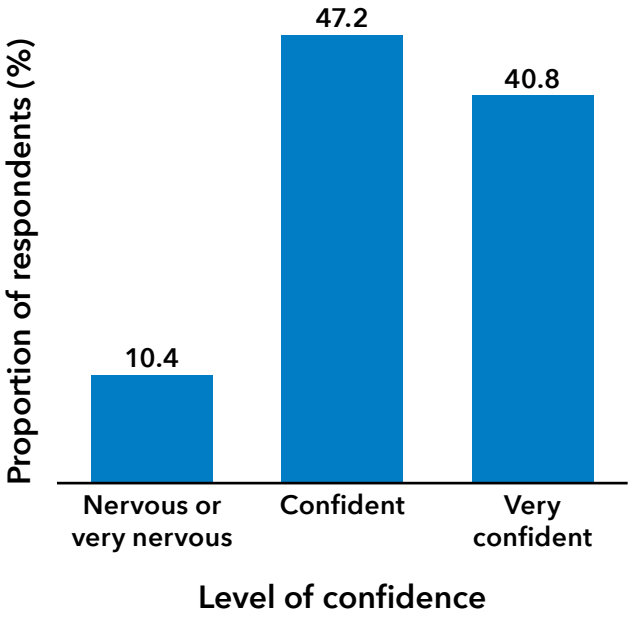
Almost all of the survey respondents had access to an automobile for transportation.



Confidence as a cyclist

Most (88.0%) of survey respondents reported feeling confident or very confident as a cyclist on the streets in Thunder Bay. As seen in Figure 29, 10.4% of the respondents reported feeling nervous or very nervous while cycling on the streets in Thunder Bay.

Figure 29: Proportion of respondents by confidence as a cyclist



Seasonal cycling

Respondents were asked in which seasons they rode their bike. Nearly all respondents rode in the summer (96.8%), most rode in the fall and the spring, while only 13% rode their bikes in the winter. Bike paths and many multi-use trails are not maintained for cycling in the winter which, in addition to cold weather, likely explains this dramatic decline in winter months.

13%
Cycle during winter

> **I try not to let the cold be the factor that doesn't allow me to bike. I always say that my bike warms up a lot faster than my car does. Like I'm always sweating by the time I get anywhere even if it's -30."**
>
> Interview participant

> **I just wait - can't wait till the spring comes so I could ride my bike."**
>
> Interview participant

Bicycle use in non-winter months

Respondents were asked about the frequency of cycling and length of average ride during non-winter months. Almost two-thirds (62.6%) of survey respondents reported using their bicycle at least once a week while approximately 20% reported riding on a daily basis, as seen in Figure 30. In terms of average ride length, most of cyclists reported lengths of between 11 and 30 minutes (37.3%) while just over 30% reported an average ride length between 31 minutes and 1 hour (Figure 31).

Figure 30: Proportion of respondents by bicycle use in non- winter months

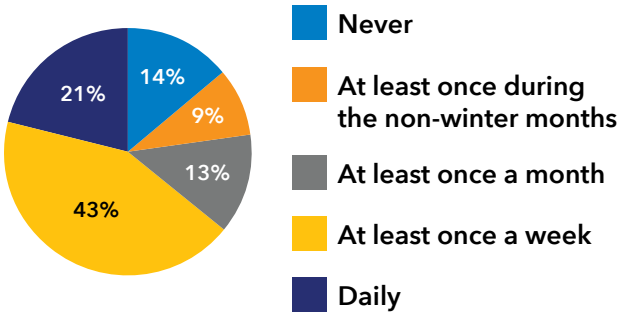
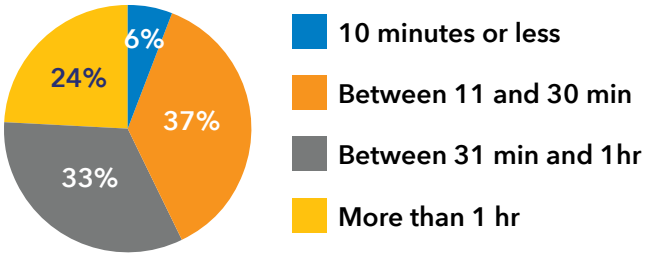


Figure 31: Proportion of respondents by bicycle ride duration in non-winter months

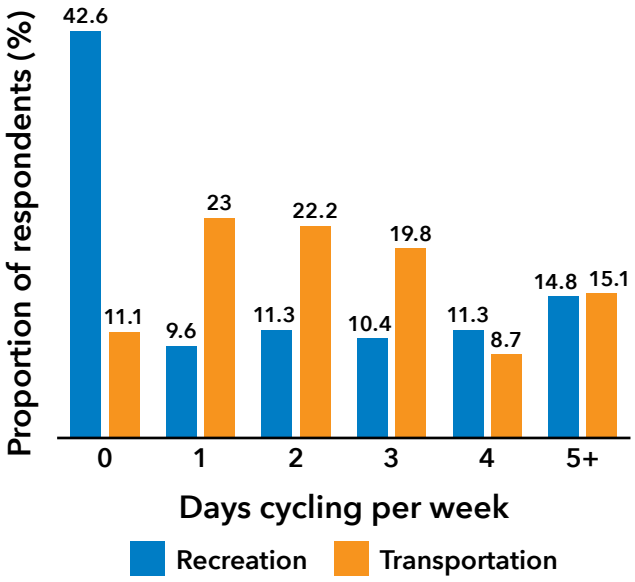


Cycling for travel to work versus recreation

The survey data illustrates that cycling for recreation is more common than cycling for transport. Overall, approximately 57% of cyclists reported commuting to work using a bicycle 1 or more days a week while nearly 90% reported cycling for recreational purposes at least once a week (Figure 32). Interestingly, approximately 15% of cyclists reported cycling on a daily basis for both commuting and recreational purposes; a large number of daily cyclists overall.

> **I'm lucky at [my place of work] that I have access to showers… I bike to work in my bike clothing. I can have a shower if I want to and change…"**
>
> Interview participant

Figure 32: Proportion of respondents cycling for transport and recreation by number of days per week



> **There's not very much [bike] parking at my workplace, so like outside. It's all on the street and downtown area. There's no bike rack. There's not really a place I could bring my bike into the building."**
>
> Interview participant

84%
of respondents would like to cycle more than they are currently cycling

"…there's no space – there's like, two lanes, traffic, no space for a bike. And, it's kind of hairy. So, that's why I use the sidewalk there."

Interview participant

"…sometimes I also bike on the sidewalk, I know you're not supposed to, but like I said Memorial is just terrible so typically on Memorial I bike on the sidewalk."

Interview participant

"… I was on the sidewalk because that day I wasn't feeling very comfortable. I was not feeling safe so I was actually traveling pretty slow."

Interview participant

"…the only reason I don't wear visible clothing is because I can't afford it. If there was like the odd booth that handed out like oh nice, a little like reflective vest, I'd definitely rock that every day of the week."

Interview participant

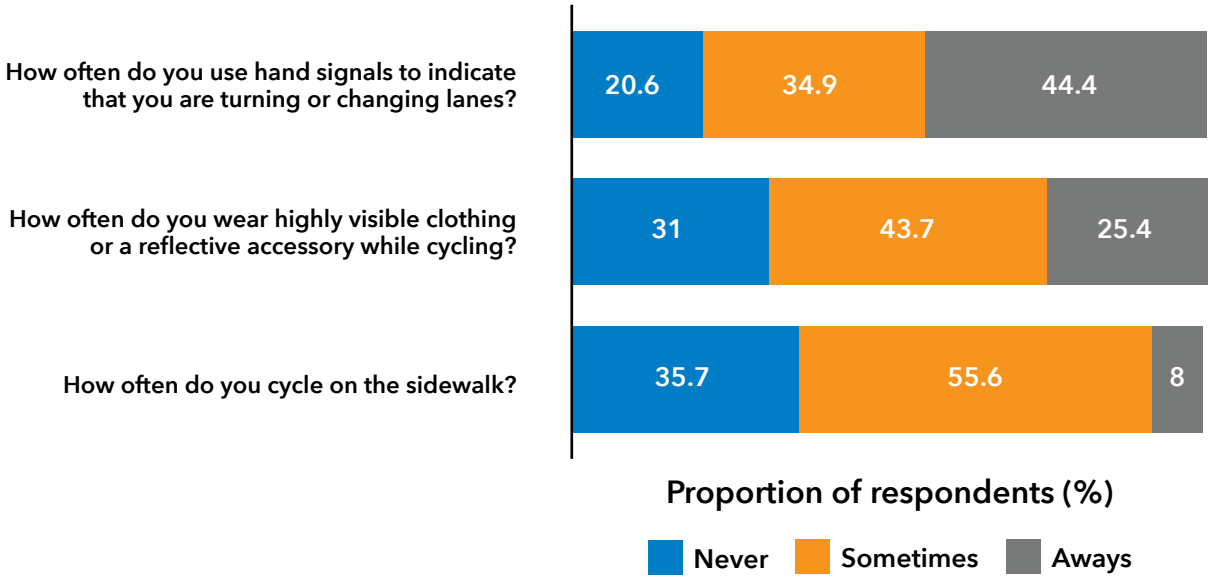
"Bike lanes like the one on Shuniah where it is just painted onto the side of the road… those I consider poor quality. That's the lowest level of bike lane that I will ride on. And I don't like always doing it, if it's a really busy road. I might choose the sidewalk instead."

Interview participant

Safe cycling behaviours

Overall, the survey data indicates that cyclists are employing best practices in terms of individual level safety sometimes or always. For example, almost 80% of cyclists reported using hand signals to indicate turning or changing lanes to vehicle drivers, as seen in Figure 33. Although most cyclists reported wearing highly visible clothing, 3 out of 10 do not; this could be improved through education or the provision of high visibility vests. Although riding bicycles on sidewalks is not permitted (city bylaws state that any bicycle with wheels with a diameter of more than 43cm must be ridden on the road and not on the sidewalk), and can actually increase risk of a collisions, approximately 55% of respondents indicated that they cycled on the sidewalk sometimes. As suggested by quotes from cyclist interviews, this likely occurs when there is nowhere else to ride other than roads with high levels of vehicular traffic. This is commonly mentioned in the interview data. Cyclists often explain this behaviour noting that they ride on the sidewalk in certain areas of the city where riding on the road feels unsafe.

Figure 33: Proportion of respondents by cyclist behaviour



"It's a really great way to get my work out in the day without even having to think about it. And it is a great de-stressor and it actually gets me motivated to get up and going in the morning. It's just very pleasurable, enjoyable and gets you in a good mood for the day."

Interview participant

"It's cheaper, it's healthier, it's better for the planet."

Interview participant

"There's fresh air. There's excitement in the journey. You get to go to places by bike. Go to meetings or grocery shopping. There's lots of reasons to be on a bike. Exercise. Fellowship, there's other cyclists out there."

Interview participant

"I've always loved cycling. I like being in control. I love the wind going past my face and I love being able to stop whenever I want… you get to park it somewhere and lay down in the grass and look at the sky, you know..."

Interview participant

Facilitators and barriers to cycling

There are many factors that could encourage or deter individuals to cycle, including personal, social, and environmental reasons. Based on the high level of education and household income of most survey respondents, this mode of transportation is likely a choice. For a smaller portion of respondents, cycling may be their only mode of transportation. This section aims to investigate the facilitators and barriers faced when cycling in Thunder Bay.

Facilitators

Respondents were asked to indicate those factors that encouraged them to cycle. Figure 34 shows that nearly all participants (92.9%) reported that physical health benefits/fitness encouraged them to cycle. Pleasure and mental health benefits were also reported as factors encouraging cycling by more than 80% of the respondents. Unlike other larger urban centers, limited access to automobile parking is not an important facilitator for cycling in Thunder Bay. Interestingly, 7 out of 10 cyclists reported that environmental benefits encouraged them to ride their bike. Respondents were also asked to report the single primary factor that encouraged them to cycle (Figure 35). More than half (58.4%) reported that physical health benefits were the main reason they cycled. Note that any respondents who selected more than one factor were removed before calculating proportions for this question.

Figure 34: Encouraging factors for cycling in Thunder Bay

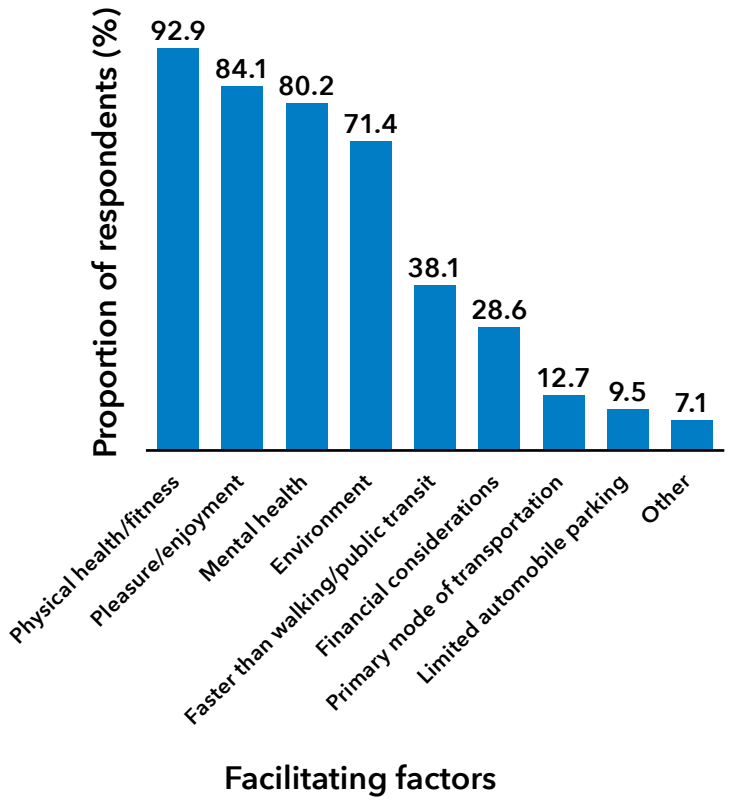
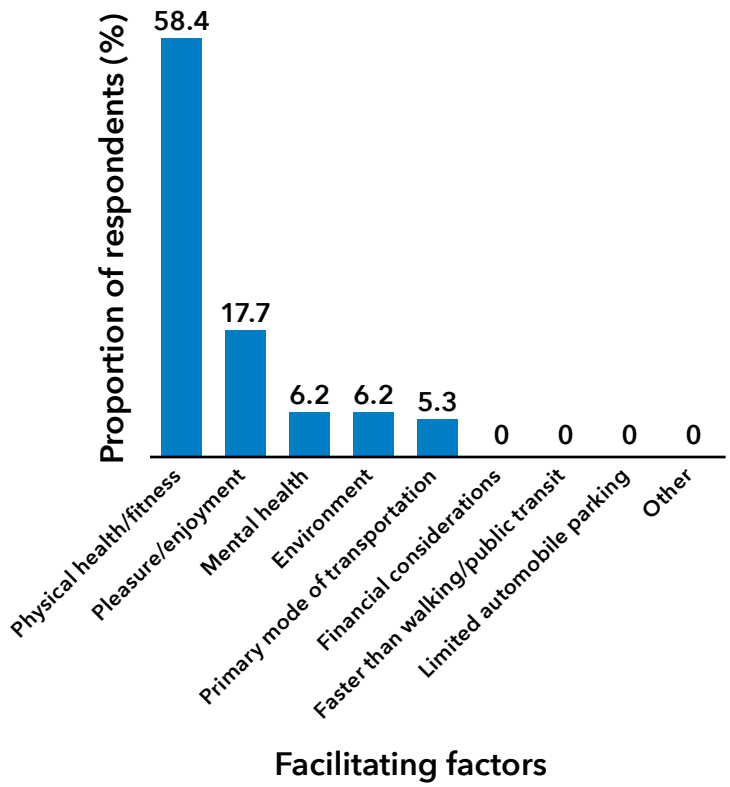


Figure 35: Primary encouraging factor for cycling in Thunder Bay



*Multiple responses were removed before calculating proportions

"I've definitely had a lot of near-misses. Those happen a lot just mostly people trying to pass me without me knowing… A lot of people just try cutting by you in the same lane."

Interview participant

"…having bike lanes that are protected from the road and connected to where people live and to where they need to go will like do more than anything else to reduce the barriers for people to bike."

Interview participant

"It was such a close call that I was shaking afterwards… then you're biking, the rest of your bike is like, 'Am I invisible or do people value my life so little that they don't care if I crash or die?'"

Interview participant

"I was biking on Memorial, this transport driver was driving. We both locked eyes. I continued going. He pulled out and hit me. It was the truck driver's fault. I was biking on the road. Like I said we both made eye-contact, he seen me and I don't know what… he was thinking. He like pulls out and, pulls out and hit me."

Interview participant

"Almost every day when I get on my bike, it sounds morbid but, I think 'Today might be the day I get hit by a car.' And because it's real like it's a real thing and like people get hit by cars all the time. Yeah. And I did get run over once. It was luckily just my front tire…"

Interview participant

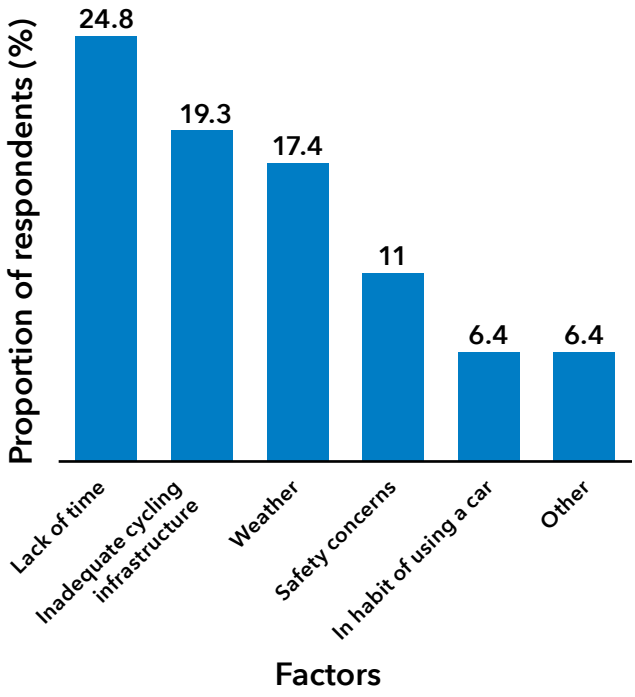
"… now that I've kind of had a couple incidents it's terrifying and it reminds how vulnerable you are…"

Interview participant

Barriers

Respondents were also asked to report the primary reason for not cycling more often. Figure 36 shows that the most commonly reported barriers were: lack of time (24.8%), inadequate cycling infrastructure (19.3%); and weather (17.4%). Note that any respondents who selected more than one factor were removed before calculating proportions for this question.

Figure 36: Respondents' primary reason that prevents them from cycling

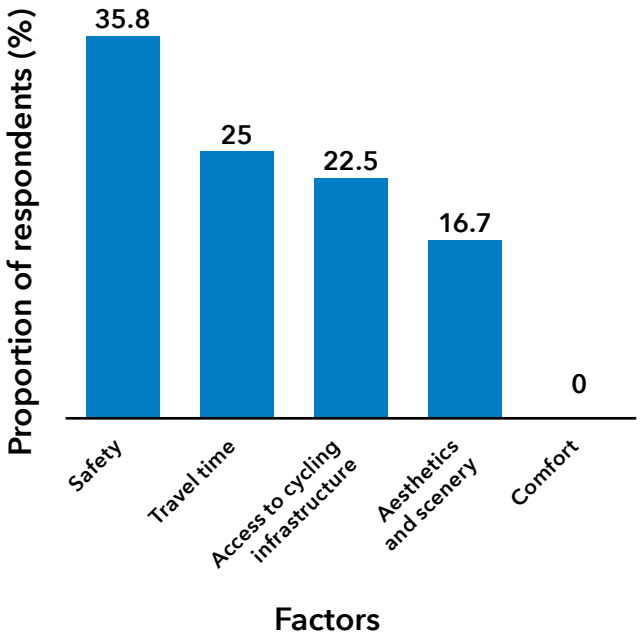


*Multiple responses were removed before calculating proportions

Route selection

The most commonly reported factor affecting route selection by cyclists was safety (35.8%). Travel time and (25.0%) and access to cycling infrastructure (22.5%) are also important in terms of route selection, as seen in Figure 37.

Figure 37: Reason for selecting cycling route



*Multiple responses were removed before calculating proportions

Cyclists in Thunder Bay prefer safe routes that are quick, connected, and have appropriate cycling facilities.

Collisions, crashes and 'near misses'

More than 20% of cyclists have experienced a collision or crash while cycling in Thunder Bay while 62.7% have experienced a near miss.

Over 20%
of cyclists experienced a collision or crash

62.7%
of cyclists experienced a near miss

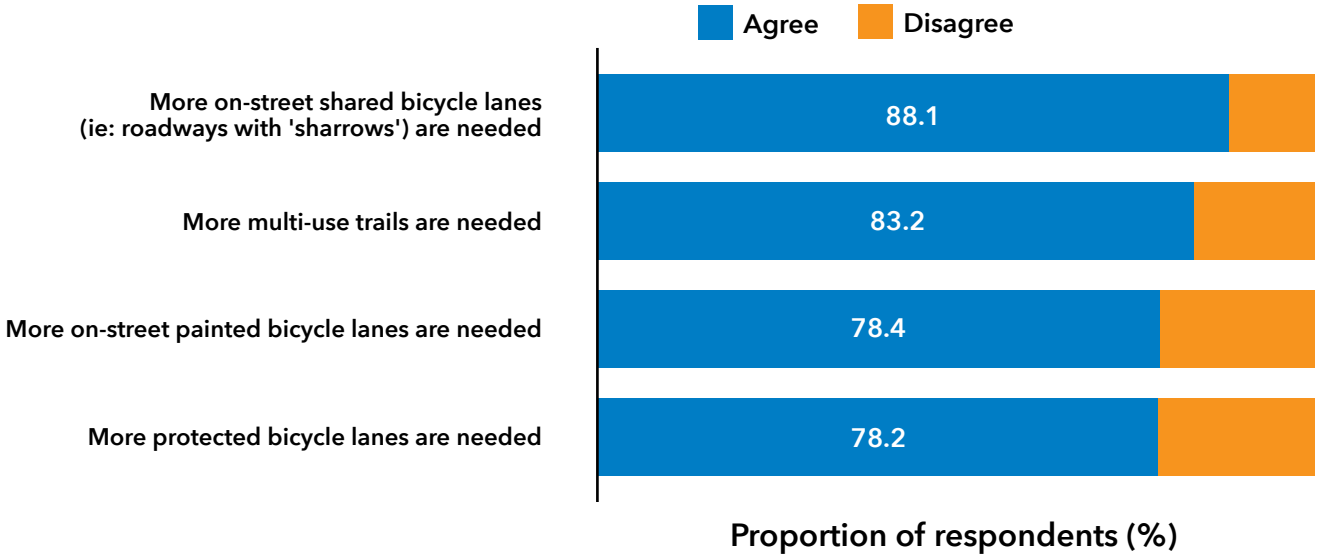
Perceptions of cycling infrastructure and safety

The following section explores respondents' perspectives on the current availability, connectivity, and safety of cycling infrastructure, as well as factors that made them feel unsafe while riding and sharing the road with motorists in Thunder Bay.

Need for cycling infrastructure

Survey respondents were asked about the need for cycling infrastructure in Thunder Bay. The majority of respondents agreed that there is a need for more cycling infrastructure, including on-street shared lanes (sharrows), multi-use trails, on-street painted bike lanes, and protected bike lanes, as seen in Figure 38.

Figure 38: Respondent perspectives on the need for cycling infrastructure



> **"I mean obviously there's a long way to go with the infrastructure. It's a bit humorous to try and take a bike lane to its natural end cause you'll often like run into a curb or like you know all of a sudden there's just no bike lane whatsoever."**
>
> Interview participant

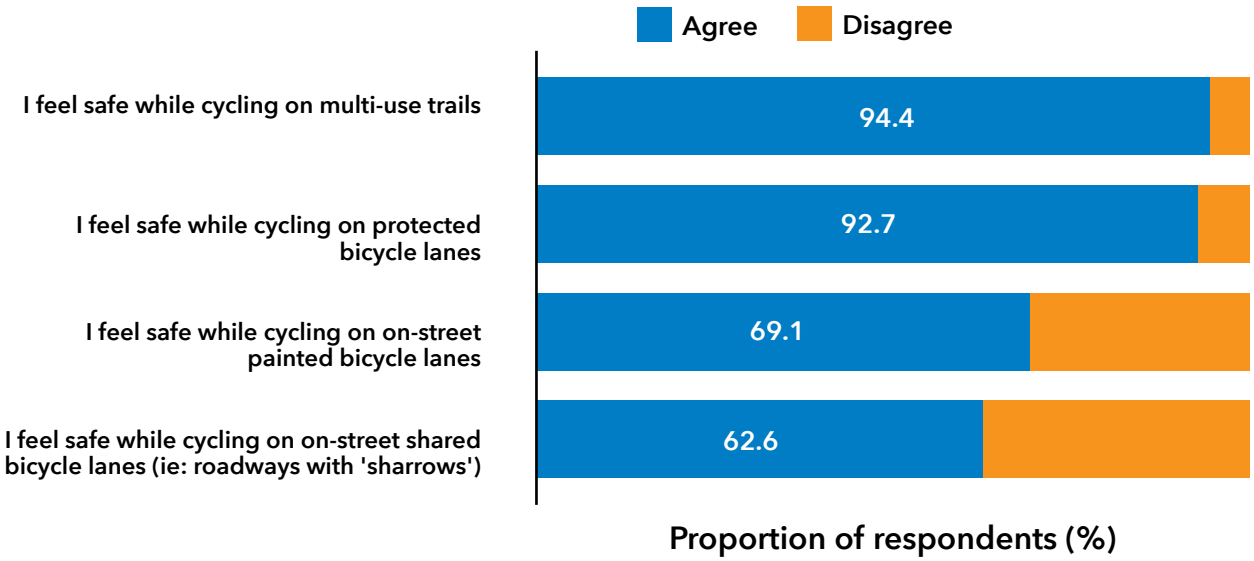
> **"I think the vast majority of people don't want to cause cyclists harm, but the infrastructure itself doesn't indicate that it's a [bike-friendly] city."**
>
> Interview participant

> **So the bike paths that exist are great for going for a nice recreational ride. They're not nearly direct enough or extensive enough to get you where you need to go, if you're like using that as your commuting system. They're pretty limited. The main arteries of town, Memorial Avenue, Algoma...Balmoral, Oliver, John...Red River, any of those roads, Arthur Street, if you're not an experienced cyclist who's able to go fast you have to ride on the sidewalk, otherwise, you're really unsafe."**
>
> Interview participant

Safety while using cycling infrastructure

The majority of survey respondents agreed that they felt safe while cycling on protected bicycle lanes and on multi use trails, as seen in Figure 39. Fewer respondents agreed that they felt safe while using on-street painted bicycle lanes or on-street shared bicycle lanes. Separated cycling facilities minimize the risk of conflict with vehicles, and seem to be preferred by cyclists in Thunder Bay.

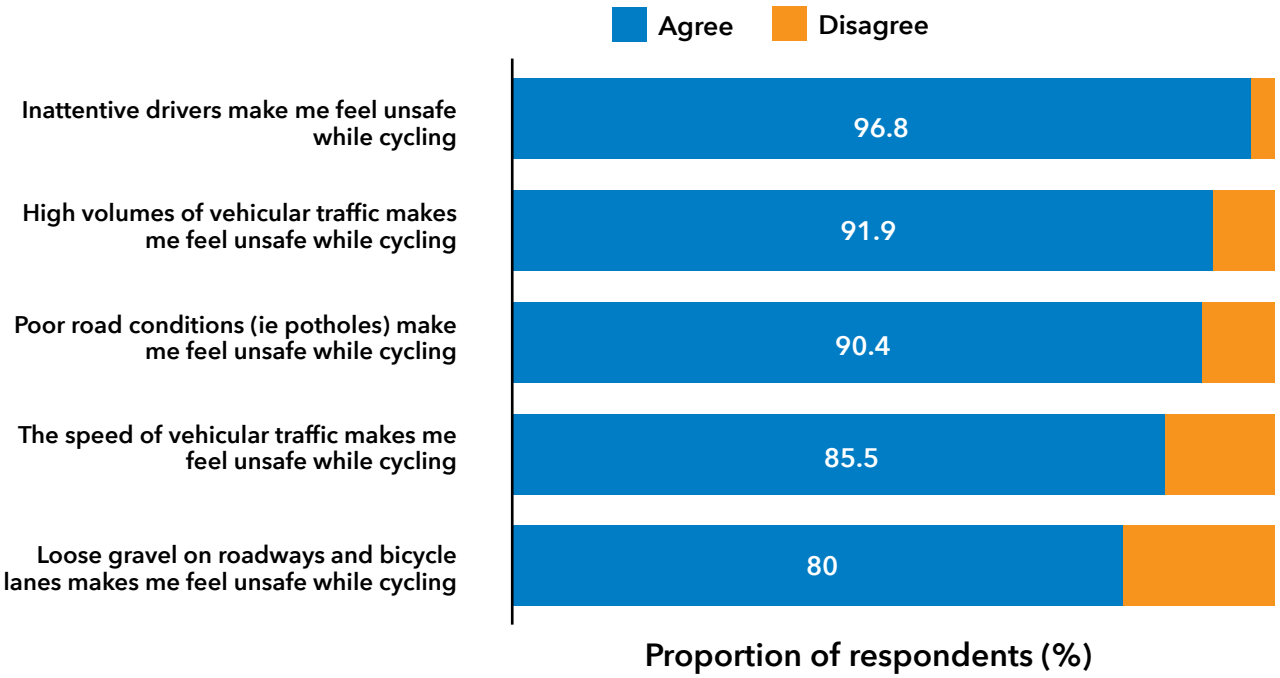
Figure 39: Respondent perspectives on safety while using cycling infrastructure



Safety while sharing the road

Survey respondents were asked about what made them feel unsafe cycling while sharing the road with vehicles and motorists. The majority of the respondents (96.8%) agreed that inattentive drivers made them feel unsafe while cycling on streets. As seen in Figure 40, over 90% of respondents reported that the volume of traffic and poor rood conditions such as potholes made them feel unsafe while cycling on the roads in Thunder Bay. Speed of traffic and loose gravel are also safety concerns.

Figure 40: Respondent perspectives on safety while sharing the road



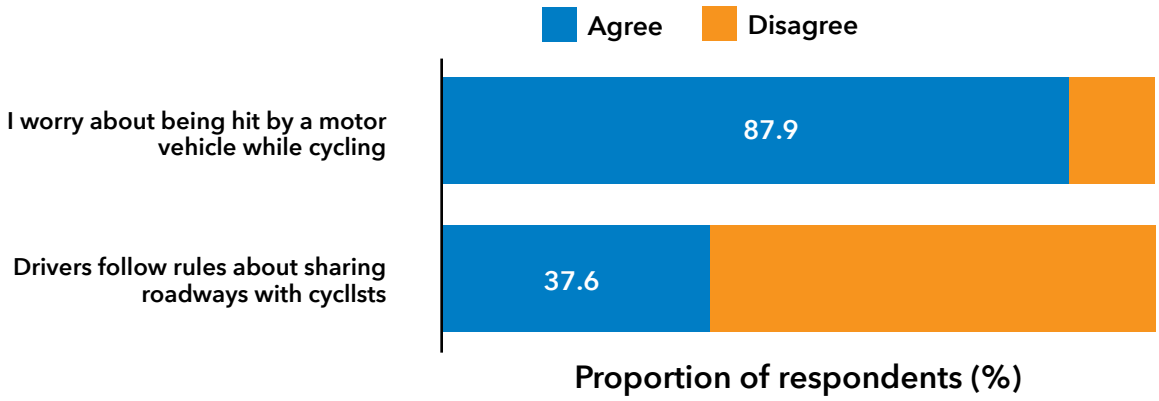
> **Most of the more dangerous encounters I've had with motorists have been just inattentiveness and I feel like you know there's a certain age demographic that is maybe not paying as much attention out there…"**
>
> Interview participant

> **…that very edge of the street being the worst for potholes, is exactly where they put the bike lanes. So even if you are in the bike lane you're gonna have to leave intermittently to avoid the potholes, and that just increases your chance of being hit by a car…"**
>
> Interview participant

Safety related to motorist behaviour

Motorist behaviour plays a large role in real and perceived safety while cycling. The majority of survey respondents (87.9%) agree that they worry about being hit by a motor vehicle while cycling. Furthermore, 62.4% believe that drivers do not follow the rules about sharing roadways with cyclists. The responses shown in Figure 41 reinforce the overall lack of perceived safety of cycling in Thunder Bay, and the importance ongoing driver education related to sharing the road.

Figure 41: Respondent perspectives on motorist behaviour



Thunder Bay Residents are satisfied with:

- How convenient and pleasant it is to cycle

Thunder Bay Residents are dissatisfied with:

- Cyclist safety overall
- Access to key destinations using the current network of cycling infrastructure
- Cycling infrastructure overall
- Connectivity of the current cycling network
- Availability of bicycle parking at key destinations

> **"I think a lot of drivers don't know what to do when a bike's on the road."**
>
> Interview participant

> **"I would say I would probably encounter at least one frustrated or angry driver each commute."**
>
> Interview participant

Satisfaction with bikeability and safety

This section of the survey intended to determine how satisfied respondents were with numerous aspects of the cycling environment and cycling safety in Thunder Bay. See Table 11 for a complete summary of these findings.

Respondents were strongly or somewhat dissatisfied with cyclist safety overall, access to key destinations using the current cycling network, cycling infrastructure overall, connectivity of the current cycling network, and availability of bicycle parking at key destinations. The majority of respondents were neutral regarding maintenance of bike lanes in the winter, likely because the majority of respondents only cycle in non-winter months. Respondents were most satisfied with how convenient and pleasant it is to cycle in Thunder Bay. This may be due to the high use of multi-use trails. Quotes from cyclist interviews confirm the appreciation for Thunder Bay's trails in close proximity to nature.

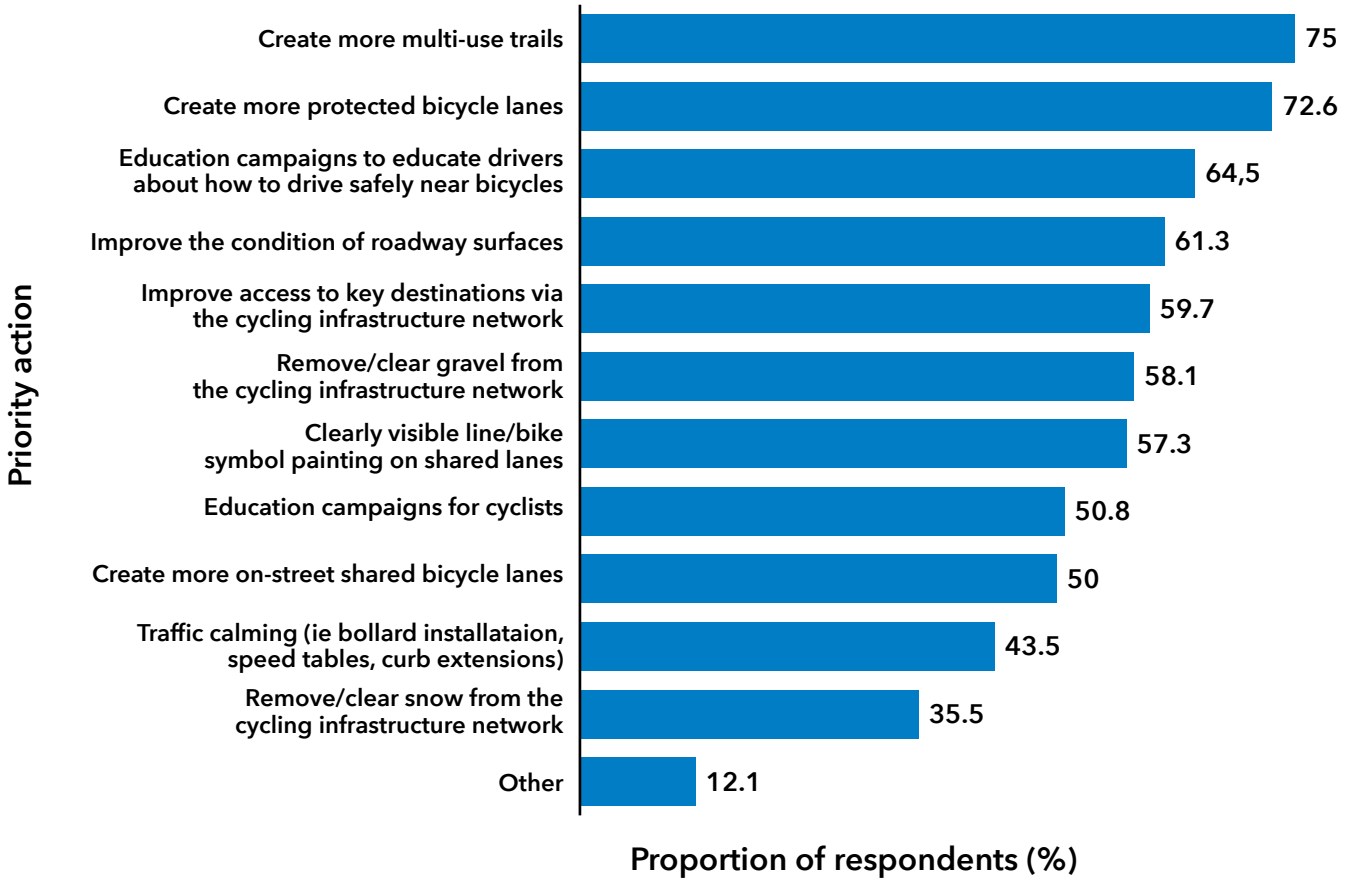
Table 11: Satisfaction with bikeability and safety in Thunder Bay

How satisfied are you with…	Strongly or somewhat dissatisfied (%)	Neutral (%)	Strongly or somewhat satisfied (%)
Cyclist safety in Thunder Bay overall	51.2	21.5	27.3
Access to key destinations using the current network of cycling infrastructure	45.1	24.6	30.3
Cycling infrastructure overall	44.7	22.0	33.3
Connectivity of the current cycling network	43.5	26.2	30.3
Availability of bicycle parking at key destinations	36.9	35.2	27.9
Winter maintenance of bicycle lanes	39.8	51.3	8.9
How convenient and pleasant it is to cycle in Thunder Bay	27.9	16.4	55.7

Priority municipal government action

In order to understand what our municipal government should prioritize in their efforts aimed to improve bikeability and cyclist safety in Thunder Bay, participants were asked: "What changes, if any, would you like to see your municipal government make to improve bikeability and cyclist safety in Thunder Bay?" Results are displayed in Figure 42. The most common responses were to create more multi-use trails (75%) and to create more protected bike lanes (72.6%). These emerging themes speak to the desire for increased safety provided by separated cycling facilities. While cyclists in Thunder Bay enjoy cycling, find it pleasant, and want to cycle more than they currently do, there is still a need to have well maintained, connected, and safe facilities to do so. Respondents also indicated a need for increased driver and cyclist education about sharing the road. While bike lane snow-removal was not a top priority action, this reflects survey respondents' habits of cycling mostly in non-winter months.

Figure 42: Priorities for municipal government action



> **Sometimes the bike routes will just end, and cyclists do not just disappear. They're still on the roads."**
>
> Interview participant

"…physical separation [of bike lanes] and lower speed limits are two big things we need to do… I think a lot of motorists would be happy to have their own space separated from cyclists and conversely cyclists would be very happy to have their own space separated from motorists, but going to the same businesses and restaurants and bars and libraries and parks and attractions - just getting there by different means."

Interview participant

"There's been some great changes lately and a lot of improvements but Thunder Bay was a city built for vehicular traffic without any other transportation methods really under consideration…"

Interview participant

"I'll take my bike shopping and I'll show up to the place where I want to shop and there's nowhere for me to lock my bike. And I'm like that's such a small thing, you know?"

Interview participant

"There are lots of beautiful paved trails in town that will take you around Boulevard and things like that, but unfortunately, I don't work at Boulevard! So to me like the most important in biking in infrastructure would be getting people to like the places that they will need to get and like where they'll be working…"

Interview participant

"…the next step to move our city forward is to get protect[ed] bike lanes. Some sort of barrier where those people who are interested but concerned can feel more comfortable biking as a utility cyclist."

Interview participant

"… if people wanted to bike in Thunder Bay there's no reason that they shouldn't. I think if the city just worked on connecting routes that had bike lanes on them and connecting major routes that cyclists would take… putting bike lanes there would really improve the bikeability and improve the rep[utation] I guess of Thunder Bay as being a bikeable city."

Interview participant

"Education is always a great thing though and I definitely think it's something necessary. Maybe having more days where there's training available or education available for both cyclist and drivers at the same time to try to bring the two groups together because there seems to be a lot of animosity. If you look on social media at all it's always this driver versus biker mentality it seems, that it's combative instead of cooperative."

Interview participant

CONCLUSIONS

Based on the key findings from the collision analysis and the community survey, the following main conclusions can be drawn:

Collision Analysis

When are collisions happening?

- There is no clear increasing or decreasing trend in the number of collisions across the study period
- Most collisions occurred in the summer months; June and July in particular
- More collisions occurred on weekdays than on weekends
- Time of day when collisions occur could not be analyzed

Where are collisions happening?

- The greatest proportion of collisions occurred at intersections
- The greatest proportion of collisions occurred on major arteries and in the downtown cores
- Four of the nine priority collision hotspots occur along May-Memorial-Algoma, a key north-south arterial road. Several more priority collision hotspots occur on image routes (Arthur Street and Fort William Road) where businesses and services are located and where there is likely higher cyclist and vehicular traffic
- Two priority collision hotspots were identified on Oliver Road, currently a designated bike route

Who is involved in collisions?

- The highest proportion of drivers involved in collisions were 29 years old or younger and were male
- The highest proportion of cyclists involved in collisions were 29 years old or younger and were male

Why and how are collisions happening?

- The majority of collisions occurred during daylight, in clear weather conditions, and on dry roads in good condition
- 30.9% of collisions occurred while a driver was not driving properly (failed to yield right of way, improper turn, disobeyed traffic signal, etc.)
- 26.1% of collisions occurred while a cyclist was not driving properly (failed to yield right of way, disobeyed traffic signal, etc.)
- 13.3% of drivers and 18.8% of cyclists were inattentive at the time of a collision
- Over half of collisions occurred at a location with a traffic control. Almost all of the collisions that occurred mid-block lacked a traffic control
- Overall, collisions occurred when both the involved vehicle and bicycle were going ahead. This applies to both intersection and midblock locations
- 4.2% of cyclists and 0.2% of drivers had been drinking at the time of a collision

Community Survey

Respondent demographics and cycling behaviours

- The top age group represented in the total survey sample was 25-39 years of age. 51.6% of respondents were male and 48.8% were female
- In general, survey respondents had a high level of education and household income
- Almost all of respondents had access to a vehicle for transportation
- The majority of respondents reported being confident or very confident as a cyclist; only 10.4% reported being nervous or very nervous
- 13% of respondents cycle in the winter
- Cyclists in Thunder Bay typically did not cycle to commute to work or school, but a large majority cycle at least once per week for leisure or exercise (in non-winter months)
- 84% of respondents reported wanting to cycle more than they are currently cycling
- The majority of cyclists use hand signals to indicate turning or changing lanes
- 3 out of 10 cyclists do not wear highly visible clothing and over half of respondents reported cycling on the sidewalks sometimes

Facilitators and barriers to cycling

- The number one reason for choosing to cycle was physical health/fitness, followed by pleasure/enjoyment
- Many respondents also indicated that mental health and environmental benefits encouraged them to cycle
- The most commonly reported barriers to cycling were lack of time, inadequate cycling infrastructure, and weather
- Cyclists in Thunder Bay prefer safe routes that are quick, connected and have appropriate cycling facilities
- More than 20% of cyclists have experienced a collision or crash while cycling in Thunder Bay while 62.7% have experienced a near miss

Perceptions of cycling infrastructure and safety

- The majority of respondents agree that more cycling infrastructure is needed in Thunder Bay
- Thunder Bay cyclists feel safer while cycling on protected bike lanes and multi-use trails than on-street painted lanes or sharrows
- Inattentive drivers, high volumes of traffic, and poor road conditions make cyclists feel unsafe while cycling in Thunder Bay
- Speed of traffic and loose gravel on roadways are also important safety concerns among cyclists
- 87.9% of respondents worry about being hit but a motor vehicle while cycling
- 62.4% of respondents report that drivers do not follow rules about sharing the road with cyclists

Satisfaction with bikeability and safety

- Respondents were generally dissatisfied with access to key destinations while using the current cycling network and connectivity of the current cycling network
- Respondents were generally dissatisfied with cyclist safety overall and cycling infrastructure overall
- Respondents were generally dissatisfied with availability of bicycle parking at key destinations
- Respondents were generally satisfied with how convenient and pleasant it is to cycle in Thunder Bay

Priorities for municipal government action

The top three priorities for municipal government action were:

1. Create more multi-use trails
2. Create more protected bicycle lanes
3. Run education campaigns to educate drivers about how to drive safely near bicycles

RECOMMENDATIONS

Bikeability and cyclist safety should be high priorities for decision makers and the City of Thunder Bay, but will take a coordinated and sustained effort between the municipality's Engineering and Planning departments, educators, health professionals, community organizations, the Thunder Bay Police Service, and others to be achieved. Private developers and landowners also have a role to play in improving bikeability, and it is necessary to harmonize public and private interests in community planning. The following section outlines recommendations that stakeholders can act upon and strive towards based on the analyses and findings presented in this report. Specific recommendations are categorized under the themes of engineering, education and encouragement, enforcement, evaluation, and planning.

Engineering

- Intersections are the most dangerous locations for cyclists. Address hazards by re-designing collision hotspot locations to improve safety for cyclists. Intersection treatments that could improve safety include:
  - Advance lights
  - Bike sensors
  - Refuge islands
  - Advanced stop bars for cyclists
  - Bike boxes
  - Protected intersection design
  - High-visibility paint markings through the intersection
  - A raised intersection
  - Reduction of turning lanes
  - Curb extensions
  - Addition of on-street parking
  - Side-friction elements
- In general, cyclists in Thunder Bay think that more cycling infrastructure is needed. Cyclists feel safest on multi-use trails and protected bike lanes. All new cycling facilities should have a high-degree of physical separation from motorist traffic in order to encourage cycling and create a safe cycling environment.
- Address key gaps in the cycling network. These commonly occur between multi-use trails and bike lanes, at intersections, and within the final 100m to key destinations.
- Implement **Urban Greenways*** to attract unsure cyclists. Greenways can address the following reported barriers to cycling: safety (35.8%), travel time (25.0%) and access to cycling infrastructure (22.5%).
- Review existing cycling infrastructure on all designated bike routes to ensure that it aligns with new cycling infrastructure standards (MTO Book 18).

*An **Urban Greenway** is a street that parallels a main transportation corridor, and is designated as a priority cycling and walking route. The Urban Greenway addresses linear gaps in the cycling network, and has enhancements and features that make it safe and convenient for riding, such as slower speed limits, street trees, enhanced lighting, traffic calming, bike symbols painted on the ground, and wayfinding signage. The new Active Transportation Plan identifies a future Greenway network.

Education and Encouragement

- Many of the cyclist-vehicle collisions involve an inattentive driver or cyclist and nearly all respondents agreed that inattentive drivers made them feel unsafe while cycling on streets. More education is needed to emphasize the importance of being attentive while operating a vehicle and the risks involved when inattentive.
- Although the majority of respondents use safe cycling behaviour according to the survey data, additional education on safe cycling practices, never riding on the sidewalk in particular, could be beneficial.
- Focus on driver education for young and inexperienced drivers on how to properly share the road with cyclists; highlighting the importance of attentive driving.
- Explore opportunities for marketing to recreational cyclists to encourage commuter cycling in favourable weather. There is a high potential for conversion from recreational cycling to commuter cycling. Almost half (45.2%) of survey respondents reported cycling 1-2 days/ week for leisure and/or exercise in the summer months.
- Implement a comprehensive Transportation Demand Management program to convert recreational riding into commute riding. Most (84.0%) of respondents would like to cycle more than they are currently cycling.
- Undertake highly-visible driver education program to boost cyclist confidence and increase actual and perceived safety.

Enforcement

- Partner with Safe Cycling Thunder Bay to deliver education and awareness about cycling safety and laws (for cyclists and drivers).
- Continue to engage in positive enforcement, such as offering bike lights and begin distributing "Good Tickets" for positive cycling behaviour.
- Engage in the following enforcement activities:
  - Mid-week targeted enforcement, focusing priority on collision hotspots
  - Highly visible enforcement campaigns on select cycling-safety laws (1m rule, yielding to cycling on right turns, etc.)
  - Enforcement campaigns on certain high-risk cycling behaviours (as found in this report) at hotspots such as sidewalk riding, riding through crosswalks, etc.

In January 2019 Ontario rolled out new driving laws that will apply stricter punishments on individuals caught driving while distracted, including the suspension of drivers licenses and fines of $1000 or more.

Evaluation

- Identify key bikeability and cyclist safety indicators to monitor progress on an annual basis.
- Ensure collision database has minimal missing data points, especially in recent years (2013 onwards). Improve the quality of collision data and develop a mechanism for City to have greater ownership of collision data for greater accuracy and retrieval.
- Invest in a comprehensive traffic information survey to gather information on cyclist and vehicle trips in Thunder Bay.
- Develop a system for citizens to provide feedback on new cycling infrastructure and to improve current cycling infrastructure; a committee of City Council would provide the political insight, robustness, and responsiveness to have a meaningful impact on outcomes.
- Improve the quality and detail of police collision reports with specific fields that better reflect cyclist collision circumstances such as:
  - Including time of collisions in AM/PM or 24 hour clock
  - Cycling-specific variables (i.e. including actions such as riding in a crosswalk through an intersection)
- Investigate a strategy to track near misses. Over half (62.7%) of survey respondents reported a near miss (collision or crash) while cycling.

Planning

- The new Transportation Master Plan and Official Plan provide direction for multimodal and connected transportation networks. It is important for the municipality to use these documents as guidance and implement good community planning and design.
- Develop new cycling-friendly policies at the municipal level:
  - Short-term and long-term bike parking By-Law
  - On-site amenities in high-density residential developments for cyclists (e.g. secure bike parking, lockers)
  - Planning for "Urban Greenways" in new urban developments
  - Winter maintenance and snow clearing on priority cycling routes
- Encourage the development of cycling-friendly policies at the organizational level:
  - On-site amenities at workplaces for cyclists (e.g. secure bike parking, lockers, showers, change rooms)
  - Promote and accelerate the Bike Racks for Business Program to deliver more bike parking at high-demand locations

CLOSING REMARKS

A city that is bikeable and safe for cyclists benefits all community members. Healthy built environments are an investment in the City's future by protecting and supporting public health, reducing greenhouse gas emissions, revitalizing the local economy, and building a livable and inclusive community. In order to improve bikeability and cyclist safety in Thunder Bay, we must first understand it. This report presents a comprehensive picture of the state of bikeability and cyclist safety in Thunder Bay by analyzing ten years of cyclist-vehicle collision data and examining perceptions of bikeability and cyclist safety in our community.

Drawing on the data and key findings, this report provides meaningful and achievable recommendations that will help transform Thunder Bay into a bikeable community where cyclists of all ages and abilities are safe and can incorporate healthy habits into daily life. Making progress on the key issues and recommendations outlined in this report will require the continued, enhanced, and integrated efforts from a range of stakeholders, additional data collection and research, and a commitment from municipal leadership.

> **"A city without separated bike lanes and off-street cycling paths may be like a swimming pool with no shallow end. It's fine for confident swimmers but intimidating for novices."**
>
> Dave Biggs, MetroQuest

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