



UNIVERSITY OF CALIFORNIA *Berkeley*
Transportation Sustainability
RESEARCH CENTER

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

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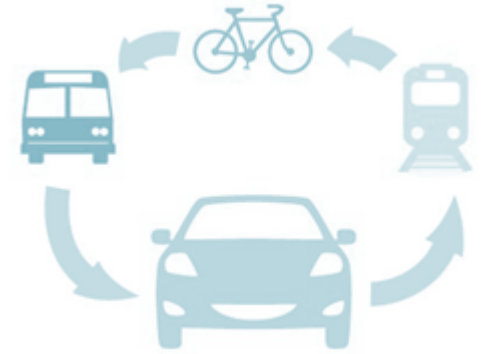
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Associate Adjunct Professor

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Associate Researcher

Bicycle Urbanism Symposium
Washington University
June 20, 2013

Overview

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



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



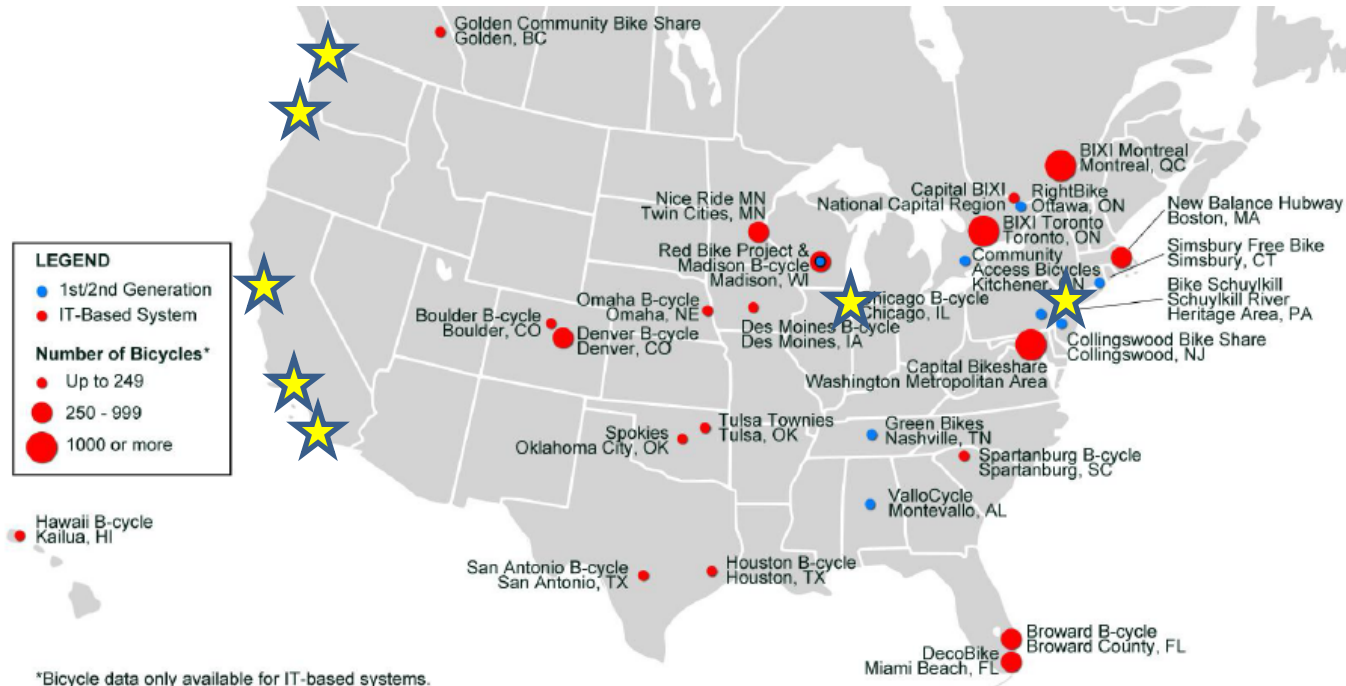
- Operator interviews with all 19 North American IT-based programs operational as of April 2012
- Conducted 14 interviews with transportation personnel, transit operators, policymakers, and community bike coordinators
- Completed online survey with users of early public bikesharing systems in: Montreal;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

Bikesharing: North America

As of January 2012, 19 IT-based programs:

- 216,422 users and 11,473 shared bicycles

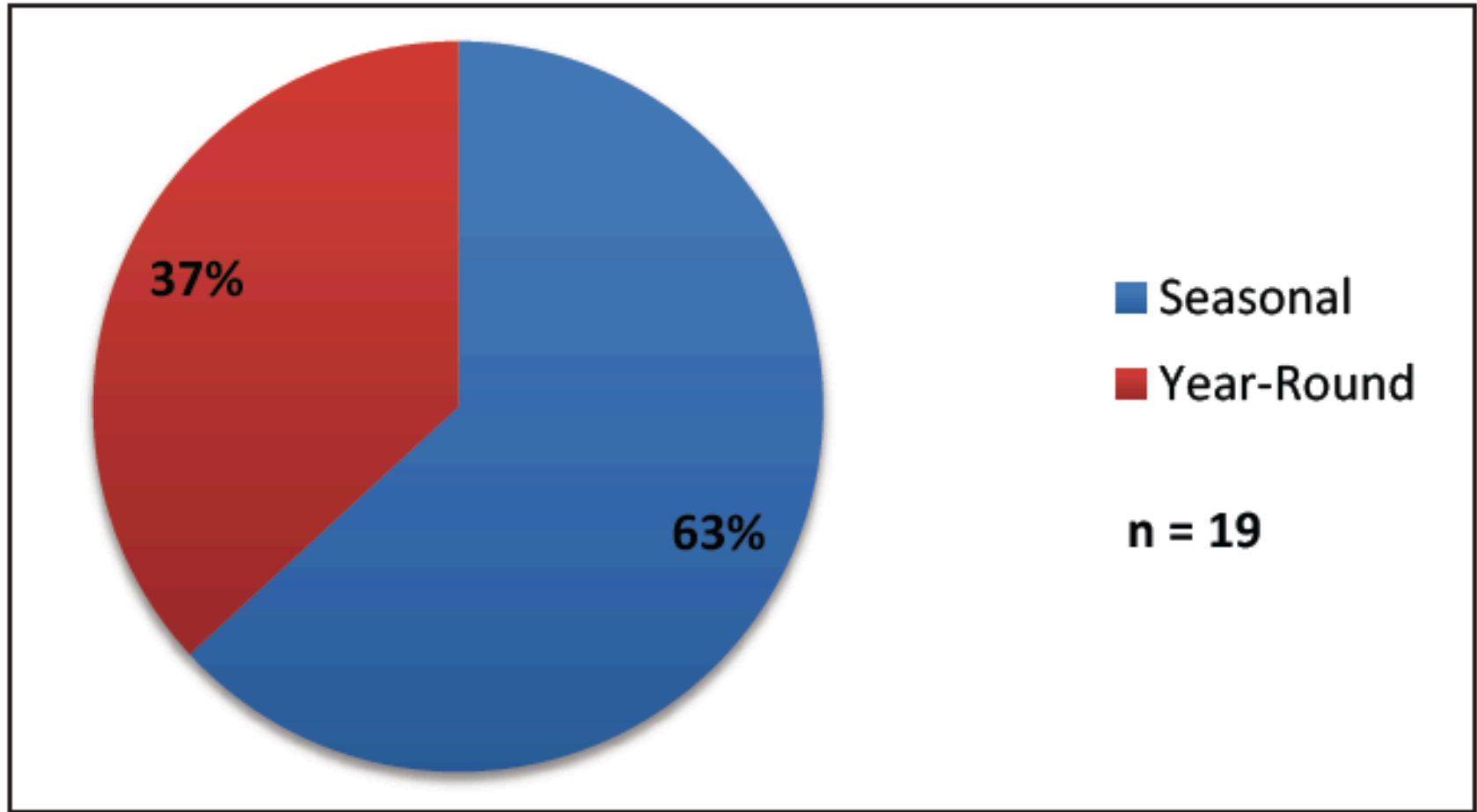
As of May 2012, there were 21 IT-based based operations.



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

Shaheen et al., 2012

Seasonal vs. Year-Round Operations



Shaheen et al., 2012

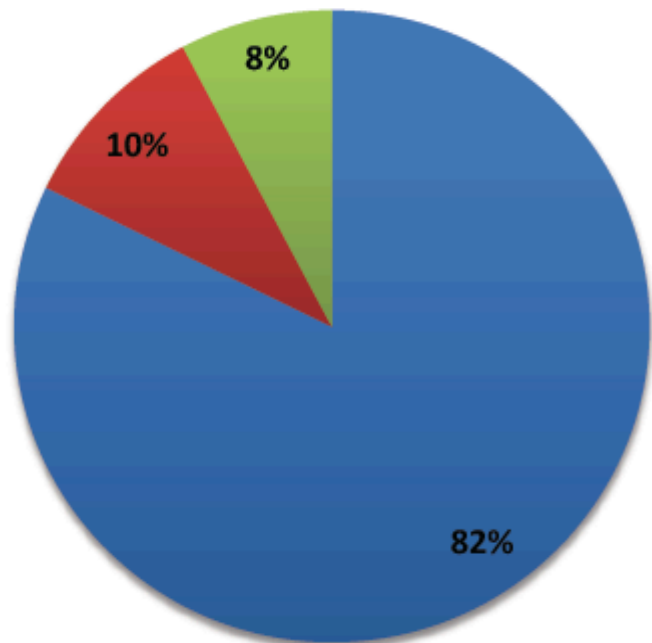
Business Models

Percentage of Members by Business Model

■ Non-Profit

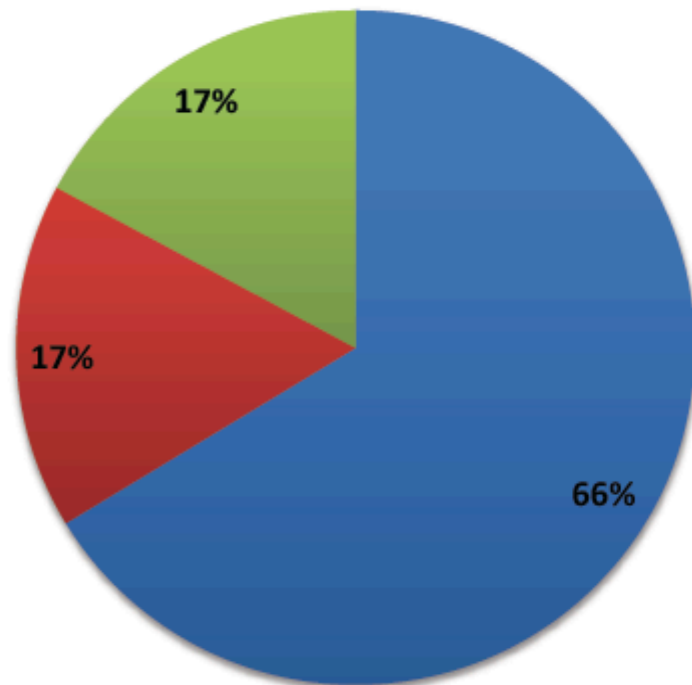
■ Publicly Owned/ Contractor Operated

■ Privately Owned/Operated



n = 18

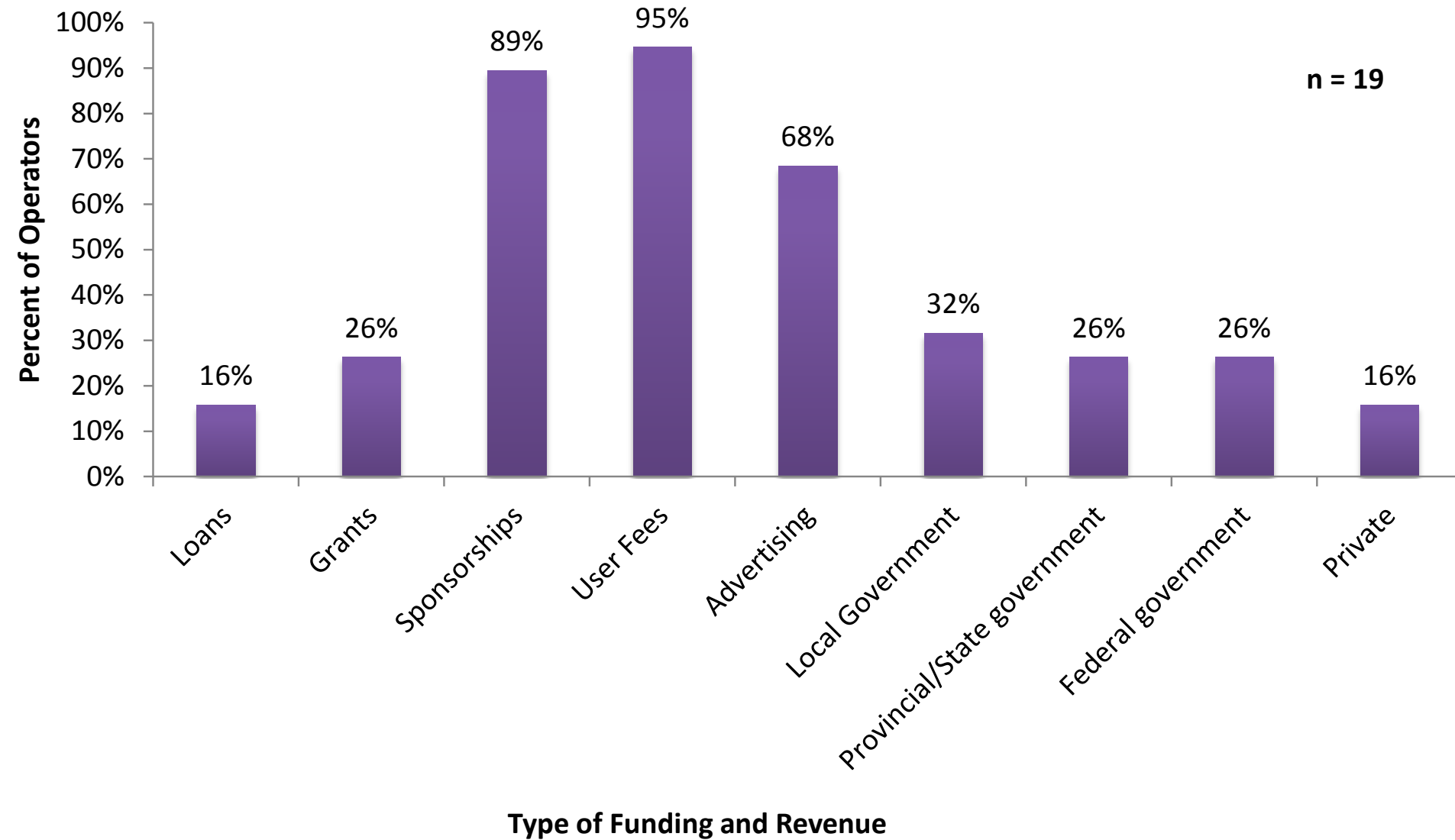
Percentage of Bicycles by Business Model



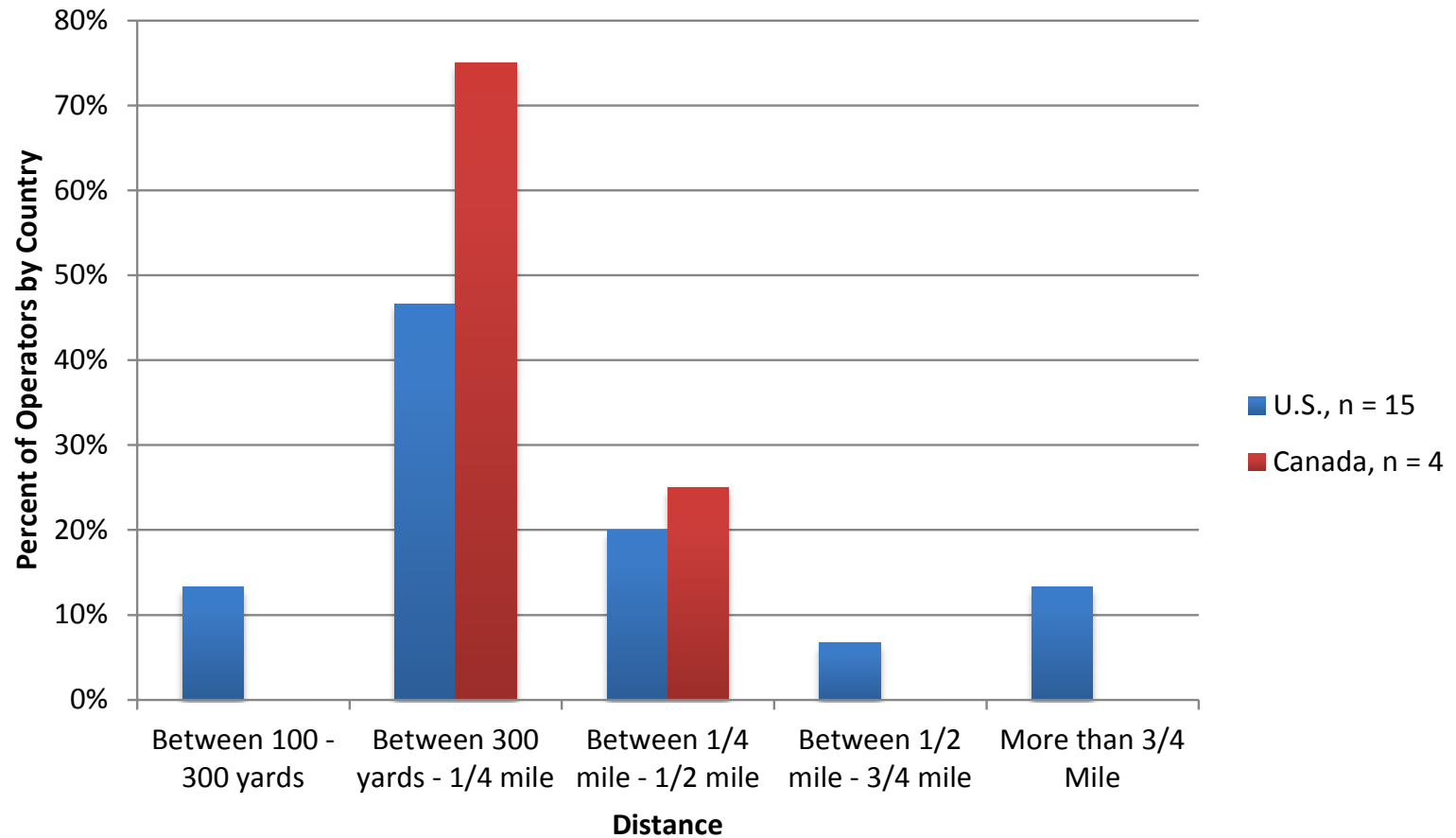
n = 18

Shaheen et al., 2012

Types of Funding/Revenue Sources



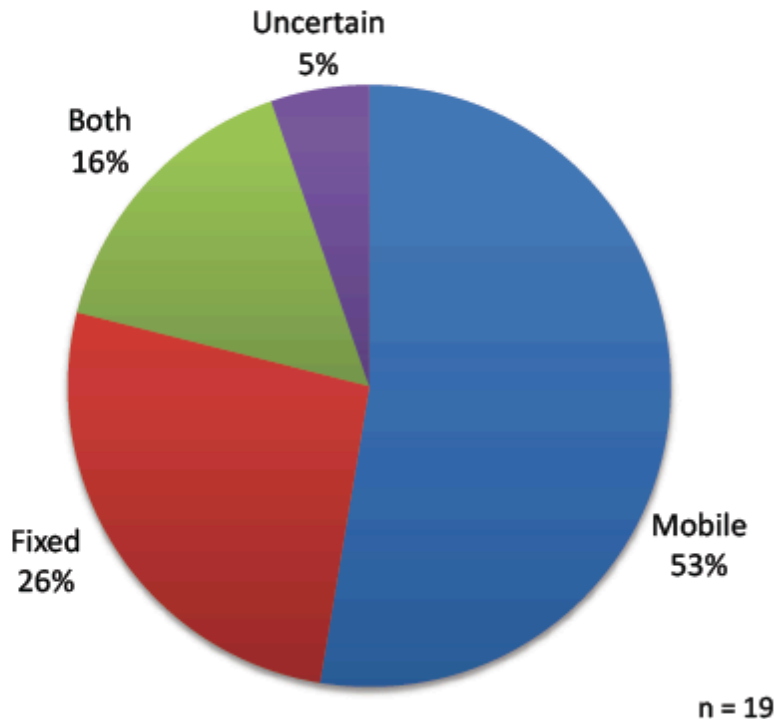
Optimum Distance Between Docking Stations



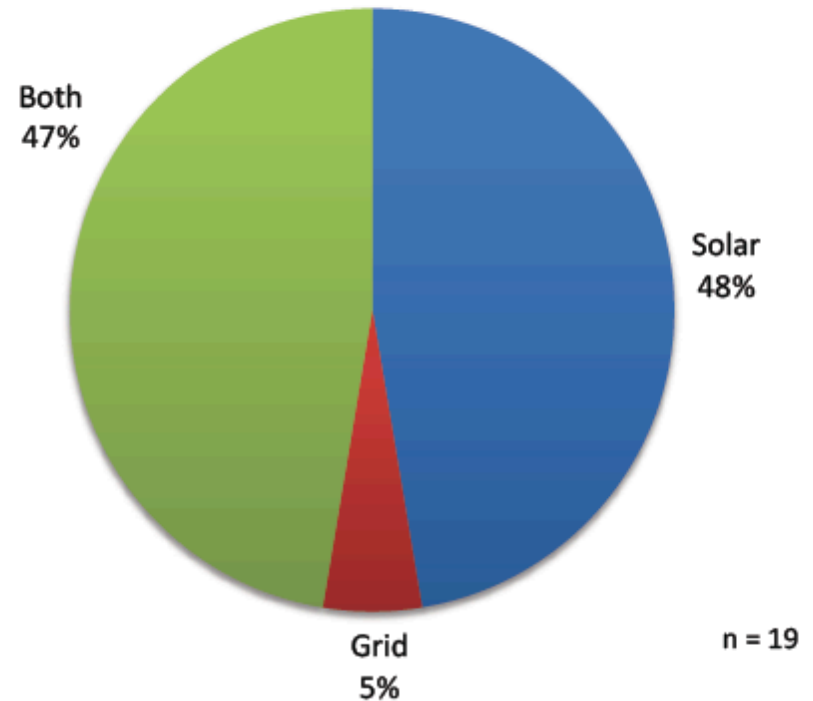
Shaheen et al., 2012

Docking Station Features

Bike Docking Stations



Power Used for Kiosks and Docking Stations



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

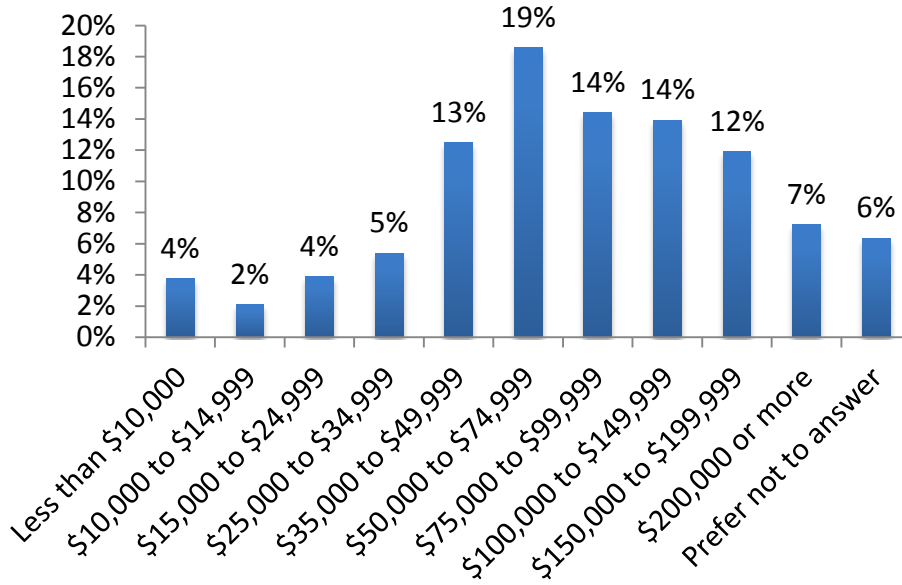
Shaheen et al., 2012

Basic City Statistics of Member Survey

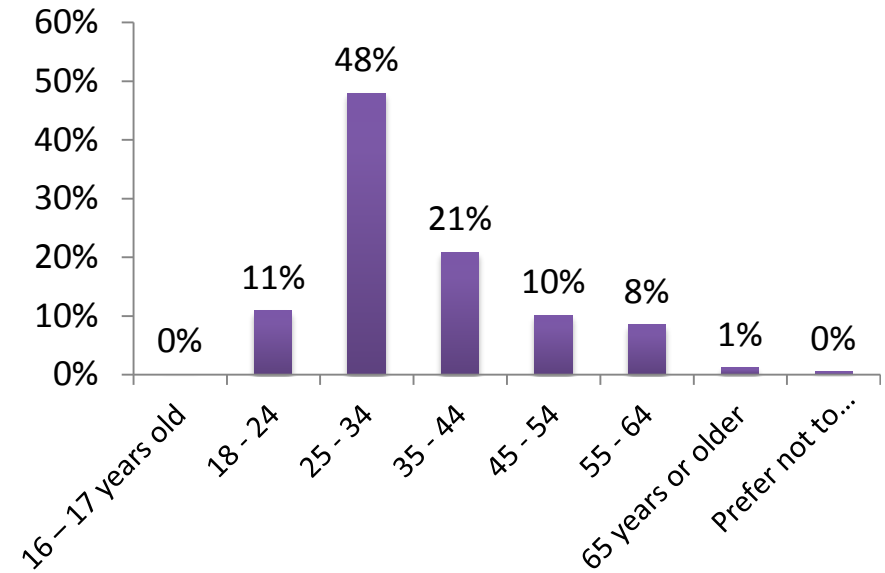
Transit Facts	Washington, D.C.	Toronto	Montreal	Minneapolis-St.Paul
Kilometers of Rail Track	341	373	122	40
Number of Buses	1,495	1,811	1,600	885
Number of Rail (or Metro) Cars	1,106	951	759	27
Unlinked trips	418,125,650	477,357,000	388,600,000	78,048,647
Population Facts	Washington, D.C.	Toronto	Montreal	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

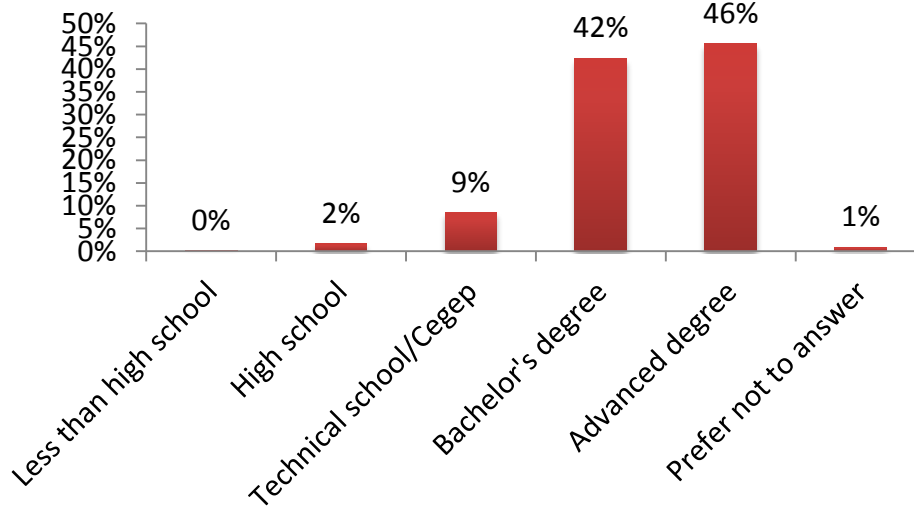
Income



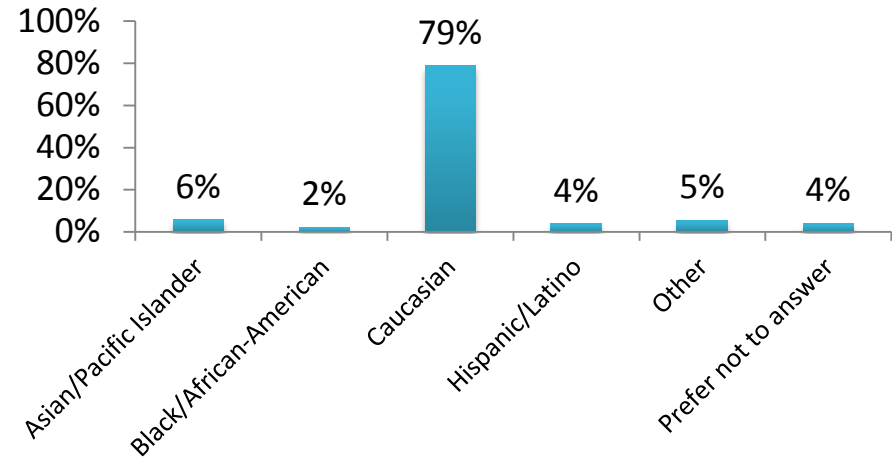
Age



Education

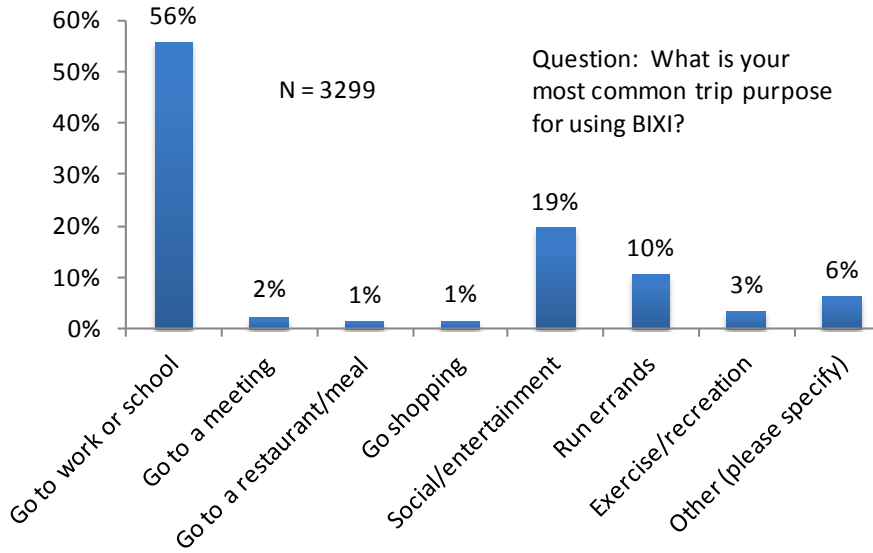


Race/Ethnicity

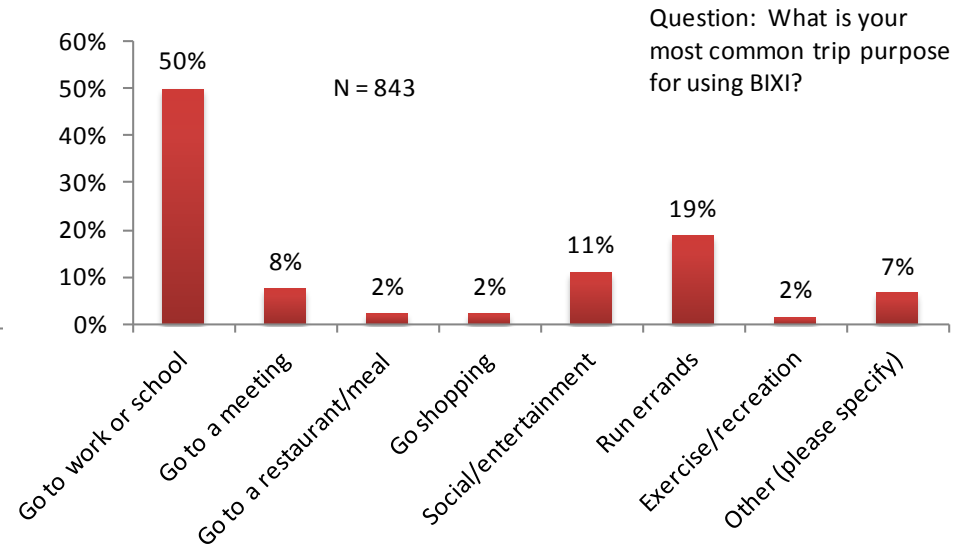


Bikesharing Trip Purpose

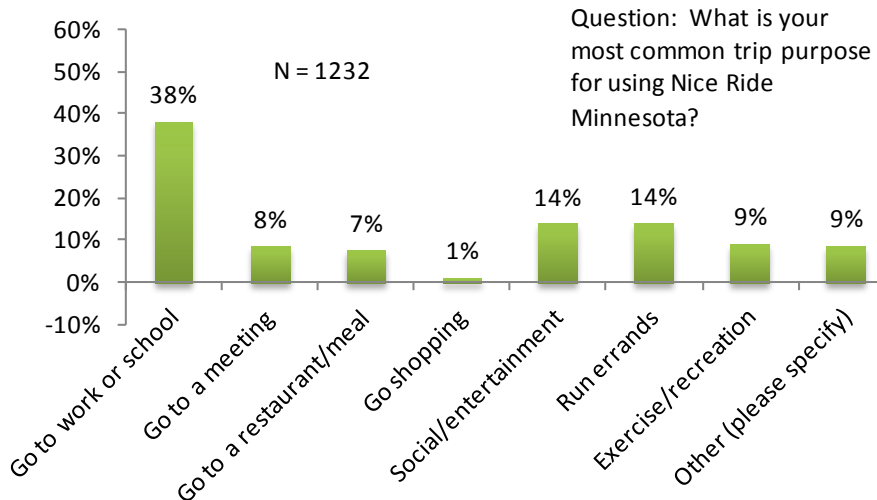
Montreal



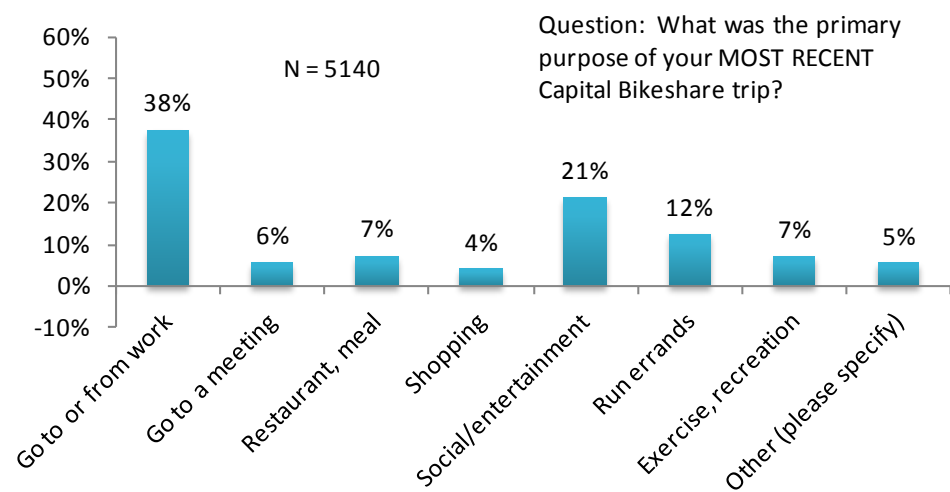
Toronto



Minneapolis-St. Paul

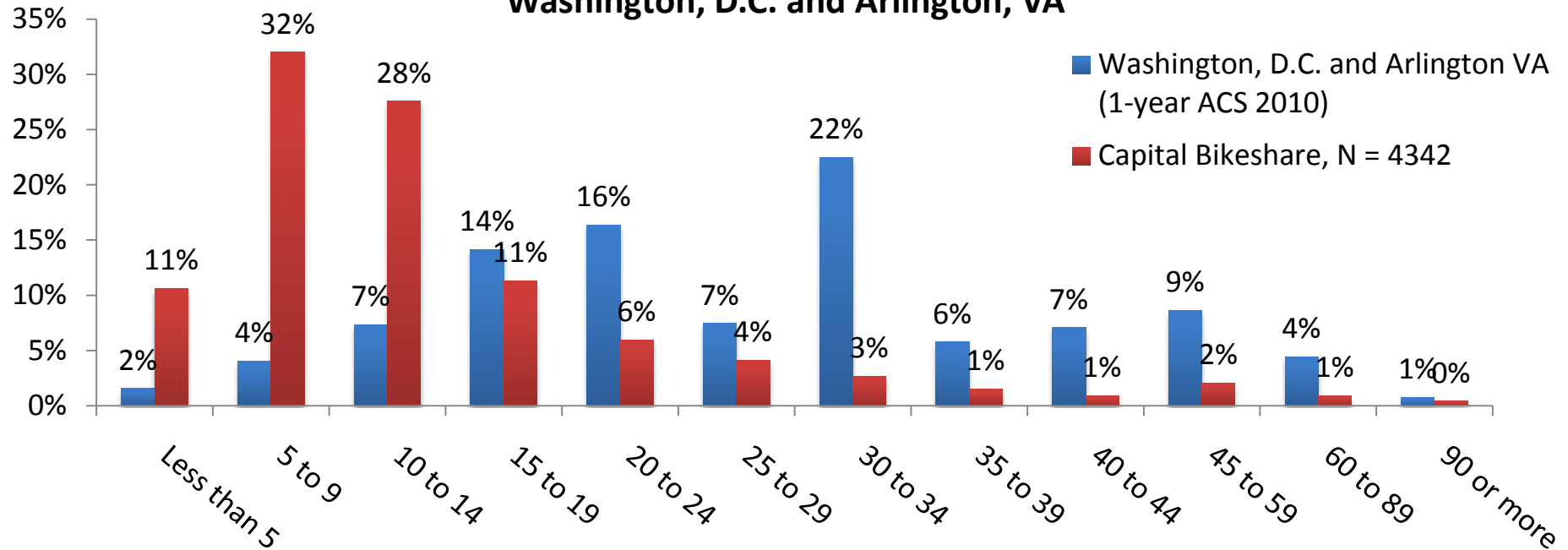


Washington, D.C.

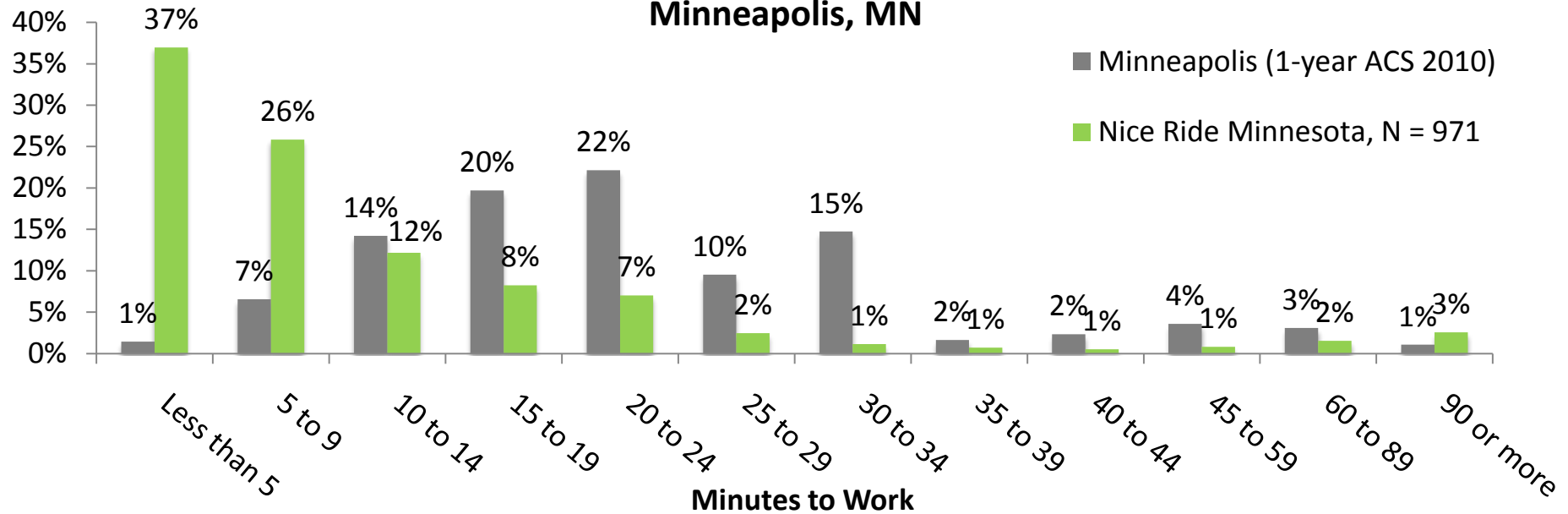


Commute Times in the United States

Washington, D.C. and Arlington, VA

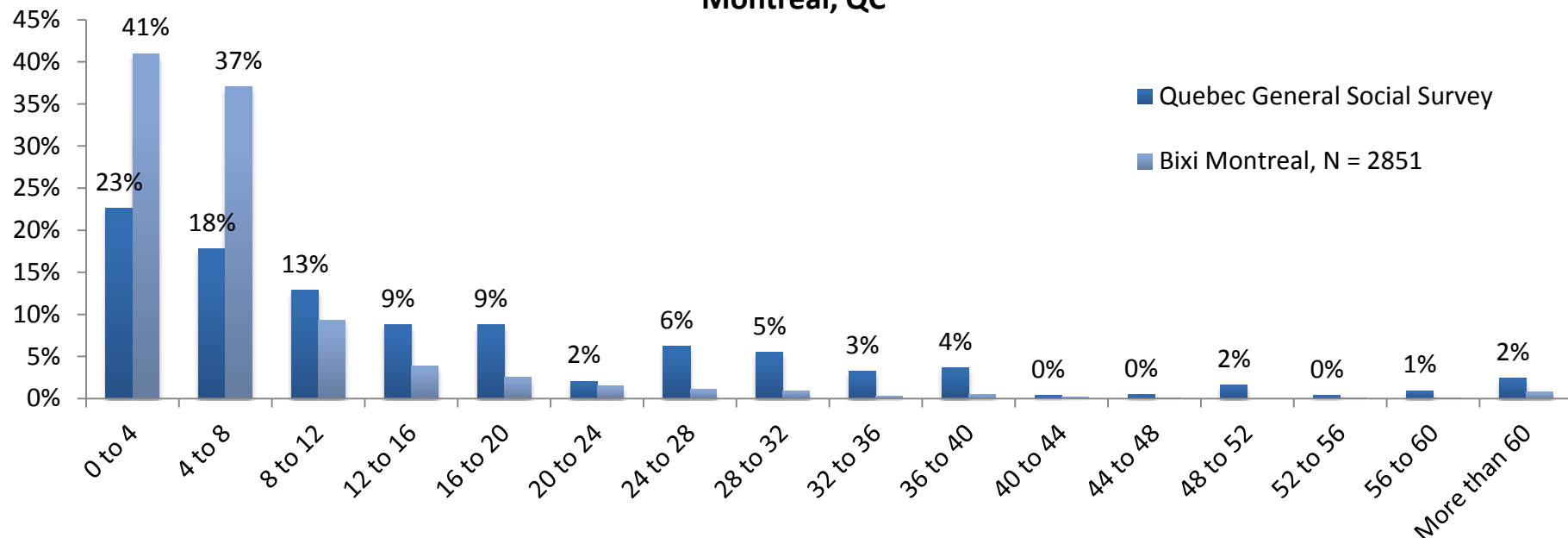


Minneapolis, MN

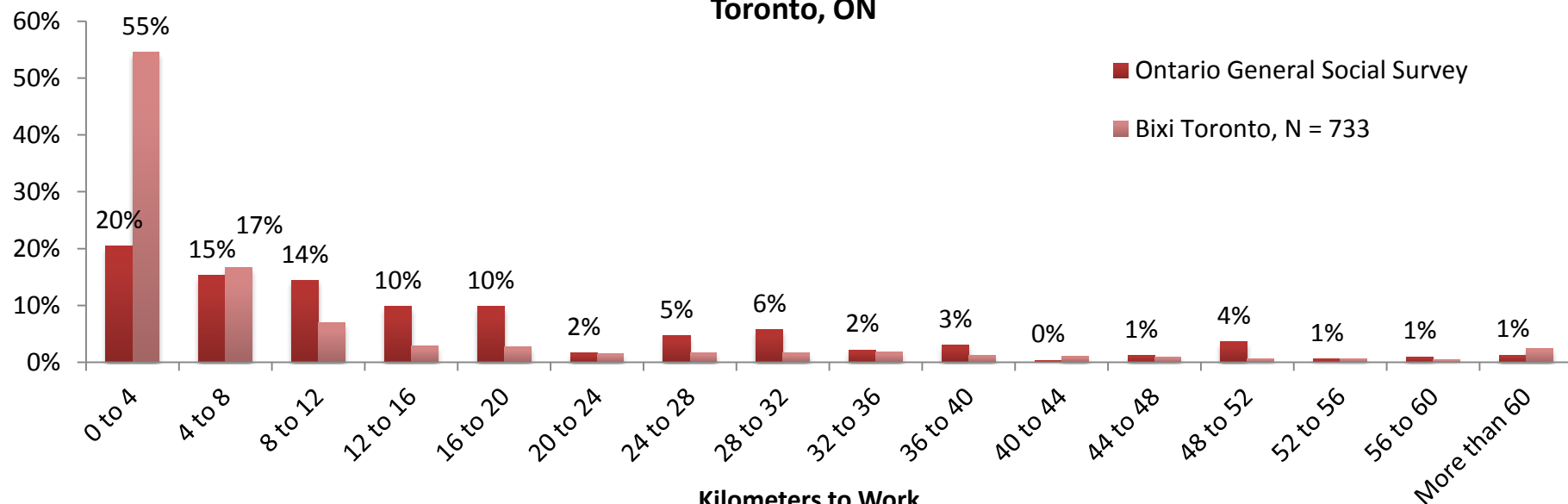


Commute Times in Canada

Montreal, QC

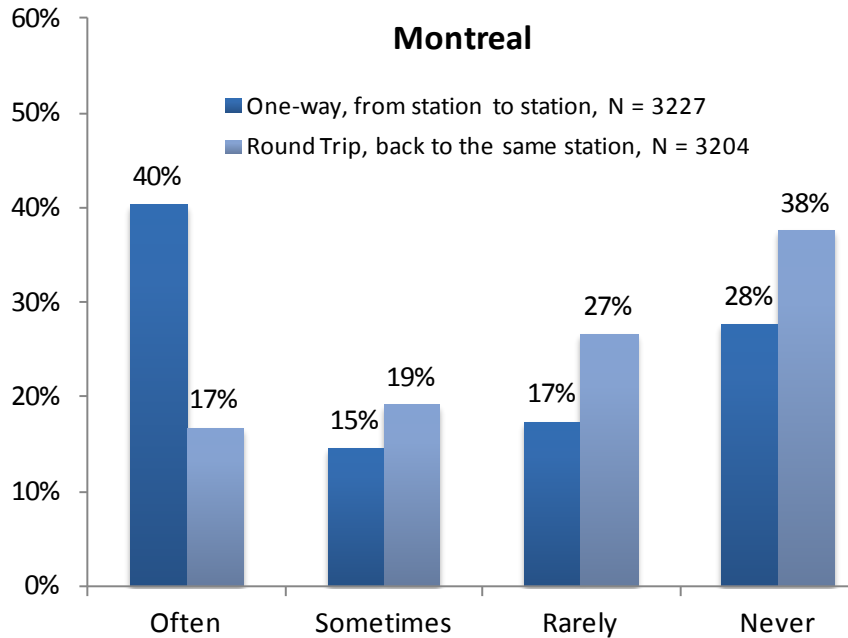


Toronto, ON

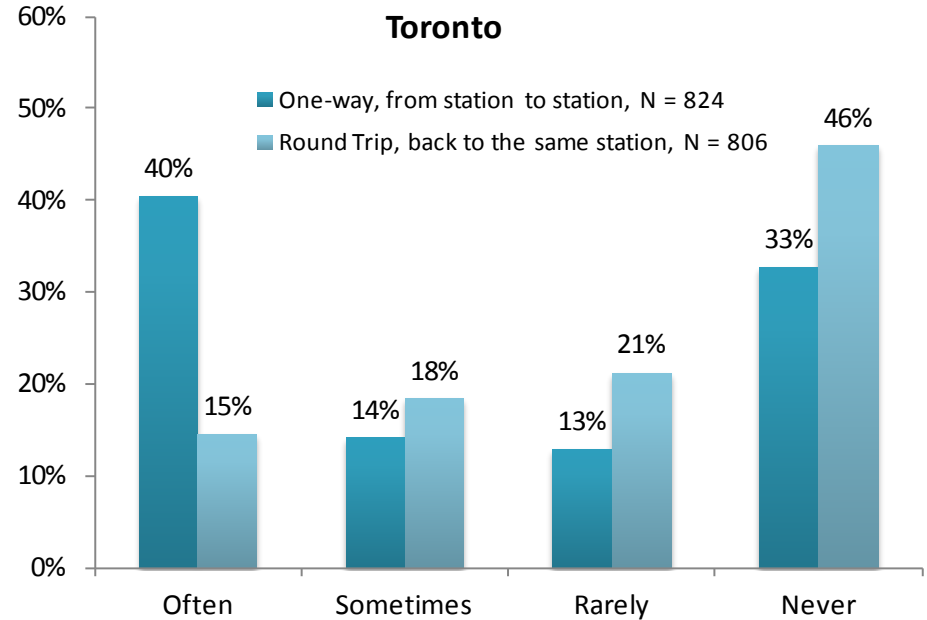


One-way and Round-trip

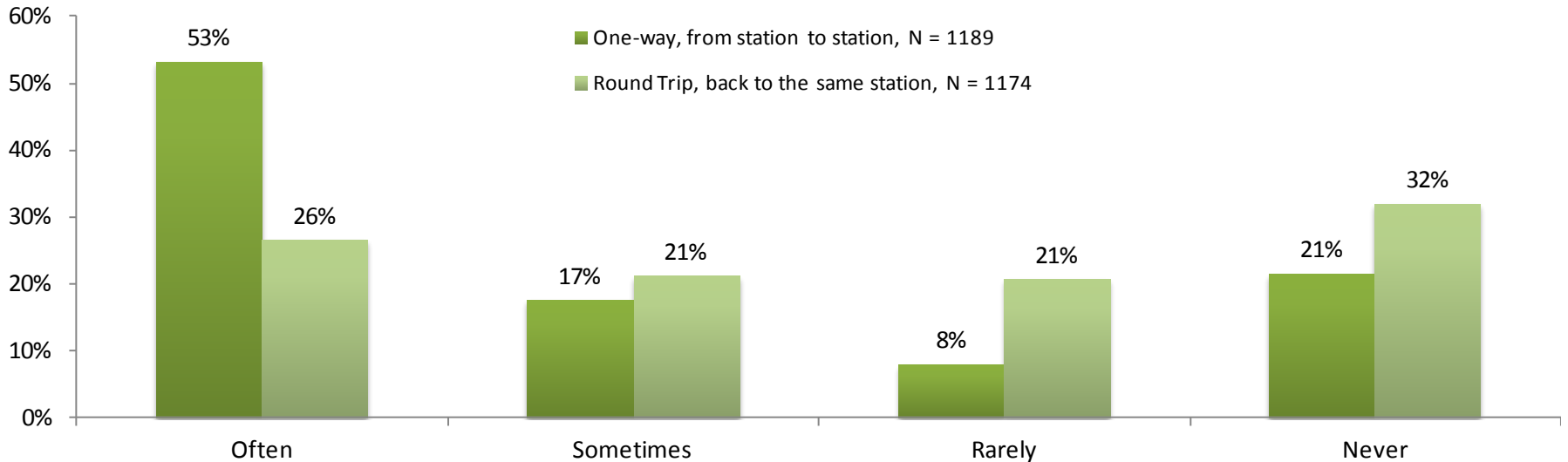
Montreal



Toronto



Minneapolis-Saint Paul



System Activity

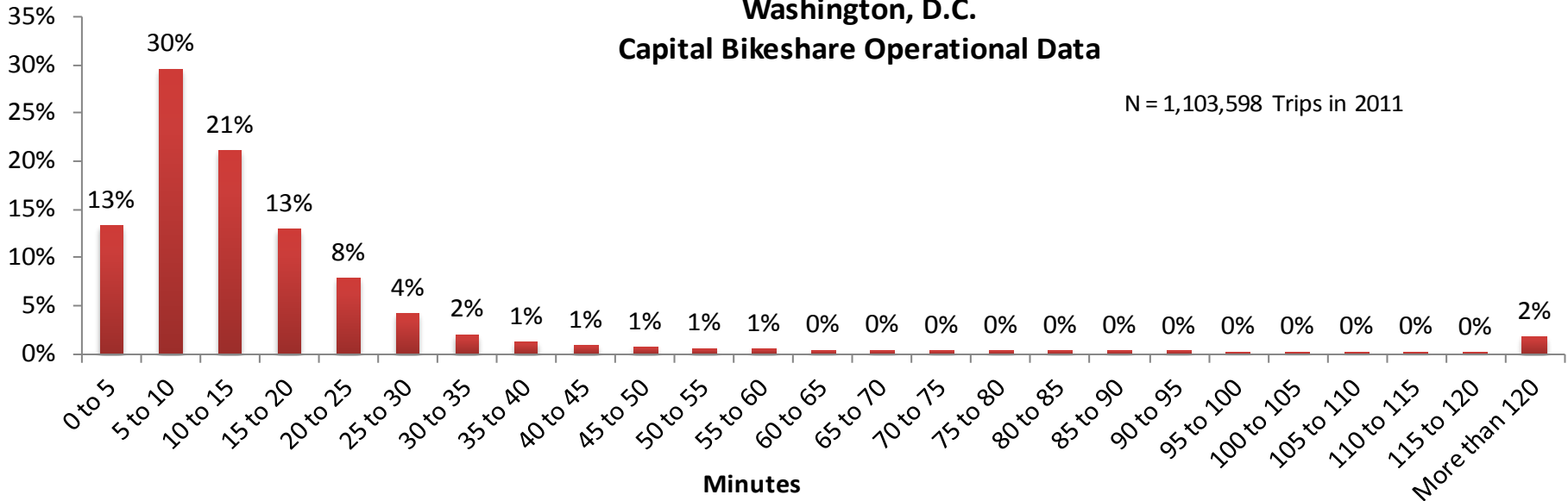
CapitalBikeshare & NiceRide Minnesota

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

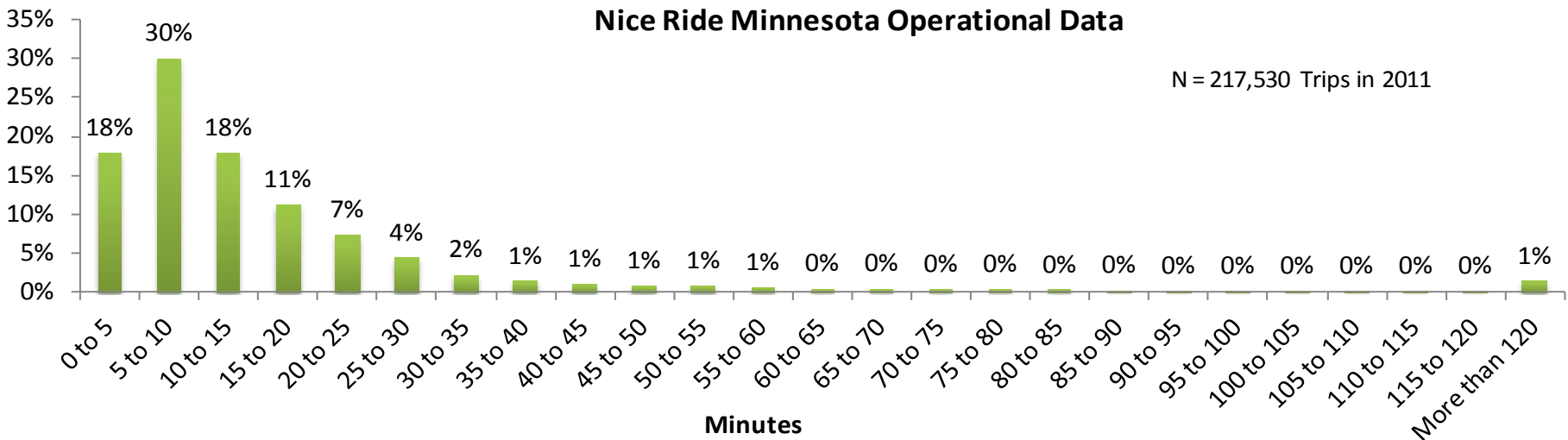
Washington, D.C. Capital Bikeshare Operational Data

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

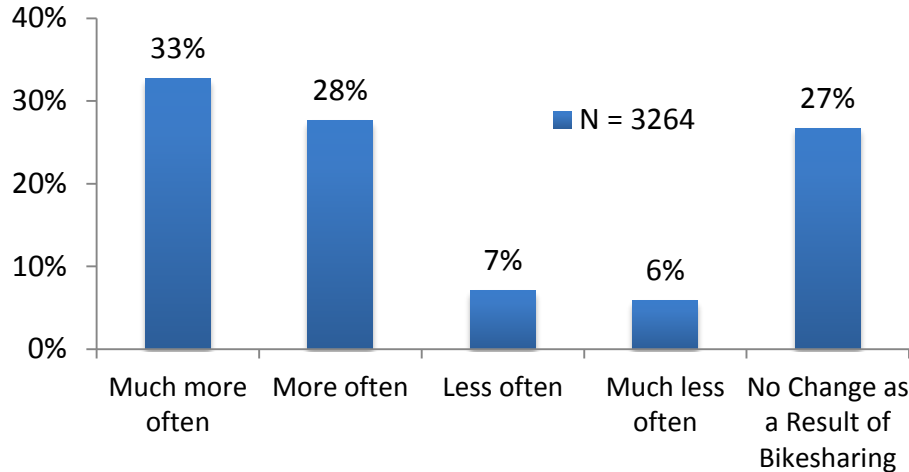
As a result of my use of <bikesharing>, I use the bus...

- ☐ 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.

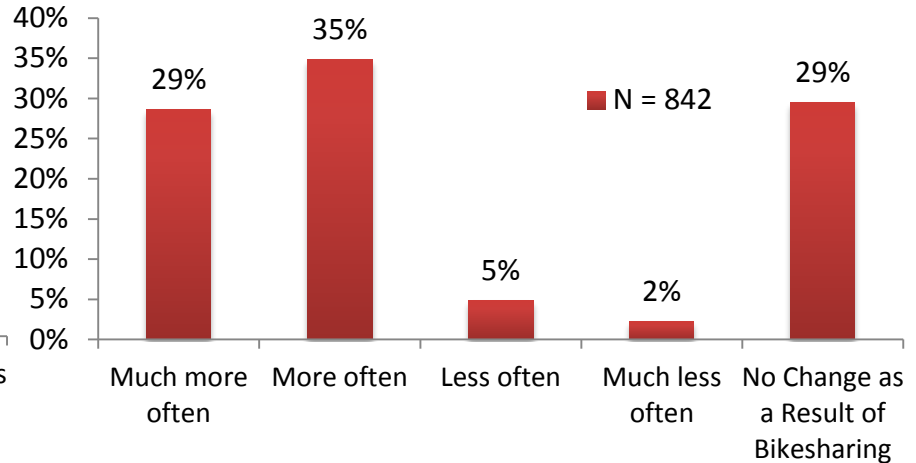
Change in Bicycling

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

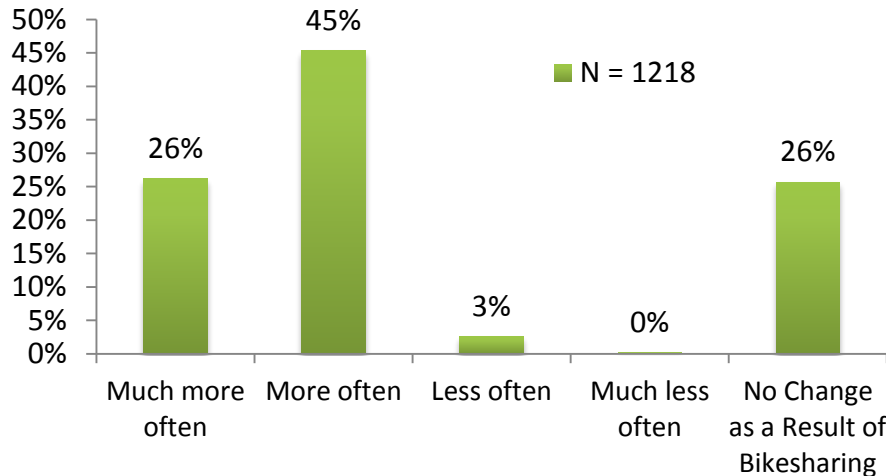
Montreal



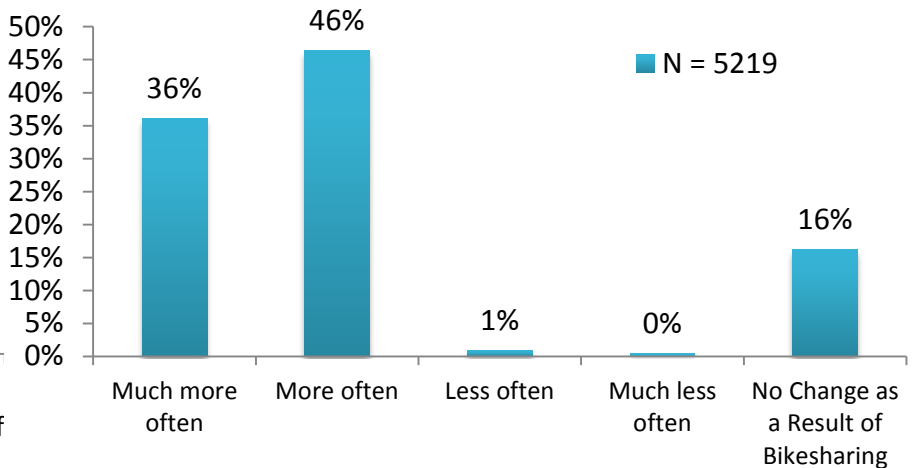
Toronto



Twin Cities



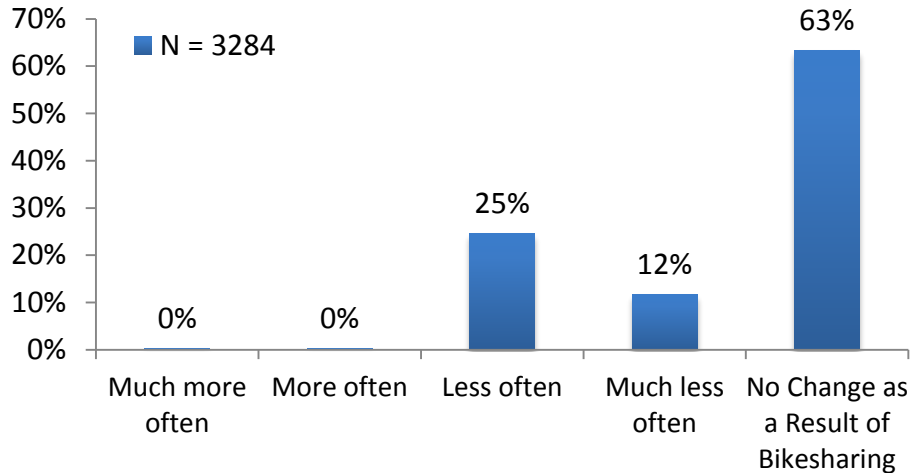
Washington, D.C.



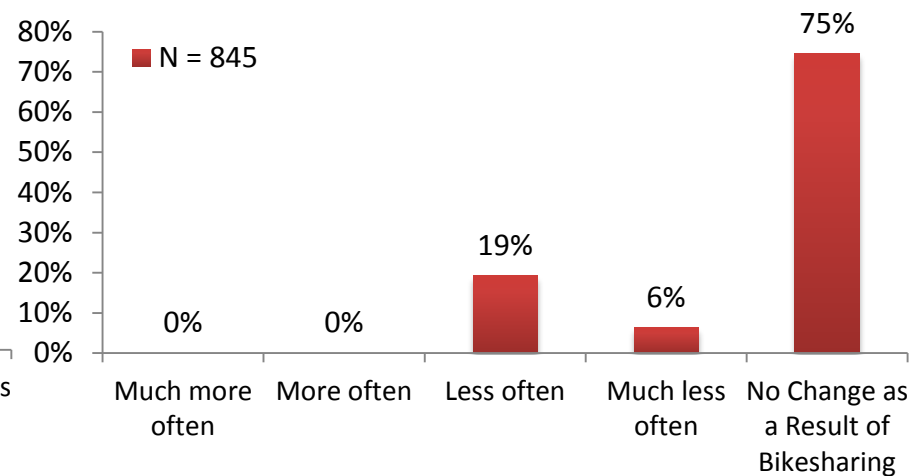
Change in Driving a Car

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

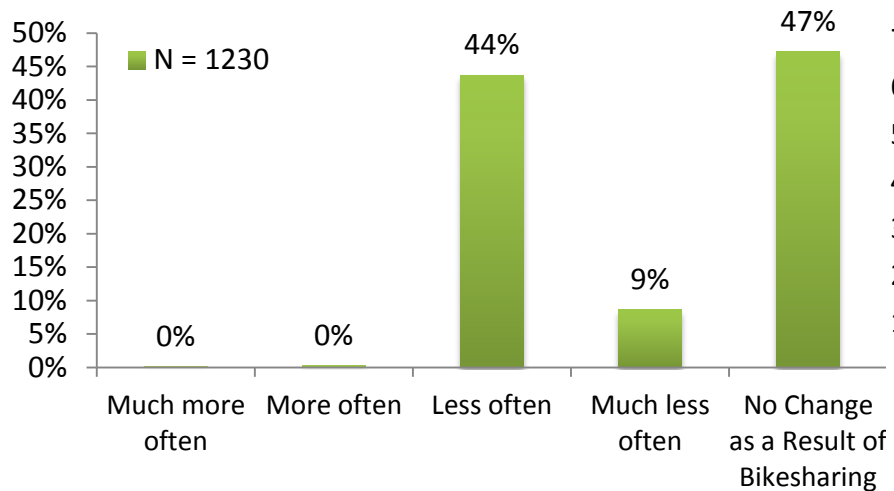
Montreal



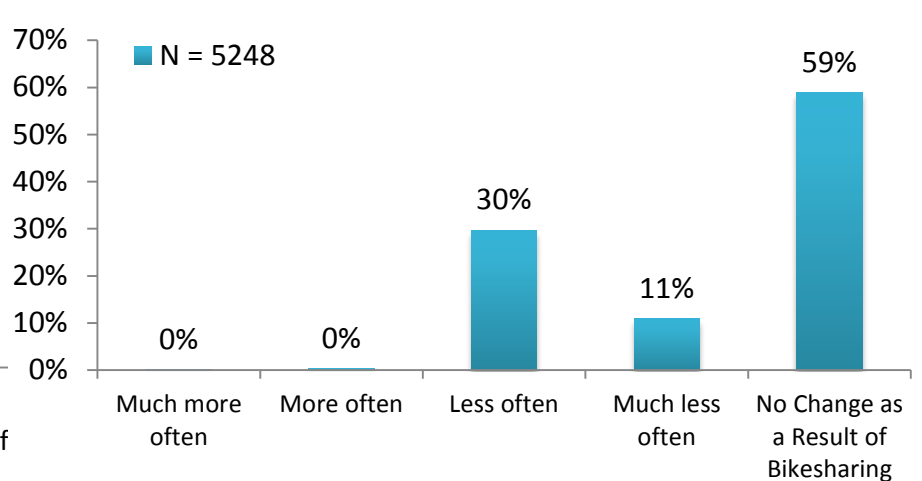
Toronto



Twin Cities



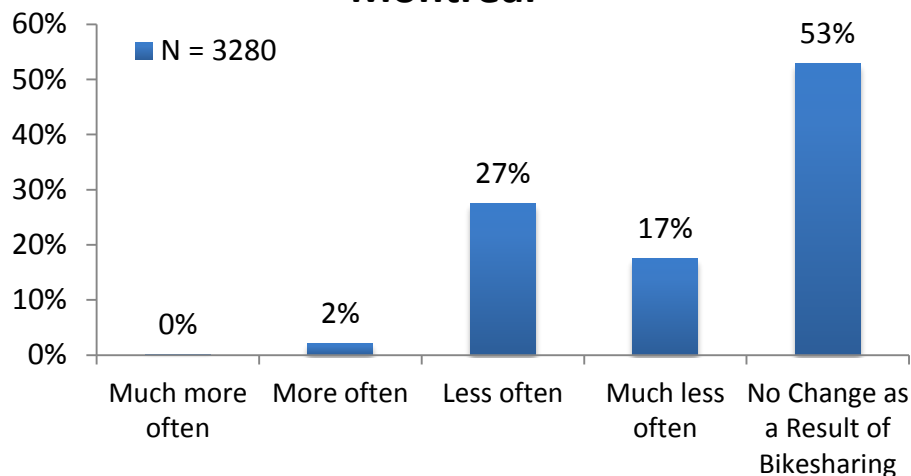
Washington, D.C.



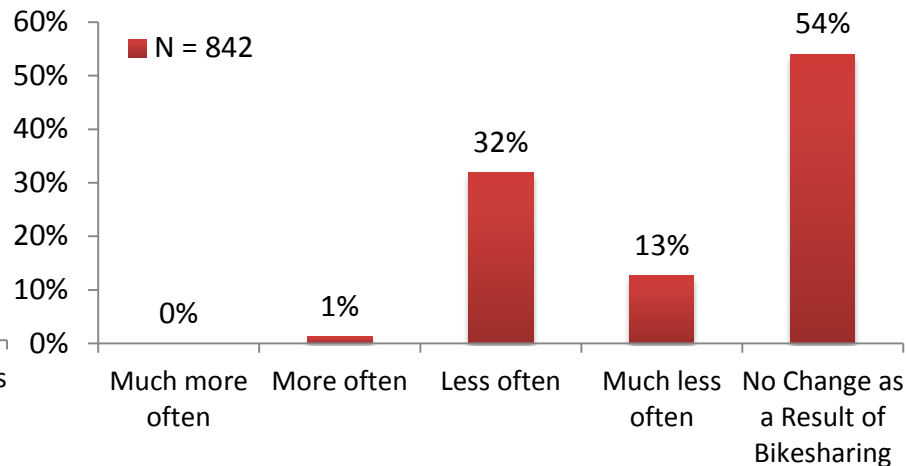
Change in Taxi Use

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

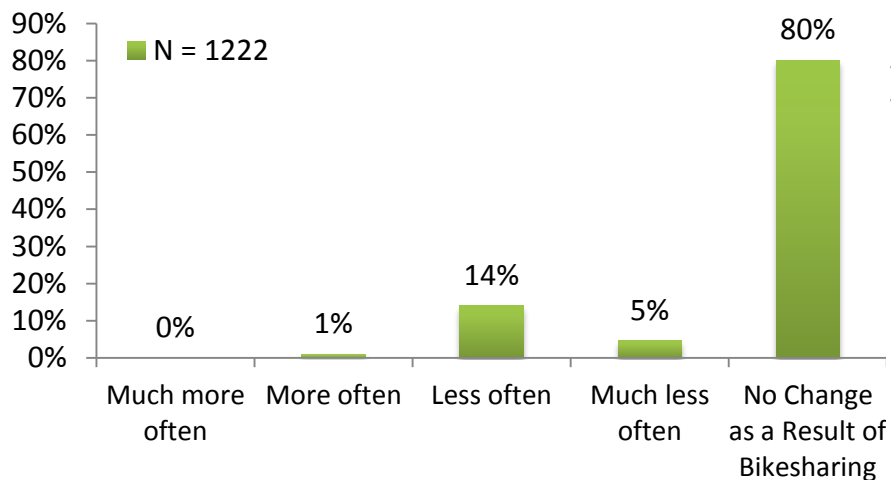
Montreal



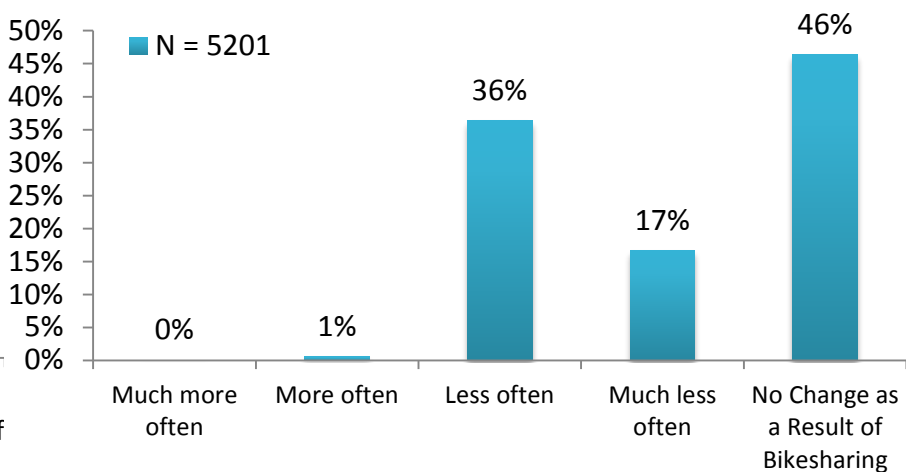
Toronto



Twin Cities



Washington, D.C.



With Transit Impacts Minneapolis Seems Different



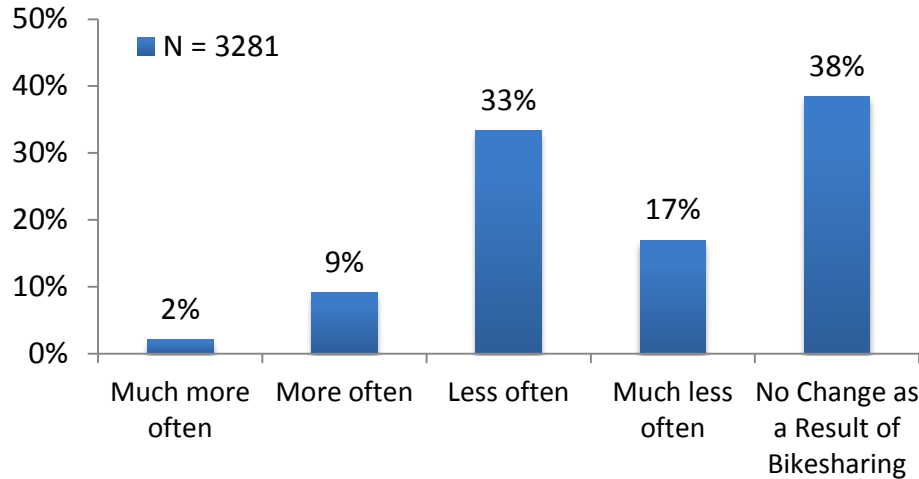
Source: Greg Benz



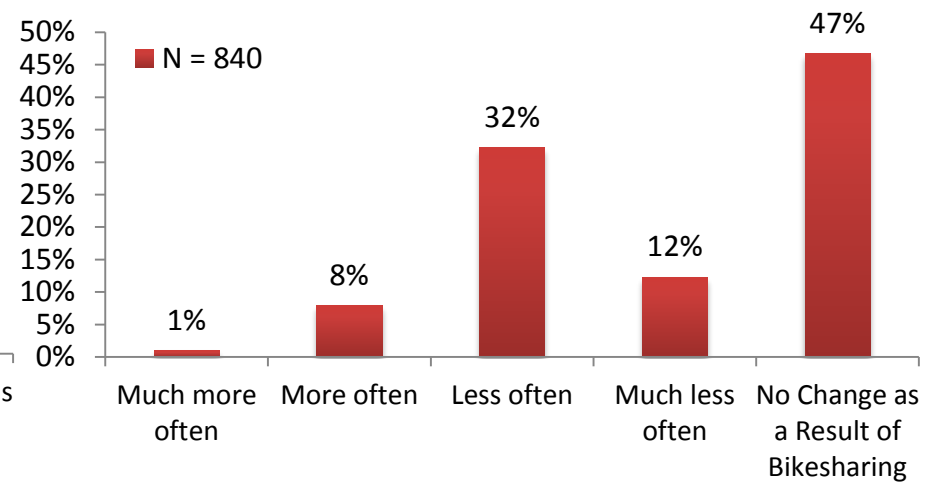
Change in Urban Rail

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

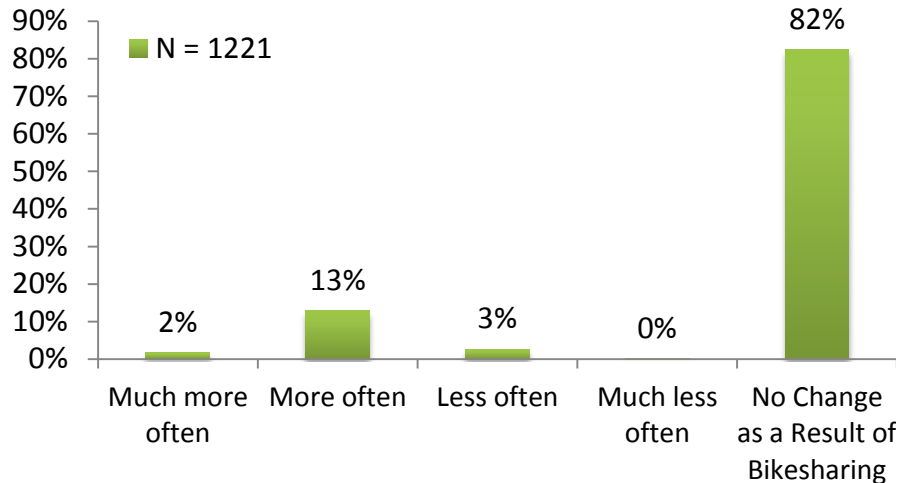
Montreal



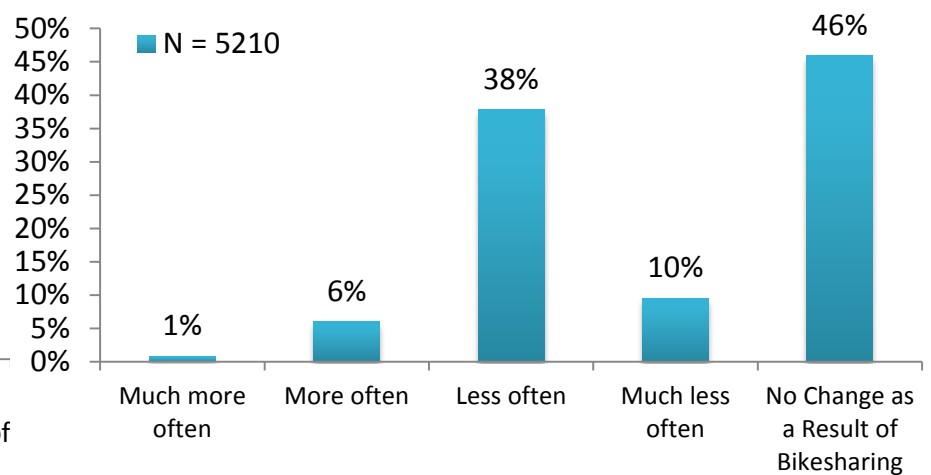
Toronto



Twin Cities



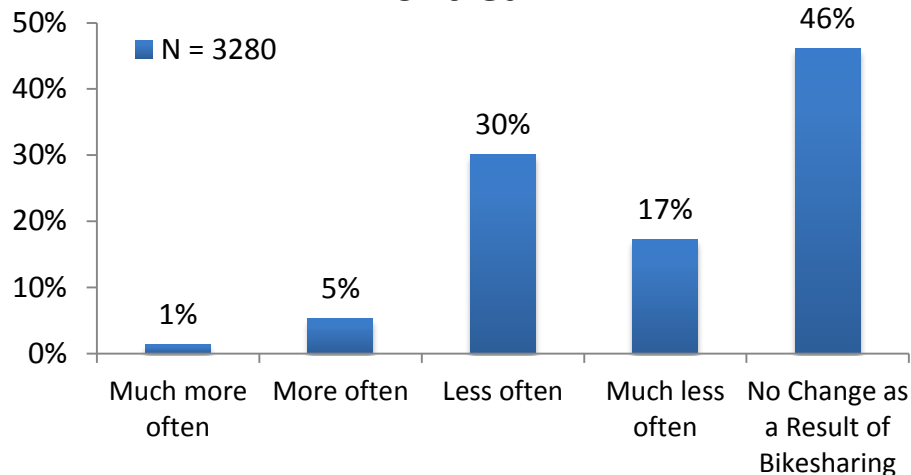
Washington, D.C.



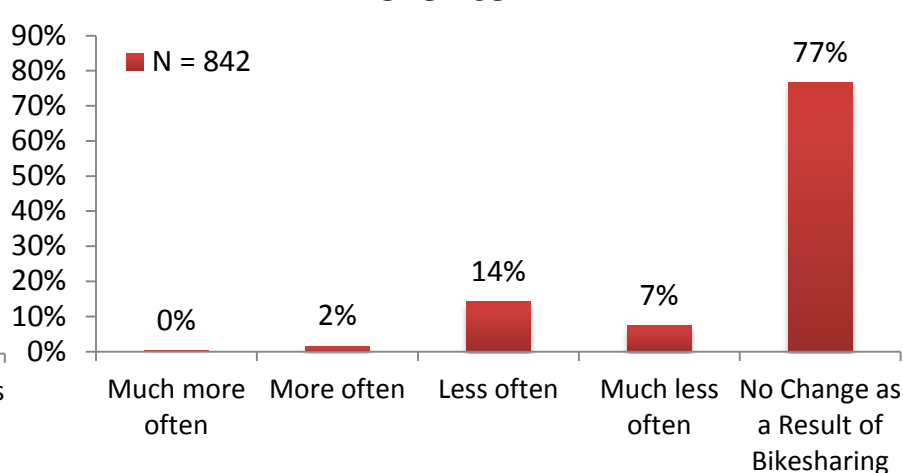
Change in Bus

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

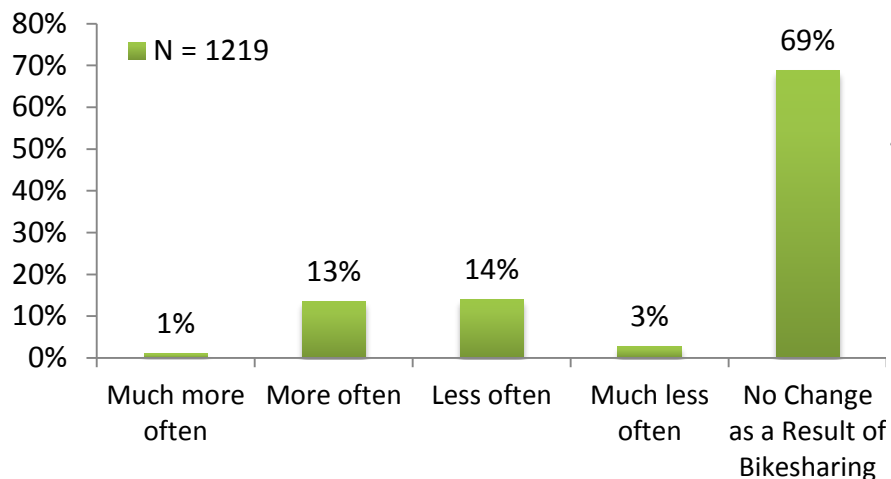
Montreal



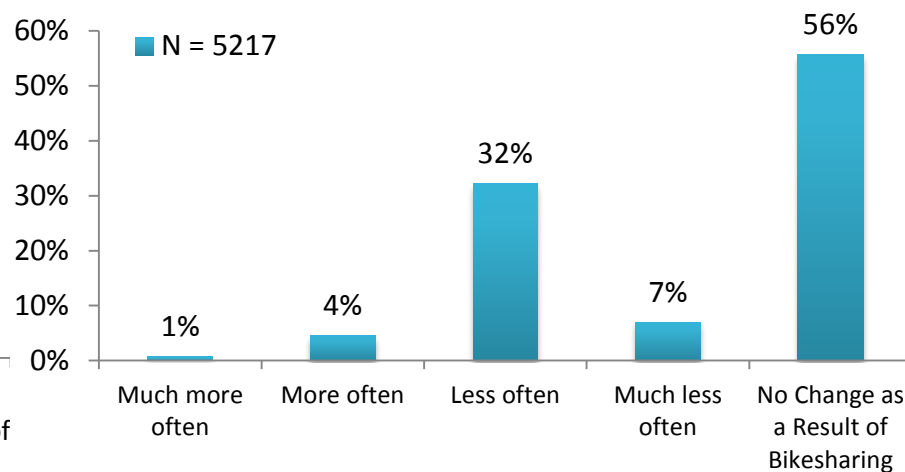
Toronto



Twin Cities



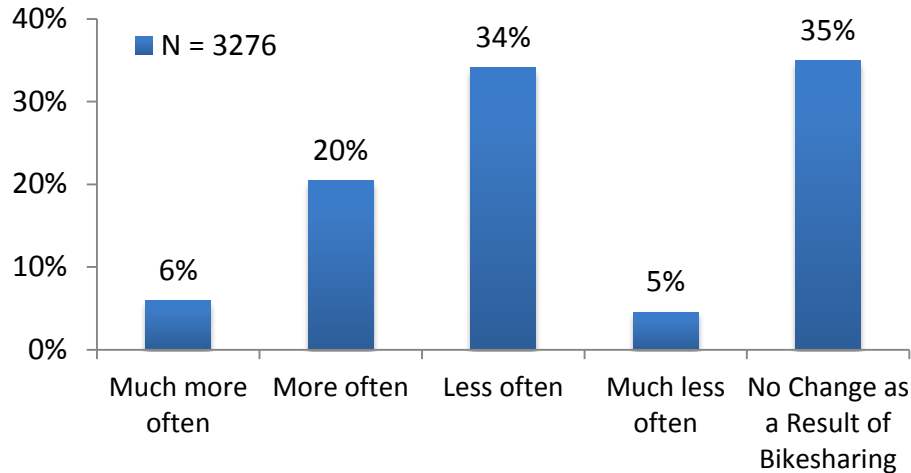
Washington, D.C.



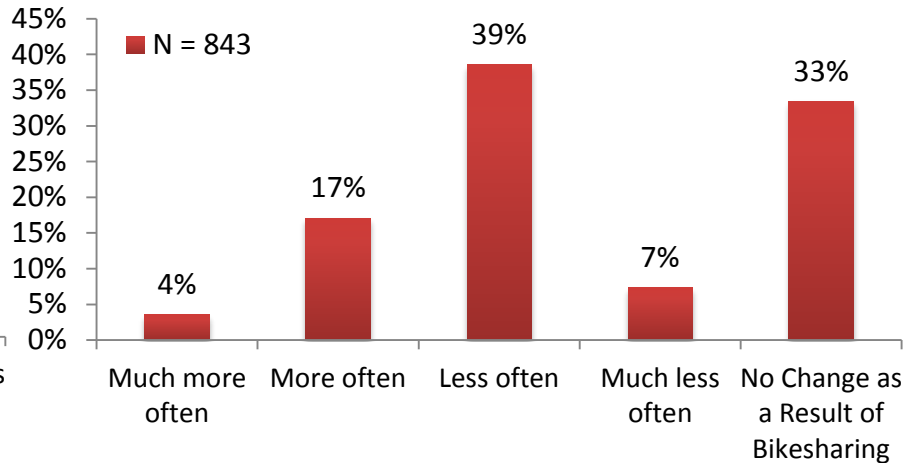
Change in Walking

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

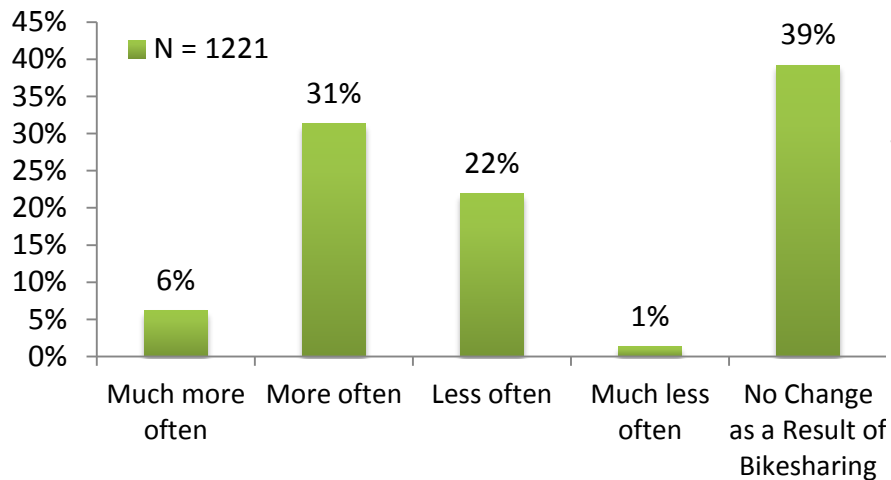
Montreal



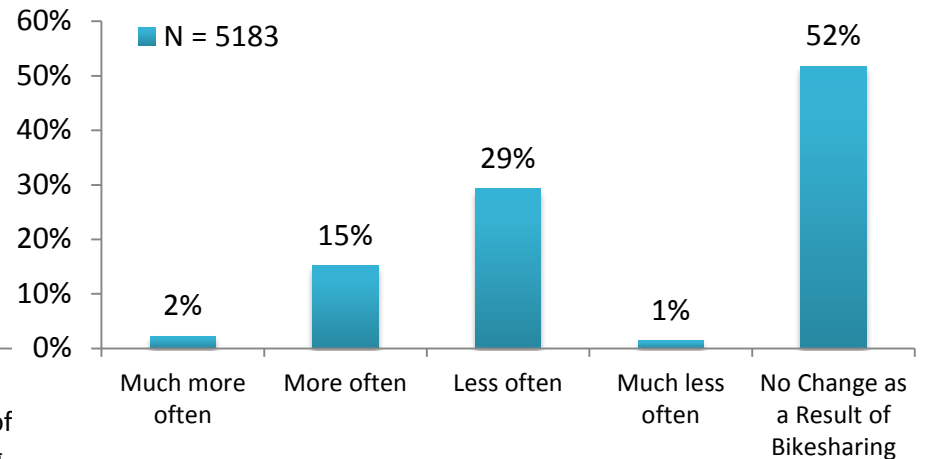
Toronto



Twin Cities

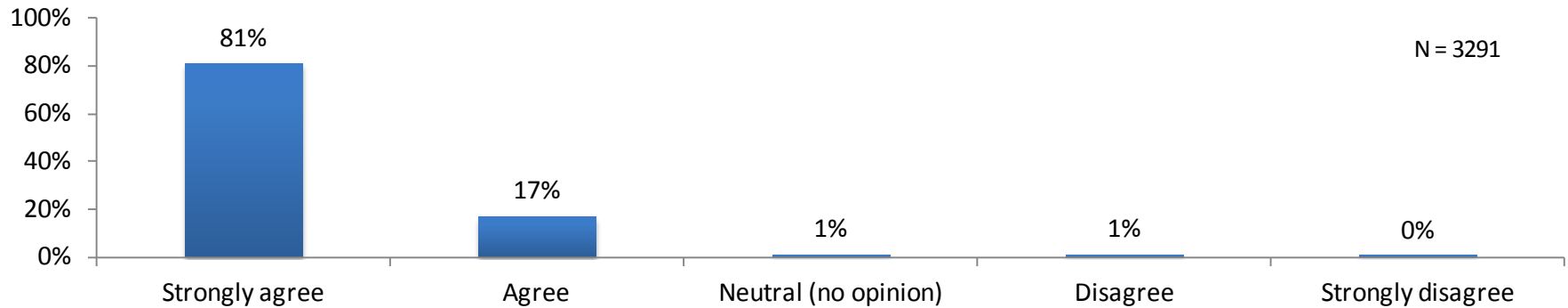


Washington, D.C.

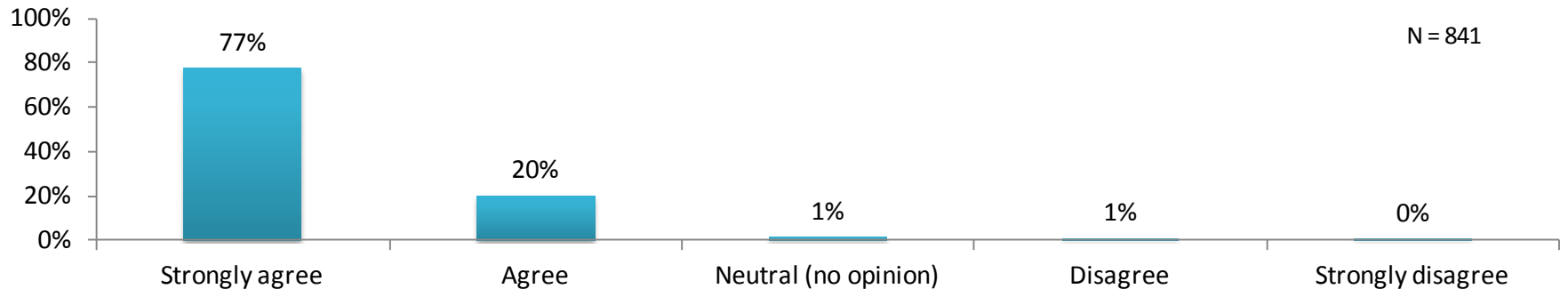


Perceptions of Bikes sharing as Enhancing Transit

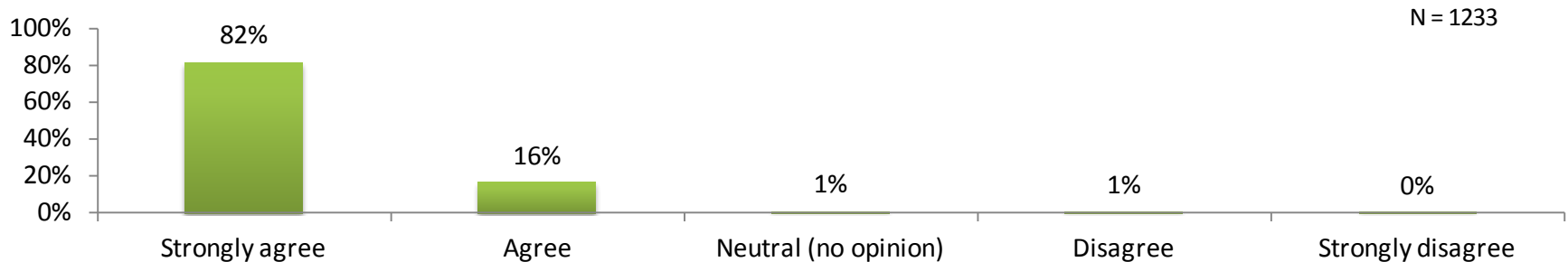
I think of BIXI as an enhancement to the Montreal public transportation system.



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

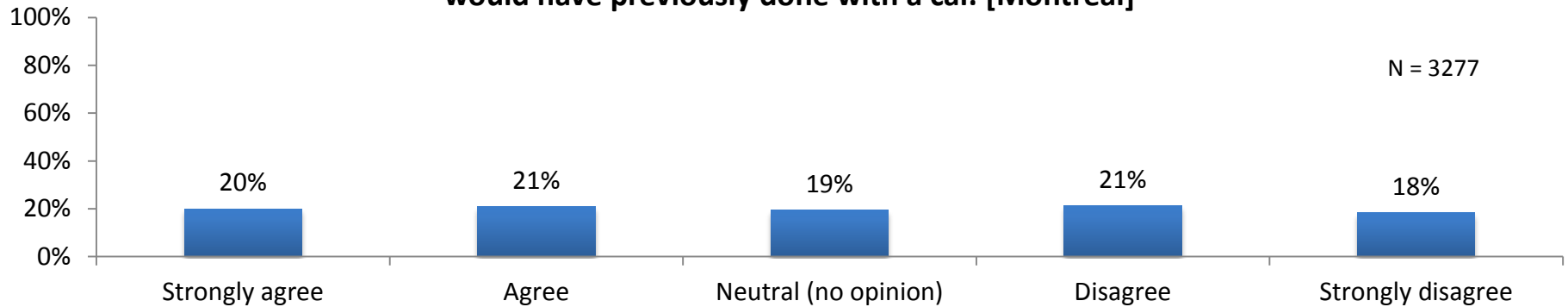


I think of Nice Ride Minnesota as an enhancement to the Twin Cities public transportation system.

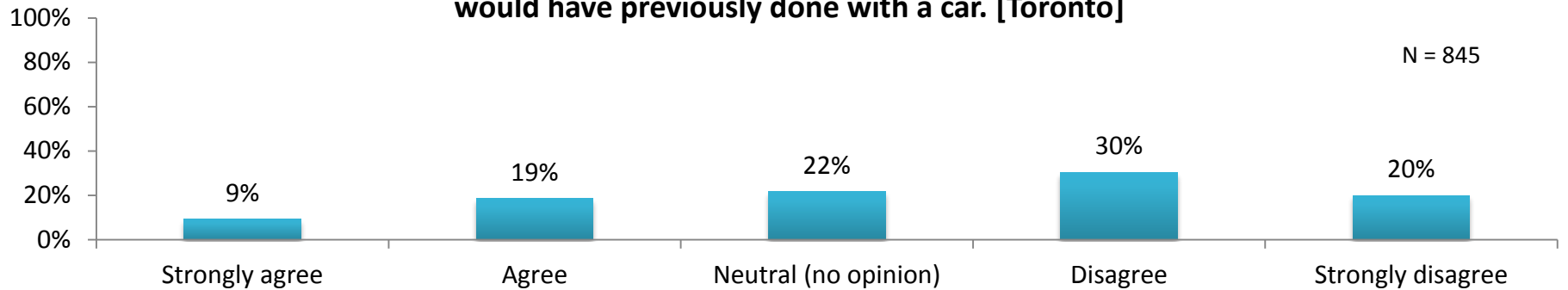


Bikesharing with Transit instead of Car

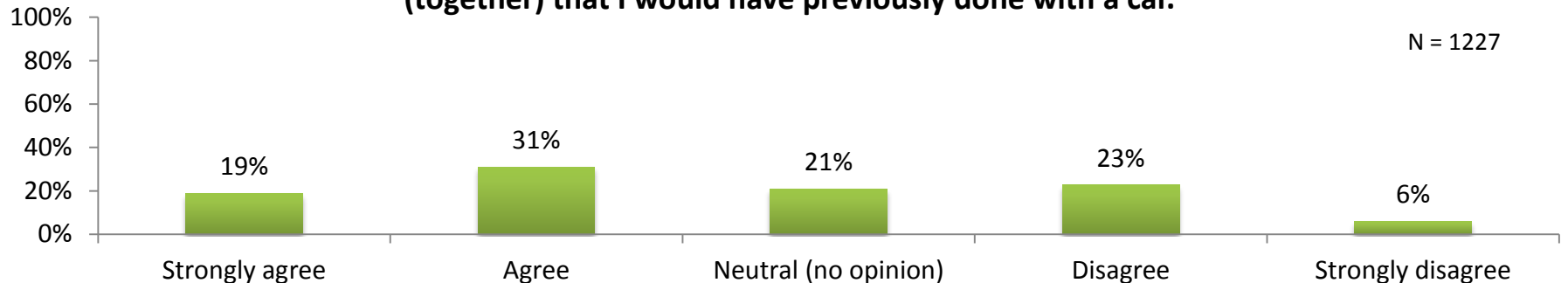
Since joining BIXI, I have made trips with public transit and bikesharing (together) that I would have previously done with a car. [Montreal]



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

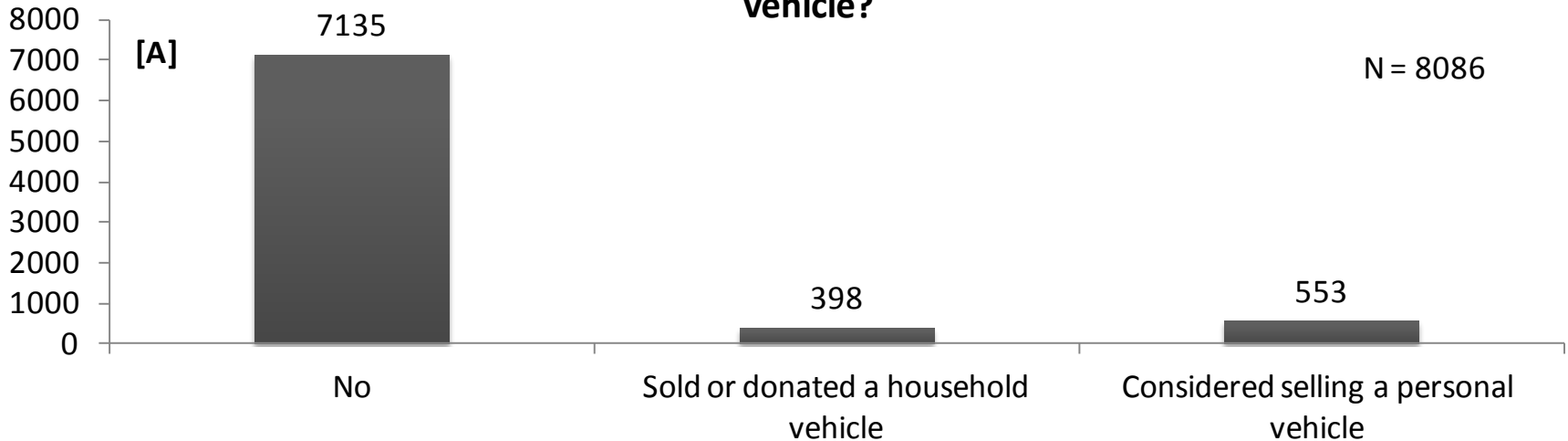


Since joining Nice Ride Minnesota I have made trips with public transit and bikesharing (together) that I would have previously done with a car.

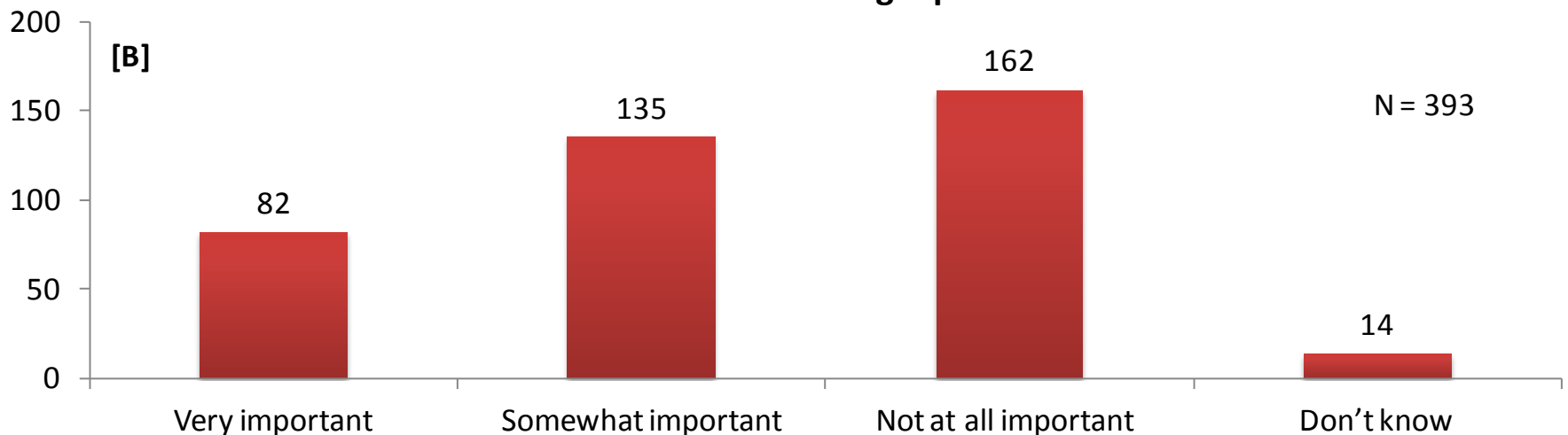


Reduction of Vehicle Ownership

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

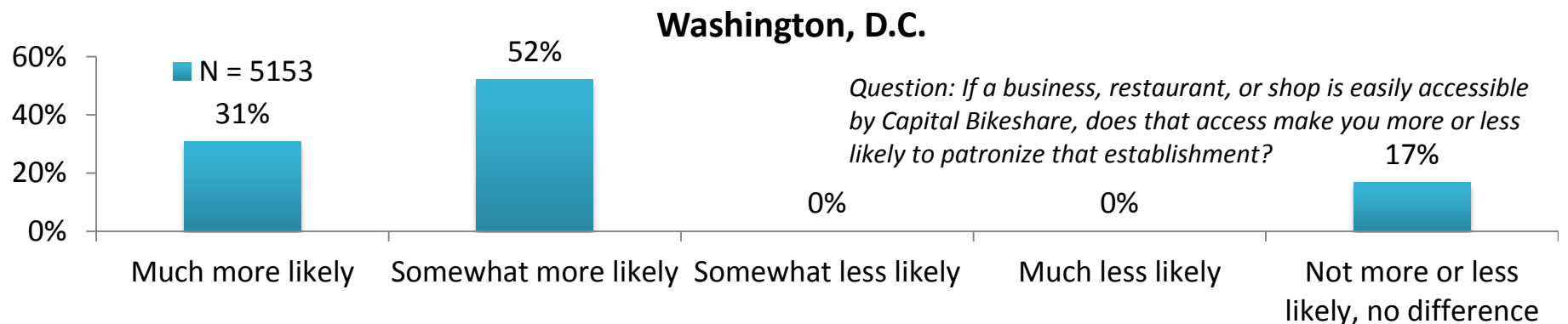
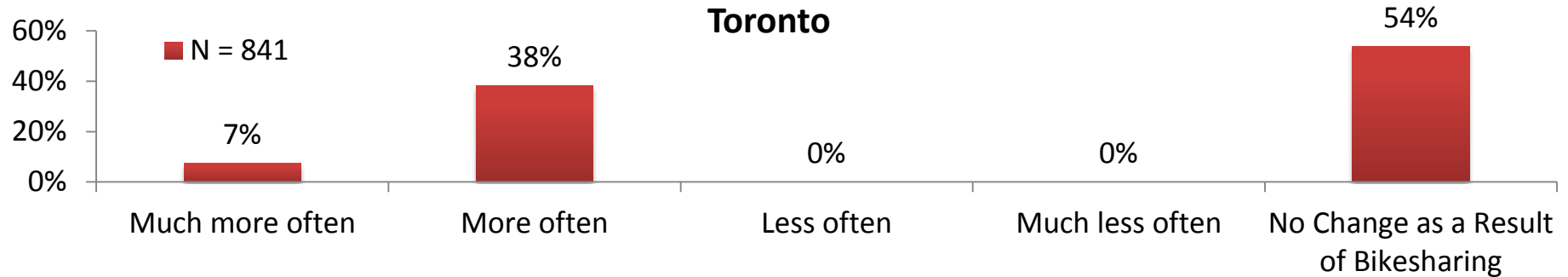
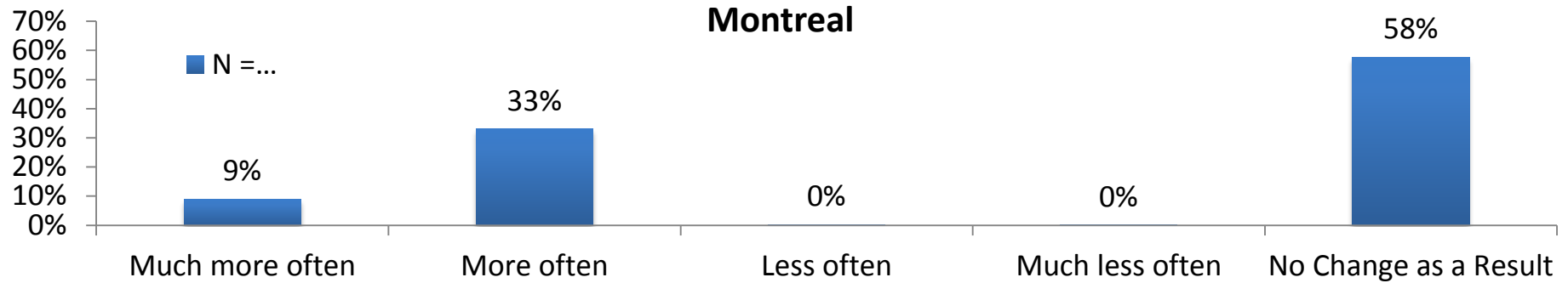


How important has your membership with [public bikesharing] been in your decision to sell or consider selling a personal vehicle?



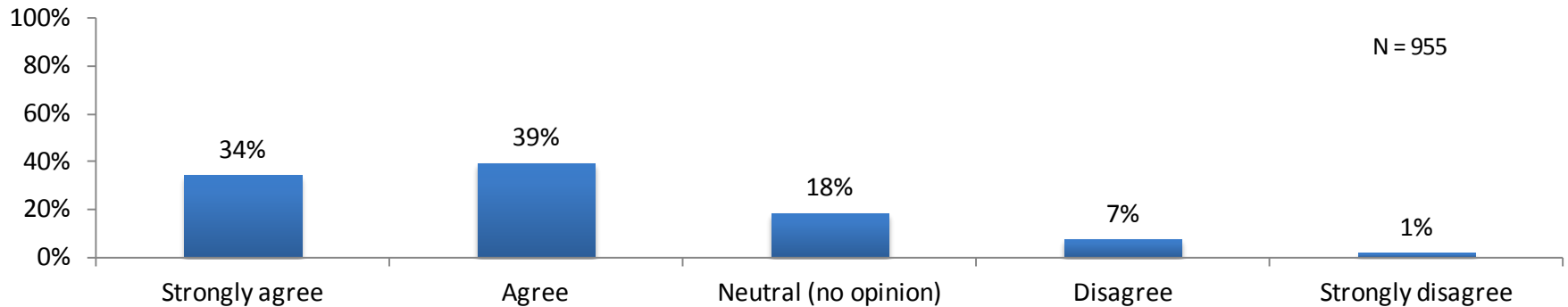
Impact on Local Shopping

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

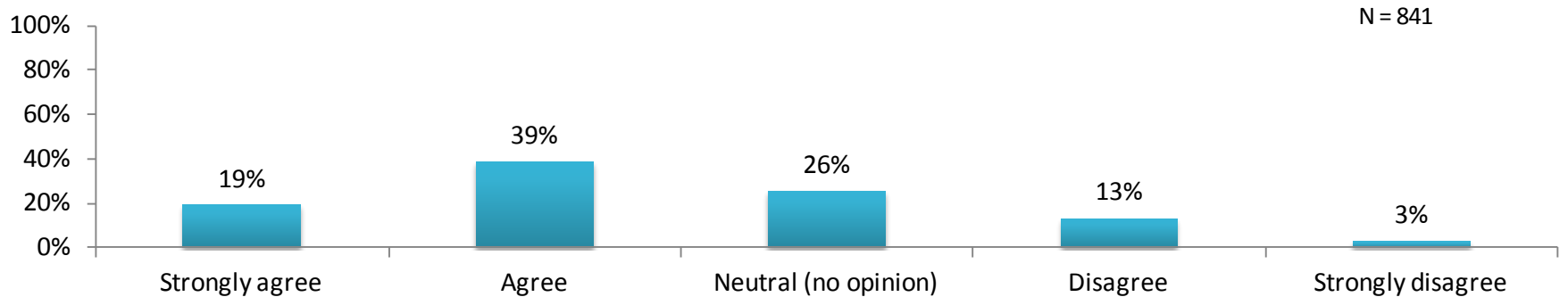


Impact on Exercise

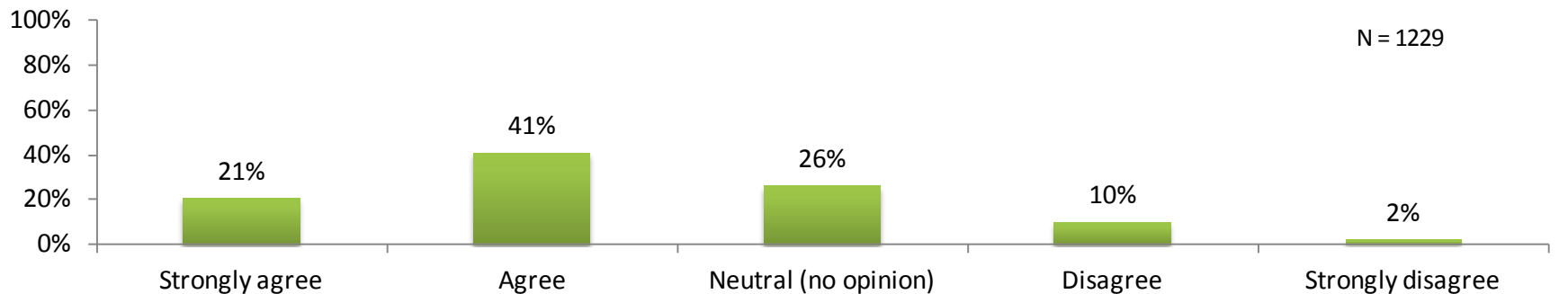
I get more exercise now that I am a member of BIXI. [Montreal]



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

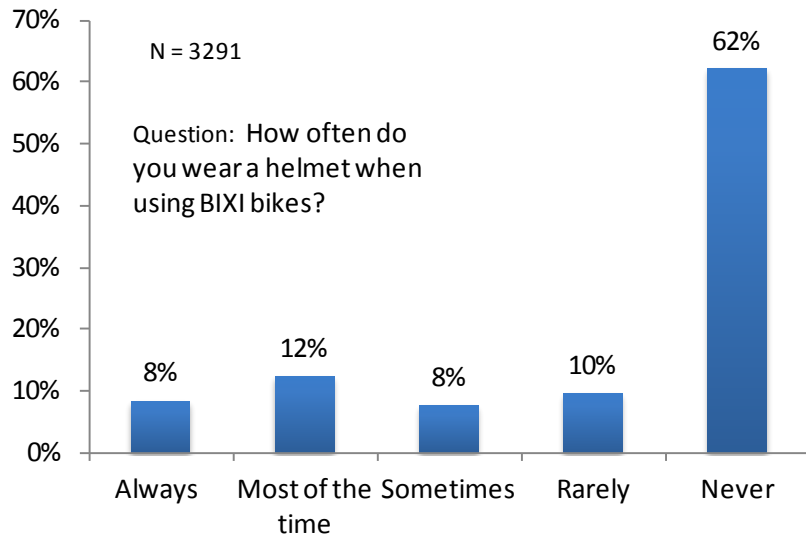


I get more exercise now that I am a member of Nice Ride Minnesota.

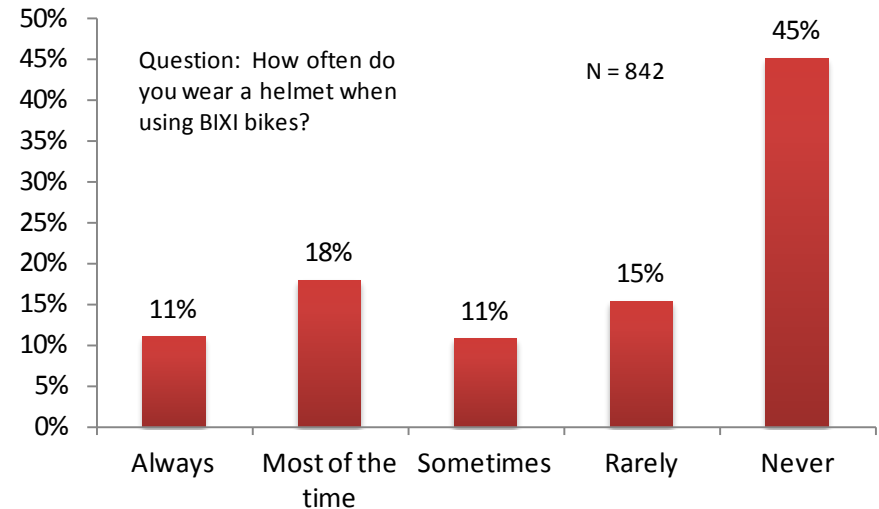


Helmet Use with Public Bikesharing

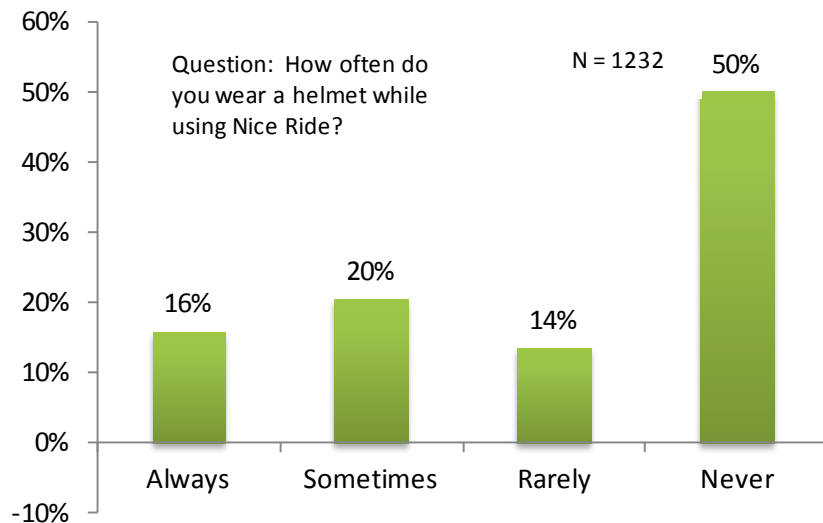
Montreal



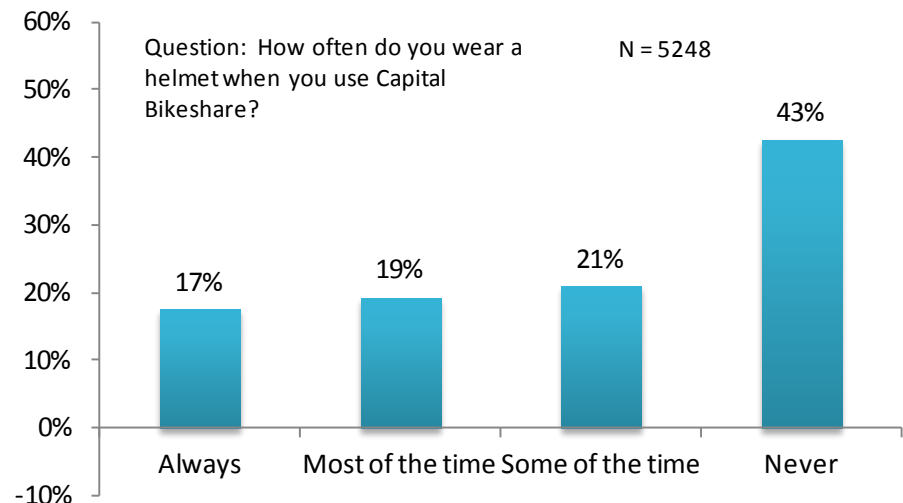
Toronto



Minneapolis-St Paul



Washington, D.C.



Summary

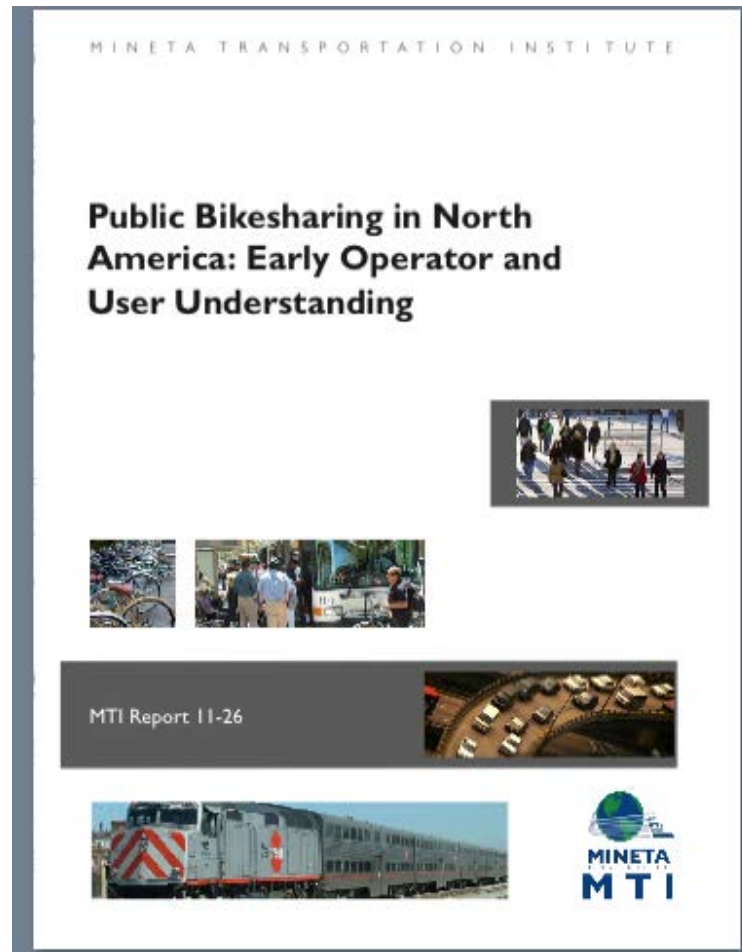
- IT-based bikesharing, starting in 2007, has undergone rapid growth in North America since 2009.
 - Approximately 20 planned and existing launches for 2012
- User survey indicates modal shift away from all other modes towards the use of the bicycle.
 - Everyone is driving less, and bicycling more
 - Most appear to be walking less, and bicycling more
 - Most also appear to be using transit less, and bicycling more
 - The dynamics of where and why bikesharing increases transit use and walking (such as is the case in Minneapolis) need to be better understood.
- Modal shift away from transit may have occurred due to transit congestion at peak times and shorter, faster, or more direct routing with bikesharing.
- Helmet use with bikesharing is limited, likely the result of helmet availability.
- Early data suggests the bikesharing may have a positive impact on nearby shopping locations.

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N. American Public Bikesharing Report



transweb.sjsu.edu/project/1029.html



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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