

The Impact of Bikesharing



White Paper on the Social, Environmental, and Economic Effects of Bikesharing

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Abstract:

This white paper analyzes different aspects of bikesharing to understand both the direct and indirect benefits of bikesharing systems in US communities. This report will highlight the various social, environmental, and economic effects of bikeshare systems. The social impact of bikesharing demonstrates increased connectivity of a community, positive health and exercise benefits, increased livability, and a way to increase transportation accessibility for low income users. The environmental effect of bikesharing demonstrates that bicycling is the most efficient mode of transit and that bikesharing reduces our dependency on cars and fossil fuels. The economic impact demonstrates that bikesharing generates individual gas and parking savings while stimulating local retail and commerce in a community. Bikesharing overall provides far-reaching benefits for a community and shows itself to be well worth the initial costs.

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1. Introduction to the Impact of Bikesharing

Traffic congestion, dependency on the car, and public transit connectivity (i.e. the “last mile” problem) are problems that many communities are currently facing. Universities and expansive corporate campuses also face transportation challenges which are not easily solved through busing or cars. In the search for solutions to these issues, those interested in a sustainable transportation solution are increasingly turning to bike-sharing and improved bicycle infrastructure as solutions to these growing issues in communities, universities, and corporate campuses alike. Data and study analysis on the benefits of bikesharing has been largely limited, though the current data available builds a strong case that bikesharing has a significant and positive social, environmental, and economic impact on communities, universities, and corporate campuses that implement a bikeshare.

Bikeshare systems have experienced great popularity when implemented. New York City’s CitiBike system has passed the 10,000,000 ride benchmark according to official CitiBike data, Capital Bikeshare has sold over 450,000 24 hour memberships all-time according to official program data, and even the new bikeshare in Indianapolis has exceeded ridership expectations according to the Indianapolis communications director Marc Lotter.¹ This kind of bicycle usage means that bikesharing does get people on bikes and as a result increases bicycle ridership. Some of the data used in this white paper come from the effects of general bicycling, not bikeshare itself, but because bikesharing increases bicycle ridership, much

of the data available on the impact of bicycling is highly relevant and interconnected to the impact of bikesharing.

As the next three sections of this white paper will elaborate on, research either strongly suggests or securely demonstrates that bikesharing exhibits positive social, environmental, and economic effects. The social impact of bikesharing examines the transit connectivity benefits of bikeshare, health & exercise benefits from increased bicycling, increased vibrancy and livability of an area, and the potential to making more equitable transit for those who are disadvantaged. The environmental impact of bikesharing examines the evidence that bicycling is the most efficient mode of transit fuel-wise, reduces carbon emissions significantly, and reduces dependency on the car/fossil fuels. The economic impact of bikesharing examines the evidence that bicycling and bikesharing saves individuals money, stimulates local commerce, and that bicycle infrastructure and bikesharing provide a positive return on investment. Through a comprehensive understanding of the different social, environmental, and economic impacts of bikesharing, one can better appreciate the power of bikesharing and its far reaching effects.

¹ Tuohy, John (July 2014) “[Indianapolis bike-share program exceeds expectations](#)” The Indianapolis Star.

2. Social Impact of Bikesharing

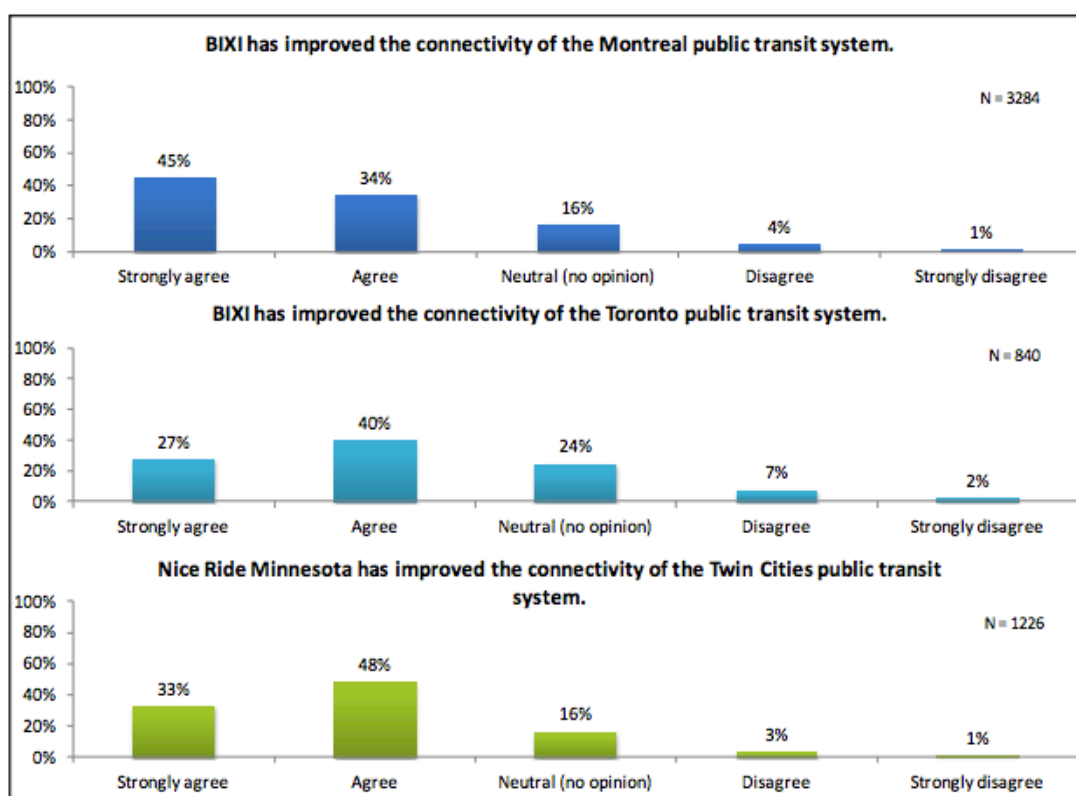
The major social impacts of bikesharing can be sorted by the increased connectivity, social capital, and health benefits that a system offers. Bikesharing offers increased transportation options and greater community connectivity at a macro-level and provides simpler and quicker commutes for residents, students, and employees alike.

Increased Connectivity

Bikesharing has been introduced as a short-term bike rental network to offer one-way and public transportation, ideal for dense, concentrated city centers, large universities and large corporate campuses. It's easier to

interact with your community from a bike or on foot than it is from a car or bus, which makes bikesharing a natural solution to increasing the connectivity of a community, university, or corporate campus. As explained in the economic effects section, bikesharing stimulates local commerce in large part due to the ease of checking out a storefront on foot or bike than from a car, an effect of increased connectivity.

In a 2011 rider survey done by Capital Bikeshare (Washington D.C.), 70% of riders reported they last used bikeshare because they saw it as the quickest and easiest way to get to their destination.² Among large scale



² LDA Consulting (June, 2012) "[Capital Bikeshare 2011 Member Survey Report](#)" p. ii.

bikeshare systems, it is quite common for bicycle fleets to be collocated with public transit, which 4/9 medium to large operators did in 2011.³ 6/9 of the medium to large operators integrated transit and bikesharing maps into their systems.⁴ As bikesharing technology continues to develop, it will further connect with different forms of public transportation. This shows that bikeshare operators want their systems to be well-connected and well-integrated within a community, university, or corporate campus.

For universities, connectivity can be an issue. Bikesharing offers universities housing, sustainability, and transportation benefits. Building a dormitory or additional housing farther away from campus becomes more feasible with a bikeshare system. It can give officials in charge of transportation a new, cost-effective way to transport students across campus, especially ideal for 0.5-2 mile distances. This allows universities to more effectively expand into territories that may have been inaccessible for distance reasons.

Health & Exercise Benefits

Bikeshare offers a simple way to incorporate moderate exercise into a user's daily routine. Users involved in many systems self-report health benefits and increased aerobic capacity since joining their local bikeshare system. 57% of Capital Bikeshare members indicated that they joined the bikeshare through a desire for increased exercise, as indicated by Capital Bikeshare's 2013

Member's survey.⁵ According to Denver B-Cycle's 2013 annual report, users burned 16,812,729 calories, equivalent to over 30,000 Big Macs. These two facts suggest that bikesharing either inspires or aids members to make active lifestyle choices regularly.

While studies of Capital Bikeshare and Boulder Bikeshare show that the average bikeshare rider consistently rides between 0.5 and 2 miles each time, research shows that there is a significant relationship between the modes of transit used in commuting to work and amount of time a person engages in recreational physical activity outside of their commute.⁶ Frequency and average length of trips suggests that Capital Bikeshare members use bikeshare to help them reach their recommended level of physical activity.

According to the On Bike Share website, the employee health and productivity benefits make bikesharing something to consider. Here were the employee benefits cited by On Bike Share:⁷

- Healthy employees take 9 times fewer sick days than workers with poor health.
- The healthiest employees were nearly 3 times more productive than those with poorer health.
- Fit workers made 60% fewer errors on jobs involving concentration and short-term memory.

³ Shaheen et. al (July 2012) "Public Bikesharing in North America: Early Operator and User Understanding" p. 35.

⁴ Ibid, p. 36.

⁵ LDA Consulting (May 2013) "[Capital Bikeshare 2013 Member Survey Report](#)" p. iii.

⁶ Terzano, K. & Morckel, V.C (2011) "[Walk or Bike to a Healthier Life: Commuting Behavior and Recreational Physical Activity](#)" George Washington University. p. 492-496.

⁷ On Bike Share (2012) "[Bike Share for Corporations](#)".

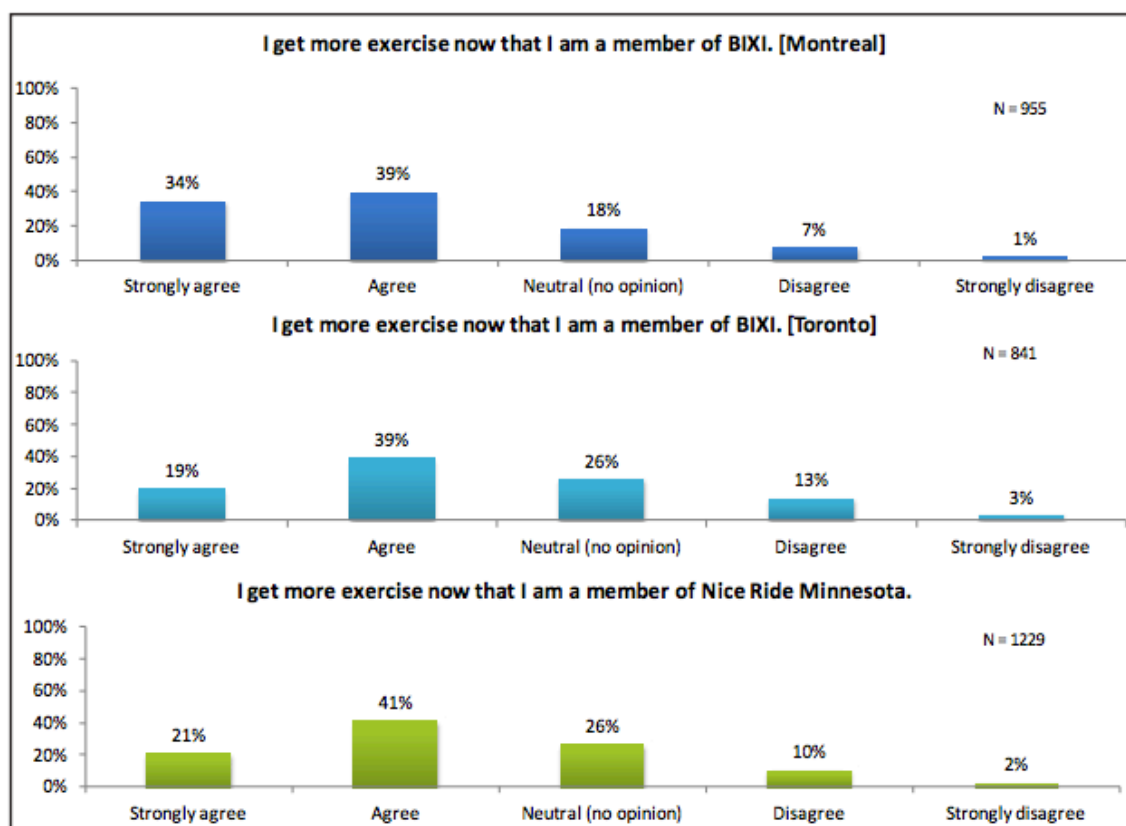
- Vigorous exercise improved mental alertness and productivity for four to five hours afterwards.

These benefits can be hard to quantify, but employers and corporate campuses have great incentive in investing in bikeshare systems. With improvements in technology, it's becoming very cost efficient for corporations to host a robust bikeshare system. For more information, check out A2B Bikeshare's Technology White Paper.

Highly difficult to measure but perhaps one of the most important health benefits of bicycling is the happiness and entertainment factor. 76% of Capital Bikeshare members

responded that the simple enjoyment of biking was a motivation for using the bikeshare system.⁸ In the same survey, the most common non-work trips were taken for social and entertainment purposes.⁹ The exercise and simple enjoyment induced from a bikeshare ride may contribute to increased happiness along with increased health.

There is great evidence that investing in bicycling infrastructure and as an extension bikesharing provides communities great returns. According to an analysis of the costs and benefits of the bicycle investment project in Portland, OR by Gotschi, the promotion of bicycling has shown great potential to increase overall physical activity, and by



⁸ LDA Consulting (May, 2013) [2013 Capital Bikeshare Member Survey Report](#), p. iii.

⁹ LDA Consulting (May, 2013) [2013 Capital Bikeshare Member Survey Report](#), p. v.

analyzing health care cost savings, has demonstrated that by 2040, Portland, OR is projected to save between \$388 to \$594 million with its bicycling investments.¹⁰ Just the immediate healthcare costs alone can justify the investment in bicycling. It should come as little surprise, then, that healthcare companies are one of the most common bikeshare sponsors. Bikesharing is an ingenious way to combine the need for more effective commuter options while promoting physical activity and exercise.

Bikesharing Makes Areas More Vibrant and Livable

Bikesharing can change the very dynamic of a living or working space. Cities that rate highly in livability are often also highly cycle-friendly. Internationally, cities that rate highly in livability (e.g. Vienna, Copenhagen, Zurich, and Munich) often had robust bicycle infrastructure and bikeshare systems. The four examples provided above rate in the top 10 of many livability measurement studies and invest heavily in bicycling, be it a bikeshare system to further augment bicycle ridership or investing heavily in bicycle infrastructure. Not only does bikesharing make a community more livable, but it can also make a university or corporate campus more livable and workable, as demonstrated by the positive health and connectivity effects of bikesharing at these institutions.

Bikesharing can also offers tourists an alternative way to navigate a city, which can

both reduce congestion caused by tourism and give tourists a novel, potentially more enjoyable mode of sightseeing transportation. According to Capital Bikeshare data from January, 2012, the 6th most common one-way trip was tourists sightseeing Washington D.C. from the Smithsonian station back to the Smithsonian station, with 3,586 of such trips lasting an average of 2 hours, 48 minutes, meaning tourists take advantage of bikesharing and experience a community in a new way.¹¹ Bikesharing allows individuals to experience a community, university, or corporate campus in a more connected and intimate way, which consequently makes them more vibrant and livable.

Offers More Equitable Transportation to Lower Income Areas

One of the biggest issues to date with bikesharing is that low-income neighborhoods are generally situated in the outskirts of city centers or away from downtown areas and have less access and opportunity to take advantage of bikesharing. In these areas, residents tend to lack cars and access to affordable and efficient transit options. Bikesharing has yet to reach those who could use it most. Operators counteract this problem in conjunction with community wishes to subsidize memberships for low income earners, thus providing an inclusive pricing structure. Some non-profits, like Hubway Bikeshare (Boston, MA) that run bikeshare systems have started to research and implement pilot programs of subsidized

¹⁰ Gotschi, Thomas (2011) "[Costs and Benefits of Bicycling Investments in Portland, Oregon](#)" Journal of Physical Activity and Health, Human Kinetics Inc.

¹¹ Alpert, David (January 2012): "[Capital Bikeshare data already yields interesting facts](#)" Greater Greater Washington. Retrieved 27 May 2014.

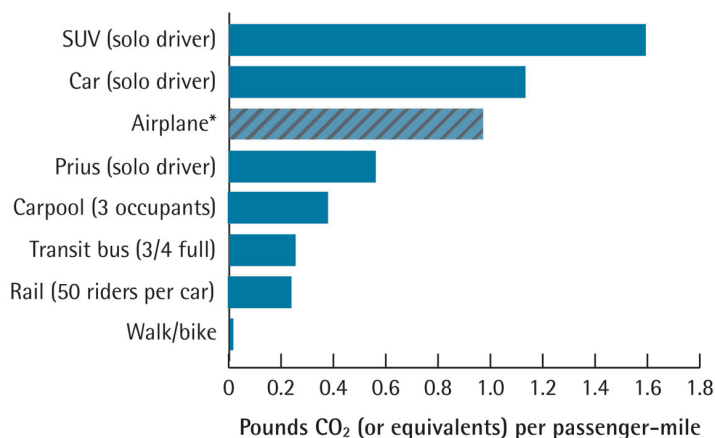
memberships while implementing stations in low-revenue areas to increase access and equity of ridership. Hubway bikeshare offers a membership for \$5 annually for interested people on public assistance.¹² Capital Bikeshare has partnered with local non-profit, Job Access Reverse Commute, to offer a limited number of free memberships, free bicycle safety information, and a free helmet. Awards are based on income level thresholds and are intended to increase the diversity of ridership.¹³ As bikesharing technology develops through more flexible station sizes and placement, greater accessibility will be achieved.

¹² Boston Bikes Subsidized Hubway Memberships Page, <http://www.bostonbikes.org/programs/subsidized-hubway-memberships/> Retrieved 17 July 2014.

¹³ Capital Bikesharing Pricing Website, <https://www.capitalbikeshare.com/pricing>

3. Environmental Impact of Bikesharing

Bikesharing offers a transportation solution that emits an absolute minimal amount of CO₂ into the atmosphere, reduces our dependency on fossil fuels, and offers people a practical alternative mode of transit. As part of the alternative energy initiative, bikesharing is quickly becoming a desirable option to improve upon solving our current pollution and car dependency problems.



*Aircraft emissions are the most variable. Use an online calculator, such as Atmosfair.com, to estimate the climate impacts of your flight.



Minimal Carbon Emission

The bicycle is currently the most energy-efficient vehicle commonly used, measured to be even more efficient than walking,¹⁴ which makes bikesharing an effective solution in cutting down carbon emissions and other harmful pollutants. Increased use of bikeshare solves first- and last-mile problems that plague public transit coverage and replaces short one-way fuel-based trips. Above is a chart that shows how many pounds of CO₂ each mode of transportation emits per passenger-mile.

Bikesharing has shown an immediate impact in avoiding fuel usage and carbon emissions. In 2013, Denver B-Cycle users spared the atmosphere 1,028,836 pounds of CO₂ emissions and rode about 560,424 miles.¹⁵ A member survey demonstrated that 43% of B-Cycle rides replaced car trips, resulting in a 15,868 gallon decrease in gasoline

consumption, avoiding 312,121 pounds of carbon emissions and saving about \$55,000 in gas.¹⁶

Investing in bicycling returns large savings for a community. According to an analysis of the costs and benefits of the bicycle investment project in Portland, OR by Gotschi, the promotion of bicycling has shown great potential for savings on fuel costs. By 2040, Portland, OR is projected to save between \$143 to \$218 million with its bicycling investments, showing that bicycling (and by extension bikeshare) can have a tremendous impact on the environment. The reduction of carbon emissions significantly impacts air quality and is a prudent solution to modern pollution and global climate change problems.

¹⁴ Ghanta, Praveen (May 2010) "[Fuel Efficiency: Modes of Transportation Ranked by MPG](#)" True Cost Blog.

¹⁵ Denver B-Cycle (2013) "[Denver Bike Sharing 2013 Annual Report](#)"

¹⁶ Denver B-Cycle (2013) "[Denver Bike Sharing 2013 Annual Report](#)"

Reduces Car and Fossil Fuel Dependency

Bikesharing reduces rush hour traffic, the need for parking downtown, and congestion caused by an overabundance of motorists at peak hours. Residents in a community with a bikeshare system find bikesharing to be an effective alternative commuting option, an ideal supplement to the car. As the graph on the next page shows, over half of Nice Ride member respondents drove less often because of bikesharing, a pattern that can reduce our dependency on the car, reduce congestion, and make commutes within dense urban areas easier.

This shows that carbon emission offset estimates from bikeshare systems are likely accurate if trips are not “induced” by the presence of bikeshare, but are taken as alternatives based on an existing array of transportation options. 40% of trips in urban areas are 2 miles or less, but 90% of those trips are taken by car.¹⁷ Replacing those rides with a bike would greatly reduce congestion and pollution caused by standstill traffic. Users in all cities with bikesharing indicated a reduction in driving as a result of bikesharing.

The data shows that bikesharing does reduce the need to drive, and that people will use the bikes instead of their cars. The Twin Cities survey reported 53% of individuals decreasing their driving as a result of bikesharing.¹⁸ The 10,000+ respondents that answered bikeshare surveys from the twin cities, Washington D.C., Montreal, and Toronto reported 40% of individuals (about 4,000 people) driving less often, showing this effect takes place in many urban settings.

Bikesharing can free up space on the roads for motorists that actually need to drive to their destinations. This carbon emission offset contributes to greener and healthier communities by reducing the amount of particles in the atmosphere that cause global climate change and contributes to the alternative energy revolution by decreasing dependency on fossil fuel energy sources.

The reduction in fossil fuel dependency also applies to universities and corporate campuses. Bikesharing can reduce a small amount of rides at universities that may have been taken by bus or car, and a bikeshare at a corporate headquarters can allow employees to travel around campus or out on the town easier.

Public endorsement and implementation of bikesharing changes car culture and the mentality that streets are made for cars only. As biking becomes more visible through the presence of a bikesharing system, motorists become more aware of bikers, whether on bikeshare bikes or not. Therefore, cities with bikesharing systems become friendlier for all cyclists.¹⁹ The visibility of bikesharing acts as advocacy for urban cyclists in the community. With this in mind, we recommend implementing bikeshare systems with highly visible stations and well-branded bikeshare bikes to increase awareness around the presence of cycling and importance of motorists’ awareness of cyclists.

¹⁷ Sierra Club “[Pedaling to Prosperity](#)” p. 1.

¹⁸ Ibid, p. 85.

¹⁹ Blumenauer, Earl (May, 2013) “[Why New York City will love bike share](#)” New York Daily News.

4. Economic Impact of Bikesharing

Bikesharing offers economic benefits on both macro and personal levels. On an intuitive level, it makes sense that bicycles have a positive economic effect. It's easier to check out storefronts on a bicycle than from a car. Driving a bicycle uses far less power than a car, thus remains a far more affordable option for individuals than a car could ever be. In addition to the commerce and personal savings generated, bicycling and bikeshare also provide communities, universities, and corporate campuses with a return on investment. It's easy to imagine, then, that studies have confirmed these intuitions about bicycling's positive economic effects on a community-level.

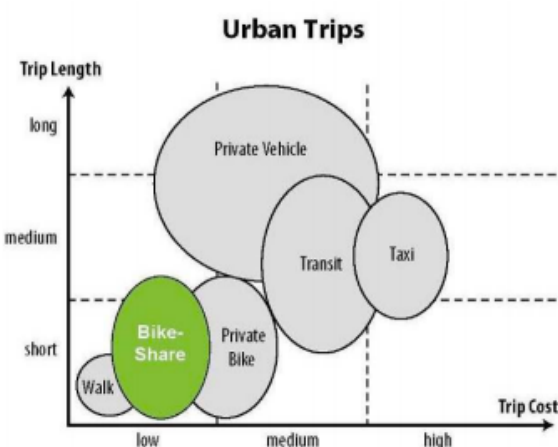


Figure 6 – Urban Transportation Spectrum

The cost efficiency of bikeshare compared to distance that can be travelled ([Cincinnati Bikeshare Feasibility Study](#)).

Personal Savings from Less Driving

Bikesharing offers individuals a price efficient alternative to the car in denser areas. According to the AAA (American Automobile Association), the average American spends an average of \$9,122/year operating a car in a given year at about \$0.60/mile.²⁰ Bikesharing annual memberships come at a much lower price, costing usually less than \$100 for an individual. Of all 2011 Boulder B-Cycle members, nearly 40% saved money on gasoline and more than 20% reported they saved money on parking.²¹ On average, Capital Bikeshare members that own a car have saved \$800 per year on personal travel costs. Additionally, 60% of riders said they have used a taxi less often since joining bikeshare.²² Bikesharing makes it easier to be less dependent on car and taxi transportation options.

²⁰ American Automobile Association (2013) "[Cost of Owning and Operating Vehicle in U.S. Increases Nearly Two Percent According to AAA's 2013 'Your Driving Costs' Study](#)"

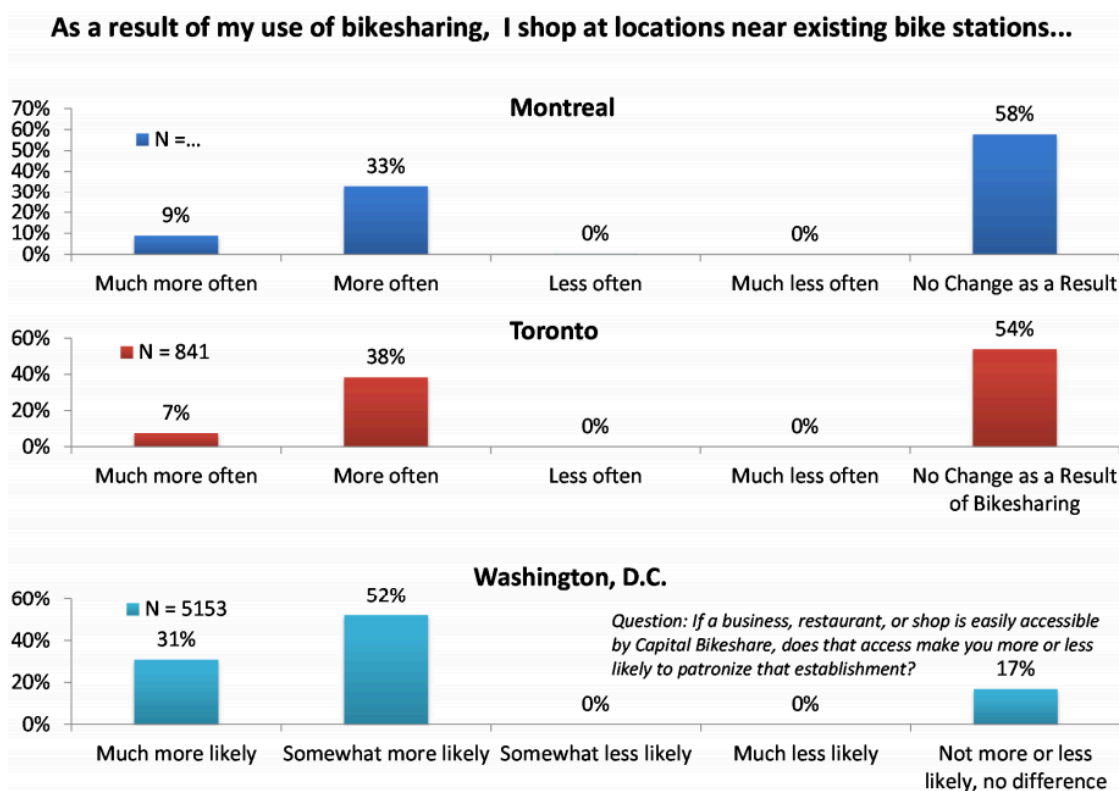
²¹ Boulder B-Cycle (2011) [Boulder B-Cycle 2011 Annual Report](#), p. 8.

²² LDA Consulting (May, 2013) [2013 Capital Bikeshare Member Survey Report](#), p. ii.

Bikesharing also offers individuals more public transportation options for short and medium distance commutes. Sometimes the increased connectivity and transportation options offered by a bikeshare are so great that people sell their cars. Of the 5% of Capital Bikeshare members who sold their vehicle since becoming a member, 81% of them indicated the bikeshare as a factor in their decision.²³ Even if such an extreme effect is not seen in all communities, by eliminating these small trips, bikeshare riders can decrease their transportation costs and dependence on expensive fossil fuel-based transit options.

Bikesharing Stimulates Local Commerce

Bikesharing has shown to contribute to the economic vibrancy of city centers and downtown commercial districts. Riders create more foot traffic and are more likely to get off their bikes and enter local businesses in concentrated commercial areas than motorists because of issues with space and parking. 85% of Capital Bikeshare users stated that they were more likely to patronize a store that was near or next to a bikeshare station.²⁴ This highlights an opportunity for communities to get local businesses involved in corporate sponsorships and becoming station hosts. Bikesharing represents an investment in downtown districts that can be used to create local partnerships and gain initial community support to start a bikesharing program.

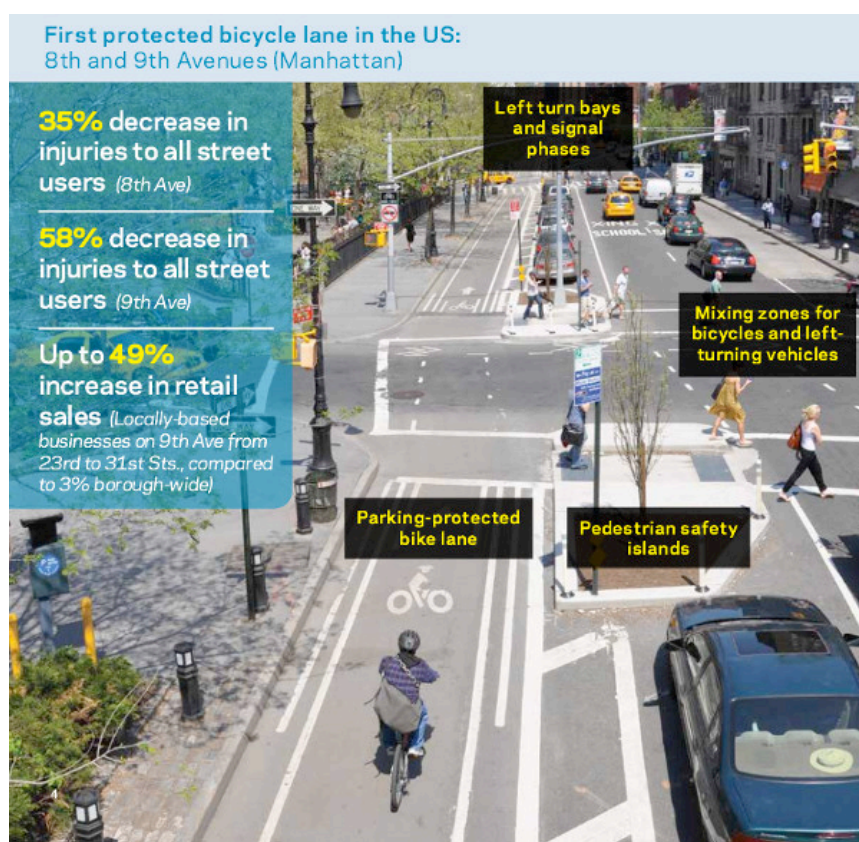


²³ LDA Consulting (May, 2013) [2013 Capital Bikeshare Member Survey Report](#), p. ii.

²⁴ LDA Consulting (May, 2013) [2013 Capital Bikeshare Member Survey Report](#), p. 45.

Increased bicycling and better bicycle infrastructure has been shown to increase the local retail and commercial demand in New York City. When New York City created protected bike lanes on 8th and 9th Avenue, there was a 49% increase in retail sales, compared to a 3% increase borough wide.²⁵ The easier it is for consumers to step into a store, the more often they will do it, which makes bikesharing an easy way to increase community retail activity and bring vibrancy to commercial centers.

Another study that reaffirms the effects of bicycling stimulating local commerce was an analysis on the the Bloor-Danforth corridor in Toronto, a commercial zone that has ideal attributes for a bikeshare lane. The main findings were that only 10% of patrons drive to the Bloor Annex neighborhood to shop, and that patrons arriving by foot and bicycle visit the most often and spend the most money per month.²⁶ Reallocating on-street parking space into a bike lane or using it for a bikeshare station significantly increase commercial activity, reduce traffic accidents, and increases bicycle ridership.²⁷



²⁵ New York City DOT (2012): "[Measuring the Street: New Metrics for the 21st Century Streets](#)"

²⁶ The Clean Air Partnership (February 2009) "[Bike Lanes, On-Street Parking and Business A Study of Bloor Street in Toronto's Annex Neighbourhood](#)".

²⁷ The Clean Air Partnership (February 2009) "[Bike Lanes, On-Street Parking and Business A Study of Bloor Street in Toronto's Annex Neighbourhood](#)".

Bicycling and Bikeshare Provides a Return on Investment

Bikesharing is currently the lowest cost-per-mile public transport option, making it the best option for public transportation in concentrated community settings.²⁸ According to the Sierra Club, bicycling saved Americans about \$4.6 billion in 2012.²⁹ For \$60 million – the cost of a single mile of urban highway – Portland, OR was able to implement a city-wide bicycle network.³⁰ Portland's investment in bicycling has a positive return on investment, even by the most conservative of measures, as analyzed by Gotschi's bicycling investment report.³¹ Portland's investment has also been recognized by the League of American Bicyclists, earning the highest possible platinum rating, an exclusive rating that only three other communities can claim.

With developments in bikesharing technology, bikesharing is becoming financially profitable. Fourth generation bikeshare is breaking the kiosk barrier, which has been the main factor in costs remaining high. A2B Bikeshare's Technology White Paper in detail how the technology from different vendors is reducing the capital and operational costs that have plagued bikesharing in the past.

BICYCLISTS IN THE U.S. SAVE \$4.6 BILLION A YEAR BY NOT DRIVING	
HOUSEHOLD COST SAVINGS FROM ANNUAL BICYCLE TRAVEL	
Annual bike trips	4,082,000,000
Average bike trip distance (miles)	2.26
Annual miles bicycled	8,956,000,000
Estimated annual cost savings from bicycling travel	\$4,661,598,000
Cost of fuel saved by bicycle travel	\$1,610,574,790

²⁸ Kisner, Corinne (2011) "Integrating Bike Share Programs into a Sustainable Transportation Option" NLC p. 2.

²⁹ American Automobile Association (2013) "[Cost of Owning and Operating Vehicle in U.S. Increases Nearly Two Percent According to AAA's 2013 'Your Driving Costs' Study](#)"

³⁰ Sierra Club "[Pedaling to Prosperity](#)" p. 1.

³¹ Gotschi, Thomas (2011) "[Costs and Benefits of Bicycling Investments in Portland, Oregon](#)" Journal of Physical Activity and Health, Human Kinetics Inc.

5. Concluding Remarks

It is clear from independent studies and bikeshare annual report data that bikesharing provides numerous benefits at the community, university, corporate and individual level. Bikesharing fits well into a healthy and connected lifestyle. In conjunction with other community initiatives, bikesharing increases quality of life and is part of an active lifestyle. Bikesharing helps people decrease the dependence on fossil fuels by offering convenient and quick transportation infrastructure alternatives. Additionally, communities can see decreased CO2 emissions and the issues that are caused by these emissions. Increased environmental quality of city and suburban communities are part of an alternative energy revolution. Finally, bikesharing increases foot traffic and thus the economic vibrancy of downtown commercial districts while saving individuals money.

Using the evidence presented in this white paper, it is our recommendation that communities, universities, and corporate campuses look into implementing a bikeshare system for their community to counter problems with traffic congestion, dependency on the car, and public transit connectivity while impacting the community in positive social, environmental, and economic ways.

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