

# Successfully Initiating a Bike Share Program in Smaller Communities: The College or University as a Focal Point

Mason S. Gilbert<sup>1</sup>, Abigail Smith<sup>1</sup>, Alison L. Walsh<sup>2</sup>, M. Felicia Cavallini<sup>3,\*</sup>

<sup>1</sup>Business, Limestone University, Gaffney, South Carolina, USA

<sup>2</sup>Health Sciences, Limestone University, Gaffney, South Carolina, USA

<sup>3</sup>Exercise Science, Limestone University, Gaffney, South Carolina, USA

\*Corresponding author: [fcavallini@limestone.edu](mailto:fcavallini@limestone.edu)

Received March 24, 2021; Revised May 02, 2021; Accepted May 09, 2021

**Abstract** Successful bike share systems are more common in larger than smaller cities. People use bikes to run errands, shop, go out to eat, or tour the city. But what about smaller communities that make up so much of the United States? For the sake of access to transportation and the economic boost to smaller municipalities, it is important to implement a bike share program that provides its citizens with options for public transportation. Incorporating a bike share system should be considered in smaller cities or municipalities that contain colleges or universities, given the large available student population that would be interested in using bikes for their own transportation needs. The approach is to first build the foundation for bike share success among college students while methodologically planning to increase bike availability to sites with probable high participation usage, including locations centrally located to city commerce in the community. The purpose of this article is to present the foundation to implement a successful bike share program for those smaller cities and communities with a college or university. The benefits of a bike share partnership with a college campus, overall physical activity (PA) and health benefits, potential and current demographic groups to use the bike share scheme, economic benefits, environmental factors, dock versus dockless bike share programs, and the finances and logistics of a bike share scheme will be examined. Yearlong strategies and important considerations for a successful bike share program will be explored.

**Keywords:** bike share program, college campus, health benefits, economic impact, finances and logistics

**Cite This Article:** Mason S. Gilbert, Abigail Smith, Alison L. Walsh, and M. Felicia Cavallini, "Successfully Initiating a Bike Share Program in Smaller Communities: The College or University as a Focal Point." *American Journal of Educational Research*, vol. 9, no. 5 (2021): 255-262. doi: 10.12691/education-9-5-2.

## 1. Introduction

Imagine a way that could increase the health of people, reduce energy consumption, lessen car congestion, and promote economic growth. This could all be done by implementing a bike share program. A bike share program is defined as the provision of accessible bicycles at bicycle stations throughout a defined urban area [1]. These systems are usually located in larger cities and provide transport at a low cost to the user. As of 2013, there were about 535 bike sharing programs worldwide [2] and with the rising public concern over climate change and over-use of oil-based transportation, bike sharing programs are likely to increase in number. A major situation that is impacting the world currently and possibly in the future is the COVID-19 pandemic. The pandemic has caused people to be quarantined in their homes and struggle to find transportation due to social distancing rules. It has decreased public transportation due to the close proximity of people. This has caused physical barriers to people wanting to shop, run errands, go to work and school,

and utilize traditional public transportation. Bike share programs could be a safe alternative due to the nature of the program being outdoors and the ability to social distance on singular bikes.

Successful bike share programs are more common in larger than smaller cities. People use bikes to run errands, shop, go out to eat, or tour the city. Bike stations tend to be centrally located for all to use. But what about smaller communities that make up so much of the United States? For the sake of access to transportation and the economic boost to smaller municipalities, it is important to implement a bike share program that provides its citizens with options for public transportation. Incorporating a bike share program should be considered in smaller cities or municipalities that contain colleges or universities, given the large available student population that would be interested in using bikes for their own transportation needs. Students who want to travel from one end of the campus to the other for class or school activities, as well as international students and others without a car, would enjoy and benefit from the accessibility of the bikes. To maximize the success of bike share participation in these types of areas, it is important to implement the program

within the higher education school setting first, and then broaden the bike share program slowly to the community at large. The approach is to first build the foundation for bike share success among college students while methodologically planning to increase bike availability to sites with probable high participation usage, including sites centrally located to city commerce. The purpose of this article is to present the foundation to implement a successful bike share program for those smaller cities and communities with a college or university.

## 2. Benefits and Partnerships of a Campus Bike Share Program

There are many benefits of a bike share program including the profound influence active transportation can have to improve the economy of the city, the safety and health of the community, and the air quality and cleanliness of the environment. A prosperous area for bike share programs is at college and university campuses. There are many students that utilize bikes to go between classes, get food while on the run, dash off to practice, or simply exercise or relieve stress. Students who consider using a bike from a station in proximity in a safe environment with minimal physical barriers are more likely to be active participants of a bike share program [3]. Bike share programs on college campuses can attract students to enroll because it is an easy way to transport in and around the school setting. Bike share program usage can also be a viable alternative to vehicle use, and of course, parking those vehicles. It can be difficult for students to find parking, and a great alternative would be to put the bike in the rack right next to the building where a particular class or event is being held. Once a bike share program is established, there tends to be a higher involvement in student bike use. This was the case at Valencia University where nearly 20% of the student population eventually became bike users after eight months and overall bike active transportation to school increased from 7% to 11% [3]. Cycling can be a utilitarian mode of transportation that people prefer for day to day living and movement purposes. Also, studies support that cycling practices are looked upon as a “smart” and “trendy” mode of transportation [4]. Another example of a successful campus bike share program is the UP Diliman campus. This is an urban green space area within the Metro Manila area that initiated car-free Sundays. This encourages people to walk or bike to wherever they need to go [4]. If more places in general developed this idea, this would promote a much healthier living style. Overall, college campuses can be a prime opportunity to initiate a bike share program due to the presence of large, generally safe spaces on university grounds [4].

In some cities where bike share programs are created, there is a college or university near or in the city. One example is Fargo, North Dakota where North Dakota University is located. This city partnered with the university to fund the program [5]. After a study on the bike share program was completed in Fargo, it was determined that the success of a bike share program depended largely on the partnership between the city and

university [5]. The evidence from studies shows that partnerships with higher educational institutions is a large factor in program sustainability in smaller cities [5].

## 3. Improvements in Health and Fitness

Most people are aware of the obesity problem in the United States [6]. A way to reverse this accusation is by increasing physical activity (PA) levels. Physical exercise is an accepted means to reduce chronic illnesses [1], such as diabetes, hypertension, CVD, respiratory diseases, active aging, frailty, sarcopenia, and dementia [7]. Biking is excellent exercise, and a bike share program can be an easy way to physically participate because many do not have the resources, safety, or availability of biking on their own. Instead, one can reserve a bike and drop it off when they are finished.

Bike share programs are a great way to increase physical health and fitness. Research supports adult preferences for lifestyle PA in both males and females and across all groups [8]. Overall, people prefer to meet the PA guidelines of 150 minutes of moderate to vigorous PA through everyday tasks, responsibilities, and daily jobs through such activities as raking leaves, gardening, shoveling snow, walking the dog, vacuuming, active transportation and home improvements [9]. Many people do not like going to the gym or do not have much time. Engaging in simple tasks such as riding a bike can aid in the process of completing the 150 minutes of PA and overall health of the person. Research indicates that most people from South Carolina and Southern Ontario believe exercise is a stress relief for them and helps them feel happy and accomplished [8]. Exercise not only improves physical health but positively affects mental health as well.

## 4. Current and Potential Demographic Success

Many studies conducted in different cities around the US have focused on what groups tend to utilize bike share systems [6,10,11]. The prevalent factors that appear to determine participation are income, gender, ethnicity, and education. In essence, the findings collectively demonstrate that the greatest users are well educated, financially secure, and Caucasian males. Barbour, Zhang, and Mannering [6] found that households with an annual income below \$50,000 tended not to participate in a bike share program more than once a month. Most annual members of Capital Bike share Program, located in DC, have an annual income over \$75,000, and greater than 90% of its members earn over \$35,000 in annual income [10]. A Florida study found that gender was also a factor in bike share participation [6], with males showing the greatest use. A study in Minnesota found that areas populated predominantly by Caucasians had great bike share system participation [11]. Author (year) revealed similar results; respondents that identified as Caucasian were more likely to be regular bike share riders [6]. The Capital Bike share Program active in DC [10] showed that the majority of the annual members of this share program

(80%) had a 4-year university degree (39%) or a master's degree (41%). Only 5% had an education level of less than a 4-year degree.

Low income communities can particularly benefit from bike share programs and there have been more efforts recently to implement these systems to promote greater equity accessibility [12]. Lower income areas could also do well with the implementation of the program. In less affluent areas, there may be more obesity, less people able to work, and no visitors. Bike shares can aid in all these areas. It may be difficult for a lower income area to support the bike share program, but it can be done through sponsors and grants. A small city of South Africa, Johannesburg, attempted to initiate a bike share program in 2016, but unfortunately, the mayor did not support the idea, labeling the program as too expensive and inaccurately envisioning the image of bike riders only to be upper income population, and not residents in low-income neighborhoods [13]. Even though this stereotype exists, there are many positives that the bike share program brings to a lower income area. Like universities, many people are not able to afford cars and must walk everywhere if public transportation is not an option. If bikes were available, it could save time for people having to walk long distances. Also, if there is an available job, but it is a long distance away, this program could provide greater options in terms of job accessibility. There might even be job openings within the bike share program itself that could help provide job opportunities [13]. According to Teixeira and Lopes [14], communities with bike share programs can offer an alternative low cost over infrastructure building and public transportation. This can be a critical connection to low-income residents who do not own a car and depend on bike transportation. Bike share programs can also increase the popularity of the city. Just like the universities, it may attract people to live there or visit, since they would have the option of riding the bike instead of walking, renting, or buying a car. In three short years, bike users from low-income neighborhoods increased from 2.9% to 4.3% [3]. This increase demonstrates the feasibility to successfully implement a bike share system in lower income areas.

One difficulty in the promotion and establishment of bike share programs in minority and lower income populations is the lack of information provided to the public about the programs [12]. Up to 77% of the people surveyed in one study had not used the program and the most common reason for their lack of use was due to not having enough information or having misinformation [12]. One of the pieces of misinformation that had a large impact was that a credit card is needed to check out a bike. Not all programs use a credit card to check out a bike. Bike share systems that are in low-income and minority communities should not require a credit card because many people in these areas do not have a credit card, and may not have any banking system stemming from distrust of banking institutions [12].

## 5. Economic Benefits

There are significant economic benefits to implementing bike share systems [6,10,11,15,16]. In one study

conducted in Dublin, Ireland, it was found that travel time to and from work was significantly shortened, creating a 6.6-million-Euro (7.87 million US dollars) benefit [16]. Another investigation in Beijing, China found that on average, each worker that participated in the bike share program, saved 8 minutes a day resulting in a 1.2 billion Chinese Yuan dollar gain (183.37 million US dollars) [15].

Another economic benefit of the bike share programs is increased spending. A Capital Bike share Program in DC (2014) found that 23% of bike share users claimed they were more likely to spend during their trip [10]. The research did not indicate however, which stores benefitted the most from bike share participants and shoppers. A Minnesota bike share study found that increased spending due to the bike share system was primarily focused on the food industry [11]. The results revealed that there was an increase spending at grocery stores, fast food places and restaurants.

## 6. Natural Features

Natural, physical, and topographical environmental features also impact the decision-making in whether to implement a bike share program. A man-made physical feature that affects bike-riding is the existence of bike lanes and safe bike paths. Creating bike paths increase safety so it is expected that parts of the city with bike paths have greater participation in bike share programs [5]. It was also discovered that participation decreased if the path from one point to another took the rider through a heavily used intersection i.e. less safe [5,12].

There are also other natural features that affect people's preferences to biking. One of them is ambient temperature. Outdoor temperatures exceeding 81 degrees Fahrenheit adversely affected the use of bikes [5]. If participation in a bike share program is already low due to college students returning home for summer break, then this seriously questions whether the bike share program should operate during these months. Similar results were observed in Toronto, Canada [17] when most of the bike share program trips were made when the perceived temperature fell between 20 and 30 degrees Celsius (68 to 86 degrees Fahrenheit). Precipitation, snow on the ground, and humidity were negatively correlated with ridership [17]. This could explain why the bike share program in Fargo, North Dakota does not operate in the winter months; it is only open for use from March- October due to the frigid climate condition in the wintertime [5].

In addition, because most bike share programs are situated in larger cities, there is a need to examine smaller cities particularly with colleges and universities. Interestingly, bike trips made in smaller cities such as Cork, Ireland tended to be shorter but habitual [18]. Clearly, the bike share program has loyal users who are not willing to ride long distances to reach their destinations.

## 7. Dockless Programs

All the programs that have previously been mentioned in this review are based on dock bike share programs. There is another type of bike share program that is

referred to as dockless. This program gets this name because the bikes that are used do not get returned to a dock when the rider is done with the bike. Instead, bikes can be left anywhere once they are no longer being operated and picked up from any location. However, there is still rebalancing done at the end of each day for the bikes to be in a proper place when the program reopens in the morning.

Dockless programs provide advantages from traditional programs, in that, without the cost of bike docks, dockless programs are less expensive to finance. Although the bikes themselves contain more technology, it is still cheaper to finance the dockless programs. Another advantage to dockless programs is that they are better suited for spatial equality. Dockless programs are more accessible to lower-income communities. The dockless programs focus less on higher educated and higher income neighborhoods [19]. Likely, this is because it costs to buy and maintain the program.

One disadvantage to dockless programs is the increased regulation these programs carry compared to the dock programs. A major reason for the increased regulation is the uncertainty of where to park the dockless bikes after use by the participants. As a result, there are many problems with dockless bikes being parked in inappropriate places after final use [20]. This is not a problem in a docked bike programs because the bikes can only be parked with the docks. Increased government regulation may be necessary in order to sustain a dockless program and maximize benefits [21].

## 8. Finances and Logistics to Bike Share Programs

The exact startup cost will vary depending on the number of bikes, whether they are dockless or have docking stations, and other capital expenditures. A bike can cost between \$500 and \$2000 and the operating costs can range from \$1000 to \$2000 per bike [22]. Although these costs may be able to be partially recovered through user fees, maintaining and supporting a program annually depends on the specific package and its annual usage. Vidalis et al. [22] determined the objective in implementing a bike share program is ensuring that the city or university implementation costs are feasible for the users of the program, including providing low costs to participate in the bike share program. Depending on other options in a given city, whether it be a public bussing system, a subway, or Uber, the option to rent a bicycle will only be appealing if it is cheaper and more accessible than other options.

As cities probably will not be able to bear the cost of a bike share program on their own, it is likely that a mixture of investments from local businesses, allocated taxpayer money, or state/federal grants will be needed to pay for the implementation. Local businesses have an opportunity here through investing in the bike share program and subsequently gaining rights to exclusive advertising which could be placed on bikes and bike docks [22]. St. Xavier University sought investment capital from the start to

implement and sustain their bike share operation. The startup cost for a bike share program was \$250,000 and included 65 bikes [22]. This is a significant startup cost, but through external investments and federal grants, the realized cost to startup a program can be much more realistic to the city or campus.

What about the cost to the user? There are many different programs that offer different subscription services and rental fees. St. Xavier University uses a system that allows campus students, staff, and faculty to rent bikes from docking stations using their university-issued identification. Renting a bike is free for the first 15 minutes but then costs \$0.60 for every additional 15 minutes thereafter [22]. It appears that much of this system is reliant on funds to operate, resulting in lower costs to the user. Other programs offer other costs to the user [22-25], like the one at the University of California-Davis, which is more of a long-term bike rental program. The costs to the user for this specific program are \$15 a day or \$50 a week. Another long-term program at the University of Wisconsin offers a less expensive \$40 per semester rental with a \$20 return deposit if returned at the end of the semester [22]. It is evident that depending on the needs of the community, the costs vary significantly from program to program. Finding the happy medium is essential when implementing a program at a university or city because if the costs to the user are high, as seems to be the case at the University of California-Davis, then the investment of the bike share program might prove to be a loss or a failure. However, most programs offer inexpensive options to its users.

James Wine [26], executive director of Bike Easy, indicates the specifics on the economic and fiscal impacts of a bike share program and examines a few different case studies from different cities with such programs, while providing logistics including user fees and advertising revenues. Economically speaking, it was evident local business sales increased as a result of bike share facilities in Portland and Toronto [26]. Essentially, bike share systems encourage more people to travel to destinations not normally ventured without a bike. For instance, it encourages office-workers in larger cities to travel a mile down the street to eat somewhere for lunch rather than the restaurant located right next door to their building. This would undoubtedly have a positive economic impact on local small businesses. Fiscally speaking from the vantage point of city planners, and on a much larger scale reflecting a major metropolitan city such as New Orleans, it would cost approximately 1.5 million dollars to purchase 200 bikes and 20 kiosk systems [26]. Thus, a bike share program can be very cost effective compared to other public transit and infrastructure, which can cost tens of millions of dollars per mile [26]. Wine [26] strongly suggests the implementation of bike share programs form the foundation for positive economic infrastructures in municipalities that costs much less to transport and invest in community public transit systems. A bike share program can be economically feasible while allowing a greater number of people to participate compared to driving. While this case seems to be supported, it will take observation of historical data to conclude if utilization was

maximized and if funding a system proved profitable with cities' budgets.

Wine examines bike share systems in Minneapolis and Boston, among others, to make a case for implementing a bike share program in New Orleans. In Minneapolis, a bike share system was set up with 700 bikes and 65 dock stations. The system cost \$3.2 million overall and costs the user a fee of \$60 annually, \$30 monthly, or \$5 daily. This project was supported through federal funding implemented in certain congressional designations, nonprofit organizations, settlement money from a tobacco dispute through Blue Cross Blue Shield of Minnesota, and local business donors [26]. In Minneapolis' case, they were able to amply provide for a new bike share program on a large scale through the different funding options at their disposal. For Boston, the bike share program was a huge success upon implementation as they reached 100,000 riders in only 10 weeks with 600 bikes and 60 stations. The previous bike share program in Minneapolis took 6 months to reach the same level of participation [26]. Wine suggests that the reasons for success in Boston may be the close linking docking stations near each other, coupled with the high population density. Sources of funding are similar to the way Minneapolis funded their program – some local businesses donated money, but Boston also received money through the Federal Transit Administration, Bus Livability Initiative, and the Congestion Mitigation and Air Quality Improvement Program (CMAQ). Out of these programs, the one to note is the latter. The CMAQ is a program that allocates federal money for projects that are keeping in line with or improving air quality standards. For Boston, the state had to prove use for bicycles and the municipalities had to qualify before they could receive these funds [26]. Looking into the CMAQ program would prove beneficial for any city in need of federal funding to start a bike share program. States other than Massachusetts have qualified for CMAQ funding, like Louisiana, so looking into whether the city can receive this kind of funding is well worth the research.

## 9. Discussion

Since the research indicates that all demographic populations have shown robust participation in past bike share systems, shared bikes should be available to diverse populations but strategically placed for maximum involvement. It is important to decide whether “dock” or “dockless” is best based on the needs of the city implementing the program. Careful consideration must be given to the cost needed to initiate and maintain a bike share program as well as providing potential members a user-friendly mobile app or card approach to obtaining, securing, and returning a bike. In addition, bringing together key stakeholders to support and maintain a sharing program is critical. The following is a suggested framework to use in engaging in a step-by-step yearlong strategy in introducing a bike share program.

### 9.1. Year Long Strategies to Implement a Bike share Program in Smaller Communities

**As a first semester project**, organize a small group of students from the local university or college to survey the student population regarding their interest and likelihood of using a bike share program in and around their campus. During the same time frame, start to gather basic information on the equipment needed for a bike share program. What are some of the companies currently in operation regionally or even nationally that may be suitable for a smaller city? What are the cost comparisons among the companies researched?

1. When it comes to deciding which bike share program is best, remember that “one size does not fit all.” What works in one town will not necessarily work in another. Choose the program with the features and equipment that is the most appropriate for the needs of the potential participants.
2. **As a second semester project**, again organize a small group of students to use the foundation formed from the first semester to research three areas specific to incorporating a bike share program: a) the importance of active transportation, physical activity and the overall health impact of participating in a bike share program, b) the positive economic impact of a bike share program as well as examining the populations most likely to use to mobile bikes, and c) the financial, logistical, and overall costs of implementing a program. Is a dock or dockless system most effective for cities with less residents?
3. When enough research has been collected, ask to meet and work with the City Manager or Administrator every, or every other week to report findings in each of the health, economic, and financial impact research findings. This is an excellent opportunity to build rapport with the local municipal representation while garnering interest and enthusiasm among students and city officials alike.
4. Consider obtaining sponsorship for the bikes through local banks, doctors, dentists, and well-established restaurants.
5. Once enough information has been collected and researched, request a 10 to 15-minute presentation to the City Council members to obtain their support. Highlight or collect important facts from each of the areas of health, economic impact, and finance, and design, organize, and arrange PowerPoint slides for presentation.
6. The presentation needs to emphasize the very main points of each research area succinctly and effectively, and then address a “Plan of Action” to make the bike share program become a reality. Presenters should ultimately address which type of bike program is best and why (docked or dockless). In addition, the number and cost of the bikes should be addressed as well as potential locations of the bikes based on research findings.

7. In smaller cities, the university or college should be emphasized as the focal point of the project since it is projected that many students will potentially use the bikes. The idea is to convince City Council on quality, not quantity of bikes that will usefully serve primarily the students initially with the vision that more and more citizens in the community participate in the bike share program eventually. The ultimate goal is to have a balance of residents and students engage in a bike share program. However, the strategy is to first establish a “home base” with the students first as primary users, and then broaden out to the public.
8. Field feedback from the City Council, the City Manager, and the community members to help improve the likelihood for success.

## 9.2. Important Considerations when Planning for a Successful Bike Program

It is important to critically plan through the combination of the expansion of bikes, bike lanes, roads, and pathways to gain consumer confidence in partaking in a bike share program. The marketing involved in educating the public in the benefits of a bike share program, and the placement of the bikes that allows for the highest access to food destinations as well as commercial businesses is critical to overall success. The following are important considerations when planning for a successful bike program:

1. Food destinations, whether it be a grocery store, local restaurant, or coffee shop are popular choices when participating in a bike share program. Think about bike and pathway accessibility to these often-sought-after businesses. Establish a good relationship with the City Administrator which is critical to help create and integrate bike lanes where needed.
2. It is essential to ultimately include accessibility to a bike share program in a variety of neighborhoods. Research supports bike placement in low-income or underserved communities, and more affluent districts alike [12,14].
3. When initiating a program, think quality, not quantity. Slow and steady wins the race by starting off with a small number of bikes then growing the availability steadily. Realistically estimate the number of bikes needed initially then adjust as needed with increased usage by participants.
4. To maximize saving money in the long run, consider seeking a program with theft protection technology.
5. Seek local businesses, corporate, and local and regional grant funding opportunities for support in smaller communities. Market the program to investors while promoting that a BSS improves physical and overall health, reduces accidents and roadkill, saves money on fuel costs, reduces carbon dioxide emission for a greener world, and even promotes social distance during the pandemic.

6. Consider bike share programs with user friendly accessible mobile apps. Minimize barriers with key card access to check out the bikes to increase the confidence of the participants in using the program and to increase overall bike usage.
7. Residents in less affluent areas that may not be able to afford a car, can most likely manage to pay to partake in a bike share program for transportation.
8. Bike share programs can promote the strengths of the city and attract more visitors to the community.
9. Bike share programs can increase job opportunities for the local residents due to improved accessibility to transportation. If safe and feasible, consider placing bike stations near businesses that have a high number of employees and close to public transportation stations to increase job transportation accessibility.
10. Educate the public on bike safety and the value of bike share program as a form of public transportation.
11. Many people in low-income neighborhoods are “walk up” users so it is best not to invest in memberships.
12. Accommodate a bike share program with bike paths to the most likely eating and shopping destinations.
13. Repair roads to improve safety and increase consumer confidence of biking in safe areas. Provide adequate information to potential users to instill confidence in using the bike share program.
14. Perhaps lower prices during extreme inclement weather conditions, particularly during the summer months when less students are typically around campus.

## 10. Conclusions

Bike share programs can also exist in smaller cities across the country, especially where colleges and universities are situated. Consider prioritizing a bike share program around a higher education environment with students who can use the bikes immediately for their own personal needs. What better way to improve physical activity levels while actively transporting in and around the campus and to nearby local and commercial businesses for food and other shopping needs? Since all communities benefit from a bike share program, it is important to strategically place the bikes in areas that would allow for maximum usage as the program grows in residential participation in different areas of the city. Educate people of the benefits of a bike share program in person, through the website, and social media. Promote images of a diverse group of people of all ages partaking in a bike share program for a variety of purposes (Figure 1) and encourage the community that a bike share program is for everyone, not just for college students.

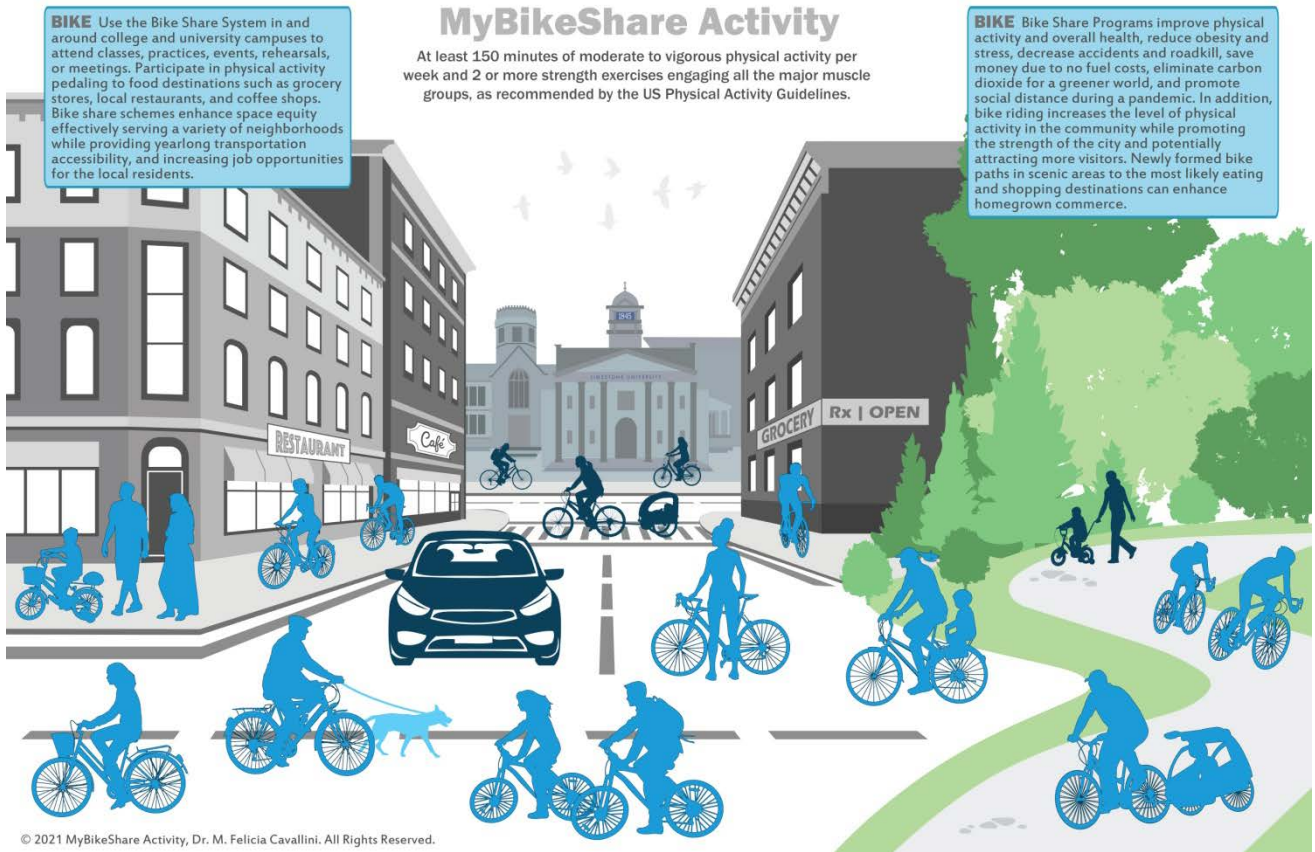


Figure 1.

## Acknowledgements

In great appreciation, the authors acknowledge the assistance of Dr. David J. Dyck from the University of Guelph in Guelph, Ontario, Canada with the preparation of the manuscript.

## References

- [1] Bauman, A., et al., The unrealised potential of bike share schemes to influence population physical activity levels - A narrative review. *Prev Med*, 2017. 103S: p. S7-S14.
- [2] Shu, J., et al., Models for Effective Deployment and Redistribution of Bicycles Within Public Bicycle-Sharing Systems. *Operations Research*, 2013. 61(6): p. 1346-1359.
- [3] Ricci, M., Bike sharing: A review of evidence on impacts and processes of implementation and operation. *Research in Transportation Business & Management*, 2015. 15.
- [4] Sharmeen, F., B. Ghosh, and I. Mateo-Babiano, Policy, users and discourses: Examples from bikeshare programs in (Kolkata) India and (Manila) Philippines. *Journal of Transport Geography*, 2021. 90: p. 102898.
- [5] Mattson, J. and R. Godavathy, Bike Share in Fargo, North Dakota: Keys to Success and Factors Affecting Ridership. *Sustainable Cities and Society*, 2017. 34.
- [6] Barbour, N., Y. Zhang, and F. Mannering, A statistical analysis of bike sharing usage and its potential as an auto-trip substitute. *Journal of Transport & Health*, 2019. 12: p. 253-262.
- [7] Jiménez-Pavón, D., A. Carbonell-Baeza, and C.J. Lavie, Physical exercise as therapy to fight against the mental and physical consequences of COVID-19 quarantine: Special focus in older people. *Progress in cardiovascular diseases*, 2020. 63(3): p. 386-388.
- [8] Cavallini, M.F. and D.J. Dyck, Exercise is medicine! Why are people not buying into the prescription? *Journal of Family Medicine and Disease Prevention*, 2020. 6(3): p. 125.
- [9] Cavallini, M.F., et al., Affective Benefits are as Important as the Awareness of Improved Health as Motivators to be Physically Active. *Journal of Physical Activity Research*, 2020. 5(1): p. 14-22.
- [10] Buehler, R. and A. Hamre, Business and Bikeshare User Perceptions of the Economic Benefits of Capital Bikeshare. *Transportation Research Record: Journal of the Transportation Research Board*, 2015: p. 100-111.
- [11] Schoner, J., R.A. Harrison, and X. Wang, Sharing to Grow: Economic Activity Associated with Nice Ride Bike Share Stations, in Hubert H. Humphrey School of Public Affairs. 2012, University of Minnesota Twin Cities.
- [12] Hoe, N., Bike sharing in low-income communities: Perceptions and knowledge April - October 2015. 2015, Temple University Institute for Survey Research.
- [13] Wood, A., Tracing the absence of bike-share in Johannesburg: A case of policy mobilities and non-adoption. *Journal of Transport Geography*, 2020. 83(C).
- [14] Teixeira, J.F. and M. Lopes, The link between bike sharing and subway use during the COVID-19 pandemic: The case-study of New York's Citi Bike. *Transportation Research Interdisciplinary Perspectives*, 2020. 6: p. 100166-100166.
- [15] Qui, L.-Y. and L.-Y. He, Bike Sharing and the Economy, the Environment, and Health-Related Externalities. *Sustainability*, 2018. 10(4): p. 1-10.
- [16] Bullock, C., f. Brereton, and S. Bailey, The Economic Contribution of Public Bike-share to the Sustainability and Efficient Functioning of Cities. *sustainable Cities and Society*, 2017. 28: p. 76-87.
- [17] El-Assi, W., M. Salah Mahmoud, and K. Nurul Habib, Effects of built environment and weather on bike sharing demand: a station level analysis of commercial bike sharing in Toronto. *Transportation*, 2017. 44(3): p. 589-613.
- [18] Caulfield, B., et al., Examining usage patterns of a bike-sharing scheme in a medium sized city. *Transportation Research Part A: Policy and Practice*, 2017. 100: p. 152-161.
- [19] Mooney, S.J., et al., Freedom from the Station: Spatial Equity in Access to Dockless Bike Share. *J Transp Geogr*, 2019. 74: p. 91-96.

- [20] Deighton-Smith, R., The Economics of Regulating Ride-Hailing and Dockless Bike Share. *International Transport Forum Discussion Papers*, 2018. No. 2018/24.
- [21] Yang, T., et al., Dynamic Feedback Analysis of Influencing Factors and Challenges of Dockless Bike-Sharing Sustainability in China. *Sustainability*, 2019. 11(17).
- [22] Vidalis, S., et al., Modern analysis of bike sharing feasibility. *International Journal of Interdisciplinary Social Sciences*, 2010. 4(15): p. 1-15.
- [23] Bieliński, T., A. Kwapisz, and A. Ważna, Bike-Sharing Systems in Poland. *Sustainability*, 2019. 11(9).
- [24] Hess, M., A Case Study of Bikeshare Financing with Recommendations for New York City. 2014.
- [25] Yu, W., et al., The Cost-Effectiveness of Bike Share Expansion to Low-Income Communities in New York City. *Journal of Urban Health*, 2018. 95.
- [26] Wine, J., *Bike Easy: Bicycle Share Feasibility Study*, New Orleans. 2012, UNO Transportation Institute Publications, Paper 14.



© The Author(s) 2021. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).