



UNIVERSITY OF CALIFORNIA *Berkeley*
Transportation Sustainability
RESEARCH CENTER

Public Bikes sharing in North America: Early Operator and User Understanding

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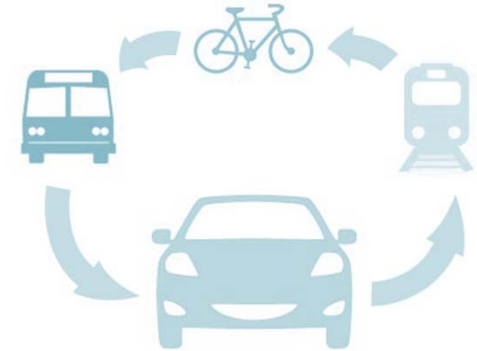
Adam Cohen
University of California, Berkeley

Stanford University
May 17, 2013



Overview

- Public bikesharing defined
- Public bikesharing: history
- Study methodology
- Bikesharing operations in North America
- N. American bikesharing impacts & developments
- Future innovations
- Summary



What is Public Bikesharing?

- Bikesharing organizations maintain fleets of bicycles in a network of locations
- Stations typically unattended, concentrated in urban settings and provide a variety of pickup and dropoff locations
- Allows individuals to access shared bicycles on an as-needed basis
- Subscriptions offered in short-term (1-7 Day) and long-term (30-365 Day) increments



Bikesharing Station Examples



Hubway



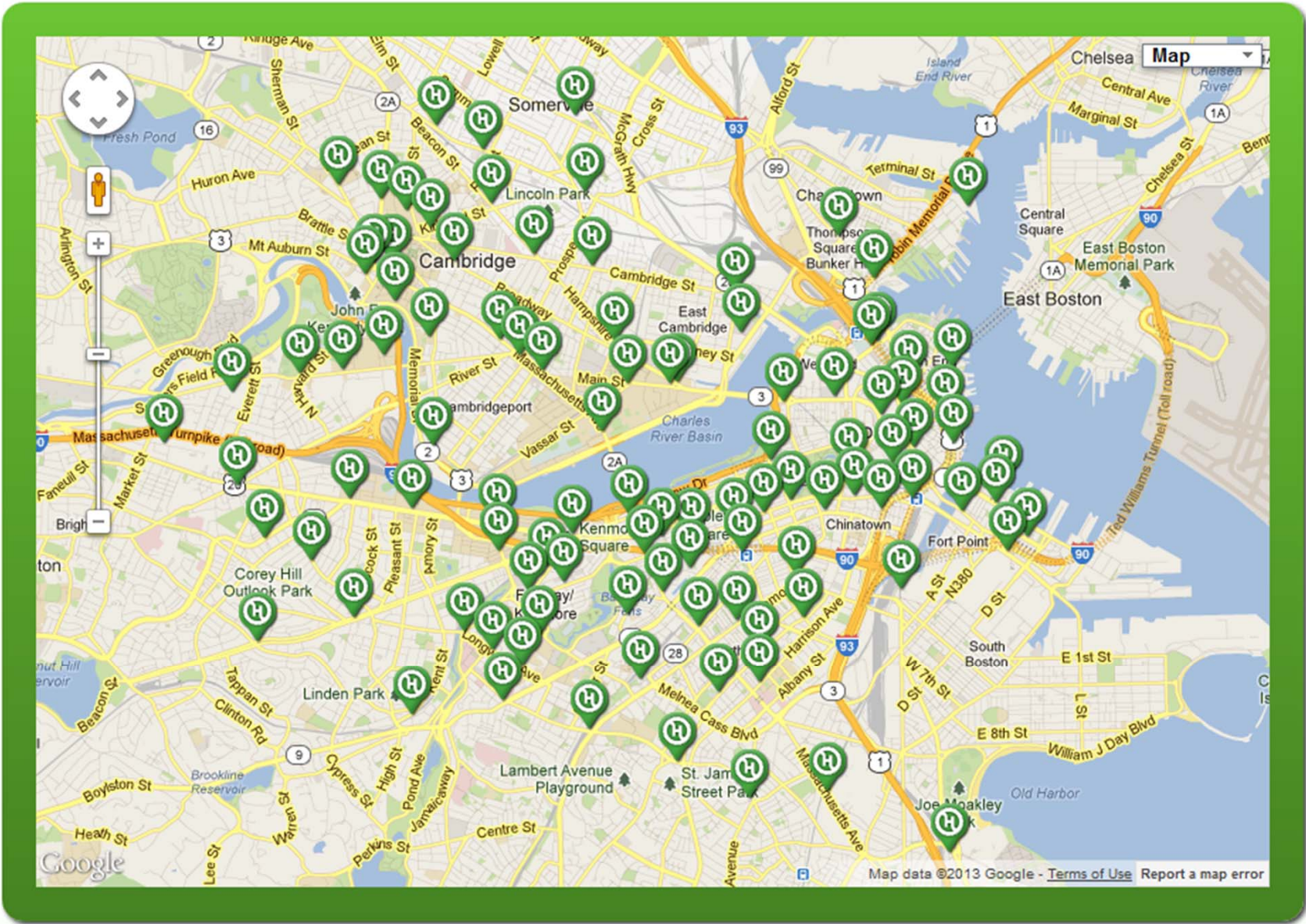
B-cycle

Station Map

In Service Out of Service Planned New *

[Suggest Locations](#)

[Download a Printable Map](#)



Source: Hubway

Bikesharing Generations



- 1st Generation: Free Bikes (“White Bikes”)
 - Demonstration and provided increased mobility
- 2nd Generation: Coin-Deposit Systems
 - Emerged from a need to deter theft and incentivize return.
- 3rd Generation: Information Technology (IT) System
 - Provides real-time information; employs technology to assist in rebalancing demand.
- 4th Generation: Demand-Responsive, Multi-Modal Systems
 - Mobile docking stations; smartcard integration with public transit; bike redistribution innovations; GPS tracking, touchscreen kiosks, and electric bikes.

N. America: Historical Overview

- North America's first IT-based bikesharing system, Tulsa Townies, started operating in 2007 in Tulsa, OK
 - First solar-powered, fully automated docking-based system in the world; provides service free of charge.



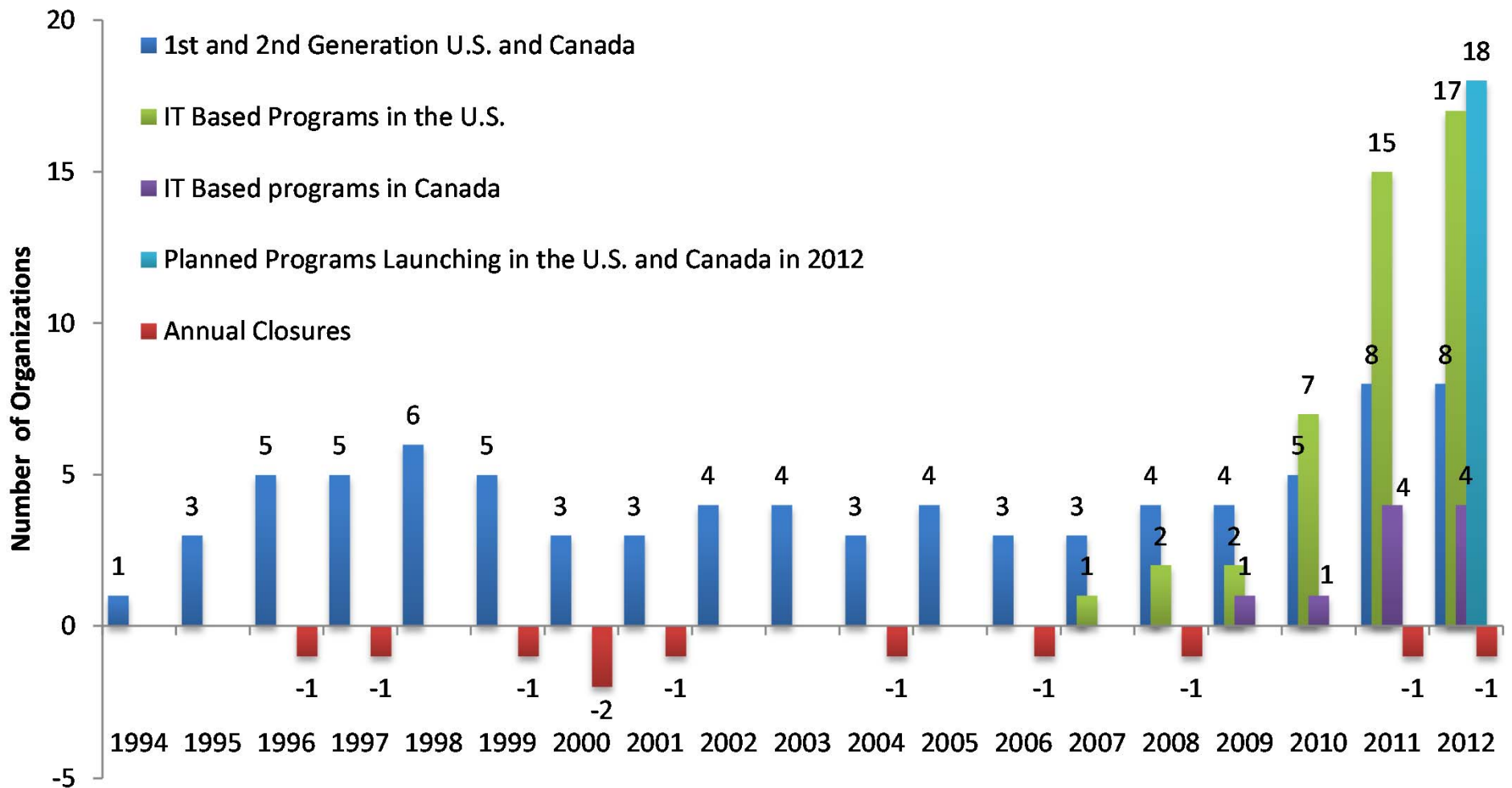
- In Canada, first IT-based public bikesharing system, BIXI (BIcycle-TaXI), began operating in 2009 in Montreal

Study Methodology



- Literature review
- Operator interviews with all 19 North American IT-based programs operational as of April 2012
- Conducted 14 expert interviews with transportation personnel, transit operators, policymakers, and community bike coordinators
- Completed online survey with users of early public bikesharing systems in: Montreal; Toronto; Washington, D.C.; and the Twin Cities (Minneapolis and Saint Paul)
- Analyzed operational data from two American operators for 2011

Startup/Closures: 1994 - May 2012

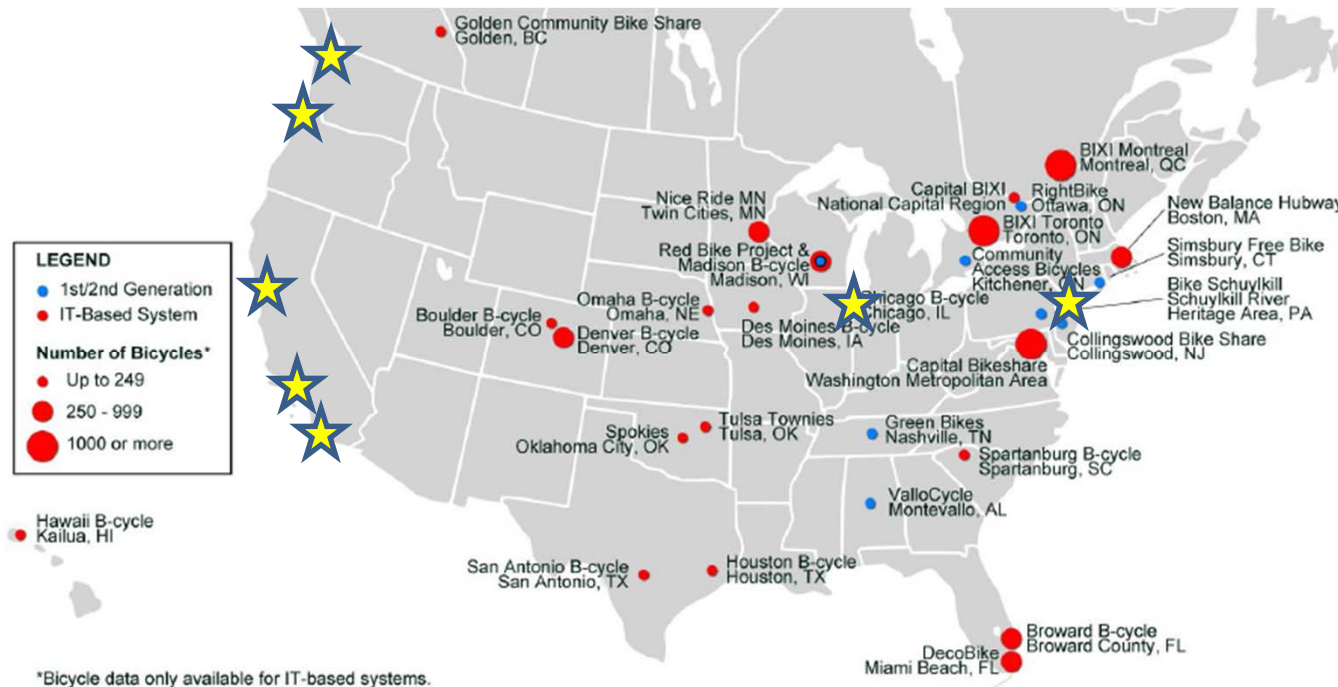


Bikesharing: North America

As of January 2012, 19 IT-based programs:

- 216,422 users and 11,473 shared bicycles

As of May 2012, there were 21 IT-based based operations.



18 more planned in 2012-2013 (NYC, Chicago, LA, SF)

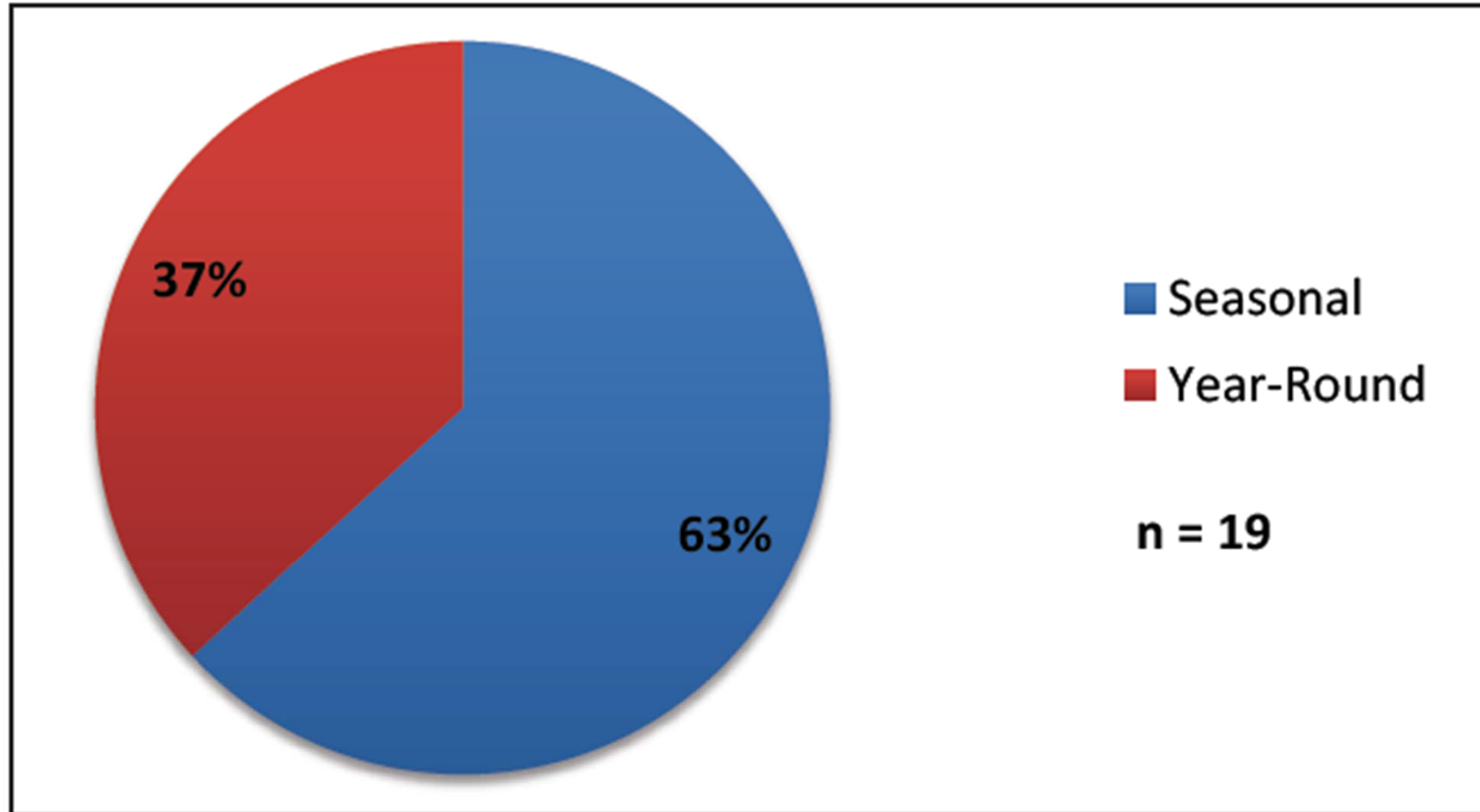
Shaheen et al., 2012

Business Models

1. Non-Profit (e.g., Denver B-Cycle)
 - Start-up and operational funding commonly supported through grants, sponsorships and loans
2. Privately Owned and Operated (DecoBike)
3. Publicly Owned and Operated (Golden Community Bike Share)
4. Publicly Owned and Contractor Operated (e.g., Capital Bikeshare)
5. Street Furniture Contract (SmartBike DC—closed)
6. Third-Party Operated (e.g., Chicago B-Cycle)
 - Profit-sharing agreement operated with local business
7. Vendor Operated (Bike Nation)
 - Operated by the same company that designs/manufactures system equipment

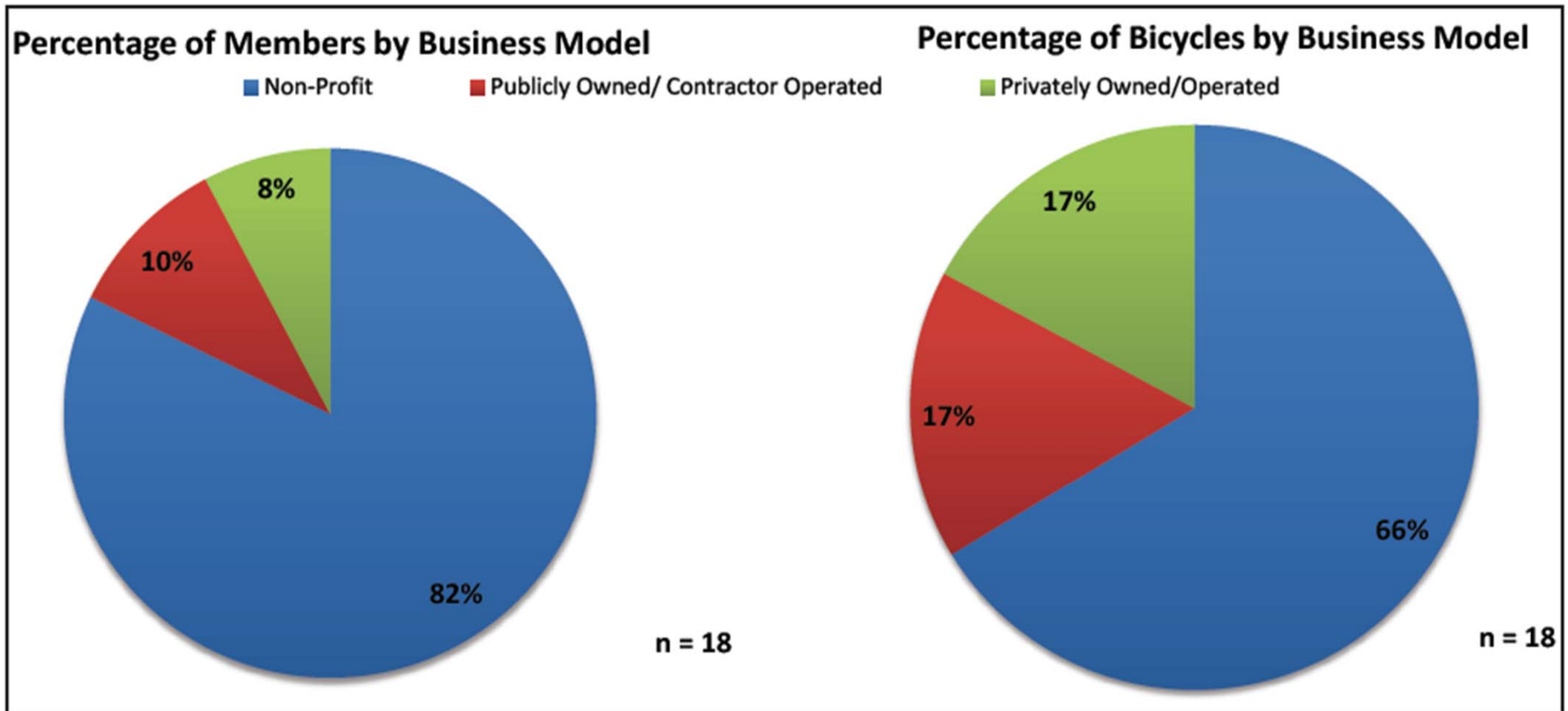


Seasonal vs. Year-Round Operations



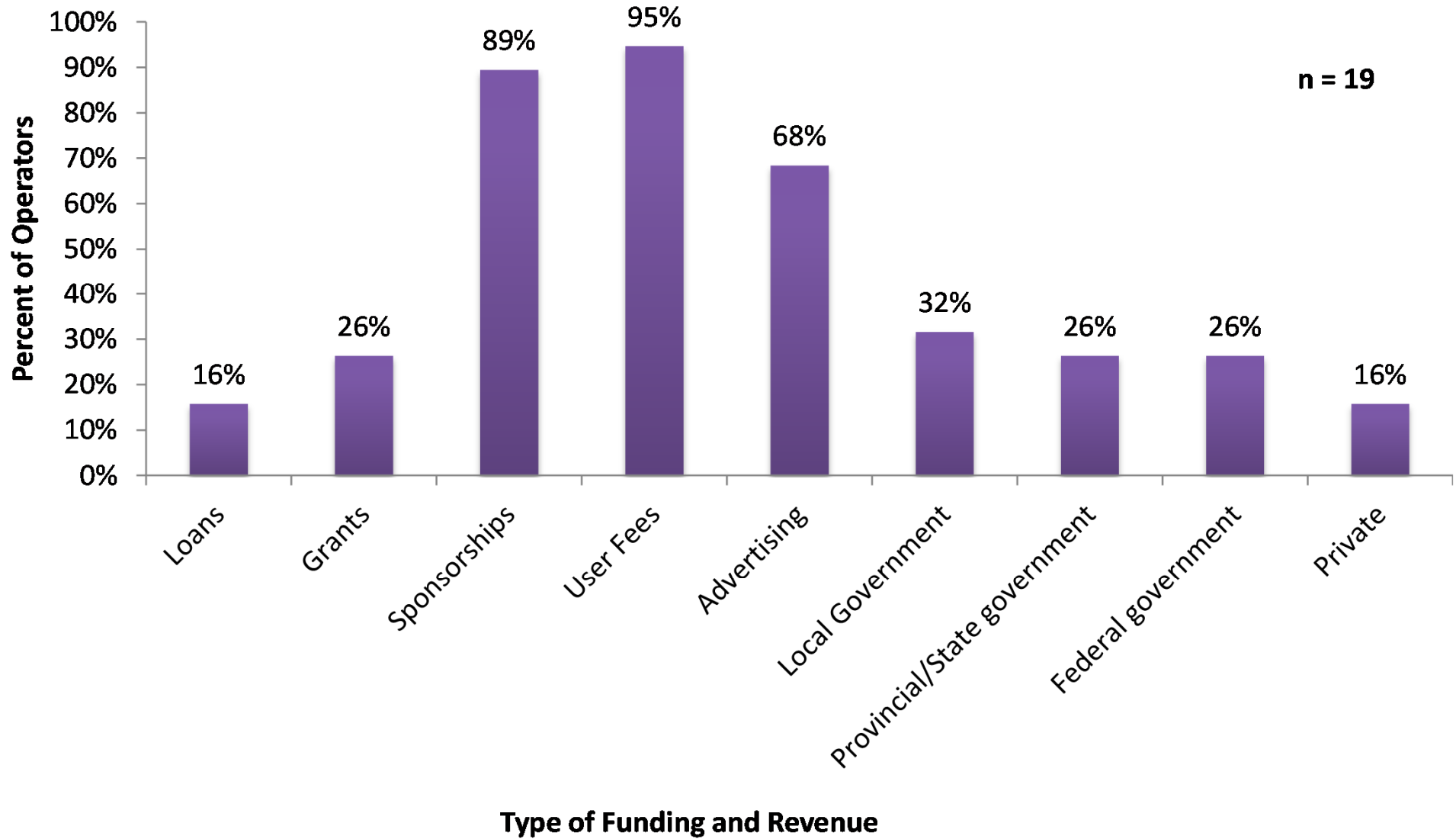
Shaheen et al., 2012

Business Models

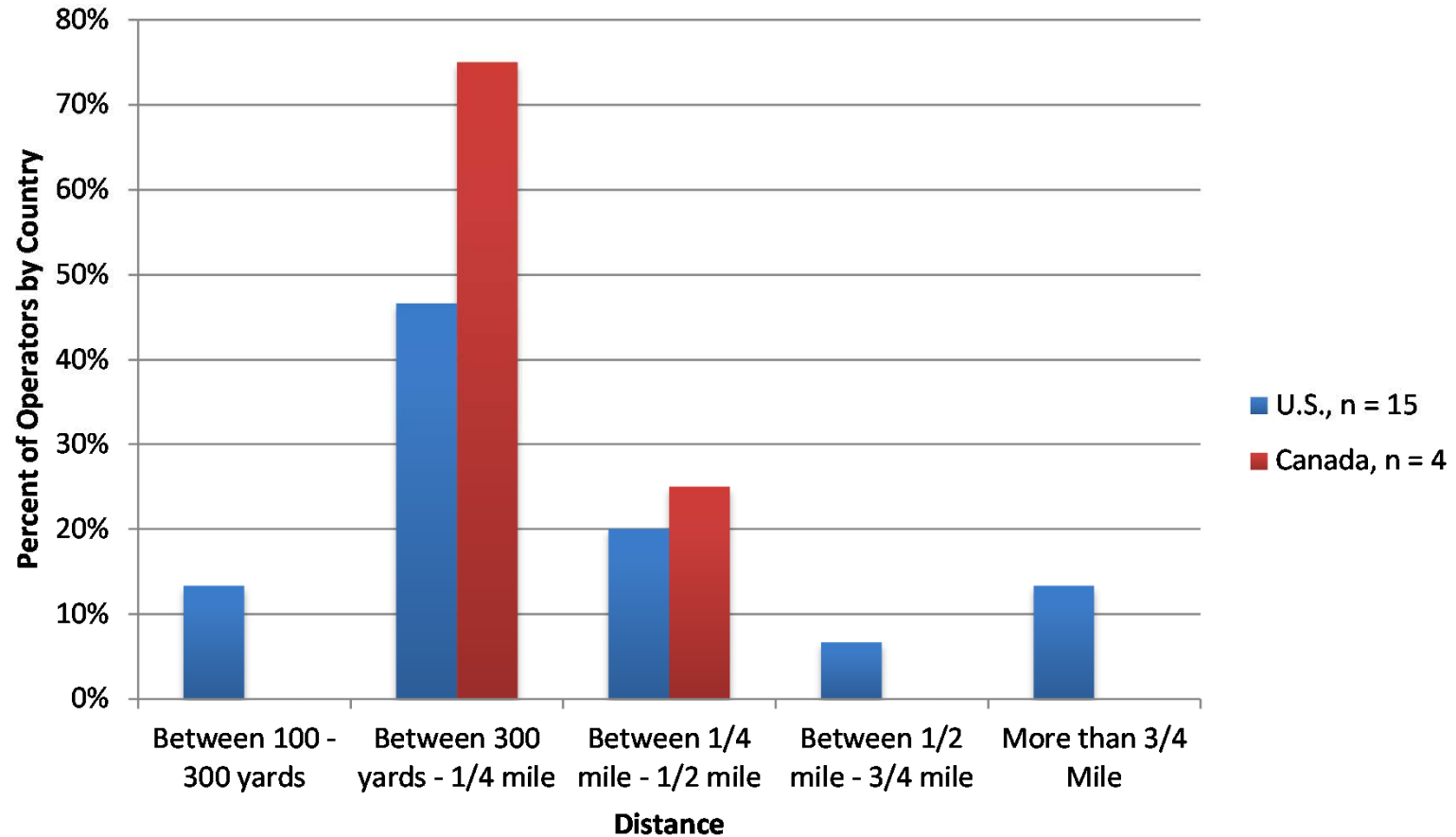


Shaheen et al., 2012

Types of Funding/Revenue Sources

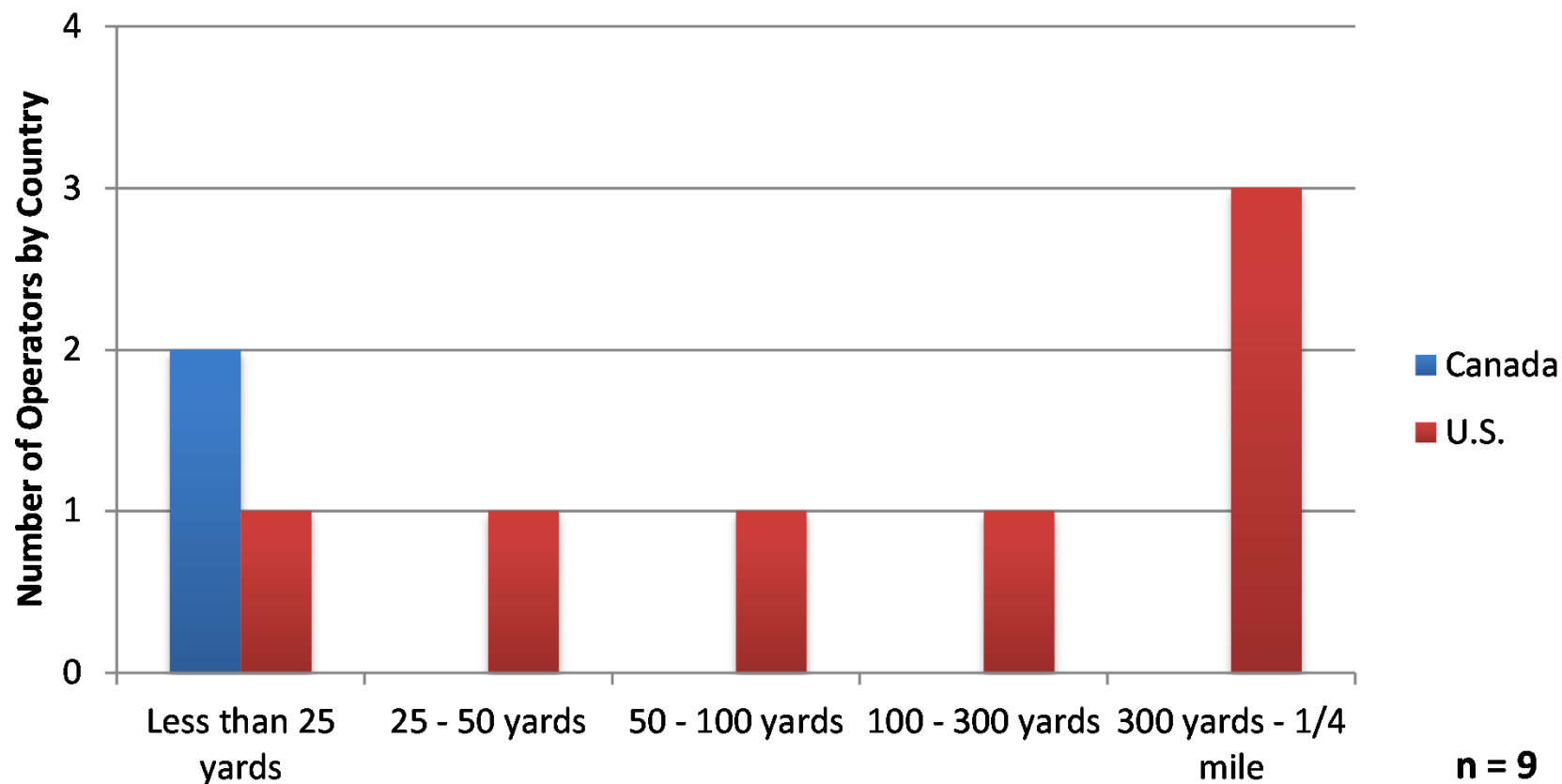


Optimum Distance Between Docking Stations



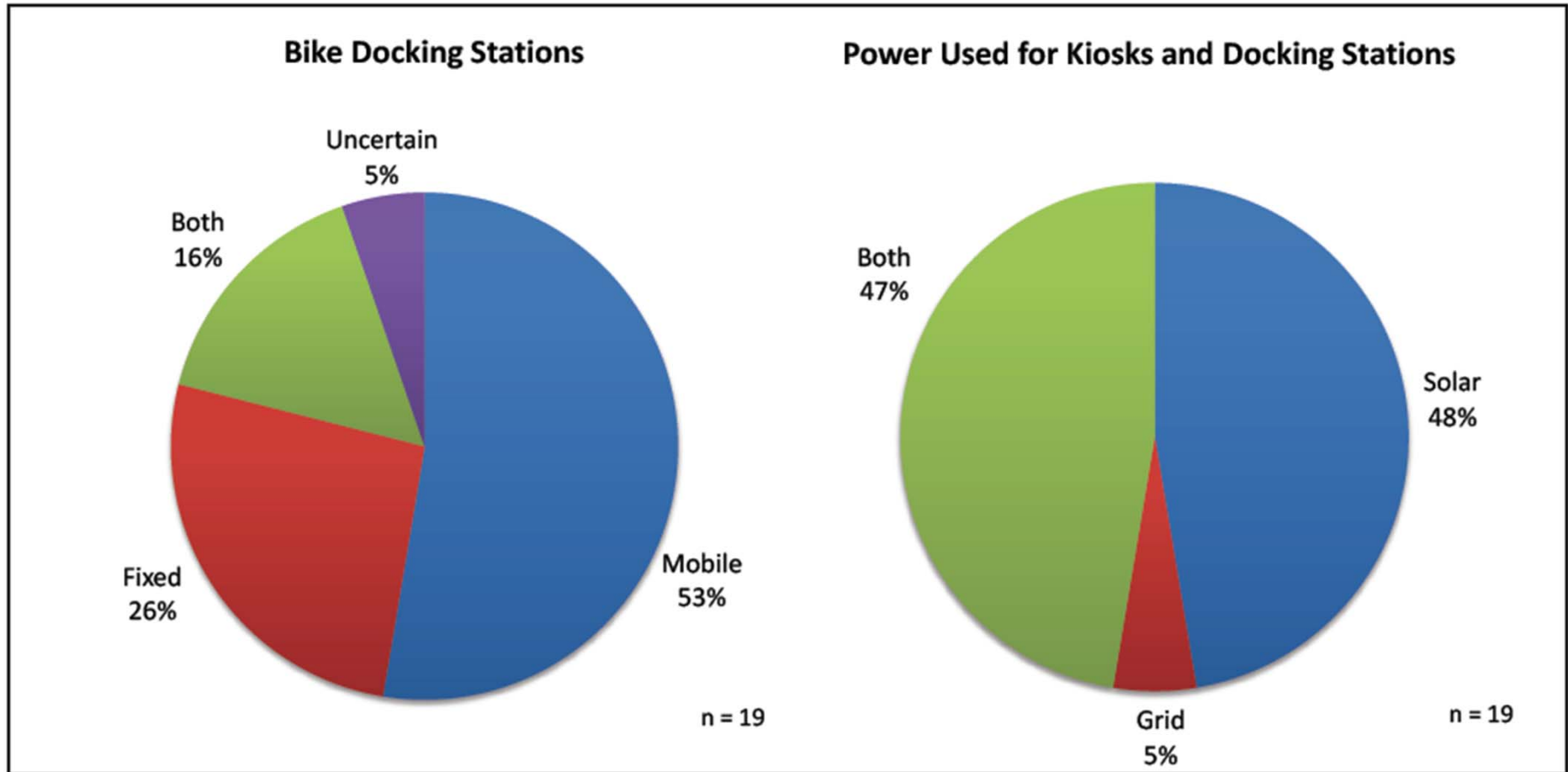
Shaheen et al., 2012

Optimum Distance From Public Transit



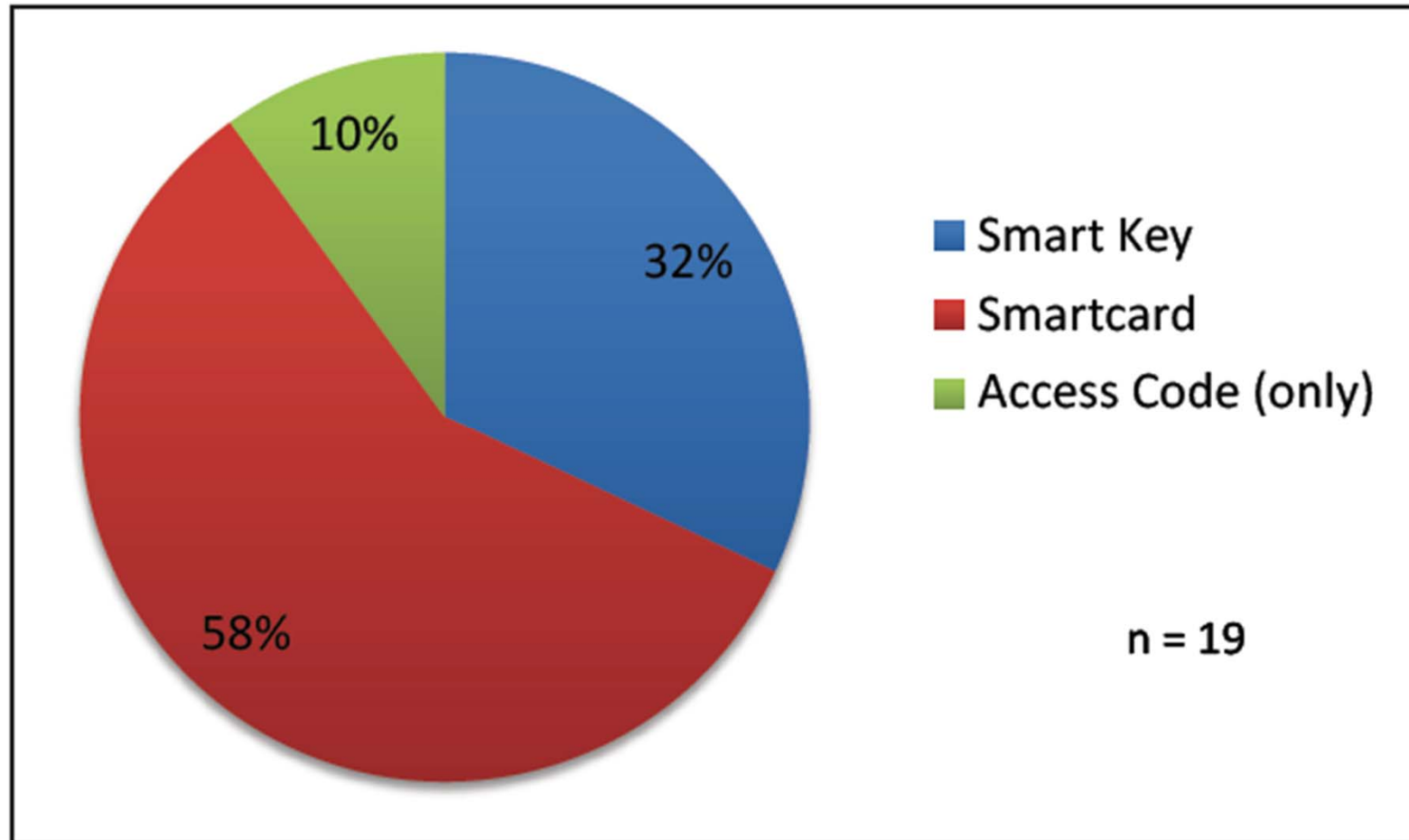
Shaheen et al., 2012

Docking Station Features



Shaheen et al., 2012

Bicycle Access



Shaheen et al., 2012

Bikesharing Impacts

	Data (Year)	Trips Per Day	KM Per Day	CO ₂ Reduction (Kg Per Day)
BIXI Montreal	2011	20,000	50,000	8,760
		Trips Per Year	KM Per Year	CO ₂ Reduction (Kg Per Year)
Boulder B-Cycle	2011	18,500		47,174
Denver B-Cycle	2011	202,731	694,942	280,339
New Balance Hubway (Boston)	2011	140,000		
Madison B-Cycle	2011	18,500		46,805
San Antonio B-Cycle	2011	22,709		38,575

Shaheen et al., 2012

Member Survey: Overview

Fall 2011/Early 2012

Program	Users	Bicycles	Stations	Sample Size
Capital Bikeshare (D.C.)	18,000	1,200	130	5,248
Nice Ride Minnesota (Twin Cities)	3630	960	116	1238
BIXI-Montreal	40,000	5,120	411	3,322
BIXI-Toronto	4,000	1,000	80	853

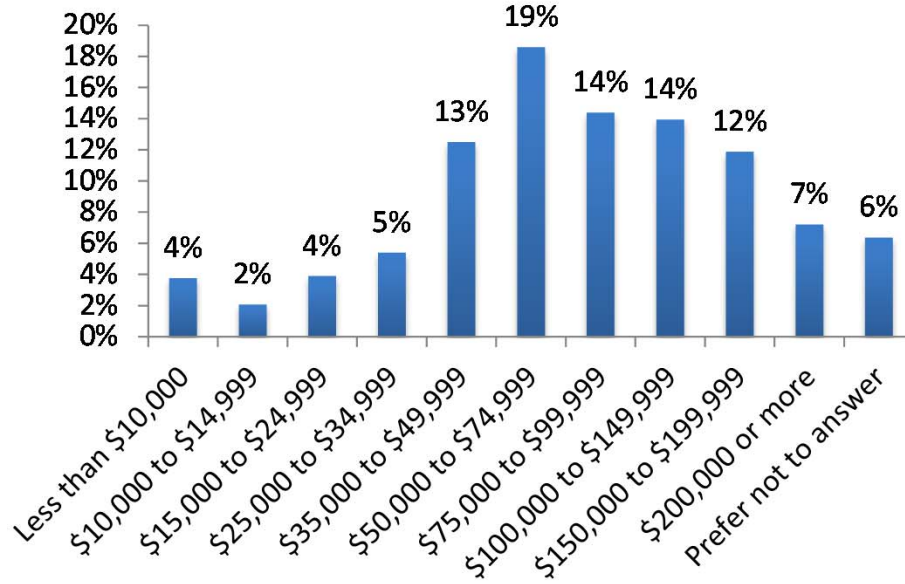
Shaheen et al., 2012

Basic City Statistics of Member Survey

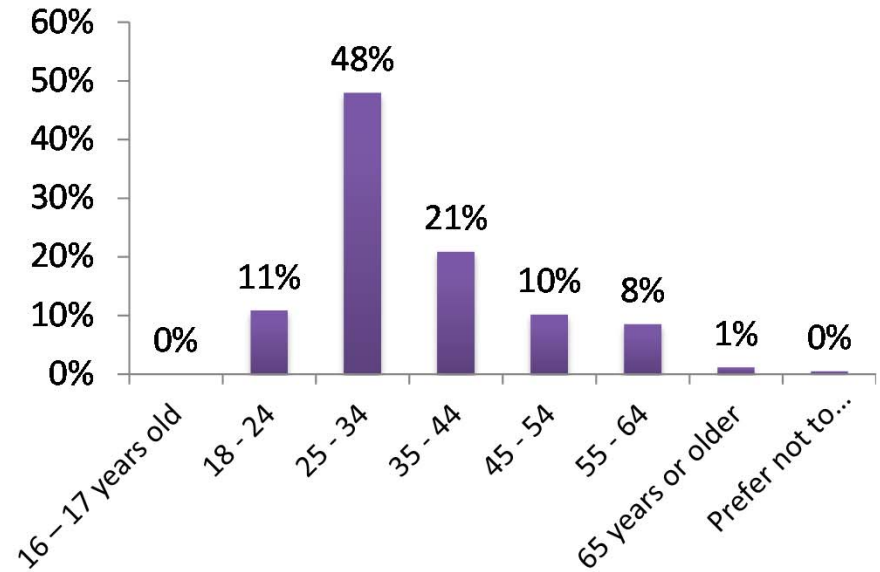
Transit Facts	Washington, D.C.	Toronto	Montreal	Minneapolis-St.Paul
Kilometers of Rail Track	341	373	122	40
Number of Buses	1,495	1,811	1,600	885
Number of Rail (or Metro) Cars	1,106	951	759	27
Unlinked trips	418,125,650	477,357,000	388,600,000	78,048,647
Population Facts	Washington, D.C.	Toronto	Montreal	Minneapolis-St.Paul
Population	601,723	2,503,281	1,620,693	667,646
Area (km ²)	177	630	365	288
Population Density (pop/km ²)	3,400	3,972	4,439	2,317
Year of Data	2010	2010 (transit) 2006 (population)	2010 (transit) 2006 (population)	2010

Distribution of Key Demographics

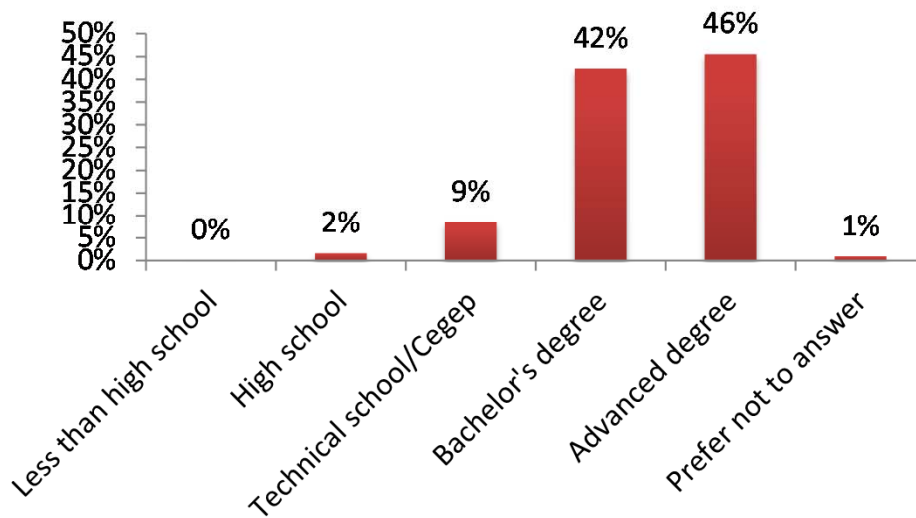
Income



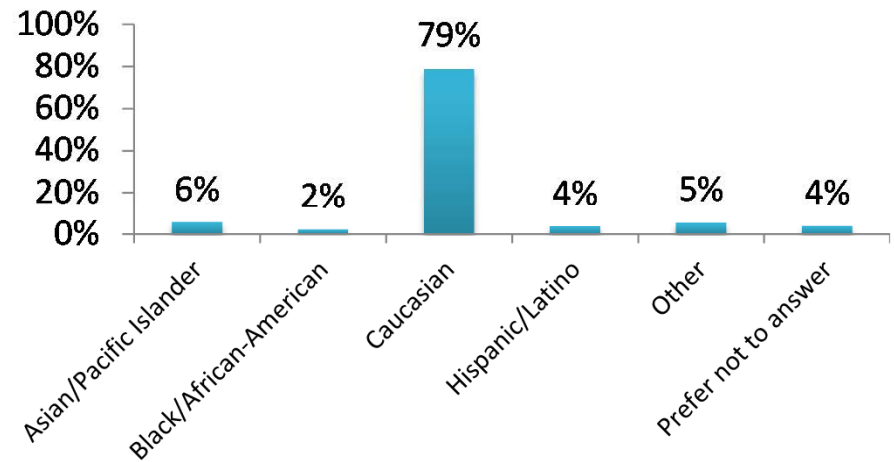
Age



Education

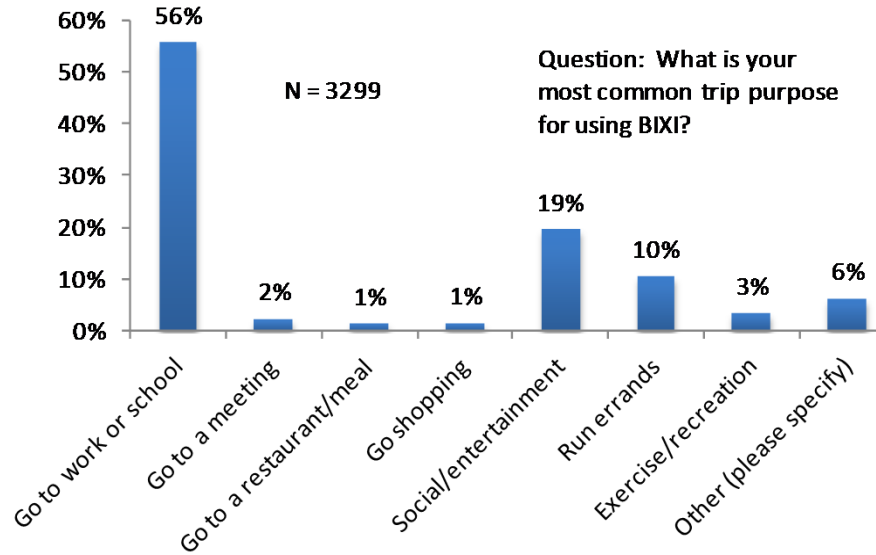


Race/Ethnicity

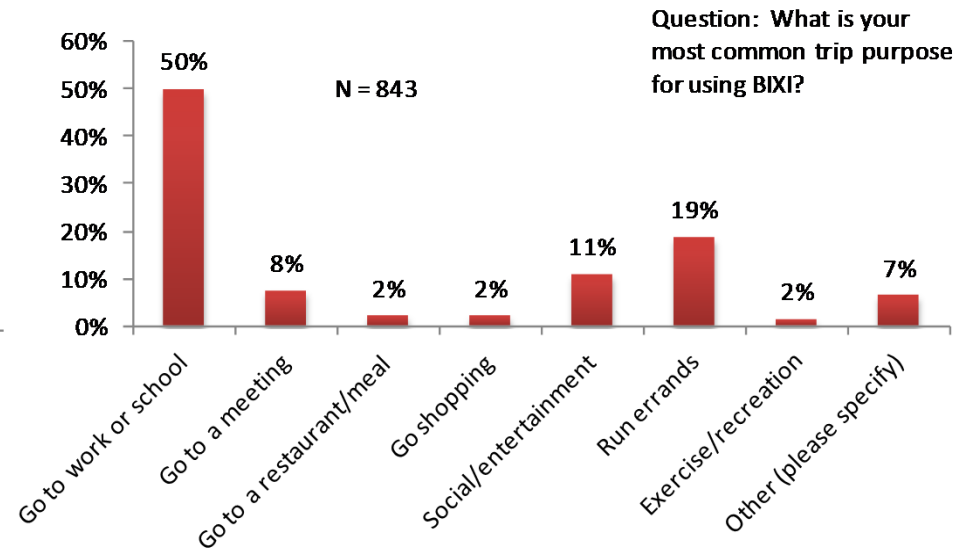


Bikesharing Trip Purpose

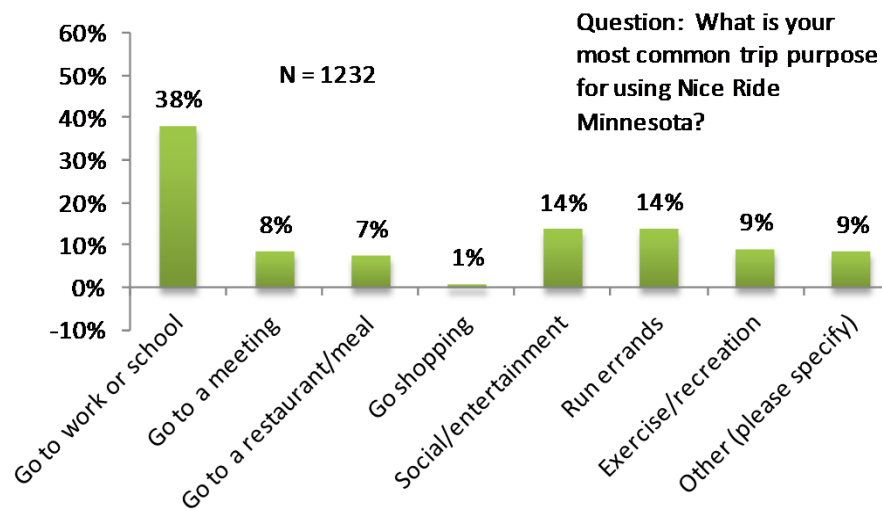
Montreal



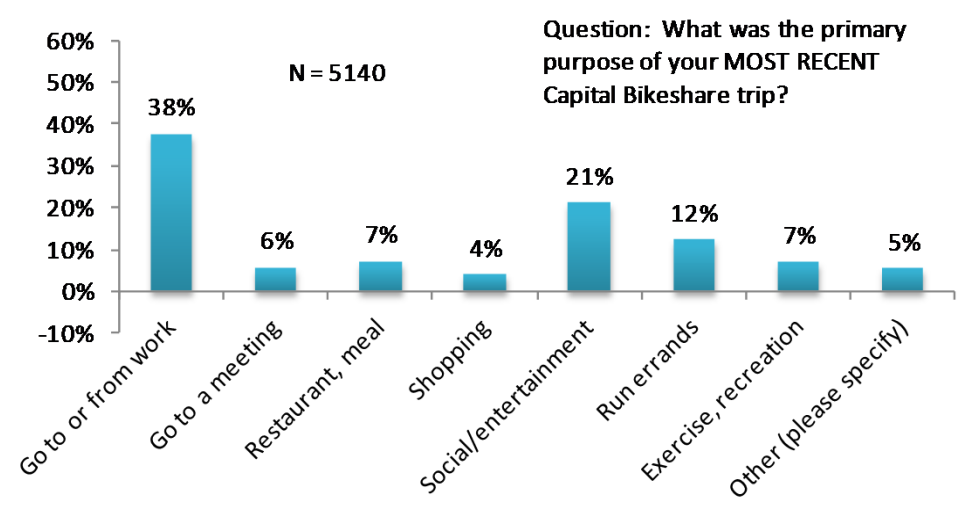
Toronto



Minneapolis-St. Paul

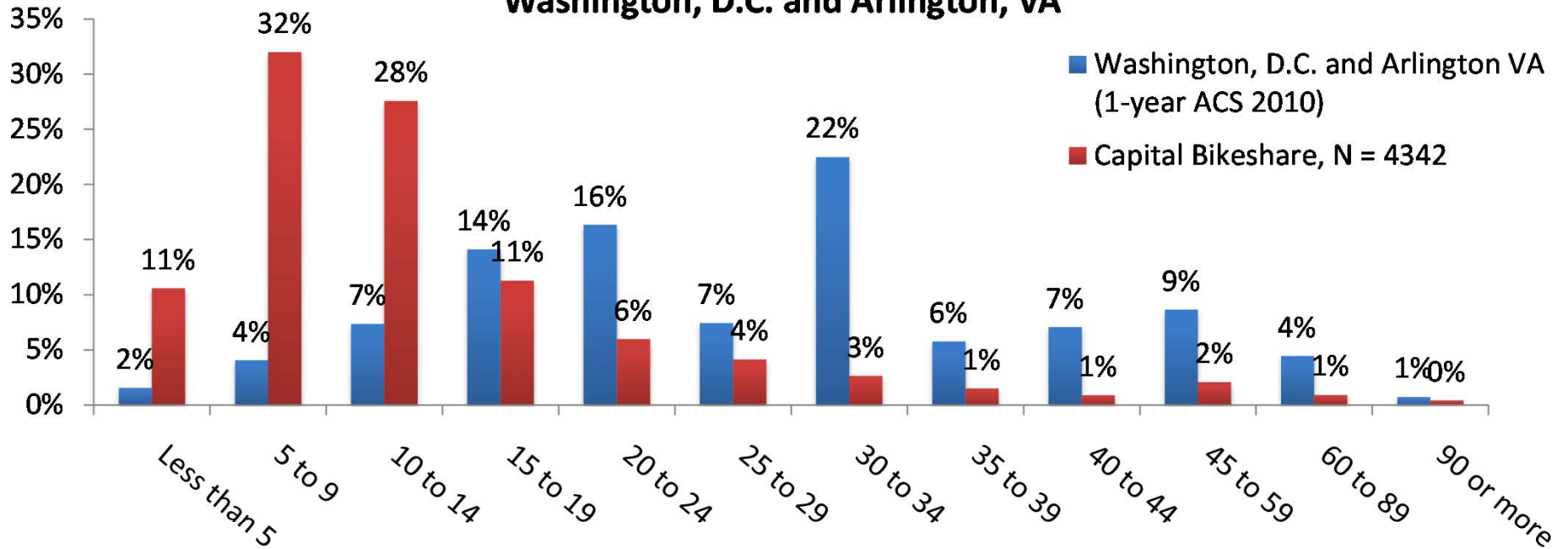


Washington, D.C.

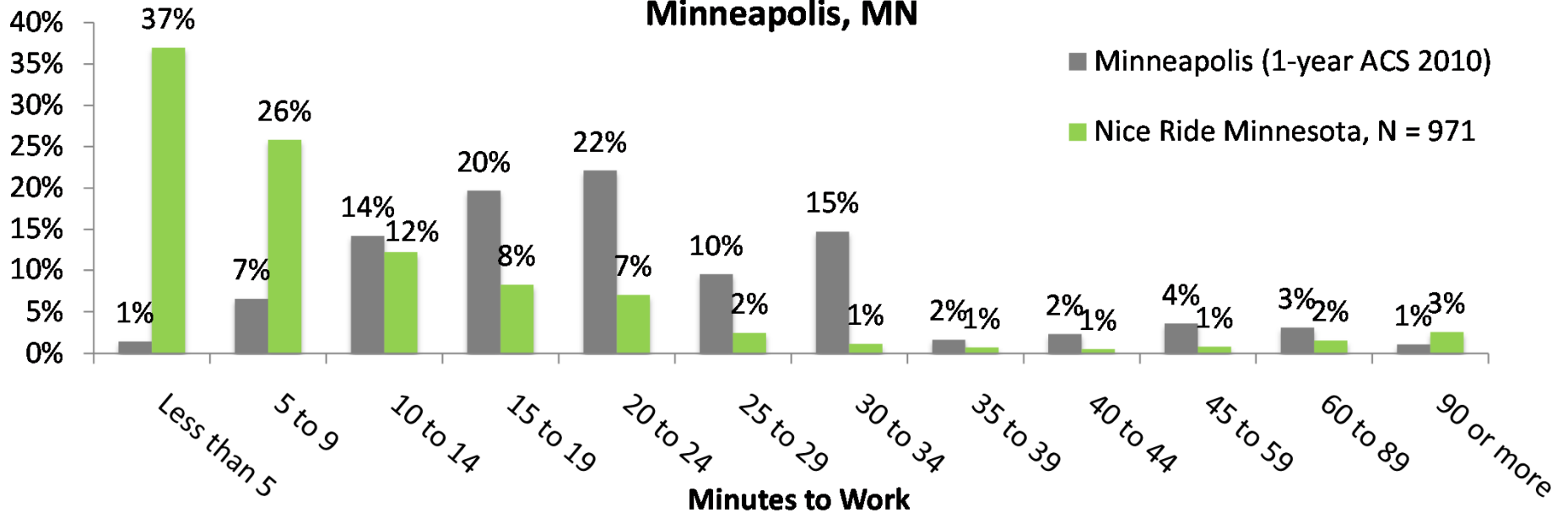


Commute Times in the United States

Washington, D.C. and Arlington, VA



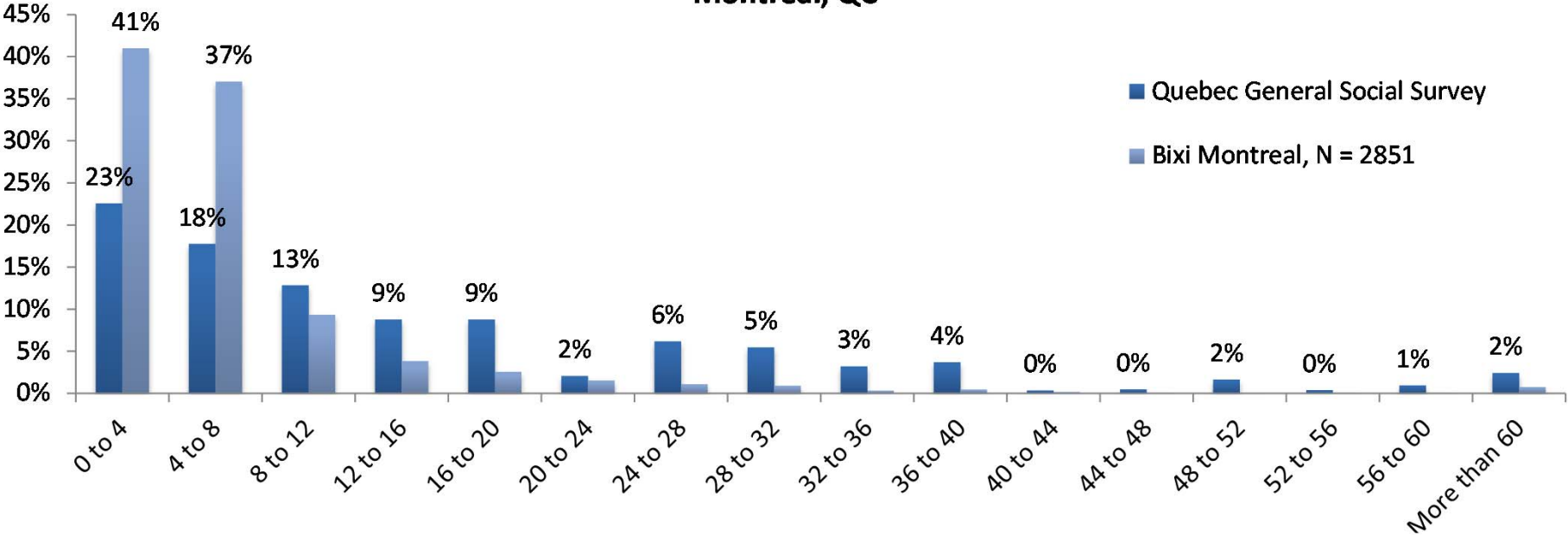
Minneapolis, MN



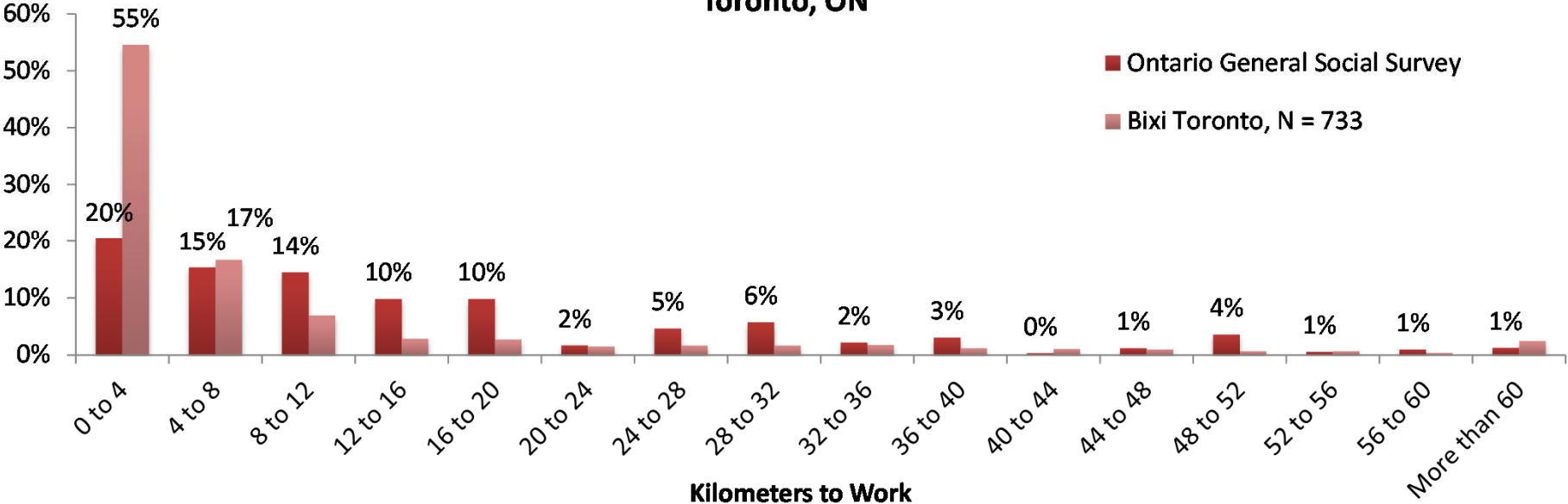
Minutes to Work

Commute Times in Canada

Montreal, QC

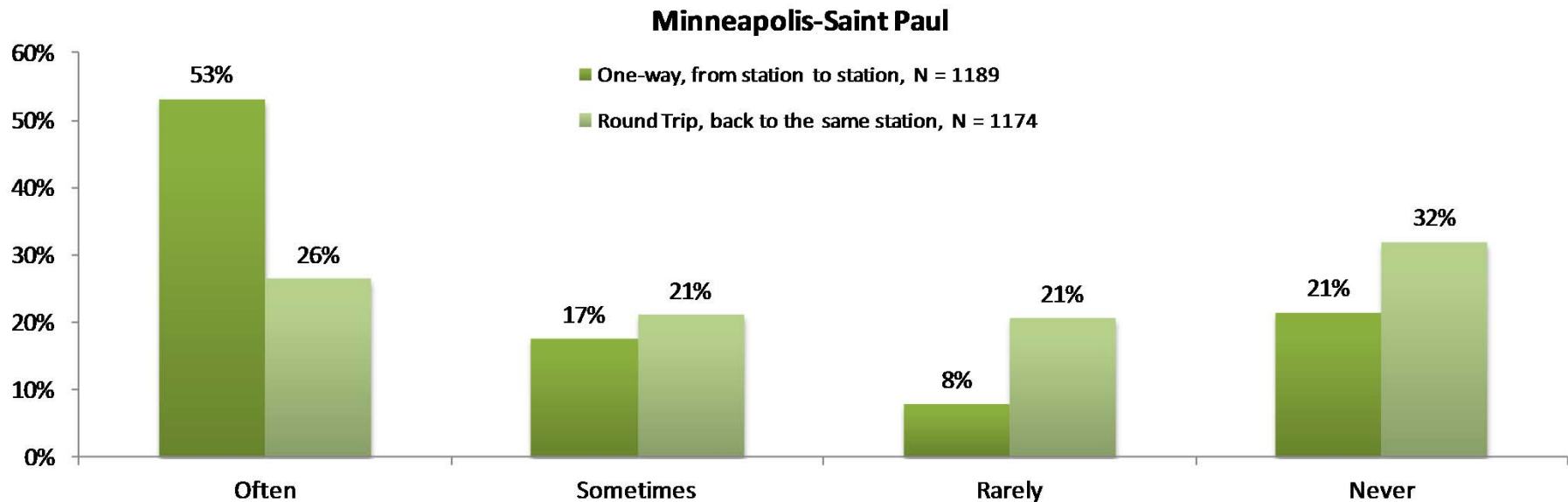
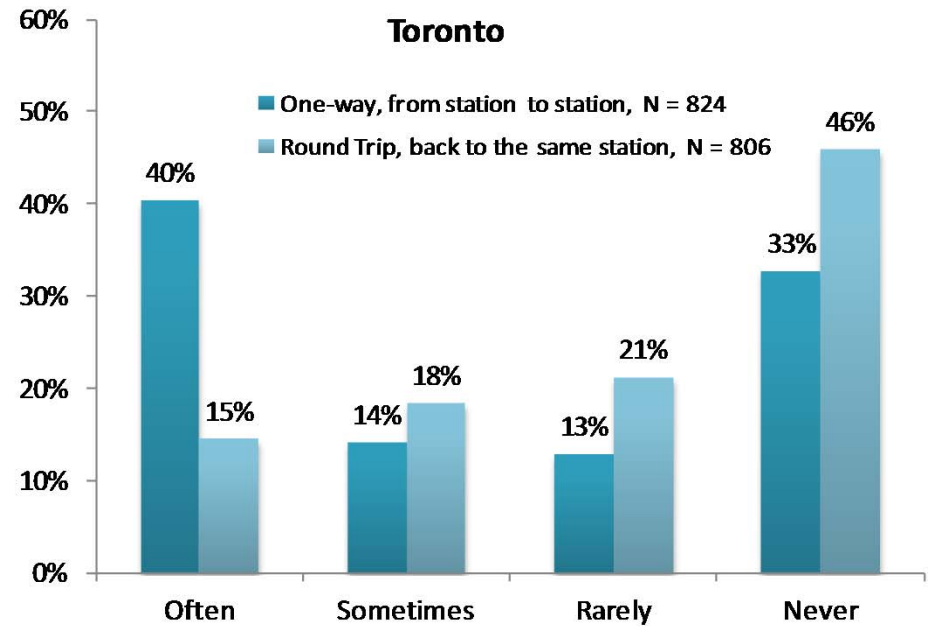
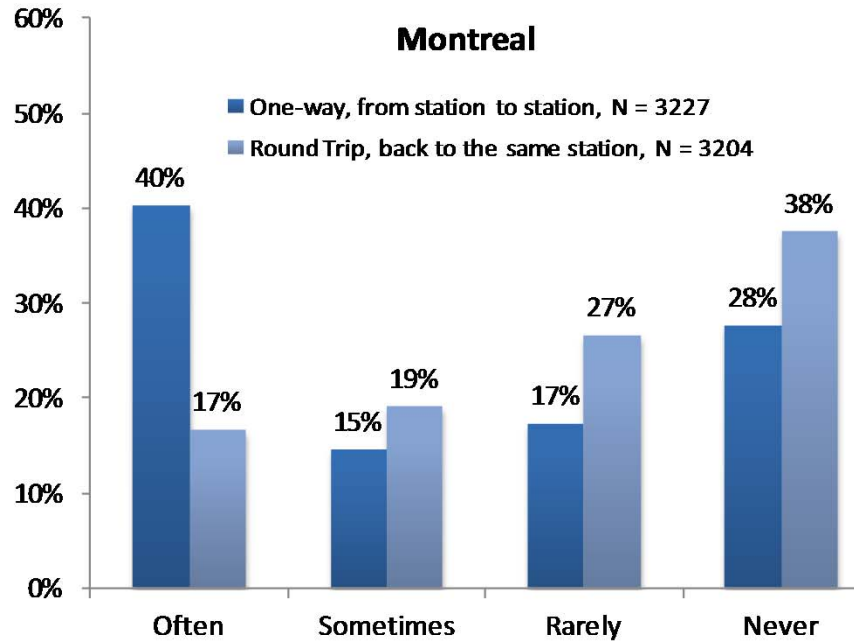


Toronto, ON



Kilometers to Work

One-way and Round-trip



System Activity

CapitalBikeshare & NiceRide Minnesota

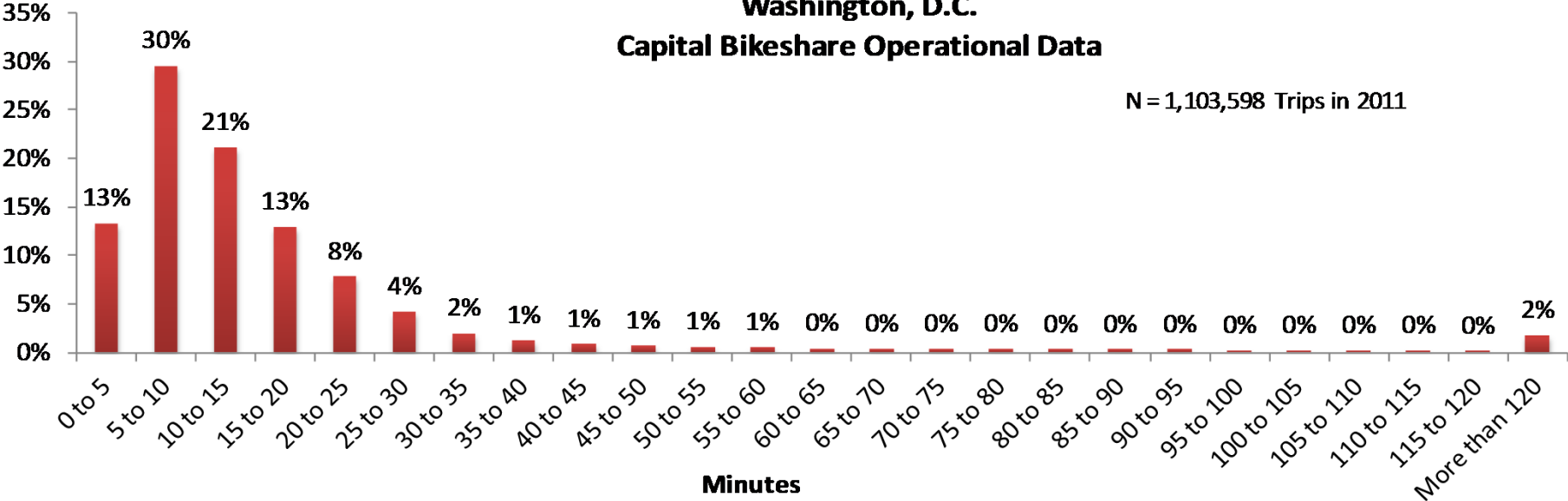
2011 System Data	Data Type	1st Quarter (limited data)	2nd Quarter	3rd Quarter	4th Quarter	Total
Capital Bikeshare (Washington, D.C.)	Total Trips	10,976†	374,203	405,450	313,001	1,103,630†
	Single-Station Round-Trips	584	24,240	23,643	13,553	62,020
	% of Single-Station Round-Trips	5.3%	6.5%	5.8%	4.3%	5.6%
Nice Ride Minnesota (Minneapolis- Saint Paul)	Total Trips	NA	60,785	117,219	39,526	217,530
	Single-Station Round-Trips	NA	5,840	11,237	2,827	19,904
	% of Single-Station Round-Trips	NA	9.6%	9.6%	7.2%	9.2%
† 1st Quarter 2011 Capital Bikeshare data released was a subset (7%) of total trips during the quarter.						



Trip Duration

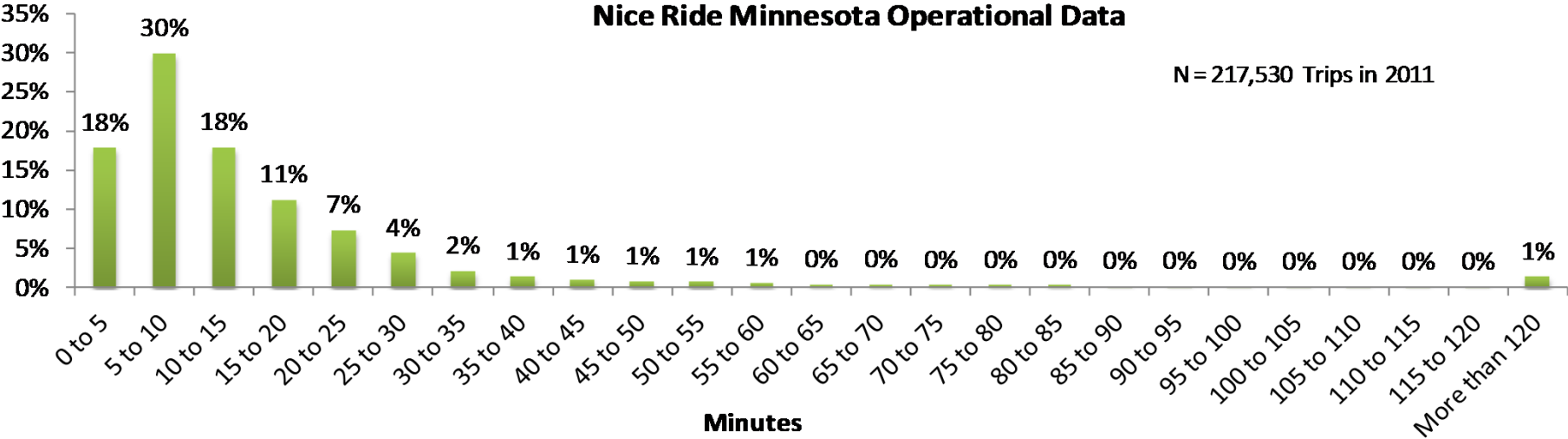
Washington, D.C.
Capital Bikeshare Operational Data

N = 1,103,598 Trips in 2011



Minneapolis-Saint Paul
Nice Ride Minnesota Operational Data

N = 217,530 Trips in 2011



Modal Shift Question Structure

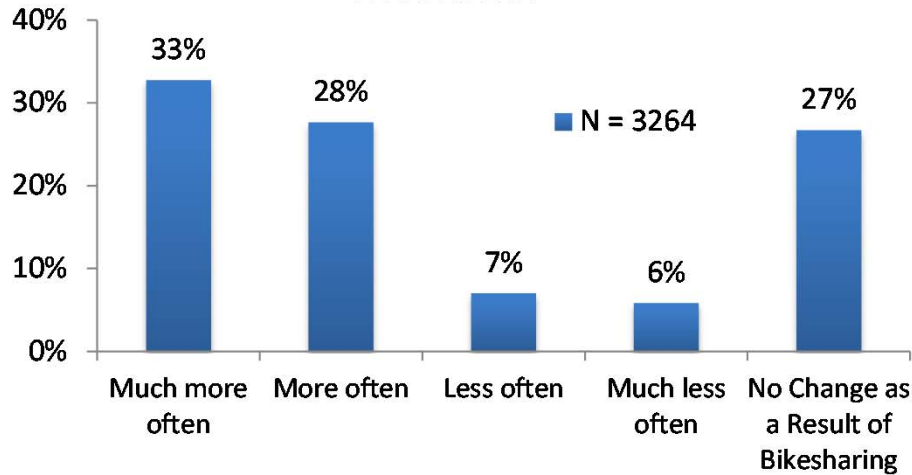
As a result of my use of Nice Ride Minnesota, I use the bus...

- Much more often
- More often
- About the same (bikesharing has had no impact)
- Less often
- Much less often
- I did not ride the bus before and I do not ride the bus now.
- I have changed how I use the bus, but not because of Nice Ride Minnesota.

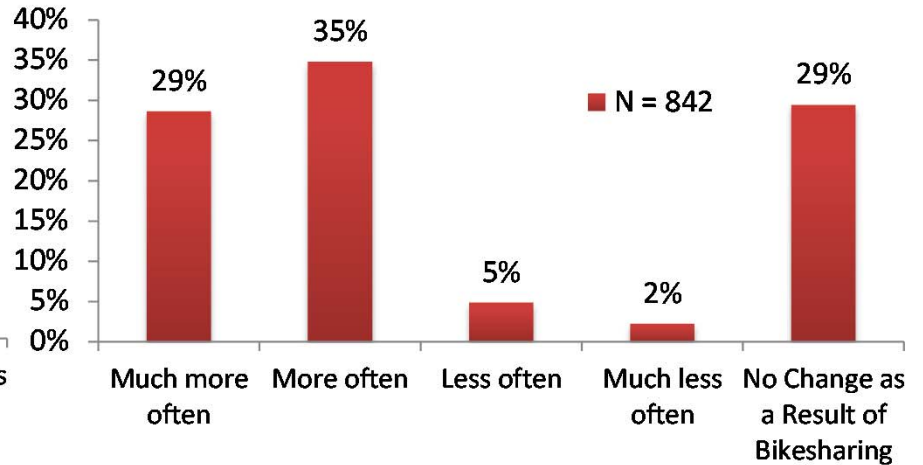
Change in Bicycling

As a result of my use of bikesharing, I ride a bicycle (any bicycle)...

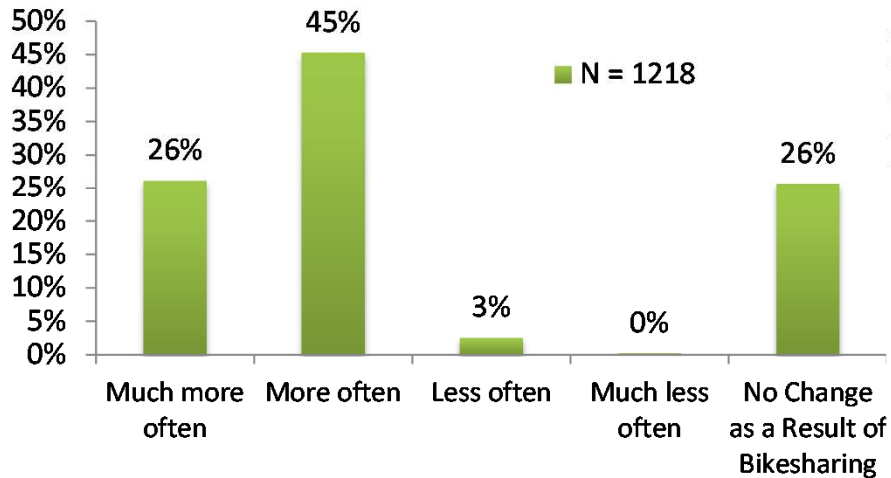
Montreal



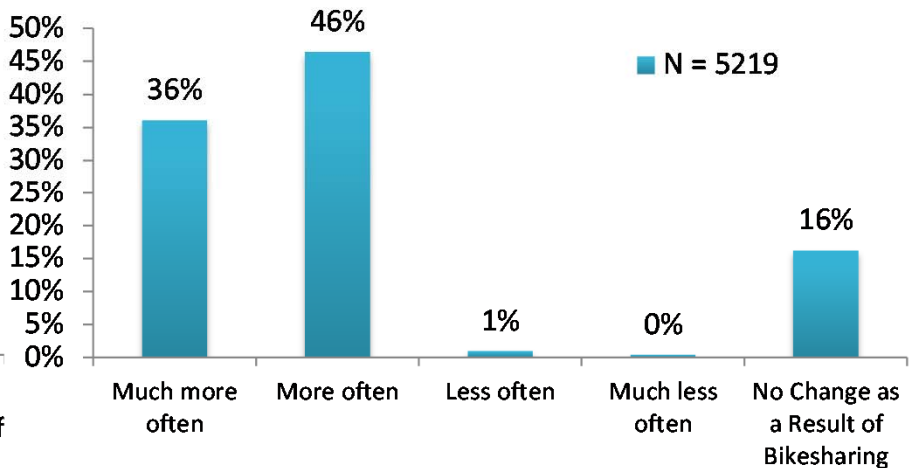
Toronto



Twin Cities

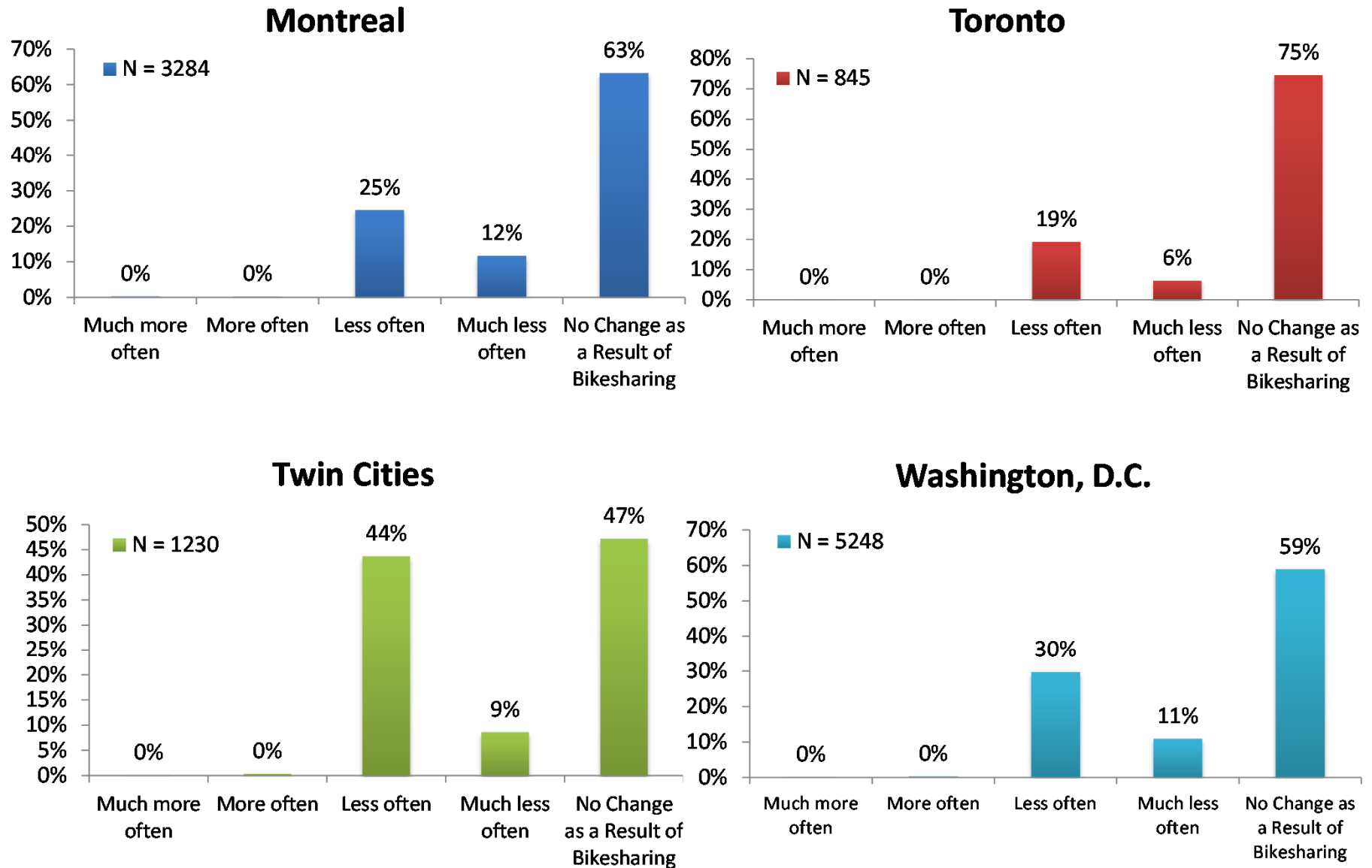


Washington, D.C.



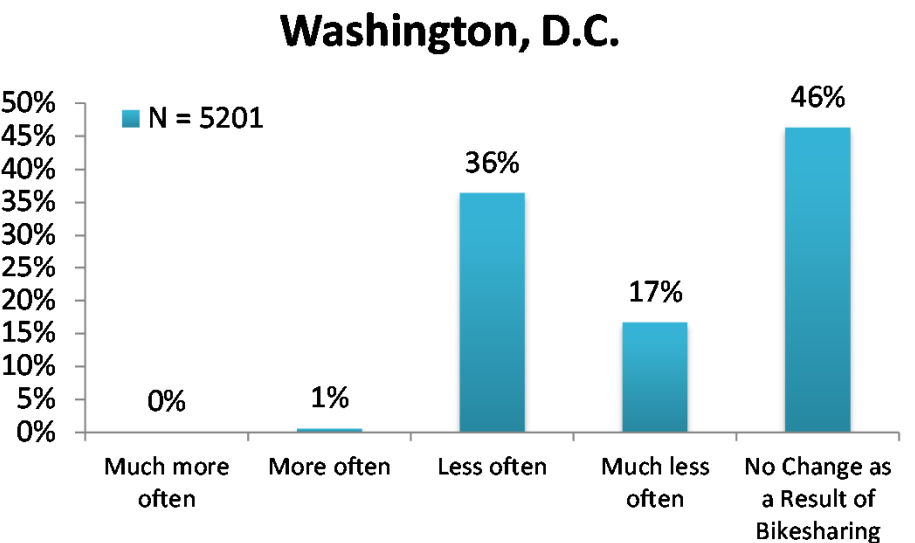
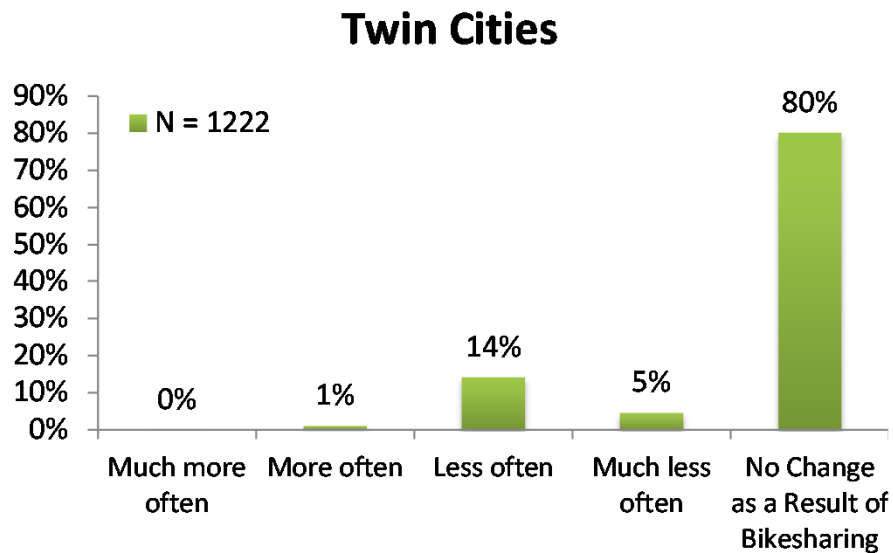
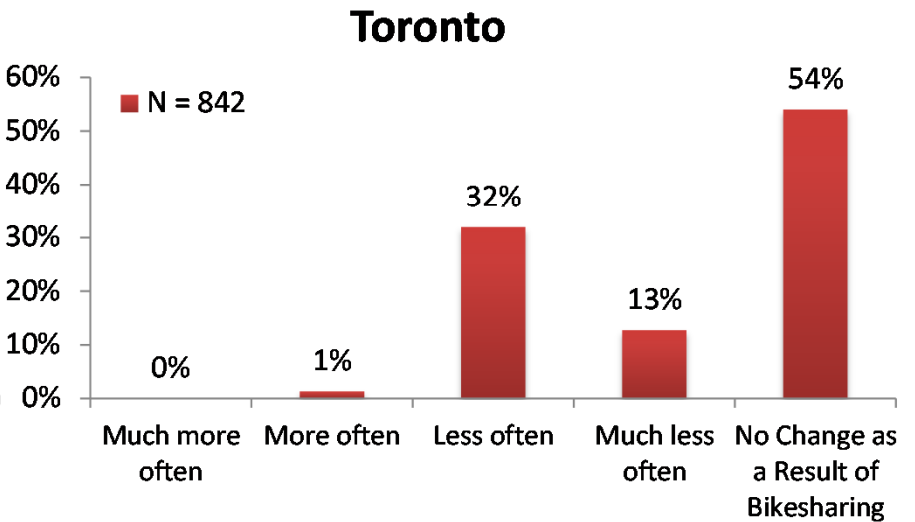
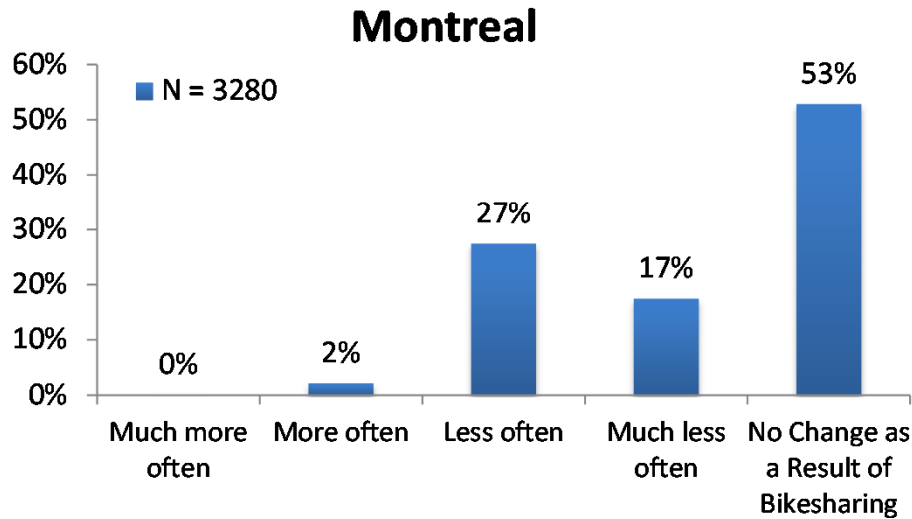
Change in Driving a Car

As a result of my use of bikesharing, I drive a car...



Change in Taxi Use

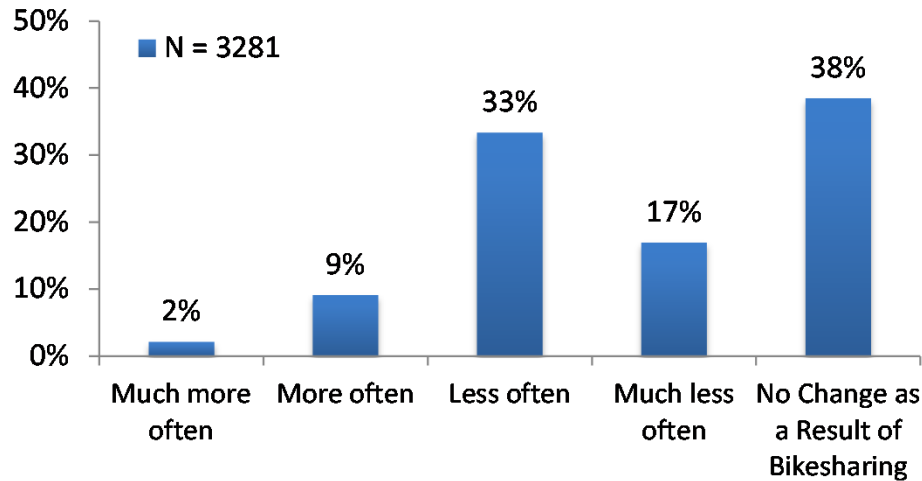
As a result of my use of bikesharing, I use a taxi...



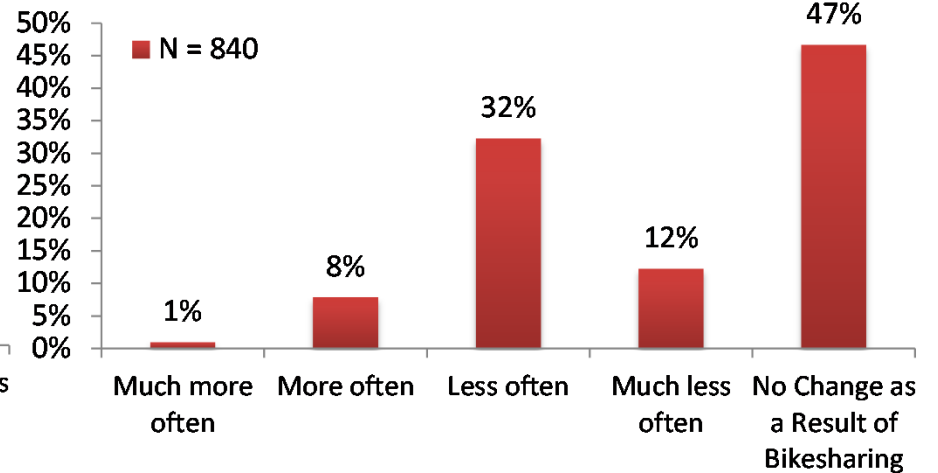
Change in Urban Rail

As a result of my use of bikesharing, I use urban rail...

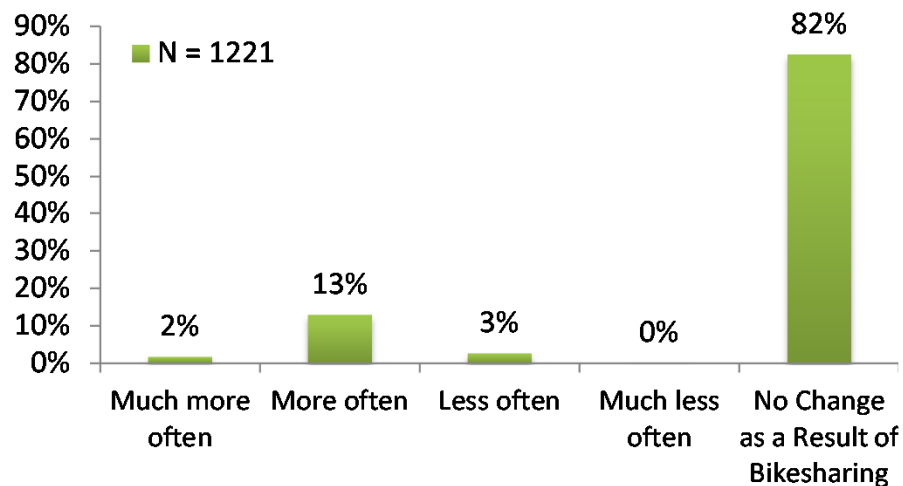
Montreal



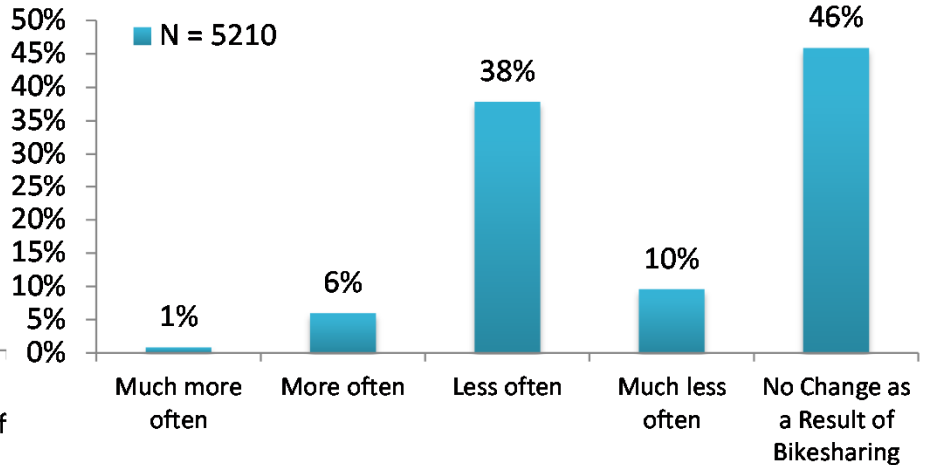
Toronto



Twin Cities

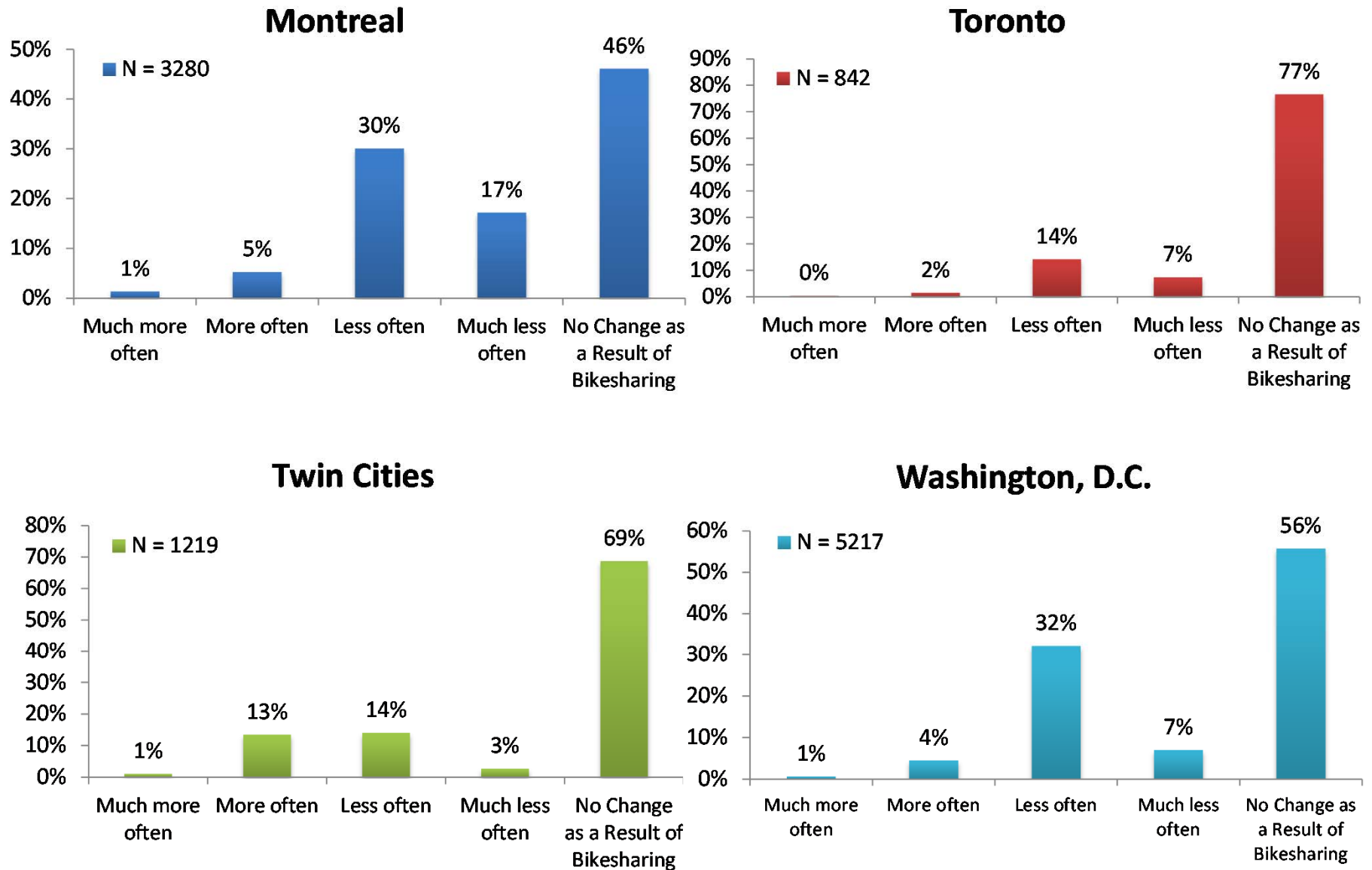


Washington, D.C.



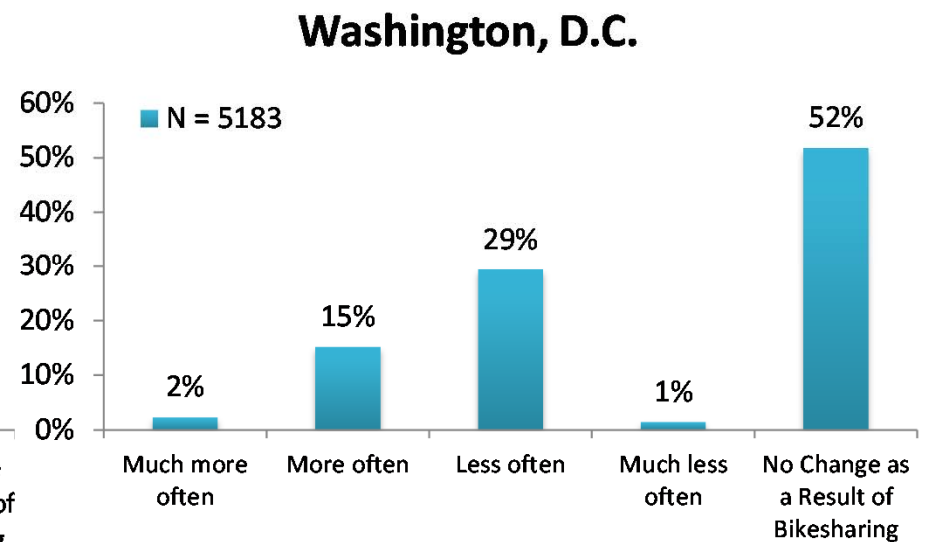
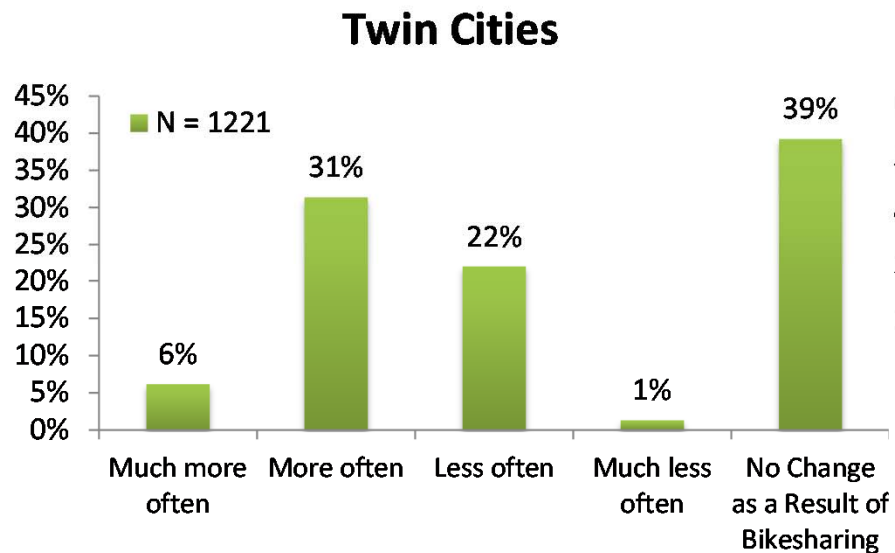
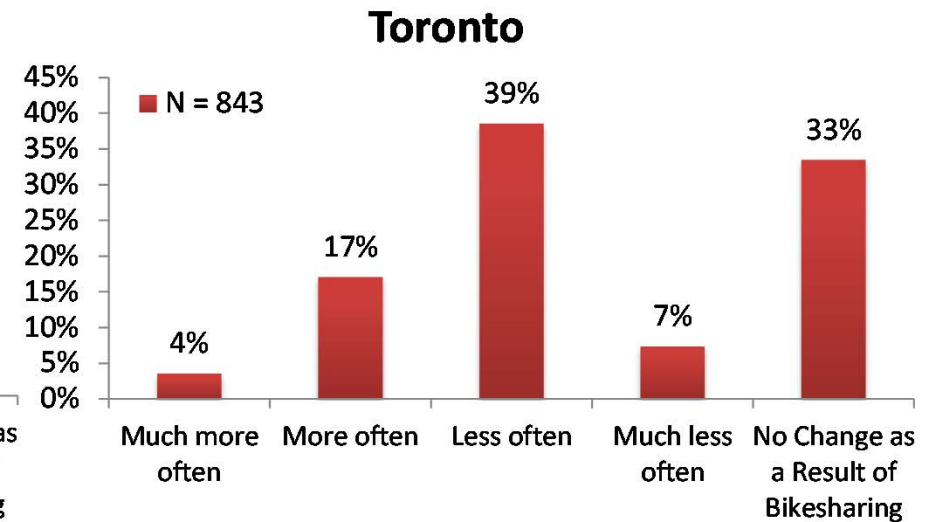
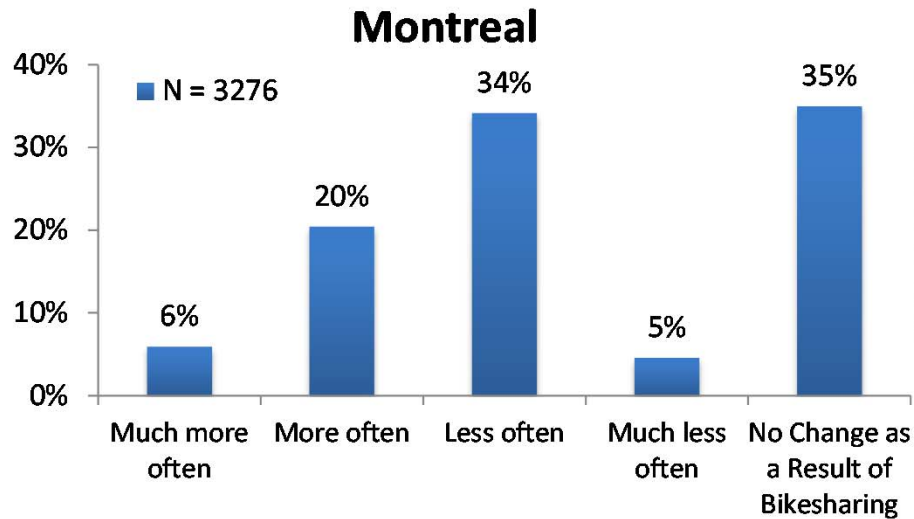
Change in Bus

As a result of my use of bikesharing, I use the bus...



Change in Walking

As a result of my use of bikesharing, I walk...



Urban Rail Systems of Cities Surveyed

Minneapolis



Montreal



Washington, D.C.

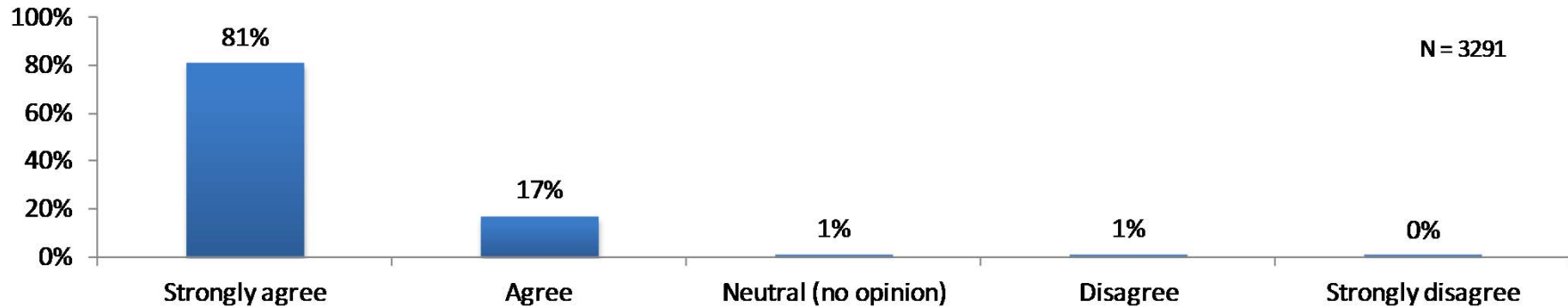


Toronto

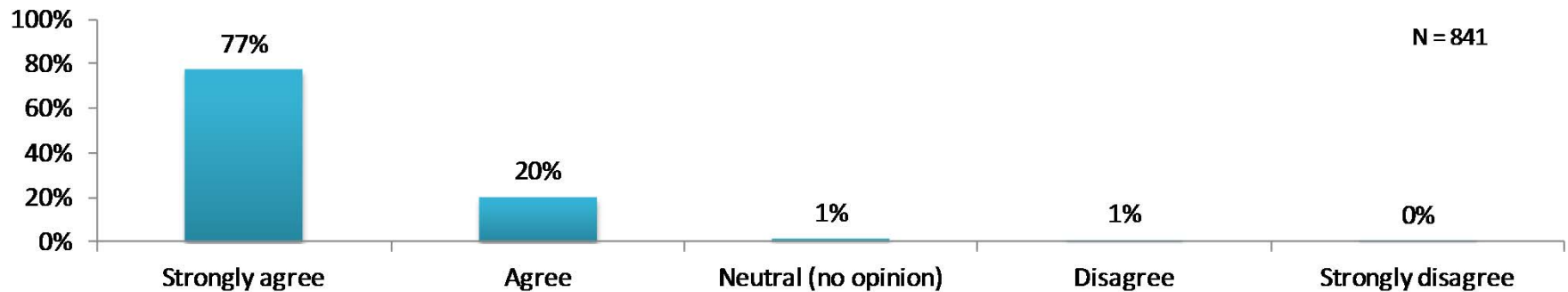


Perceptions of Bikesharing as Enhancing Transit

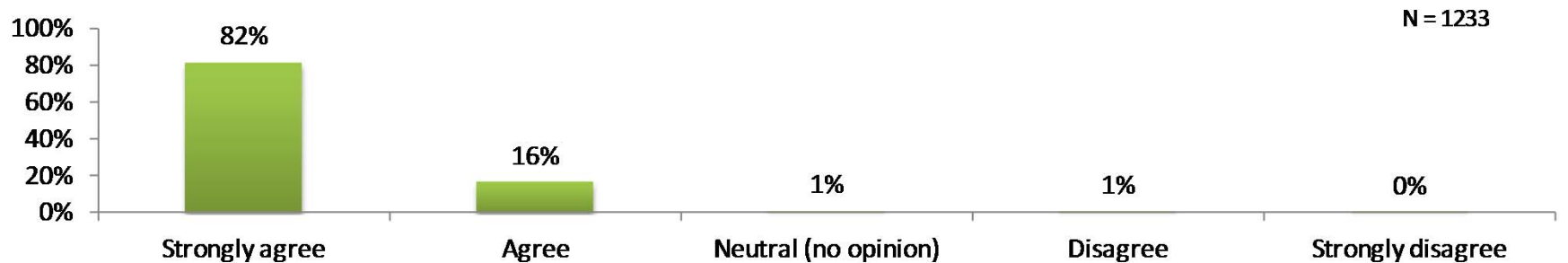
I think of BIXI as an enhancement to the Montreal public transportation system.



I think of BIXI as an enhancement to the Toronto public transportation system.

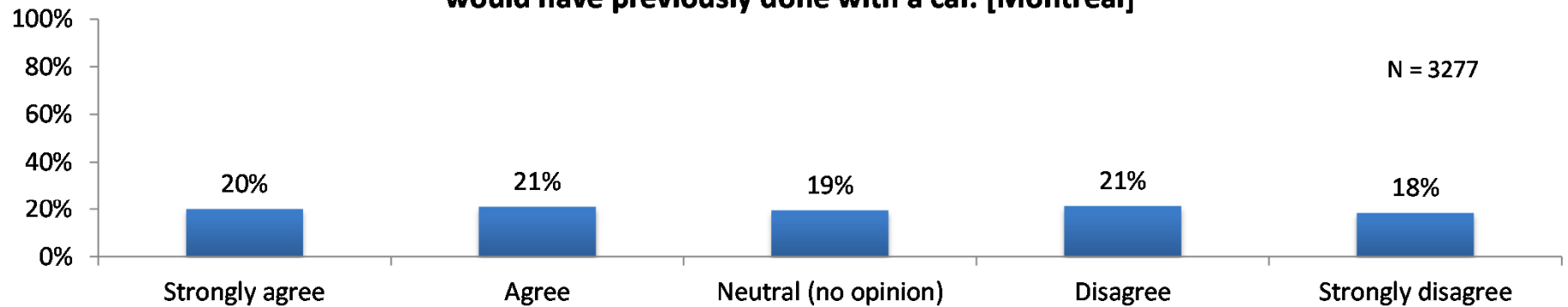


I think of Nice Ride Minnesota as an enhancement to the Twin Cities public transportation system.

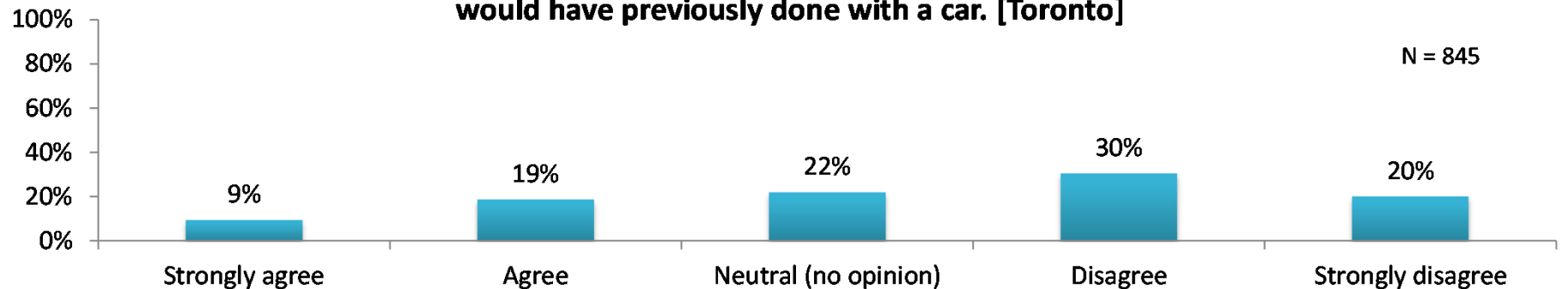


Bikesharing with Transit instead of Car

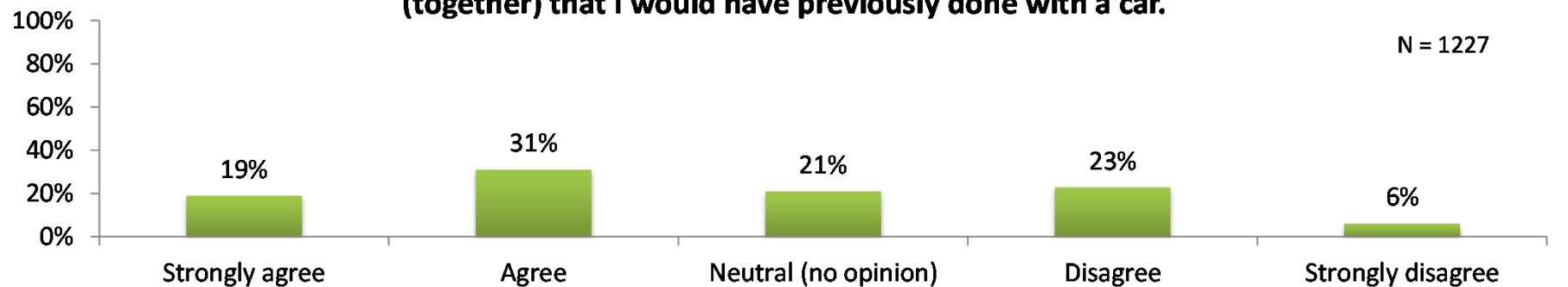
Since joining BIXI, I have made trips with public transit and bikesharing (together) that I would have previously done with a car. [Montreal]



Since joining BIXI, I have made trips with public transit and bikesharing (together) that I would have previously done with a car. [Toronto]

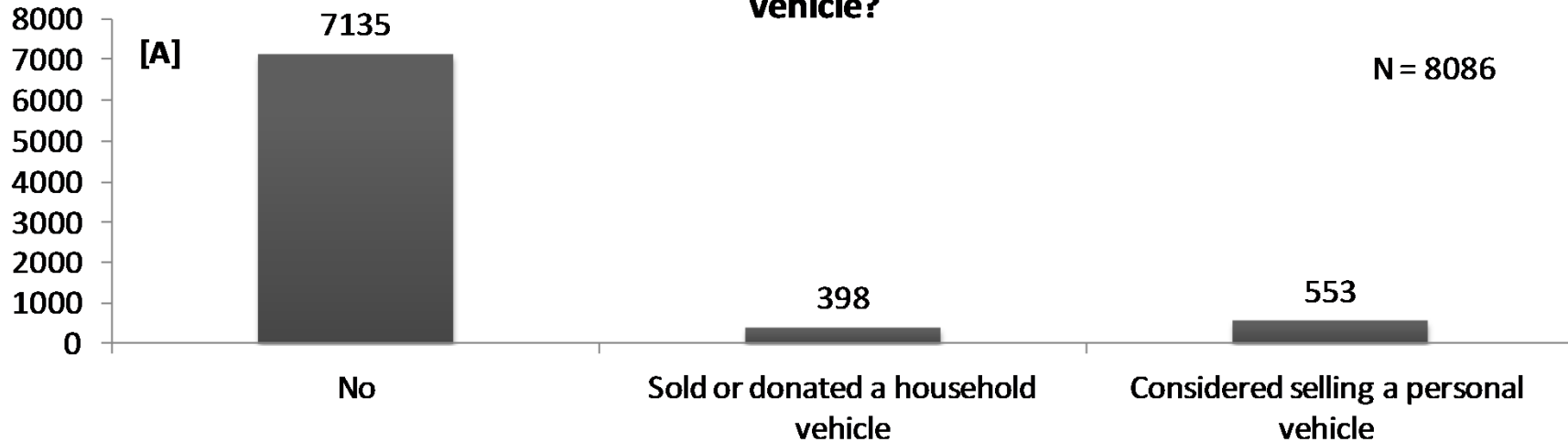


Since joining Nice Ride Minnesota I have made trips with public transit and bikesharing (together) that I would have previously done with a car.

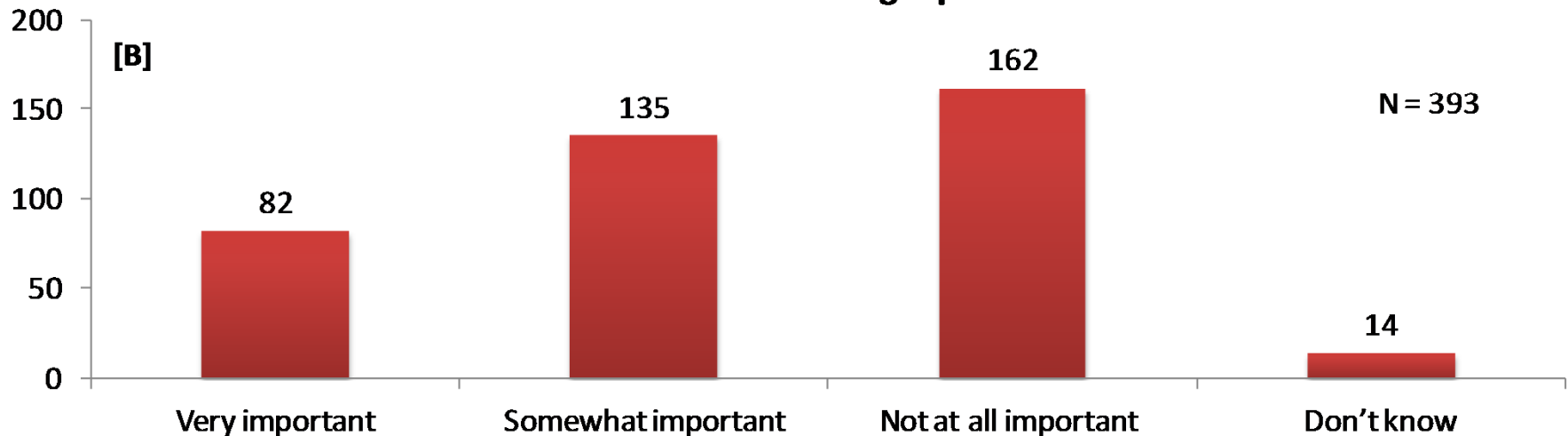


Reduction of Vehicle Ownership

Since you joined [public bikesharing], have you sold, donated or otherwise gotten rid of a personal household vehicle or considered selling a personal vehicle?

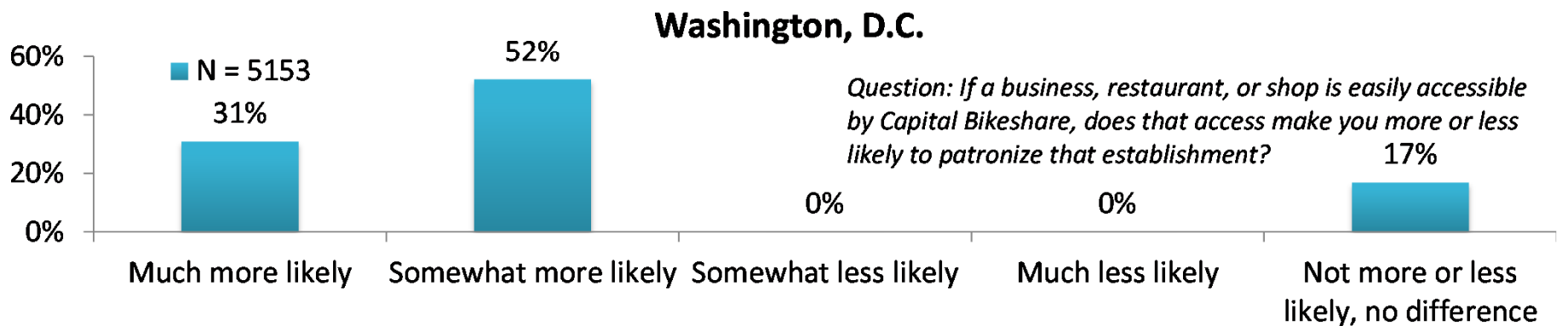
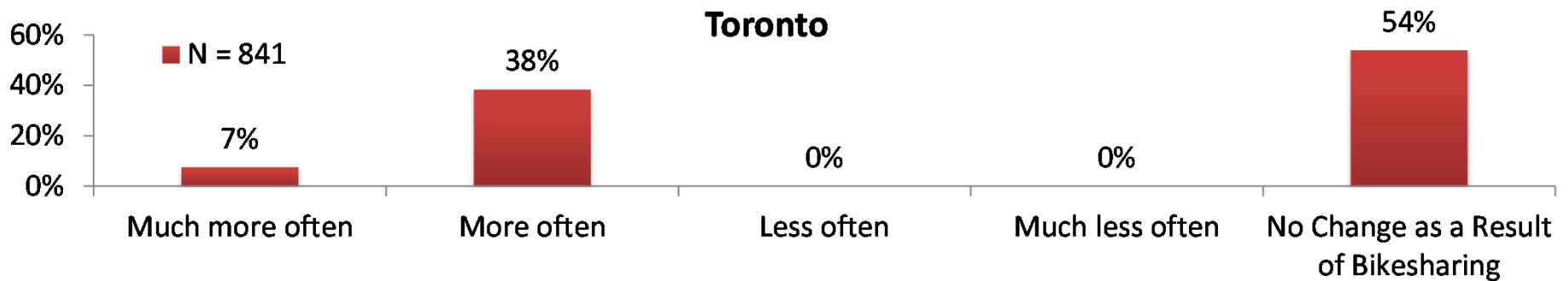
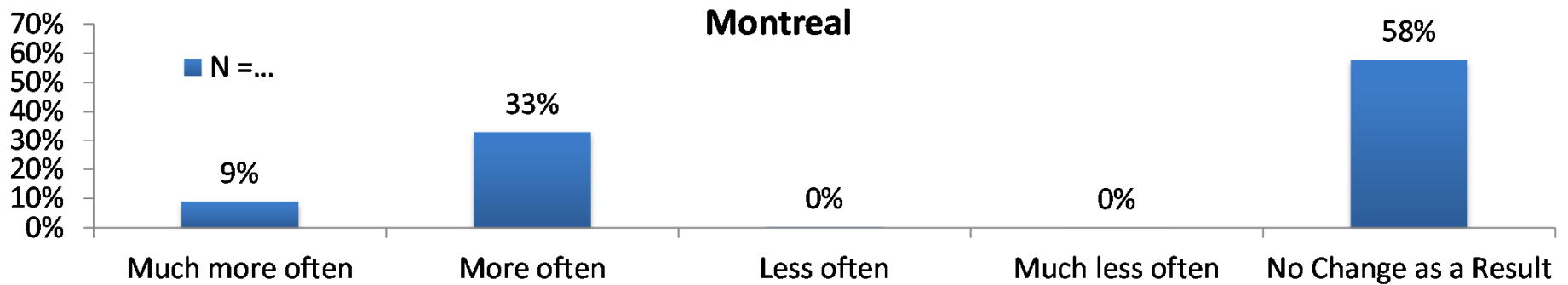


How important has your membership with [public bikesharing] been in your decision to sell or consider selling a personal vehicle?



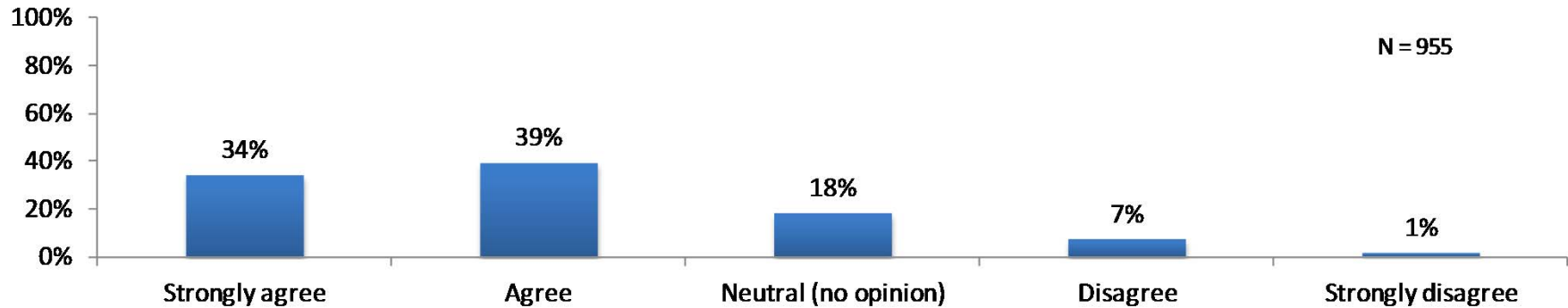
Impact on Local Shopping

As a result of my use of bikesharing, I shop at locations near existing bike stations...

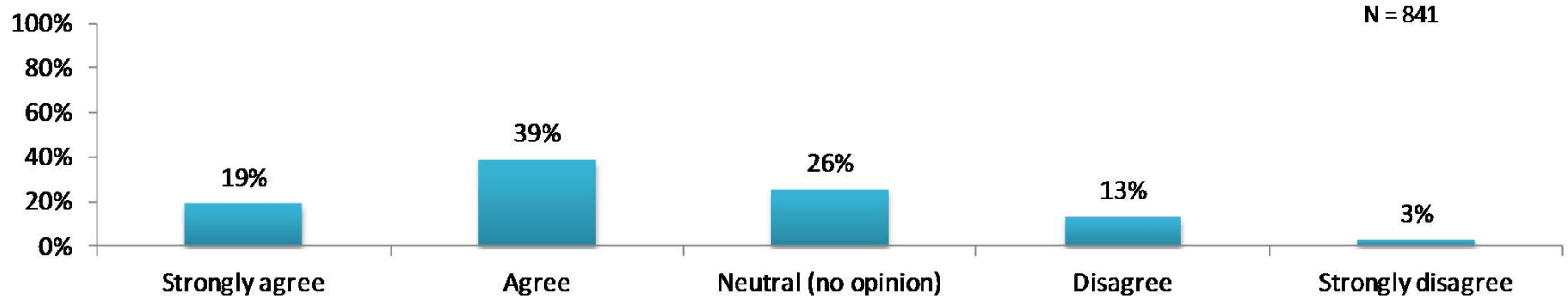


Impact on Exercise

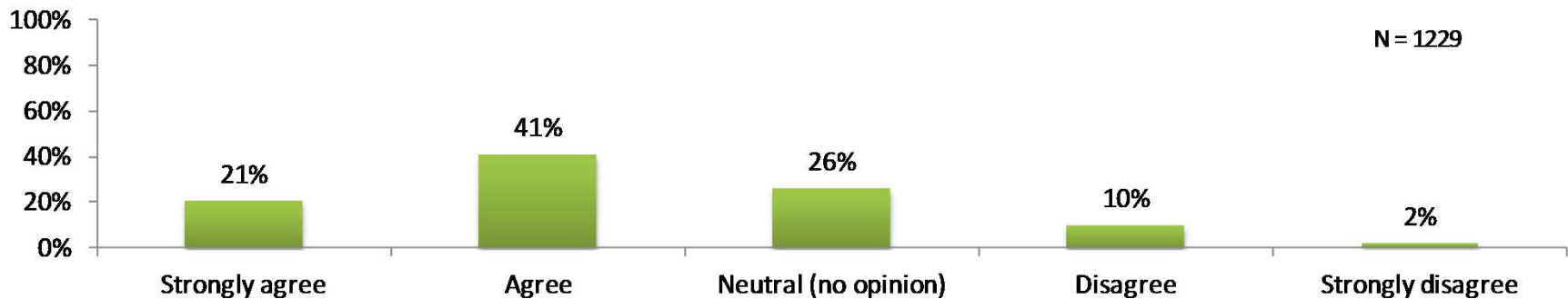
I get more exercise now that I am a member of BIXI. [Montreal]



I get more exercise now that I am a member of BIXI. [Toronto]

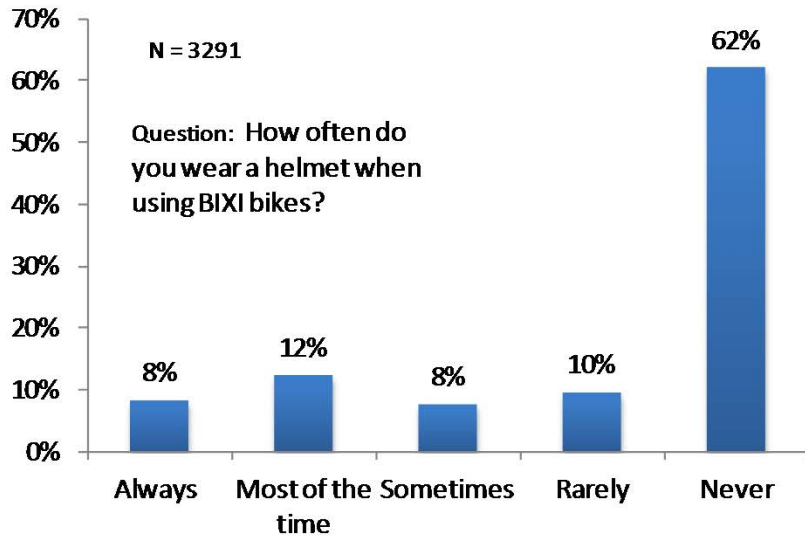


I get more exercise now that I am a member of Nice Ride Minnesota.

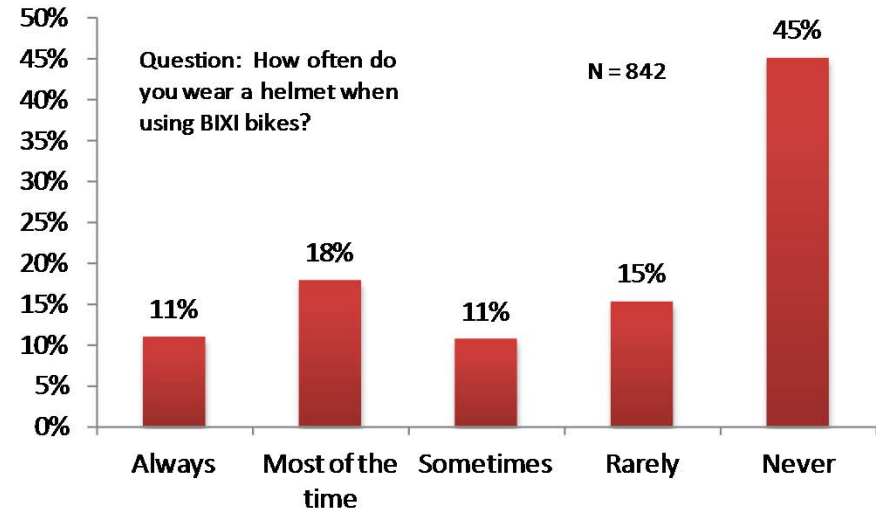


Helmet Use with Public Bikesharing

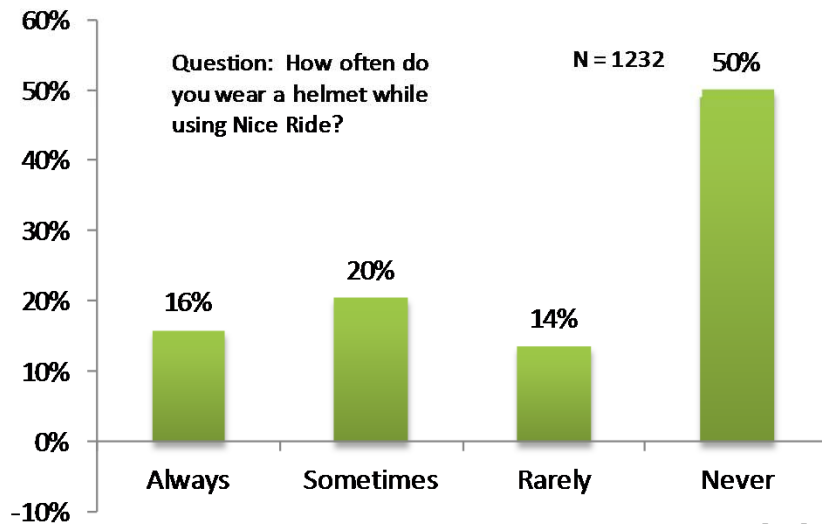
Montreal



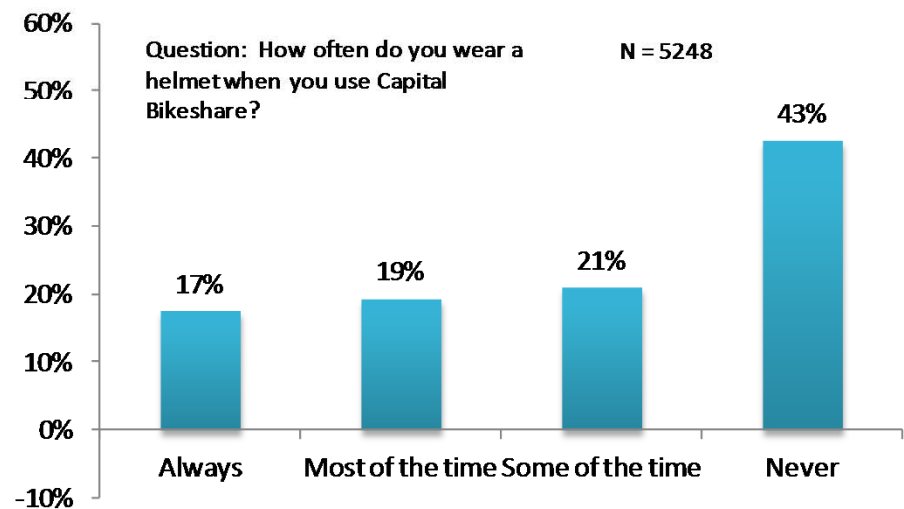
Toronto



Minneapolis-St Paul

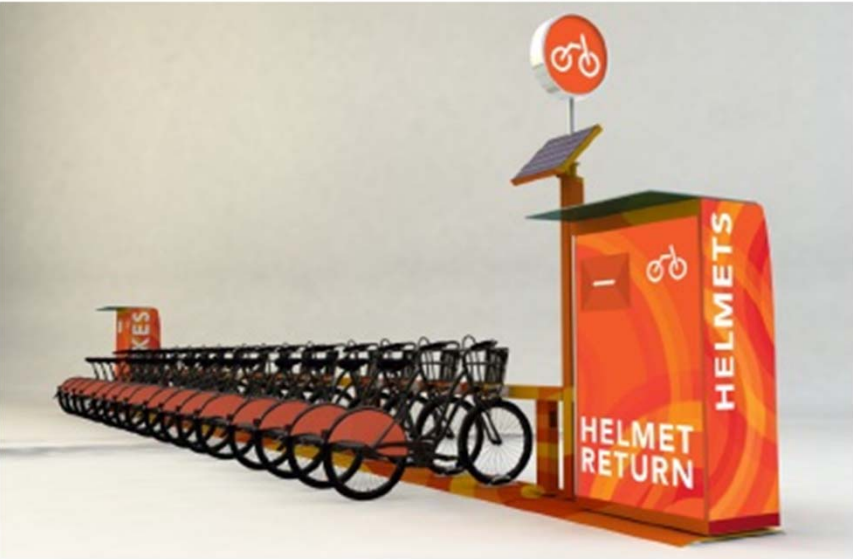


Washington, D.C.



Future Innovations

Wilson Blvd + Barton St			Clarendon Blvd + Barton St				
38B	Westbound to: Ballston Station	0 MINUTES	35 55	77	Shirlington Station to Court House Metro	10 MINUTES	36
41	Court House Metro - Columbia Pike/Dinwiddie	3 MINUTES	16 34	41	Columbia Pike/Dinwiddie - Court House Metro	11 MINUTES	28 44
77	Court House Metro to Shirlington Station	16 MINUTES		38B	Eastbound to: Farragut Square	11 MINUTES	90
Barton St + Clarendon Blvd			Capital Bikeshare				
41	Court House Metro - Columbia Pike/Dinwiddie	3 MINUTES	16 34	BIKES		DOCKS	
4B	Westbound to: Seven Corners	14 MINUTES		Wilson Blvd & Franklin Rd		7	4
77	Court House Metro to Shirlington Station	16 MINUTES		M Court House			
Barton St + Clarendon Blvd			OR				
4B	Eastbound to: Rosslyn Station	9 MINUTES	68	New Carrollton		0	
			OR		Vienna	6	
			OR		New Carrollton	8	
			OR		New Carrollton	10	
			OR		Vienna	15	



Summary

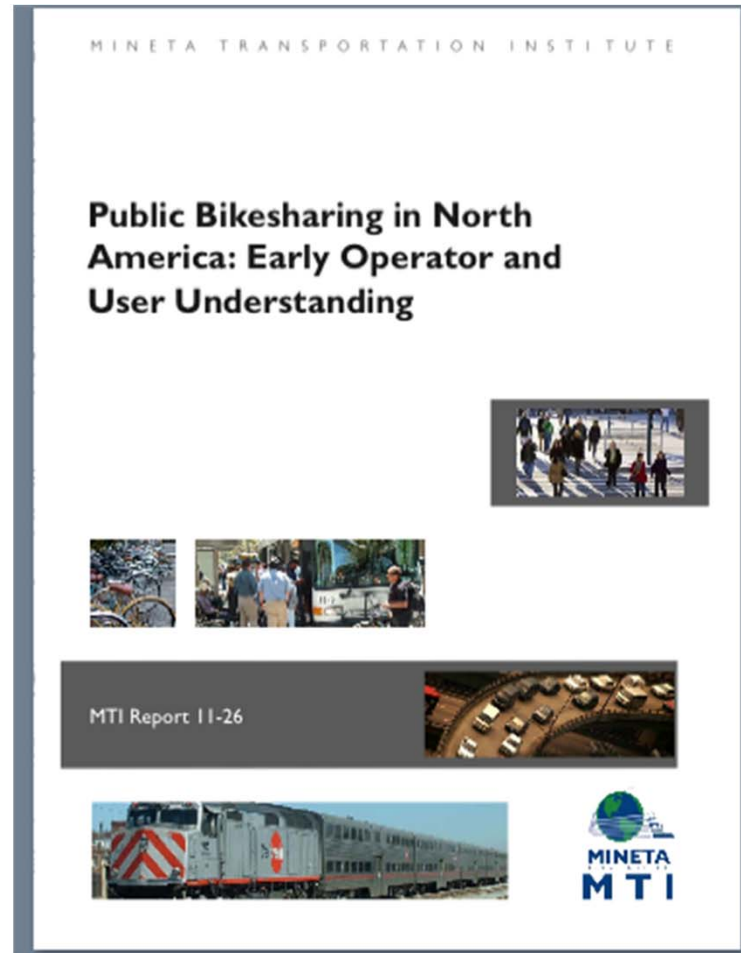
- Rapid growth of IT-based programs in North America (2010-ongoing)
 - Approximately 20 planned and existing launches for 2012
- Changing emphasis on business models
 - Profit-based models becoming more prevalent
- Broadly, user survey indicates modal shift away from all other modes (auto and transit)
- Modal shift away from transit may have occurred due to transit congestion at peak times and shorter, faster, or more direct routing with bikesharing
- Transit modal shift increase where service is more limited and less frequent

Acknowledgements

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N. American Public Bikesharing Report



transweb.sjsu.edu/project/1029.html



www.its.berkeley.edu/sustainabilitycenter