



CHAPTER 3

RISKS AND BENEFITS OF BIKE SHARE

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Bike share systems are inexpensive and quick-to-implement transportation options and based on other cities' experience can deliver a variety of transportation and mobility, economic, health, safety, and quality of life benefits. As has been seen in U.S. cities with existing programs, bike share can provide a fundamental shift in the way people move about and make decisions on transportation.

This section summarizes some of the potential benefits and risks associated with implementing a bike share program in Wilmington. The section provides a summary of risks and benefits related to mobility and transportation, economic and financial performance, health, environment, and safety.

As in other programs in the past it will be important to consider and compare the potential benefits and risks so that an informed decision on the feasibility of implementing a bike share system in Wilmington can be made.

MOBILITY AND TRANSPORTATION

Bike share has helped increase mobility and connectivity in various communities across the U.S. by adding transportation options. As bike share trips are typically short (between 15 to 35 minutes and one-to-three miles long)⁵ they provide an easy and accessible mobility option for trips that are too short to wait for transit, or too far to walk. Bike share users have reported combining their bike share trips with transit, car-share, walking, and even their own single occupancy vehicle trips when bike share is available.⁶ Bike share has been known to provide transit, active transportation and community-building benefits.

Bike share can leverage investment in and serve as a complement to existing transit services by offering a first-and last-mile option. It can also help extend the reach of existing fixed-route bus and rail services. Furthermore, bike share can help connect transit lines that do not cross and can help alleviate capacity on some already congested transit routes.

For example, in Washington D.C. over half (54 percent) of respondents to Capital Bikeshare's member survey stated

- 5 Bike Sharing in the United States: State of the Practice and Guide to Implementation. Federal Highway Administration. United States Department of Transportation. September 2012.
- 6 LDA Consulting (2013). 2013 Capital Bikeshare Member Survey Report. Accessed online at <http://capitalbikeshare.com/assets/pdf/CABI-2013SurveyReport.pdf> on December 13, 2013.



Figure 6: Capital Bikeshare. Washington, DC

that at least one of their bike share trips in the previous month had started or ended at a Metrorail station and about a quarter (23 percent) of respondents used bike share to access the bus in the previous month.⁷ Furthermore, Salt Lake's Greenbike also made it easier for people to use their existing public transportation infrastructure by providing first and last mile connections to UTA riders. In fact, 51 percent of survey respondents said that they were more likely to use other forms of public transportation like Frontrunner, Trax or buses because of the Greenbike system.⁸

Bike share has also been effective at introducing new riders and re-introducing former cyclists to bicycling as a form of transportation. A survey of Hubway members in Boston found that 12% bicycled less than once per year prior to joining Hubway and a further 16 percent bicycled less than once per month prior to joining.⁹ Bike share has been able to reduce the common barriers to entry for new bicyclists including owning, storing and maintaining a bicycle of their own. In Minneapolis for example, 33 percent of new members surveyed in 2010 by Nice Ride Minnesota had ridden less than once per month before joining.¹⁰

- 7 LDA Consulting (2013). 2013 Capital Bikeshare Member Survey Report. Accessed online at <http://capitalbikeshare.com/assets/pdf/CABI-2013SurveyReport.pdf> on December 13, 2013.
- 8 GreenBike SLC Non-Profit Bike Share 2014 Annual Report. Accessed from <https://configuringgreenbike.bicycle.com/docs/librariesprovider32/default-document-library/2014-annual-report.pdf?sfvrsn=2> on July 2015.
- 9 Presentation titled The Hubway Influence on New Riders given by Nicole Freedman, 2013. Accessed from: <http://baystateroads.eot.state.ma.us/movingtogether/docs/Freedman-Moving%20Together%202013.ppt.pdf> on August 2015.
- 10 Two-thirds of members also said they had increased their amount of bicycling since joining Nice Ride. Figures taken from Nice Ride 2010 Annual Report.

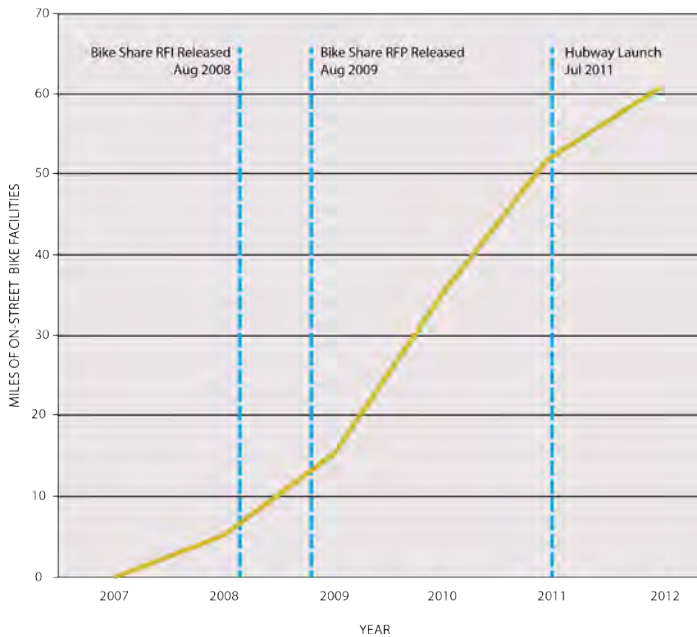


Figure 7: Increase in On-Street Bikeways in Boston with the Launch of Hubway

As Wilmington has a nascent bicycling community, the addition of more bicyclists in the form of bike share users, could provide the impetus for further investment in bicycle-friendly facilities. This could in turn help the City advance from a bronze level bicycle friendly community (as recognized by the League of American Bicyclists) to a more advance category. This was the example of the City of Boston, which increased its on-street bikeways in conjunction with the implementation and launch of its bike share program (see **Figure 7**).

As it has become evident that bike share can serve as a complementary service to traditional transit options, the Federal Transit Administration (FTA) and the Federal Highway Administration (FHWA) have both provided funding for several systems including in Boston, Chattanooga, Chicago and more recently Birmingham, Alabama. To be eligible for FTA and FHWA funding stations must be within a 3 mile radius of transit and funds can be used towards bike share docks, equipment and other capital costs (the cost of the bikes and operating costs are not eligible).¹¹

¹¹ Federal Transit Administration's Frequently Asked Questions and Answers Concerning Bike Sharing Relative to the United States Department of Transportation. Accessed online at http://www.fta.dot.gov/documents/Informal_Q_and_As_Final_6-14-12.pdf on August 2015.

RISK

As noted by a recent National League of Cities report, 20-40 percent of bike share trips have replaced short single occupancy vehicle trips.¹² While the some of the trips remaining have been defined as new trips taken by users, a good proportion of those trips have detracted from other public transit or active transportation trips, therefore incrementally reducing the number of public transportation trips, and consequentially their farebox recovery.^{13,14} However, on an order-of-magnitude basis, the number of public transportation trips replaced by bike share has been de minimis.

ECONOMIC

There are a number of economic benefits that bike share offers at an individual, community, and business level.

At a community level, bike share continues to be recognized by many cities as a means for attracting or retaining residents, students, and workforce talent. Many communities have used it as a companion to other initiatives to help (re)vitalize and redevelop some of their more depressed areas. Others have used it to promote their image as a forward thinking, bicycle friendly community. Bike share embraces new technology, social media, and is part of the new sharing economy, all of which are



Figure 8: Charlotte B-cycle. Charlotte, NC

¹² National League of Cities (2011) Integrating Bike Share Programs into a Sustainable Transportation System.

¹³ Nice Ride Minnesota (October 2011) Presentation about Nice Ride Minnesota.

¹⁴ 2014 Capital Bikeshare Member Survey Report. Obtained from <http://www.capitalbikeshare.com/assets/pdf/cabi-2014surveyreport-execsummary.pdf> on July 2015.



attractive characteristics to younger demographics and professionals.

The economic benefits of bike share for individuals come in various shapes and forms. For example, bike share members have experienced reduced household expenditures on transportation and health care (which combined make up over 22 percent of annual average household expenditures in the United States).¹⁵ Furthermore, when compared to the cost of owning and operating a car (the median cost of annual car ownership is approximately \$9,100),¹⁶ a bike share membership and use is relatively inexpensive with most programs costing between \$60 and \$150 per year and usage fees between \$2 to \$4 per additional hour. Users also save money on public transportation while being able to access parts of the city that were not reachable by transit before: 87 percent of annual members in Washington D.C. said they saved money on weekly travel costs by using Capital Bikeshare. This resulted in an average of \$800 per year saving on personal transportation costs for each of the more than 15,000 members.¹⁷

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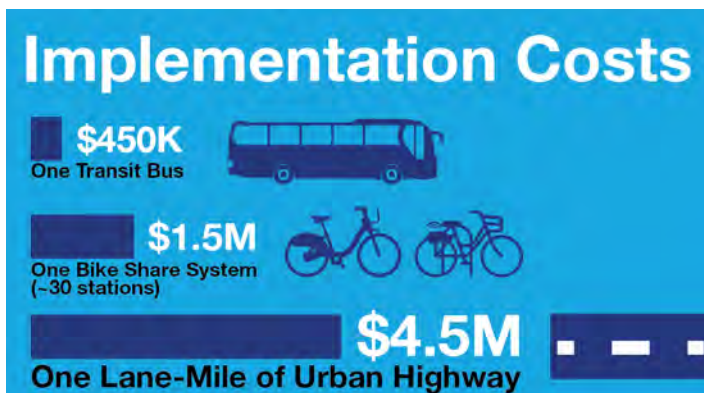


Figure 9: Transportation modes cost comparison

15 U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey, 2010.

16 www.consumerreports.org accessed on July 2015.

17 LDA Consulting (2013). 2013 Capital Bikeshare Member Survey Report. Accessed online at <http://capitalbikeshare.com/assets/pdf/CABI-2013SurveyReport.pdf> on July 2015.

Bike share embraces new technology, social media, and is part of the new sharing economy, all of which are attractive characteristics to younger demographics and professionals. Bike share also serves visitors and is a unique way to experience a city, helping attract their spending power. The amount of national and international press coverage generated by a bike share system would serve to emphasize the city to visitors, businesses, and employers. For example, the launch of Charlotte B-cycle in North Carolina received exposure in 18 newspapers including the New York Times.¹⁸

There have been several studies into whether businesses located near bike share stations have seen an economic benefit. A recent study of annual members of the Nice Ride system in Minneapolis / St. Paul found that annual members made a number of commercial trips that they would otherwise not have made because of bike share. Based on the average amount that respondents' spent for these trip types, the researchers calculated that Nice Ride annual members created an additional \$150,000 in economic activity at local businesses over the course of one bike share seasons. Further, in a study of five Capital Bikeshare stations in 2013, a positive economic impact was found in those commercial areas surrounding each of the respective bike share stations.¹⁹ In this instance, a large number of riders travelling to these stations spent money within a four block area and planned to return to the neighborhood on a regular basis.²⁰ Other surveys indicated that approximately 20 percent of bike share riders would not have made the trip if not for bike share, suggesting that bike share generated new spending trips to these commercial areas.²¹

Bike share has also brought benefits for local employers and businesses. Many have seen bike share as an addition to a company's health and wellness program or have included it in their travel demand management program.

18 From the Sponsor's Perspective (2013). Accessed online at www.bikeshare.com on December 12, 2013.

19 Economic Impact & Operational Efficiency for Bikeshare Systems. Anderson, Ryan et al. Accessed from: <http://ralphbu.files.wordpress.com/2014/01/virginia-tech-capital-bikeshare-studio-report-2013-final.pdf> on July 2015

20 2013 Capital Bikeshare Member Survey Report. Obtained from <http://www.capitalbikeshare.com/assets/pdf/CABI-2013SurveyReport.pdf> on July 2015

21 Ibid

To serve this sector, bike share programs around the U.S. offer corporate or company membership packages which offer discounted rates for employees.²² For local businesses, bike share represents a way to get their name out there through the use of promotions for members. In the Washington DC area for example, various businesses offer special discounts to Capital Bikeshare members and this has helped generate traffic to their businesses.²³

RISKS

Only a few bike share systems are economically self-sustaining on system revenues alone (i.e. operating costs are greater than system revenues). Therefore, the organization responsible for the program (city, public agency, non-profit, or private company) must ensure that enough funding is available to support all expenditures related to the implementation of a bike share program (capital purchases, expansion, and ongoing operations). Furthermore, funding the day-to-day operations of a bike share system can also be complicated as bike share is not eligible to access federal dollars for operations. Therefore, if membership and ridership are not as significant enough to cover those costs, these will need to be recaptured through other funding sources including private donations, sponsorships and advertising.

Although there are several examples in North America where the initial business model was not successful (e.g., Montreal, Ottawa, Toronto, New York, San Antonio), all systems to date have identified adjustments to their business and/or ownership model which have allowed them to continue operating.

Based on stakeholder conversations, there are likely various potential sponsors for a bike share system in Wilmington. It is likely that the system owner will need to employ a multi-pronged strategy towards sponsorship, which includes title and/or presenting sponsorship as well as station, bike and other types of smaller sponsorships (such as in Philadelphia's system).

ENVIRONMENTAL

22 Corporate memberships. Pronto Bike Share. Obtained from <https://www.prontocycleshare.com/pricing/corporate-memberships> on July 2015.

23 Member Benefits. Obtained from <https://www.capitalbikeshare.com/member-benefits> on July 2015.

BENEFITS

Bike share can have an impact on reducing greenhouse gas emissions by replacing trips taken previously by automobile. These impacts can be multiplied when bike share is used in combination with transit and other modes to reduce dependence on automobile use, change travel patterns and increase environmental consciousness.

In communities where bike share is available, surveys have shown that approximately 20 to 40 percent of annual member bike share trips replace what would have been an automobile trip. For example, 70 percent of GreenBike users (Salt Lake City) reported that they made fewer trips in their personal vehicles as the program inspired them to walk more, take transit or car pool, even after they had left downtown and returned home.²⁴ Furthermore, a survey of Capital Bikeshare members in Washington D.C. in 2011 showed that bike share trips had replaced approximately 4.4 million vehicle miles, representing a four percent decrease in the city's annual driving mileage.²⁵

In its 2014 survey of users, GreenBike reported that 80 percent of survey respondents had become more aware of the need to improve air quality in Salt Lake City after using the program. Additionally, in 2014 GreenBike's 46,242 trips directly removed 103,224 vehicle miles from the road. Those direct trip reductions in the number of vehicle miles traveled prevented over 130,000 lbs. of carbon dioxide from entering the atmosphere.²⁶ Another City that saw reductions in greenhouse gas emissions was Denver through its Denver B-Cycle system. A survey of members showed that over 40 percent of trips replaced a vehicle trip, resulting in almost a 16,000 gallon saving in gasoline consumption and avoiding over 300,000 pounds of greenhouse gas emissions.²⁷

24 GreenBike SLC Non-Profit Bike Share 2014 Annual Report. Accessed from <https://configuringgreenbike.bicycle.com/docs/librariesprovider32/default-document-library/2014-annual-report.pdf?sfvrsn=2> on July 2015.

25 Federal Highway Administration, Highway Statistics 2011: Urbanized Areas – 2010 Miles and Daily Vehicle – Miles Traveled. Accessed online at <http://www.fhwa.dot.gov/policyinformation/statistics/2011/hm71.cfm> on July 2015.

26 GreenBike SLC Non-Profit Bike Share 2014 Annual Report. Accessed from <https://configuringgreenbike.bicycle.com/docs/librariesprovider32/default-document-library/2014-annual-report.pdf?sfvrsn=2> on July 2015.

27 GreenBike SLC Non-Profit Bike Share 2014 Annual Report. Accessed from <https://configuringgreenbike.bicycle.com/docs/librariesprovider32/default-document-library/2014-annual-report.pdf?sfvrsn=2> on July 2015.





Figure 10: Redistribution Trailer Used in Charlotte, NC.

RISKS

A major part of operating a bike share system is the rebalancing process (i.e., moving bikes around from full stations to empty stations to ensure the availability of bicycles and empty docks). Typically, in larger systems this operation is undertaken by cargo vans. Because of the relatively high cost and low availability of non-greenhouse gas options for rebalancing vehicles, there are only few operations that utilize electric or other environmentally friendly vehicles such as the cargo bike in **Figure 10**. While there has not been a conclusive and extensive study on the impact of these vehicles on the overall GHG's emissions, this negative impact should be noted. Furthermore, the frequency of use of rebalancing vehicles will have a direct relation with the placement of stations, the number of stations, and how large the bike share program is.

HEALTH

BENEFITS

The health benefits of bicycling are well known in helping to address preventable diseases such as obesity, heart disease, and diabetes.²⁸ Bike share can have a positive impact on both physical and mental health.

Bike share represents an opportunity for people to incorporate active transportation into their daily lives and lower medical and health care costs. Bicycling for 30

pdf?sfvrsn=2 on July 2015.

28 Lindström, J. et al. The Finnish Diabetes Prevention Study: Lifestyle intervention and 3-year results on diet and physical activity. *Diabetes Care*, December 2002, vol. 26 no. 12 3230-3236. Accessed online at <http://care.diabetesjournals.org/content/26/12/3230.full> on July 2015.

minutes a day, (in the form of using bike share to go to and from work each day), can reduce the risk of heart disease by 82 percent²⁹ and reduce the risk of diabetes by up to 58 percent.³⁰ Furthermore, in a recent study of the impacts of bike share on physical activity, 30 percent of respondents indicated they lost weight as a result of using bike share.³¹

The health benefits of bike share are recognized by the health care industry and the federal government alike. For example, the Centers for Disease Control and Prevention (CDC), has funded several different systems including in Boston and Nashville. The private sector is also represented with many bike share systems in the United States supported by health care providers such as Blue Cross Blue Shield in several different cities including Birmingham, Chicago, Minneapolis, and Philadelphia, and Kaiser Permanente (Denver B-Cycle) through partnerships and sponsorships.

Bike share can also have a positive impact on mental health. This can be evidenced by users in other cities who have expressed that bike share has positively contributed to an improved outlook, increased recreation, and improved sociability. In fact in a recent study of Capital Bikeshare users 31.5 percent of respondents reported stress reduction.³²

RISKS

Some informal studies have shown that the rate of helmet usage in bike share systems is lower than in normal bicycling. While bicycling without a helmet constitutes the biggest risk to the health of users, the safety record for bike share systems has been impressive as the rates of accidents and fatalities have been much lower than those using conventional bicycles.³³ This will be further described in the Safety section below.

29 British Medical Association (1992). *Cycling Towards Health and Safety*. Oxford University Press.

30 Lindström, J. et al. The Finnish Diabetes Prevention Study: Lifestyle intervention and 3-year results on diet and physical activity. *Diabetes Care*, December 2002, vol. 26 no. 12 3230-3236. Accessed online at <http://care.diabetesjournals.org/content/26/12/3230.full> on July 2015

31 Ricci, Miriam. Bike sharing: A review of evidence on impacts and processes of implementation and operation. *Managing the Business of Cycling*. Research in Transportation Business & Management

32 Ricci, Miriam. Bike sharing: A review of evidence on impacts and processes of implementation and operation. *Managing the Business of Cycling*. Research in Transportation Business & Management

33 Bike Sharing in the United States: State of the Practice and Guide to Implementation. Federal Highway Administration. United States Department of Transportation. September 2012.

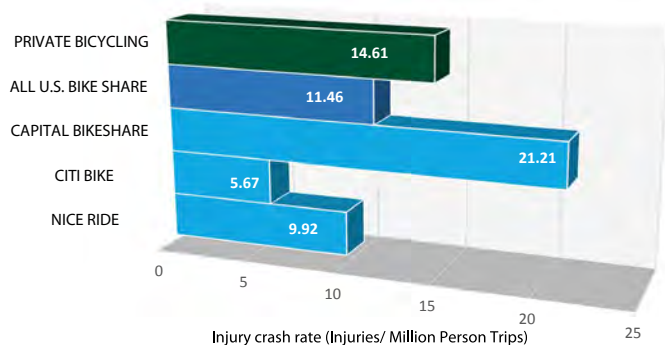


Figure 11: Injury Rate Comparison

SAFETY

Because the safety of bicycling is a significant concern to jurisdictions considering the implementation of bike share, it is important to understand the safety record of existing bike share systems. Although bike share is a relatively new transportation option in the US (the oldest systems are just completing their fifth year of operations), its safety record is impressive. To date, no system in the United States has recorded a fatality, and the rates of injury crashes have been typically lower than private bicycling, as presented on **Figure 11**.^{34,35}

Bike share's safety record can be condensed into three major categories:

- Safety in numbers
- Exposure to bicycle education and rules of the road components
- Bike share bicycles' safety features

SAFETY IN NUMBERS

Millions of bike share trips have been taken in over 50 cities with existing programs, significantly increasing the number of trips and bicycle modeshare in each city. For example, in 2013 New York, there were an additional 40,000 bike trips per day due to Citi Bike and bike share trips made up approximately 29 percent of the 113,000 daily bicycle trips made within the bike share service area.

³⁴ Only Capital Bikeshare has a higher injury crash rate than private bicycling. It is uncertain why the injury crash rate is higher in Capital Bikeshare than in other systems and higher than the private bicycling rate.

³⁵ Injury rates for private bicycling obtained from: Beck, L. et al. (2007). Motor Vehicle Crash Injury Rates by Mode of Travel, United States. Published in the American Journal of Epidemiology.

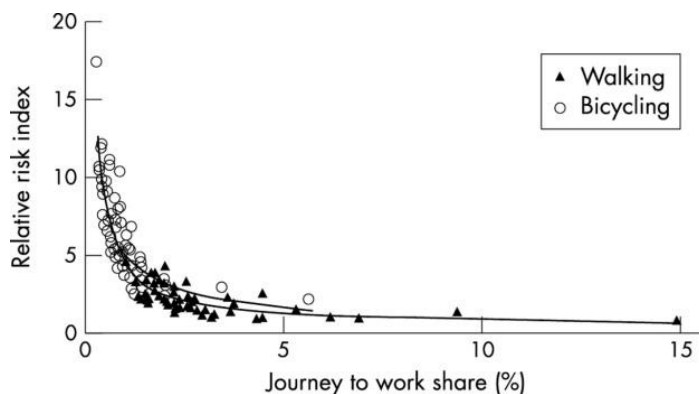


Figure 12: Walking and Bicycling Risk in 68 California Cities in 2000

Along with the high visibility of stations, the high volume of riders results in greater awareness of bicyclists by drivers. In fact, the “safety in numbers effect” is well established. A study published in *Injury Prevention* in 2003 showed that the “likelihood of a person walking or bicycling being struck by a motorist varies inversely with the amount of walking and bicycling”.³⁶ **Figure 12** shows how the injury rate (referred to as “relative risk index”) reduces exponentially with the number of cyclists using the road system (in this case using journey to work mode share as a proxy for the overall amount of bicycling).³⁷

EXPOSURE TO BICYCLE EDUCATION AND RULES OF THE ROAD COMPONENTS

Bike share systems have also provided a new medium to communicate with residents and bicyclists in general about how to the bicyclists rules of the road, and has provided an avenue for safety hints.

Many systems have included tips on their handle bars about how to behave on the roads. These include:

- Not riding on sidewalks.
- Riding with traffic.
- Looking out for car doors.
- Encouraging the use of helmets when riding
- Riding in a predictable manner

³⁶ Jacobsen, P.L. (2003). Safety in Numbers: More Walkers and Bicyclists, Safer Walking and Bicycling. *Injury Prevention* 2003;9:205-209.

³⁷ Jacobsen, P.L. (2003). Safety in Numbers: More Walkers and Bicyclists, Safer Walking and Bicycling. *Injury Prevention* 2003;9:205-209.



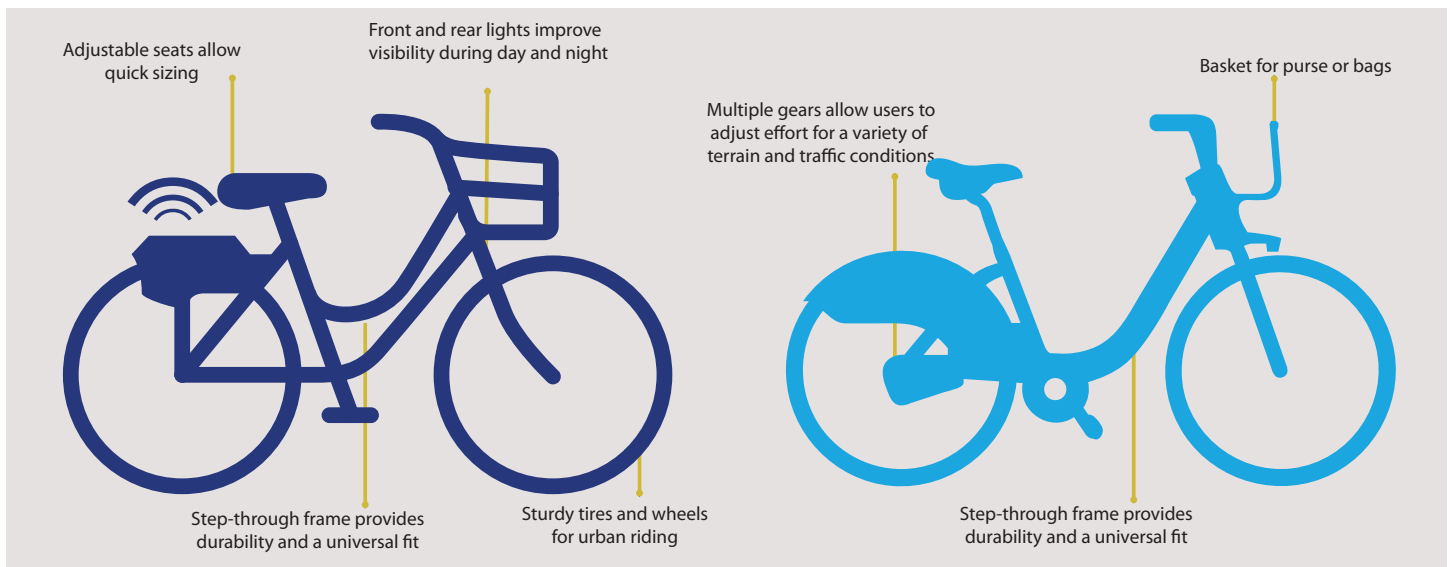


Figure 14: Bike Share Safety Features

All bike share systems have included safety messaging in their websites and social media campaigns. **Figure 13** shows a screen shot of some of the safety tips included in Indego’s website.

BICYCLES’ SAFETY FEATURES³⁸

The safe, comfortable and upright design of bike share bicycles have also impacted the safety of bike share. The safety features are shown on **Figure 14** and include:

- Built-in rechargeable front and back lights, brakes, and reflectors;

- An upright position of the rider; and
- Heavier bicycle (typically between 40 to 45 lbs.) with a wide center of gravity which generally keep slow speeds and do not allow for the rider to weave through traffic.

Another important characteristic adding to the safety record of bike share systems, includes the safety inspections and regular maintenance that every bicycle in each fleet undergoes. Many US cities have added safety provisions to their contracts with their vendors that regulate the safety inspections and maintenance of their systems. For example, Arlington County in its contract with its operator requires that the contractor inspect all drive chains for proper functioning and lubrication, inspect handlebars, tires, brakes and saddles for proper functionality on a monthly basis.³⁹

RISKS

Because bike share is a relatively new transportation option, prior to implementation, many communities have had strong concerns about the safety of a bike share program. Some of the major safety issues found include:

- Existing infrastructure in the city does not provide a complete network of safe and comfortable facilities.



Figure 13: Safety Page. Indego.

38 Atlanta Bicycle Coalition (2013). Atlanta – Decatur Bike Share Feasibility Study. Accessed from: http://issuu.com/atlantabike/docs/atl-dec_bikeshare_book_lowres# on August 2015.

39 Arlington County Virginia. Office of the Purchasing Agent. Amendment NO 2. Alta Bicycle Share Contract. Accessed from <http://egov.arlingtonva.us/purchasing/pdf/contracts/270-11A2.pdf> on August 2015.

- The introduction of new or inexperienced riders might create more conflicts between people walking, bicycling or driving.
- Low helmet usage⁴⁰

Although the safety risks are real, cities have mitigated them in different ways. Some cities have begun working with local bicycling advocacy organizations to offer education classes.⁴¹ Others have provided helmet vending machines to increase access to helmets for bike share users.⁴² Bike share has also become a catalyst to implementing new and more comfortable facilities (as seen in the Mobility and Transportation benefits section above). Furthermore, evidence suggest that none of these considerations have proven to be a significant deterrent for any existing systems.

40 Fischer, C.M. et al. (2012). Prevalence of Bicycle Helmet Use by Users of Public Bikeshare Programs. Published in the Annals of Emergency Medicine, Vol. 60, Issue 2, pp. 228-231.

41 Washington Area Bicyclist Association. Adult education. Accessed from <http://www.waba.org/adult-education/> on August 2015.

42 Seattle bike share's surprisingly simple solution to a mandatory helmet law. People For Bikes. Accessed from <http://www.seattlebikeblog.com/2014/09/24/pronto-starts-installing-station-docks-helmet-vending-machines-wont-be-ready-for-launch/> on August 2015.

