

# Briefing Note

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## Pedestrian and Cyclist Safety in Westmount: A brief to the City of Westmount

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### Abstract

This paper presents the results of the Westmount Road Safety Study, which took place from June-September 2010. It first outlines the goals and methodology of the project and provides background information on the road safety concepts employed. It then discusses the level and sources of perceived road safety risk among pedestrians and cyclists. Using survey responses and observed accident data, it compares areas within Westmount that are perceived to be risky with those observed to have high accident rates, and discusses why these differences arise. Finally, it identifies several major factors that were found to contribute to perceived and observed risk over the course of the study; these include factors Westmount can influence, but also several broader issues that are beyond its control. Particular attention is paid to the de Maisonneuve bicycle path, given its importance as an active transportation route through Westmount. The report finds that although Westmount's roads are generally safe for pedestrians and cyclists, there are risks associated with excessive traffic speed and volume, non-compliance with traffic laws, and inappropriate traffic signals and signage. The report makes several recommendations to address these concerns.

### Cite as

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## Introduction

The Westmount Road Safety Study was carried out as a partnership between the City of Westmount and the Community-University Research Alliance (CURA), “Making Megaprojects work for Communities”, a research program of the McGill School of Urban Planning.<sup>1</sup> The objectives of this research were to:

- Learn more about the kinds of day-to-day risks that exist on the roads in Westmount, with a particular focus on the safety of cyclists and pedestrians;
- Identify the factors that contribute to these risks; and
- Recommend strategies to mitigate these risks.

## Methods

First, nine direct observations of traffic flows at five intersections in Westmount were conducted.<sup>2</sup> Observers recorded the number of cyclists and pedestrians who passed through the intersection in a one-hour interval during the afternoon rush hour, as well as the number of traffic conflicts.

Second, a paper survey of Westmount residents was administered. The survey asked respondents what factors make them feel unsafe, and what (if any) locations they believe are dangerous. Respondents who cycled were also asked what makes them feel unsafe and what routes they choose to cycle through Westmount. The survey garnered 165 responses, of which a disproportionate number came from older adults and women.

Third, data were obtained on the number and location of road accidents from the Direction de santé publique (DSP) between 1999 and 2008, as well as from the Société de l'assurance automobile du Québec (SAAQ) between 2003 and 2008.

Finally, seven “key informants” whose jobs or volunteer positions give them particular insight into road safety issues in Westmount were interviewed. These included law enforcement officials, service providers for senior citizens and children, and cycling and pedestrian advocates.

## Key Findings

- In general, Westmount is a safe community for pedestrians and cyclists.
- When prompted, people easily identify places, road users and other factors they believe contribute to risk; these perceptions of risk are important to consider.
- The study documented specific safety concerns related to traffic speed and volumes; compliance with the law; specific types of traffic signalization and infrastructure design.

## Observed and Perceived Safety in Westmount

The observed rates of pedestrian and cyclist crashes in Westmount are among the lowest, relative to vehicle traffic volumes, of any area in the Montreal region. Figure 1 graphs the passenger vehicle kilometres traveled in Montreal boroughs and reconstituted municipalities against the number of crashes contained in the Société de l'assurance automobile du Québec (SAAQ) data from 2003-2008.

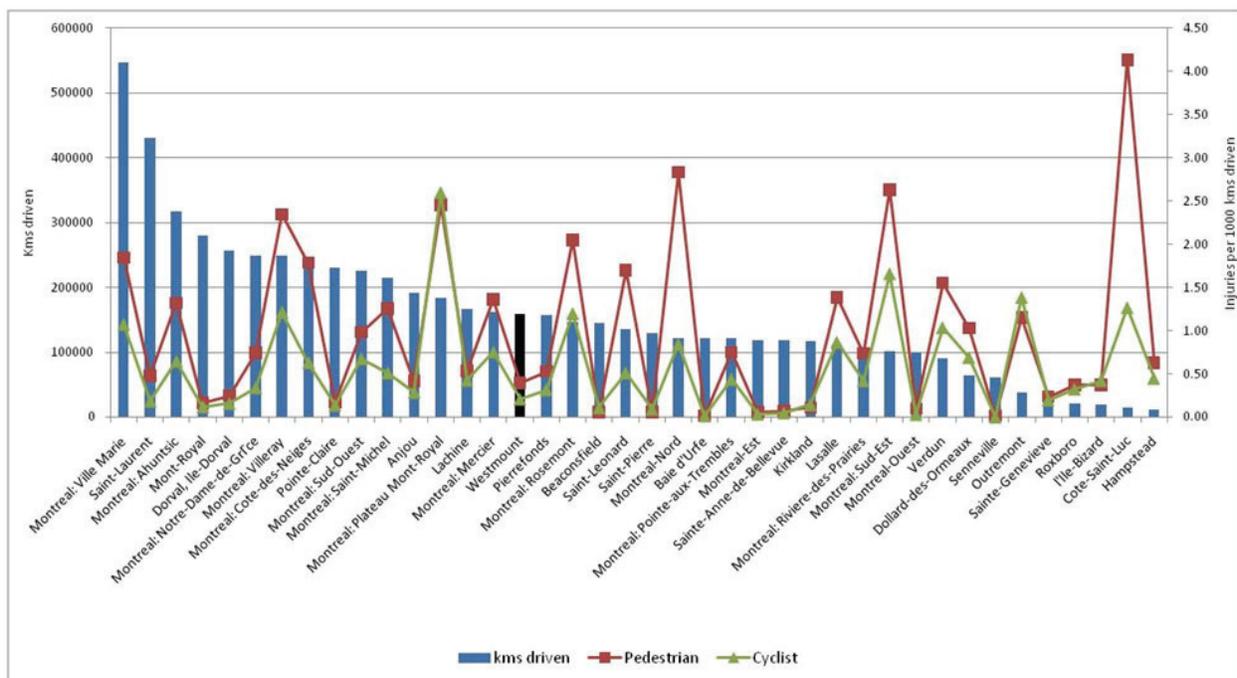


Figure 1: Estimated pedestrian and cyclist injuries per 1000 kilometers driven (Sources: 5% of population sampled, 2003 AMT Origin-Destination survey; SAAQ records 2003-2008)

Note: This figure is for comparative purposes only, as kilometres driven represent only approximately 5% of daily weekday volumes.

## Traffic Conflicts

As relatively rare events, accidents have a high degree of random variation inherent in small numbers. Therefore, studying conflicts can provide more detailed information on traffic safety. A traffic conflict is defined as an observational situation in which two or more road users approach each other in space and time to such an extent that a collision is imminent if their movements remain unchanged (Hyden, 1987). As shown in Figure 2, conflicts can be illustrated within a pyramid representing total passages through an area. Most passages are undisturbed, but some involve potential conflicts in which road users change their movements early enough that a collision is never imminent. Conflicts, of varying degrees, represent an even smaller share of passages. A still-smaller proportion involves a failure of road users to change their movements, resulting in collisions, injuries or fatalities.

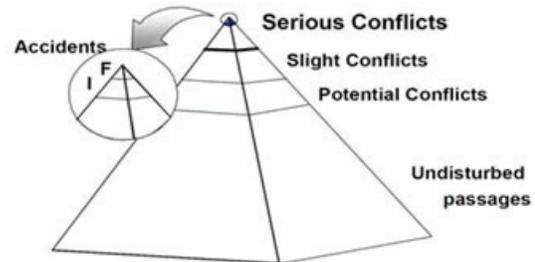


Figure 2. Understanding traffic conflicts

The finding that Westmount is relatively safe as measured by the number of road injuries is supported by low conflict rates at observed intersections. Based on intersection counts, the observed pedestrian conflict rates were clustered around 11-20 per 1,000 and cyclist conflict rates around 21-30 per 1,000, with no collisions observed for either group. The de Maisonneuve bicycle path also had a lower rate of pedestrian and cyclist conflicts and injuries than most other locations studied in Westmount.

Drawing on a comparison of personal vehicle trips made through Westmount from the 2003 Origin-Destination Survey, it was found that rates of cyclist injuries are approximately eight times higher than that of pedestrians or vehicle drivers/passengers (Table 1). Data from the Urgences-Santé records support this finding (Table 2).

Mode	Est. trips orig. in WM (per year)	Injuries per year	relative rate
Driving	7430800	70	0.000009
Walking	1960400	19.7	0.000010
Cycling	260000	20.3	0.000078

Table 1. Comparing trips through Westmount to reported injuries  
(Source: 2003 O-D survey; SAAQ reported crashes, 2003-2008)

	Pedestrians	Cyclists	Driver/passengers
At intersections	75	65	307
Between intersections	239	266	1522
<b>Total</b>	<b>314</b>	<b>331</b>	<b>1829</b>

Table 2. Road users injured in Westmount and immediate vicinity, 1999-2008 (Source: Urgences-Santé)

## Perceived Safety

Westmount is also perceived to be safe: as illustrated in Figure 3, most survey respondents were “not concerned” or “a little concerned” about their safety as pedestrians. Older adults were slightly more likely, and women much more likely, to report being “very concerned.” Nine per cent of respondents had been in a collision in Westmount, as a pedestrian, cyclist or driver, during the past five years.

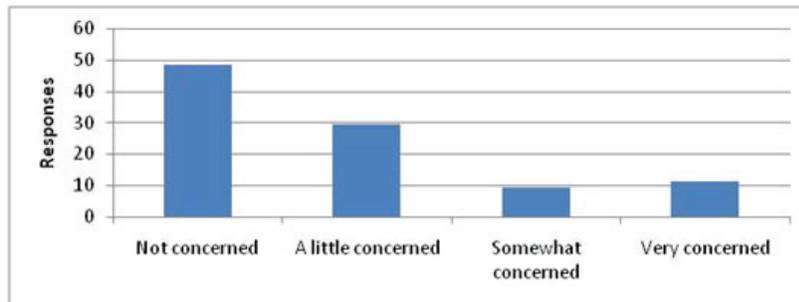


Figure 3: Concern for safety while walking in Westmount

The survey indicated that pedestrians were concerned about interactions with cyclists. Cyclists were more likely than any other mode to be cited as a “considerable” or “serious” danger to pedestrians (Figure 4). Pedestrians who responded to the survey commonly indicated that they cannot hear cyclists coming, that cyclists frequently ignore traffic signals and laws (especially by riding on sidewalks), that cyclists often lack basic safety equipment such as lights and bells, and that cyclists often ride too fast for their surroundings. The perception of danger as reported by respondents of different age groups is included in appendix 3.

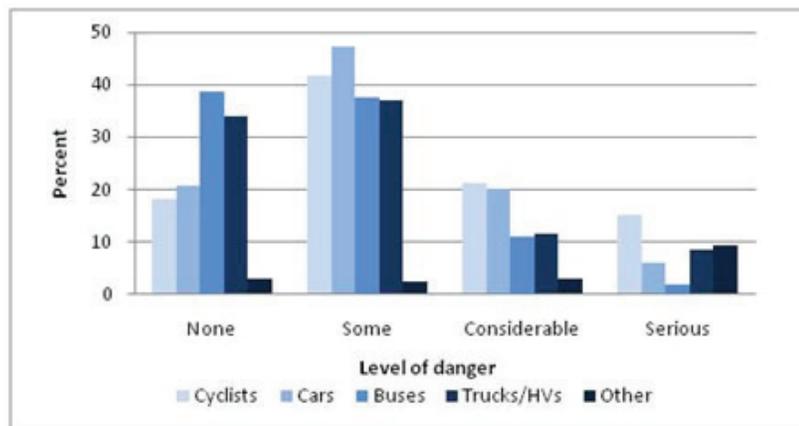


Figure 4. Perceived sources of danger for pedestrians

However, past research has revealed that the risk of serious injury or death to pedestrians struck in traffic increases with larger vehicle size and faster vehicle speeds (see figures 5 and 6). Since bicycles weigh a fraction of motor vehicles, and travel at an average of 15 kilometers per hour, a collision with one is less likely than a pedestrian-car collision to result in death or serious injury to the pedestrian. Nonetheless, widespread concern about bicycle collisions in Westmount highlights that a problem exists. This may be related to several factors, among them cyclist behaviour (as pointed out by respondents), relative frailty of respondents or those in their care, and infrastructure which is either non-intuitive or ambiguous. In addition, Westmount observers have suggested that emergency services may be less frequently called to the scene of pedestrian-cyclist collisions—particularly in cases where a pedestrian initially underestimates the seriousness of an injury and seeks medical attention hours or days later—which may contribute to an underreporting of such incidents in local police and ambulance records. It is difficult, however, to identify data that would verify this possibility.

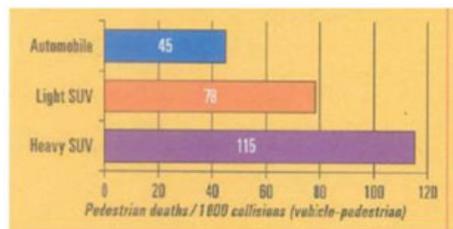


Figure 5. Risk of death for pedestrians, by category of vehicle. (Source: Agence de la santé et des services sociaux de Montréal, Direction de santé publique, *Urban Transport: A Question of Health*, 2006.)

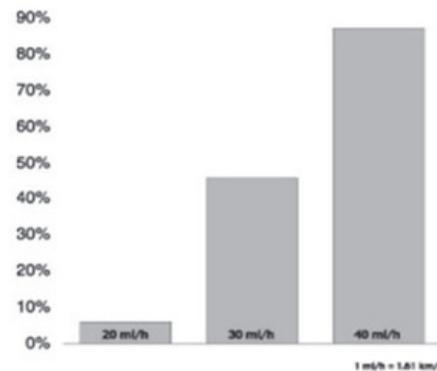


Figure 6. Fatalities based on speed of vehicle. A pedestrian's chance of death if hit by a motor vehicle (Source: U.K. Department of Transportation, *Killing Speed and Saving Lives*, London, 1987.)

To a lesser extent, cyclists were concerned about interactions with pedestrians. Fifty-nine per cent of survey respondents indicated that they were cyclists, and about one-third answered the questions concerning cycling safety and route choice. Almost 50% of those respondents said pedestrians posed “some” danger (comparable to the rate at which they cited other cyclists, cars and trucks), but they were much less likely to cite pedestrians as a source of “considerable” or “serious” danger (Figure 7). Overall, a greater percentage of cyclists identified other users of the road as posing “some” or “considerable” danger. This greater perceived level of danger among cyclists appears to be corroborated by

comparing the number of pedestrian and cyclist injuries, relative to the number of trips made. Using the 2003 Origin-Destination survey, an estimate of the number of trips made by bicycle, foot and car was made; overall, the risk of injury to pedestrians and motorists is equivalent (nine and ten in one million trips, respectively). However, although there are fewer bicycle trips made than those by foot, there are more injuries to cyclists reported; overall, the risk of injury to cyclists is 78 in one million.

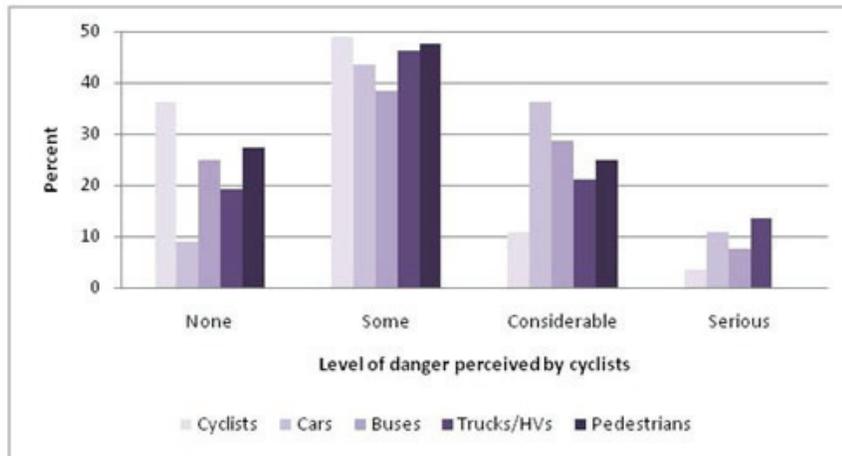


Figure 7. Perceived sources of danger for cyclists

The survey found that cars and other vehicles are a much greater source of concern to cyclists than to pedestrians. This is likely because cyclists riding on roads spend more time interacting with vehicles. A key informant from the police department reported that the most serious collisions he had seen on duty were those involving bikes and vehicles, and that the damage could be severe whether or not the cyclist was wearing a helmet. A cycling advocate noted that, at the time, no new cycling infrastructure had been built in Westmount since 1992, even as traffic increased dramatically, which he believed negatively affects the safety of cyclists.

Even when perceived and observed risks do not correspond, it is nonetheless important to understand the issues behind perceived risk. This is partly because a location perceived to be dangerous may record a low collision rate if people modify their behaviour to avoid it (Hillman et al., 1990). Conversely, people in situations they perceive to be safe may fail to take precautions to avoid injury in a collision (Rumar, 1988; Hillman et al., 1990).

## Risk at Particular Locations

A preliminary analysis of risk locations was conducted, based on reported injuries and dangerous locations identified by the survey. These maps (Figure 8) should be considered as a starting point for further analysis and action. Significantly, no data was available on the number of cyclists and pedestrians at these locations, nor their exposure to vehicle traffic. Nonetheless, lists of the intersections with the highest frequency of cyclist and pedestrian injuries are included as appendices 1 and 2.

Despite the low overall risk to vulnerable road users, an understanding of recorded injury locations can help to improve safety. In contrast to the SAAQ data used to compare boroughs, the maps highlight injuries documented by Urgences-Santé database, compiled by the DSP. In order to facilitate comparison across modes and data sources, dots on the map represent the percentage of observations (either injuries or perceptions) occurring at a particular intersection. Note that because the map provided with the survey centred on lower Westmount, particularly Sherbrooke and de Maisonneuve, respondents may have been slightly more likely to choose locations in the centre of the map over locations in peripheral areas such as Atwater, Décarie or The Boulevard.

Overall, cyclist injuries are dispersed throughout Westmount, which is surprising as cyclist volumes are heaviest on de Maisonneuve and Sherbrooke. This observation supports the concept of safety in numbers, whereby vulnerable road users are safer when they use the roads often enough that drivers begin to expect their presence. In contrast, pedestrian injuries are more concentrated a few particular corridors, notably Sherbrooke, Autoroute Décarie and Atwater.

Comparing perceived danger with injury data, these sources are relatively consistent along Sherbrooke for pedestrians, but the perceived risk is higher than the observed injuries along de Maisonneuve and much lower along Atwater. For cyclists, as for pedestrians, perceived risk is lower than observed accidents along Atwater, consistent with observed accidents along de Maisonneuve, and higher at the Décarie and de Maisonneuve intersection. Both pedestrians and cyclists identified Vendôme Metro and the adjacent viaduct as a source of danger; however, this is not a location of a great number of injuries, possibly because this perception prompts people to avoid this area.

For vehicle drivers and passengers, observed accidents were highest on highways or highway junctions with the regular road network; this is likely due to higher volumes on highways.

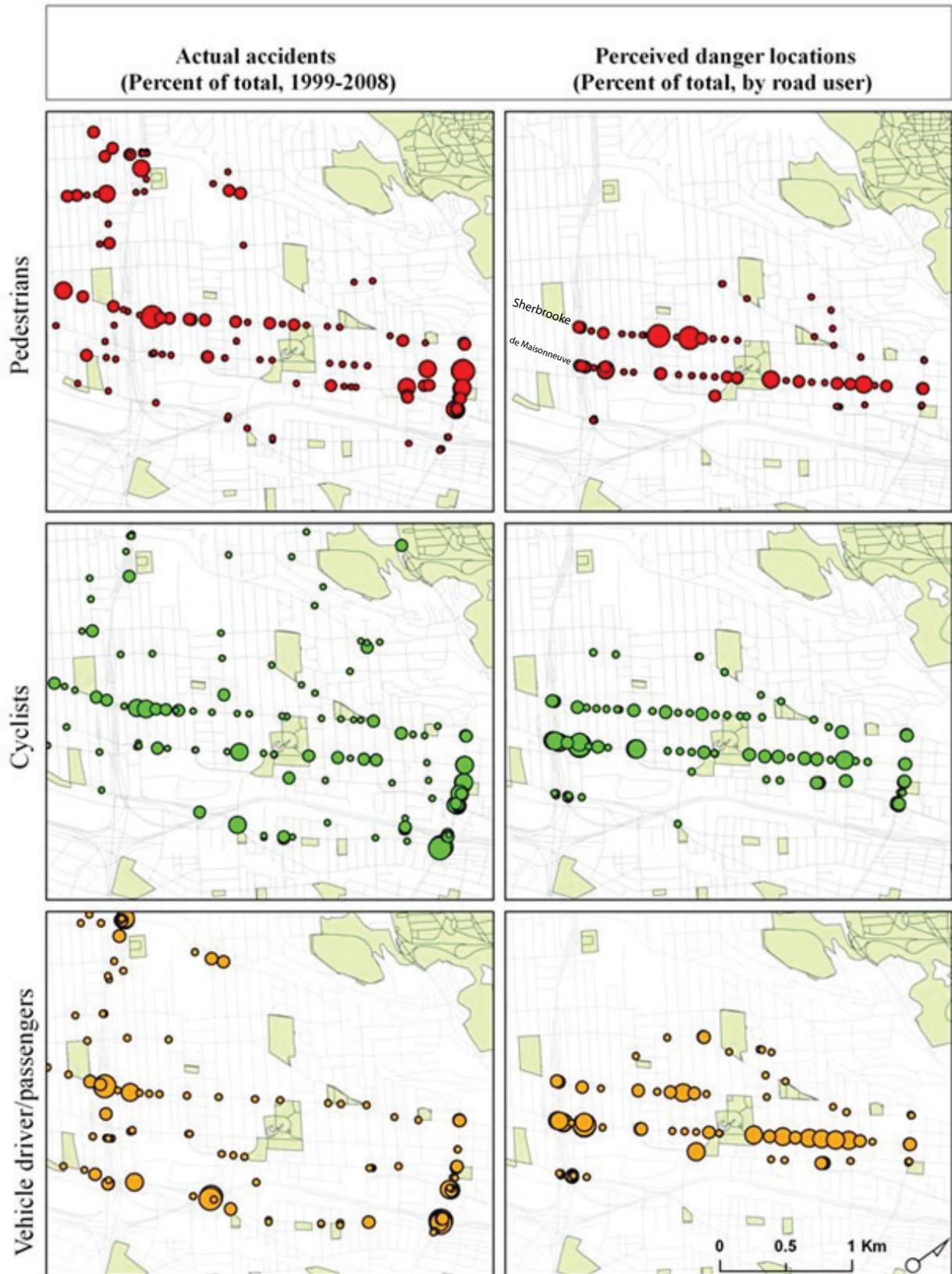


Figure 8. Comparing perceived and observed danger, across modes

## Key Factors Contributing to Risk

It is beyond the scope of this study to identify causal effects; however, based on interviews with local authorities, observations of traffic dynamics, and comments made by survey respondents, a list of recurring themes emerges. Several sources frequently pointed to the same risk factor, although they often differed on the underlying reason for that danger, as well as on the best solution. The key risk factors identified are discussed here.

### Traffic speed and volume

These factors were observed at intersection counts along Sherbrooke and identified by survey respondents and almost every key informant. The east-west thoroughfares (Ste-Catherine, Sherbrooke, Côte St. Antoine, Westmount Ave. and The Boulevard) were sources of particular concern, as was Atwater.

Intersection counts at the intersection of Victoria and Sherbrooke, perceived by numerous sources in this study as one of the most dangerous intersections in Westmount, found that conflicts often occurred because large volumes of both vehicles and pedestrians could not clear the intersection in the time allotted.

### Non-compliance with traffic laws

This factor was repeatedly cited by survey respondents and key informants and observed at intersection counts. The most common complaints were about bicycles running stop signs and riding on sidewalks, although pedestrians jaywalking or walking in the middle of the bicycle path in Westmount Park were also identified as a source of risk.

In general, issues of non-compliance can be addressed with increased enforcement, by changing the existing traffic laws or signage to facilitate compliance or some combination of the two. These strategies are discussed further below.

### Traffic signal and infrastructure design

Information from intersection observations, survey respondents and key informants revealed several specific issues in this area.

### The “scramble” intersections along Sherbrooke Street

Because Sherbrooke serves as both a major destination for users of all modes, as well as a significant vehicle thoroughfare, a signalization pattern commonly known as a “scramble” is used. However, this study noted various problems with the implementation of this system.

The scrambles do not appear to be timed for the pedestrian volumes they must accommodate. At Victoria and Sherbrooke, the length of time reserved for vehicle movement is four times longer than that allotted for pedestrians, despite more than 900 pedestrians crossing in one busy hour. In addition to this, scramble intersections can be confusing: although they appear to permit diagonal crossing when all four “walk” signs are lit, such crossings are illegal under the Highway Safety Code. However, because not enough the time is allocated to permit two separate horizontal crossings, pedestrians are expected to wait two full light cycles to make two crossings. Elderly people or people with mobility issues may have difficulty making even one crossing in the time provided.

Scramble intersections are not designed to allow crossing during a green light, outside the specifically allotted pedestrian segment; they usually display a “don’t walk” sign alongside a green light for vehicles. Conflicts at Victoria and Sherbrooke most often occurred when pedestrians attempted to cross at this time. The “don’t walk” sign was also displayed on the north side of the intersection, however, where no turning is permitted up one-way Victoria. Pedestrians were observed disregarding this signal because there was no danger to them from turning cars.

### Excessively narrow lanes

A minimum of two travel lanes in either direction is maintained along several Westmount arterials, a situation which leads to problems where the roadway is not sufficiently wide. This is the case in the segment of Sherbrooke west of Clarke. Here, cyclists are pushed dangerously close to parked cars, or must occupy a full vehicle lane and risk unpleasant interactions with drivers.

## The de Maisonneuve Bicycle Path

The de Maisonneuve path is discussed in more detail here because of this study's specific focus on pedestrian and cycling safety. This study found that de Maisonneuve is by far the most popular cycling route in Westmount. One-hour bike counts at intersection along de Maisonneuve were two to six times higher than counts along Sherbrooke at similar times. Nearly 500 bikes passed through Greene and de Maisonneuve between 4:30 and 5:30 pm on a weekday at the end of June.

Fifty-two survey respondents who were cyclists specified a route choice for their east-west trips through Westmount. Of those, the vast majority—77%—chose the de Maisonneuve bike path. Safety and enjoyment, rather than directness or speed, were the reasons most often given for choosing this route. Given the considerable bicycle traffic along de Maisonneuve, and the relatively few injuries to cyclists and pedestrians documented there, this perception of safety appears largely accurate.

Nonetheless, several problems with the existing bicycle path were identified. The failure of most cyclists to stop at intersections with four-way stops was identified through interviews, observations and survey responses. However, it is not clear whether this poses a danger, either to cyclists or other road users. An interview with a police officer revealed that these signs may represent an inappropriate use of traffic control devices as traffic calming measures, and that this type of signage may contribute to disrespect for traffic signals. He also mentioned that the stop signs in Westmount Park are not enforceable under any existing law.

The intersection of de Maisonneuve and Claremont, where the bicycle path changes from a physically-separated, bi-directional path on the south side to two painted uni-directional lanes, was identified as problematic. Special attention was also paid to interactions between cyclists and pedestrians in Westmount Park. Conflicts at the stop signs within the park were not observed to be a specific problem; cyclists generally treated them as yield signs, while crossing pedestrians were reminded to look for passing cyclists.

## Broader Issues

There are certain factors over which the City of Westmount exercises little direct control, yet which have a considerable effect on pedestrian and cyclist safety.

### Road user inattention

The use of electronic devices has been shown to dramatically decrease one's safety while driving, cycling or simply crossing the street and was raised by interviewees and survey respondents. While cell phone usage while driving is illegal, these laws have not rendered this behaviour a societal taboo. With the proliferation of cell phone and portable MP3 technology, enforcement of existing laws and awareness campaigns may be the only options available.

### Seasonal hazards

Key informants and several survey respondents identified unique winter hazards for pedestrians. These included sidewalk plows and the icy winter conditions themselves. Recognizing the potential for pedestrians, especially children and seniors, to be hurt or killed by snow plows, key informants and survey respondents called for more caution on the part of operators.

### Topography

This factor was identified as affecting primarily cycling safety. A handful of survey respondents and key informants noted that because of Westmount's steep north-south streets, cycling traffic is most common on east-west routes and Côte St. Antoine is used as a less physically challenging link between upper and lower Westmount in both directions. One proposed solution was to create a two-way bike route on that street.

## Conclusion and Policy Implications

As noted in this study, a wide variety of human and environmental factors influence road safety. This study has revealed several key findings:

- In Westmount, roads are already relatively safe and any single strategy is unlikely to have a dramatic effect on observed or perceived levels of safety; the types of problems that remain to be addressed may not be “low-hanging fruit.”
- While the perceived level of danger is highest in central Westmount, the greatest number of traffic-related injuries tend to occur in clusters at or just beyond the City’s boundaries;
- Women and the elderly tend to perceive danger more acutely;
- Key risk factors include traffic speed and volume, non-compliance with traffic laws, and inappropriate traffic signals and signage;
- The de Maisonneuve bike path has a lower rate of pedestrian and cyclist injuries than many other locations in Westmount; however, its design and signage may still be improved;
- The relatively high rates of cyclist injury and low rates of bicycle usage suggest perceptions of risk by cyclists are largely accurate; the greatest gains in safety may be made by improving the safety of cyclists in Westmount.

Based on these findings, the authors of this report recommend the following:

- That Westmount partner with the City of Montreal and the provincial government to develop more effective road safety education campaigns;
- That Westmount partner with the City of Montreal to improve road and intersection design at high-accident areas at the periphery of Westmount, including along Atwater and the Décarie Expressway;
- That Westmount continue to develop its network of cycling paths, building on the new link to the Lachine Canal, to provide more safe, legal route choices;

- That Westmount investigate traffic-calming measures that could be effective alternatives to stop signs in many parts of lower Westmount;
- That Westmount, in partnership with other levels of government, raise awareness of the dangers of the use of electronic devices while driving, cycling and walking;
- That Westmount re-visit the design and signalization of the cycling path near Claremont and Vendôme station, in partnership with the borough of Côte-des-Neiges-Notre-Dame-de-Grâce;
- That Westmount investigate possible changes to pedestrian “scrambles” to make the signals clearer and the intersections safer.

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## Endnotes

- 1 The authors would like to acknowledge the students who helped with data collection: Alex Carruthers, Stephen Charters, Molly Johnson, Jill Lance and Jill Merriman.
- 2 These intersections were Clarke and Sherbrooke, Victoria and Sherbrooke, Greene and de Maisonneuve, Academy and de Maison-neuve, and the stop sign in Westmount Park where a pedestrian walkway crosses the bicycle path.

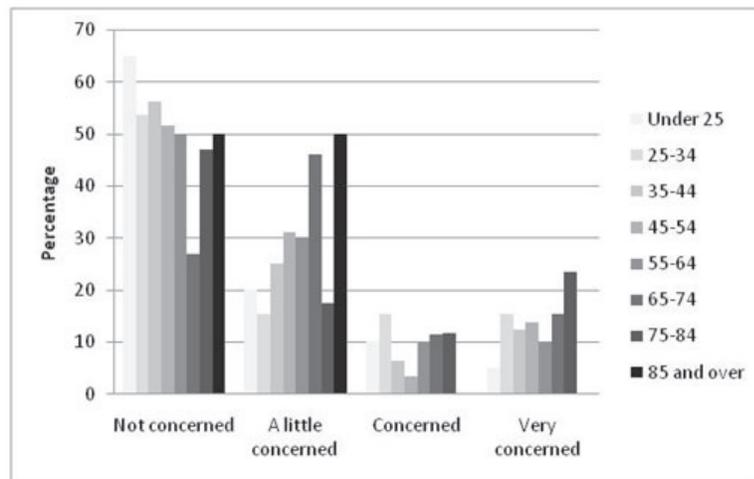
## Appendices

Street 1	Street 2	Injured pedestrians
BOUL DECARIE	RUE SHERBROOKE O	11
AV ATWATER	AV ATWATER	9
AV GREENE	RUE SAINTE CATHERINE O	6
AV ATWATER	AV ATWATER	5
AV HINGSTON	RUE SHERBROOKE O	5
AV WILSON	RUE SHERBROOKE O	5
AV WOOD	BOUL DE MAISONNEUVE O	4
AV MONKLAND	AV GIROUARD	4
RUE SHERBROOKE O	AV STRATHCONA	3
RUE SHERBROOKE O	AV GREENE	3
RUE SHERBROOKE O	AV VICTORIA	3
RUE SHERBROOKE O	AV CLAREMONT	3

Appendix 1. Most frequent locations of pedestrian injuries

Street 1	Street 2	Injured cyclists
AV ATWATER	RUE SAINT ANTOINE O	12
AV ATWATER	RUE SAINTE CATHERINE O	6
RUE SHERBROOKE O	BOUL DECARIE	5
AV ATWATER	BOUL DE MAISONNEUVE O	5
RUE SHERBROOKE O	AV NORTHCLIFFE	4
RUE SAINT JACQUES	RUE SAINT JACQUES	4
BOUL DE MAISONNEUVE O	AV GROSVENOR	4
RUE SHERBROOKE O	AV GREY	3
RUE SHERBROOKE O	AV MARLOWE	3
AV ATWATER	BOUL RENE LEVESQUE O	3
BOUL DE MAISONNEUVE O	AV KENSINGTON	3
CH DE LA COTE SAINT LUC	AV SOMERLED	3
AV SOMERLED	AV MARCIL	3

Appendix 2. Most frequent locations of cyclist injuries



Appendix 3. Concern for safety when walking, by age group



