

What Makes the Gears Go Round?

An Analysis of Factors Influencing Bicycling to Suburban Rail Stations

Matthew Graystone (matthew.graystone@ryerson.ca), Raktim Mitra (raktim.mitra@ryerson.ca) and James Schofield (james.schofield@ryerson.ca), Ryerson University, Toronto, Canada

Research Objectives

GO Transit operates regional bus and rail services in the Greater Toronto and Hamilton Area (GTHA) in Canada. Like many other regional transit agencies, it is faced with a first/last mile challenge in connecting passengers from their points of origin to a transit station.

Currently, 62% of GO Train passengers drive to a station and park.

Planned service enhancements are expected to increase GO Train ridership by 125,000-150,000 passengers. Continued expansion of parking facilities is financially unsustainable and runs counter to efforts to discourage trips by private automobile.

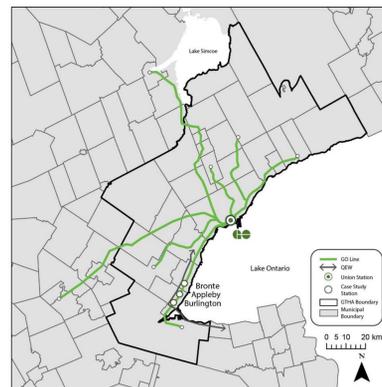
This research explores the potential for cycling the first-mile in a **suburban context** by **examining the various socio-demographic, attitudinal/motivational and built environmental factors that may explain a passenger bicycling to a GO Train.**

Study Area and Data

Currently, GO Trains operate along seven rail corridors centering on Union Station in downtown Toronto.

Passengers at three rail stations - **Burlington, Appleby, and Bronte** - were intercepted near entrances and handed a postcard with an invitation to complete an online survey.

A total of 306 survey responses were received, at a response rate of 19.7%.

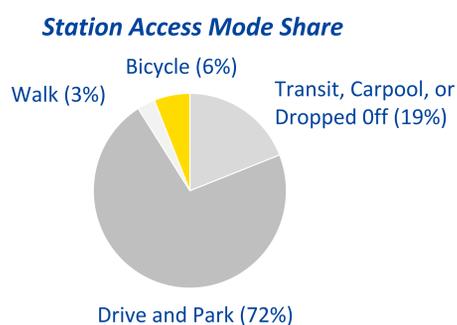


Data Analysis

A principal component analysis (PCA) of 17 survey variables produced 6 components relating to travel motivation, perception and cycling comfort.

A binomial logistic regression approach identified the correlates of bicycling (versus using any other mode) to access a station.

Due to smaller sample size ($n=265$), with few instances of the desired outcome (i.e., bicycling to GO station); a set of Firth-adjusted logistic regression models was used. We estimated partially adjusted models that controlled for variations in a passenger's age and gender.



Results

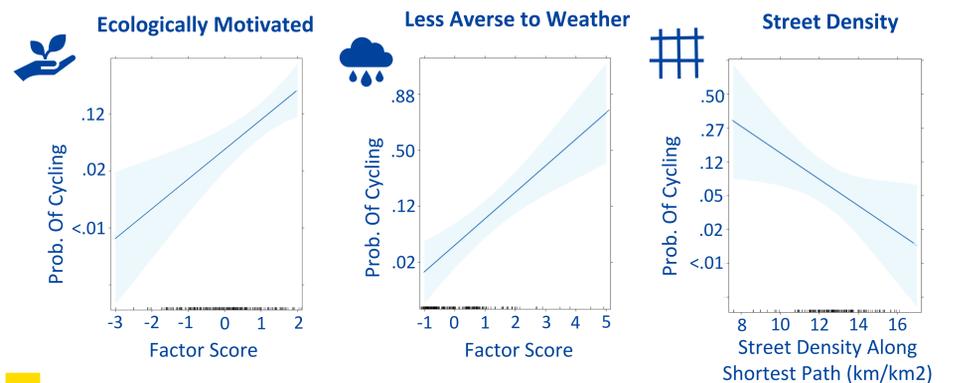
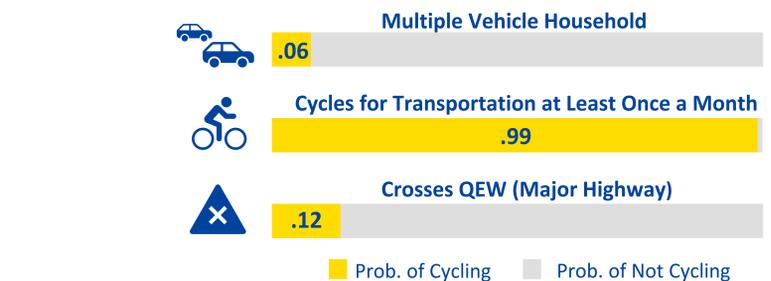
Summary of PCA Components

Components	Survey Variables
Efficiency Motivation	Is it important for you to... (1) get to the GO station as quickly as possible and (2) have flexibility in time leaving for the GO station
Ecological Motivation	Is it important for you to... (1) Choose environmentally sustainable ways to get around and (2) be physically active
End-of-trip Facilities	How important are the following facilities at the GO station? (1) a secure bike parking room (2) change rooms and showers (3) lockers for temporary storage, or (4) bike repair tools and a pump
Weather *Reverse Coded	I will not bicycle when... (1) it's raining (2) it's too cold (3) with ice or snow on the ground, or (4) if it's too hot or humid
High-traffic Comfort	Would you feel comfortable cycling in... (1) a two-lane road with moderate traffic and a painted bike lane (2) a busy arterial road with a painted bike lane, or (3) a busy arterial road with a bike path beside the road
Low-traffic Comfort	Would you feel comfortable cycling in... (1) a quiet residential street with no cycling facilities, or (2) multi-use path, separate from the street

Correlates of bicycling to GO Train station (Firth logistic regression results)

Variable	n	Odds Ratio (95% CI)	Statistically Significant
<i>Socio-demographic characteristics</i>			
Employed fulltime	263		
Student	263		
Household Income	241		
Multiple vehicle household	265	0.14 (0.04 - 0.41)	✓
Frequently cycle for transportation	227	84.26 (18.50 - 816.12)	✓
<i>Travel motivation, perception, and cycling comfort</i>			
Efficiency motivation	261		
Ecological motivation	261	2.83 (1.60 - 5.39)	✓
End-of-trip Facilities	261		
Weather	261	2.57 (1.72 - 4.03)	✓
High-traffic comfort	261		
Low-traffic comfort	261		
<i>Built environment</i>			
Distance	214		
Crossed QEW	214	0.06 (0.01 - 0.25)	✓
Cycle track and painted bicycle lane (DA, km/km ²)	213		
Job-housing balance (DA, # of pop at work/ total # of households)	213		
Percent of residential land use	213		
Population density (DA, pop/km ²)	213		
Street Density (DA, km/km ²)	213	0.68 (0.47 - 0.96)	✓

Marginal prob. of bicycling to GO Station: Effects from partially-adjusted models



Key Findings and Implications

Other than household car ownership, no socio-demographic characteristics were associated with the likelihood of a passenger bicycling to a GO Train station.

Promoting and facilitating a culture where environmentally sustainable travel modes including bicycling are seen more favourably may be a way of increasing cycling rates to suburban rail stations.

With regard to the built environment, key transportation-related barriers, such as highways and street density likely discouraged bicycling for transit access.

The quantity of available cycling facilities and comfort level in different conditions had no impact on cycling, however, a more nuanced examination of the quality of bicycle infrastructure remains a topic for future research.

Many of our findings are contrary to what is expected in urban settings. Our results begin to emphasize the importance of bicycling research specifically focusing on suburban North American context.

Presented at the 99th Annual Meeting of the Transportation Research Board, January 2020 (Paper # 20-01915)

Acknowledgement
This research was supported by the Social Sciences and Humanities Research Council of Canada

