Image: The Toronto Star

Examining the impact of cycle lanes on cyclist-motor vehicle collisions in Toronto, Ontario

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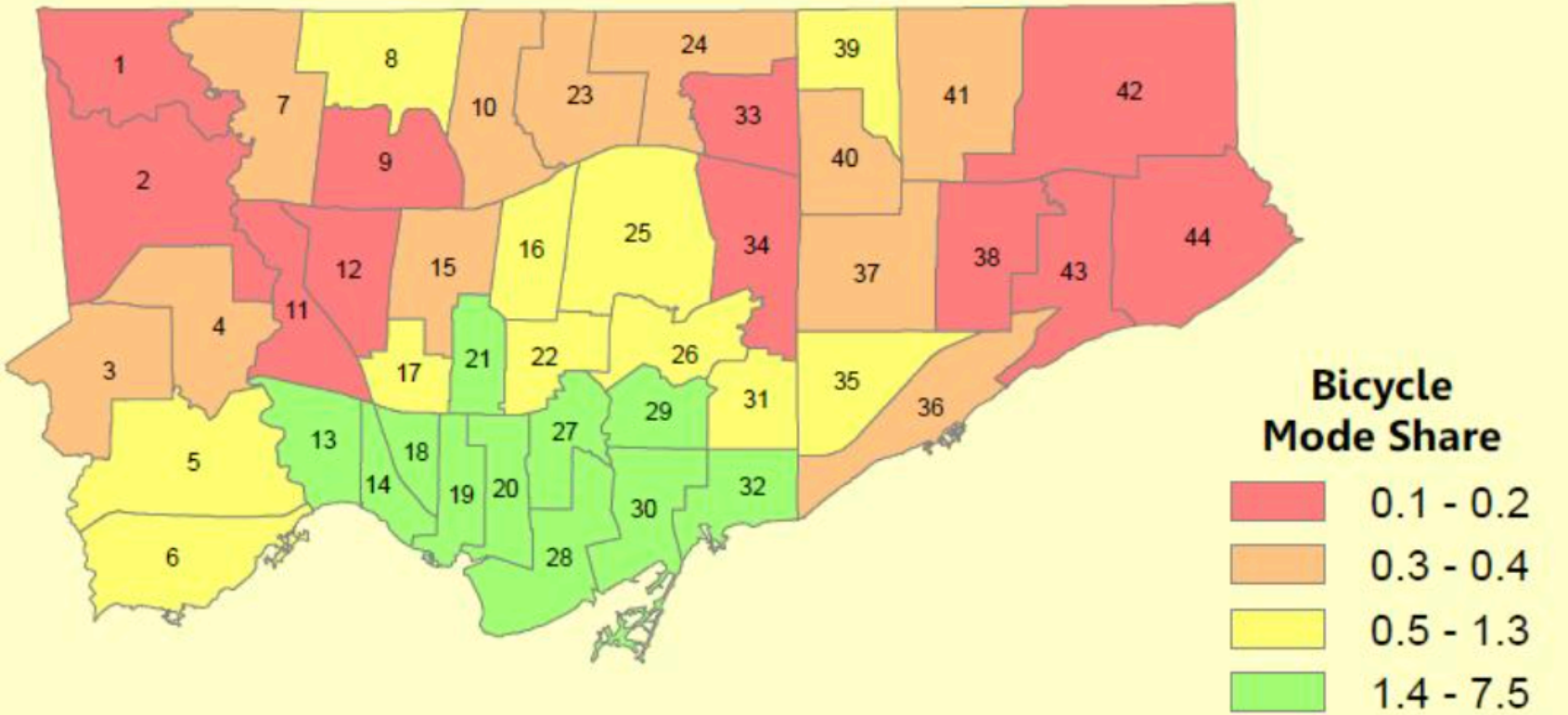
Introduction

The proportion of people riding their bike to work or school in Toronto increased by over 30% between 2001-2006 and continues to increase.

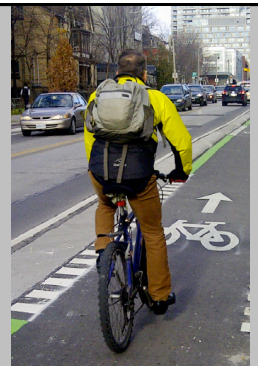
The majority of utility and commuter trips in Toronto occur in and around the downtown core.

Introduction



Toronto Cycling Think & Do Tank. *Mapping Cycling in Toronto*. 2013.

Introduction

	Signed Routes	Cycle Lanes	Sharrow Lanes	Cycle Tracks	Multi-Use Trails
					
Network Length	302 km	207 km	21.3 km	6.3 km	294 km
On-Road	✔	✔	✔	✔	
Visual Separation		✔		✔	✔
Spatial Separation				✔	✔
Reserved for Cyclists		✔		✔	

How can cycle lanes/tracks work?

Visual separation – promote driver attentiveness

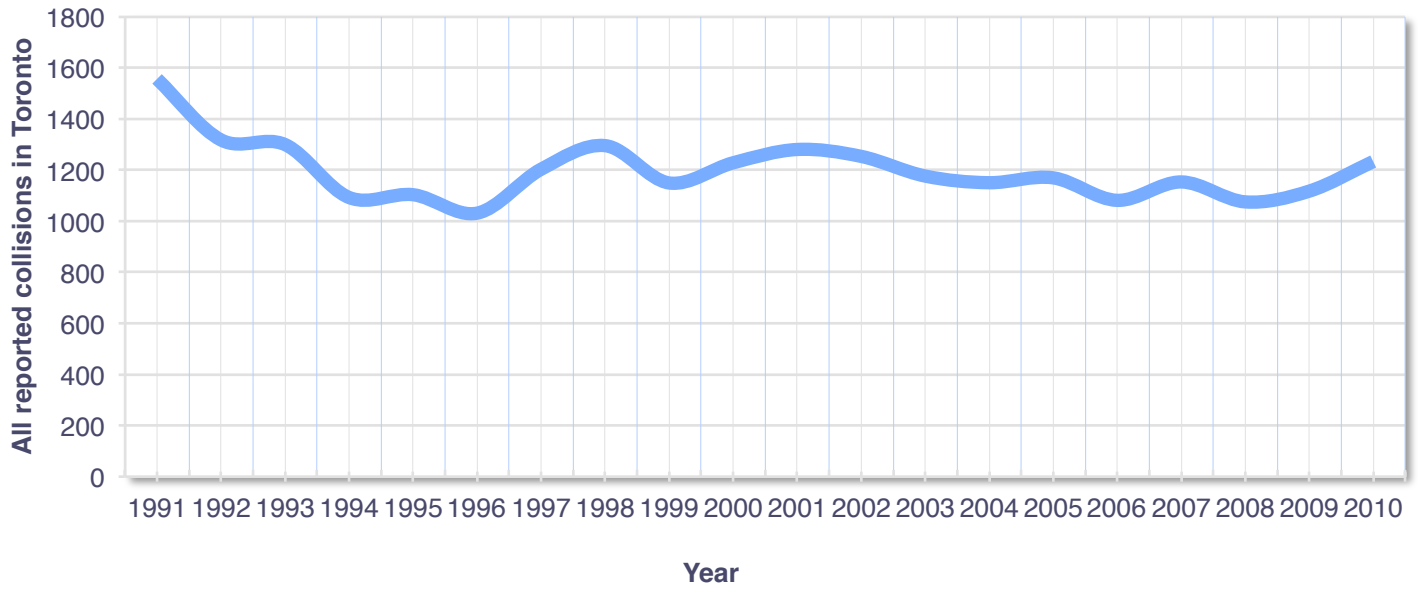
Physical separation – reduce the frequency of cyclists and motor vehicles crossing paths

Removal of on-street parking – reduced risk of “dooring” collisions

Safety in numbers – individual risk decreases as number of cyclists increase

Rationale

Despite an increase in cycling infrastructure, no drastic change in # of collisions between cyclists and motor vehicles.



Rationale

Lack of strong evidence concerning the use of painted cycle lanes – which make up >200 km of Toronto's network.

Objective

To determine the change in collision frequency and injury severity after the installation of cycle lanes on high-volume roadways.

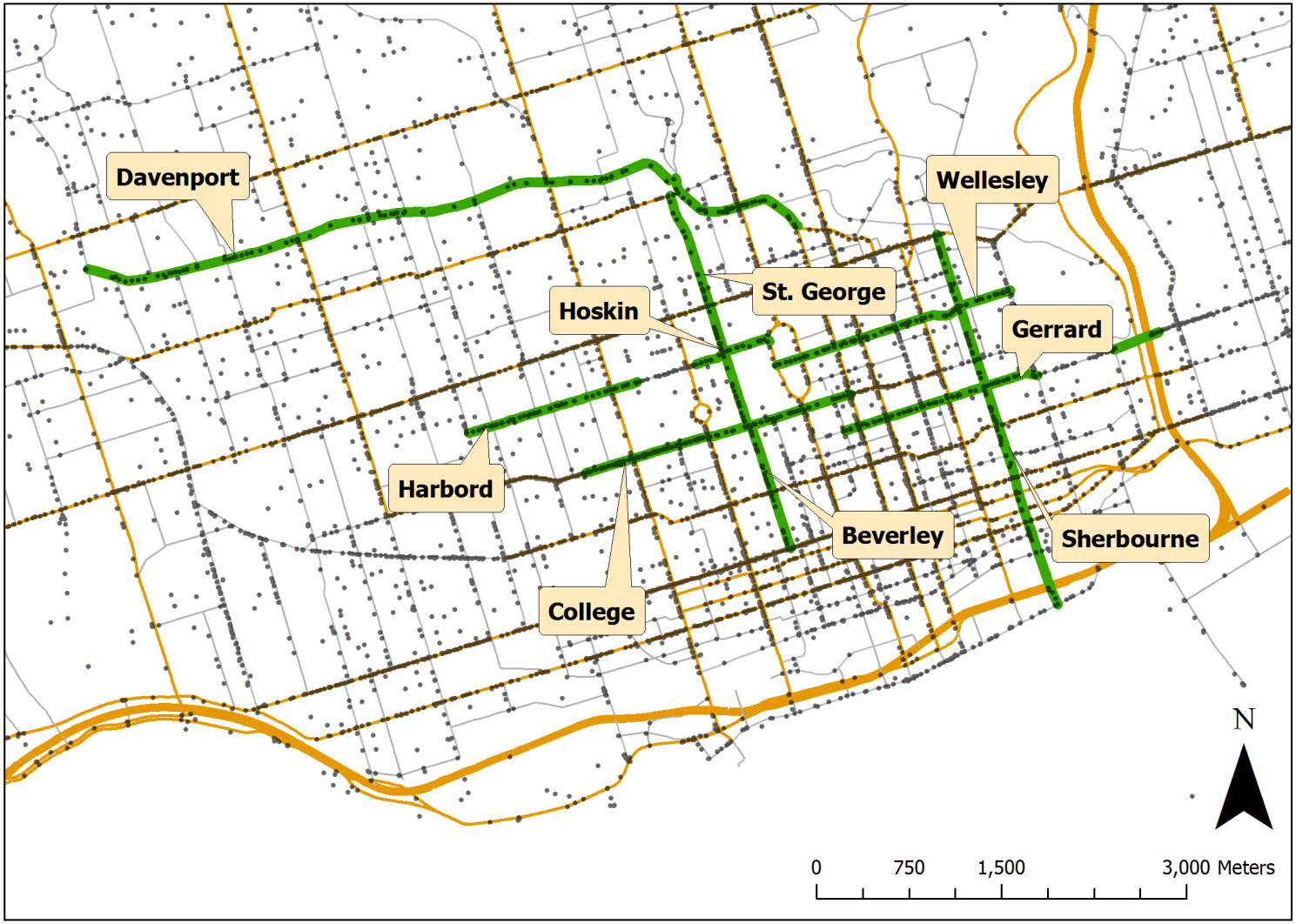
Methods

- **Data Sources**
  - City of Toronto, police-reported CMVC reports (1991-2010)
  - City of Toronto, 7 high-traffic cycle lanes in Toronto (>100 reported collisions between 1991 and 2010)
- **Unit of Analysis**
  - Segment-Month
- **Analysis**
  - Quasi-experimental pre-post design
  - Zero-inflated Poisson regression analysis, adjusting for month of collision and lane segment

Results

- 23,959 collisions between cyclists and motor vehicles were reported in the City of Toronto
- 329 of these occurred on the 7 lane segments included in this analysis
- 180 were pre-installation and 149 were post-installation.

Downtown Toronto cycle lanes and CMVCs (1991-2010) (n=23,959)



Data Sources: City of Toronto, Toronto Police Service, Jennifer Loo

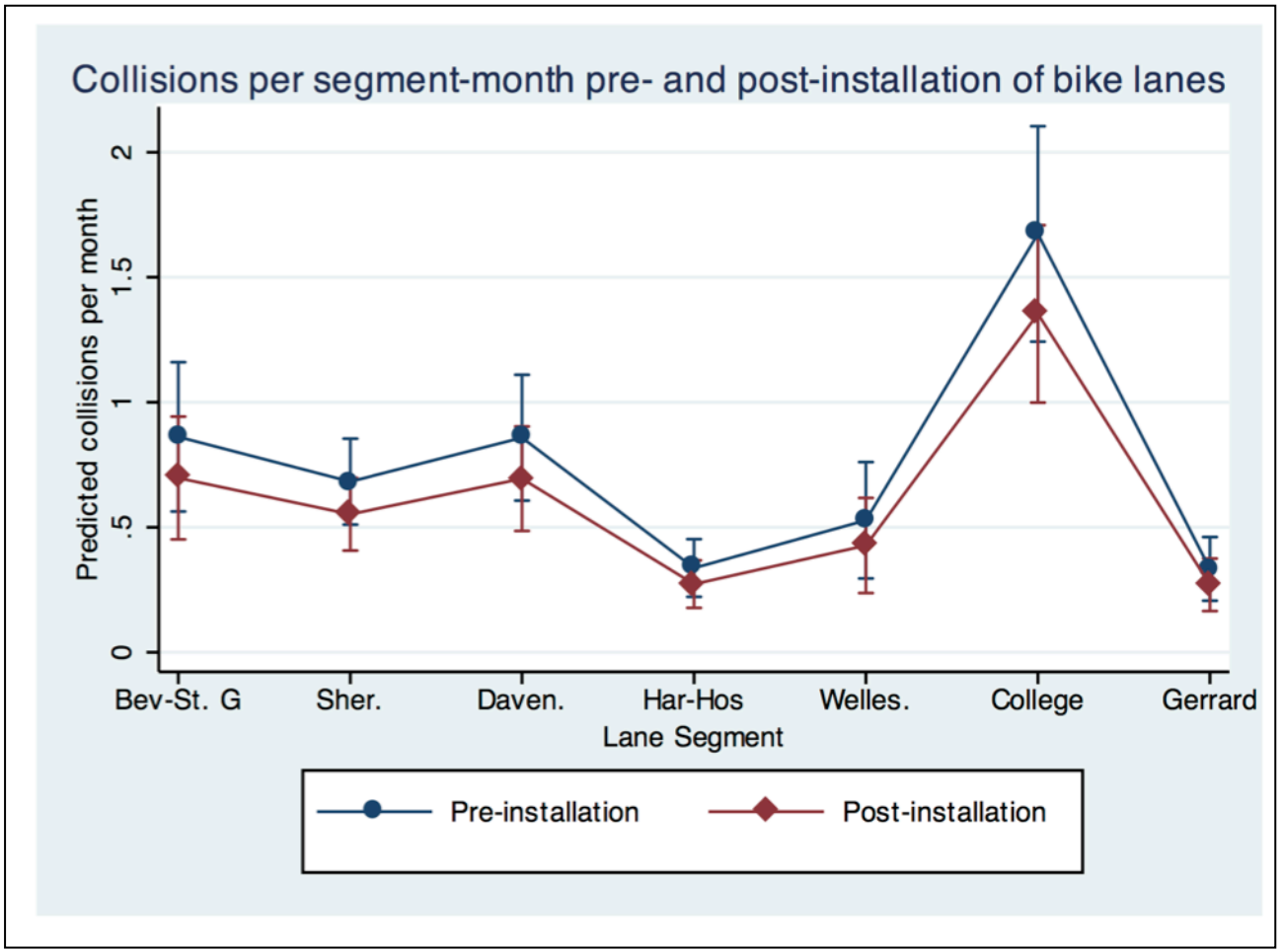
Results – included lane segments

Lane Segment	**Install date** (dd/ mm/yyyy)	**Pre period length**	**Post period length**
BEVERLEY-ST. GEORGE	**01/08/1993**	2 years	2 years
SHERBOURNE	**01/09/1996**	2 years	2 years
DAVENPORT	**01/05/1994**	2 years	2 years
HARBORD-HOSKIN	**01/08/1997**	2 years	2 years
WELLESLEY	**01/11/2008**	2 years	2 years
COLLEGE	**01/10/1993**	2 years	2 years
GERRARD	**01/08/1995**	2 years	2 years

Results – Analysis

	IR per 100 segment-months (pre)	IR per 100 segment-months (post)	Model IRR	
All lanes	65.22	53.99	0.8109 (0.65, 1.01)	
Beverley-St. George	91.7	62.5	**Change in collision freq. per 100 months:**	-16 (-34, 2.0)
Sherbourne	61.7	63.3		-13 (-27, 1.0)
Davenport	85.8	64.2		-16 (-34, 12)
Harbord-Hoskin	33.3	28.3		-6.0 (-13, 1.0)
Wellesley	58.3	33.3		-10 (-21, 1.0)
College	179.2	145.8		-32 (-66, 2.0)
Gerrard	31.25	29.2		-6.0 (-13, 1)
No injury	1.087	5.435	5.00 (1.44, 17.28)	
Minimal/minor	24.28	20.29	0.84 (0.58, 1.20)	
Major/fatal	28.98	21.74	0.72 (0.51, 1.01)	

Results – Analysis



Discussion

- Non-significant decreases were observed overall and for collisions causing any injury
- Underestimates the true association due to a lack of viable exposure data
- Commuter cycling has increased in popularity since 1996 by over 50%[2]
- Installing cycle lanes in Toronto has led to an increase in cyclist volume[1]

1. Macbeth, A. G.. ITE Journal, 1999.
2. Statistics Canada., Statistics Tables - Statistics - Reports & Studies, City of Toronto, 2014

Where the evidence fits in

Compared to other studies on the effect of cycle lanes on collision risk:

- Teschke et. al (OR = 0.69, 95%CI: 0.32, 1.48)
- Romanow et. al (OR = 0.64, 95%CI: 0.10, 4.19)
- Egan (IRR = 0.67)

Where the evidence fits in

Injury Prevention:

- Wee et. al: Crashes on roads twice as likely to result in hospitalizations compared to crashes on cycle lanes (RR = 1.97, p=0.023).

- Baker et. al: cycle lanes associated with increased odds of intersection (vs. mid-block) collision, but intersection collision injuries less likely to be severe.

Next steps

- More data needed on cycling volume – control for “funneling” effect and/or model volumes using cross-sectional counts.

- Further research can also look at the distribution of BMVCs along each segment

THANK YOU!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