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G-Bikes: Gettysburg Bike Share

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G-Bikes: Gettysburg Bike Share

Abstract

The focus of this paper was to assess Gettysburg as a possible location to implement a bike share program and ultimately to propose a framework for a successful program. We evaluated bike share programs across North America and created a list of criteria of successful programs. The second part of our data collection included a Google Forms survey which targeted three demographics, students, locals and tourists. We targeted our focus groups by posting on Facebook pages frequented by each demographic, as well as administering the survey in person with smart phones in Lincoln Square in Gettysburg. Our survey generated 134 responses, 86 of which were students, 27 locals, and 21 tourists. Our research showed that, demographically, successful programs occur in areas with high traffic from college students and tourists, as well as support from the local population. On the technical side, successful programs have 10-30 bikes per 10,000 residents with bike stations that range from 1-2 miles apart, averaging 4-8 trips per day, per bike. Our survey showed that a bike share program in Gettysburg would receive heavy support from our three demographics. It also showed that the largest concern from each demographic was bike related travel during the winter months which is consistent with the other programs we studied. Based on our research, we propose that the G-Bikes program should have 5 stations located at the top five intended locations of visitation, Gettysburg Town Center, Gettysburg College, Little Round Top, The Observation Tower, and on Steinwehr Avenue near the National Cemetery. Based off the overall population we recommend that the program start with a minimum of 20 bikes. We also recommend that the bike models follow the oBike specs from European bike share programs to maximize user convenience and minimize the threat of theft and vandalism. Through our study we determined Gettysburg's unique niche as a small college town and tourist hub to be a possible location to implement a successful bike share program that implements many of the similar characteristics of other tourist destinations we studied.

Keywords

Bike Share, Bikes, Sustainable Transportation, Gettysburg

Disciplines

Environmental Health and Protection | Environmental Studies | Tourism

Comments

Student capstone paper written for ES 400: Senior Seminar.

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G-Bikes: Gettysburg Bike Share **Capstone Project**

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ES 400
Matt Palacio and Jeff Walters

Abstract:

The focus of this paper was to assess Gettysburg as a possible location to implement a bike share program and ultimately to propose a framework for a successful program. We evaluated bike share programs across North America and created a list of criteria of successful programs. The second part of our data collection included a Google Forms survey which targeted three demographics, students, locals and tourists. We targeted our focus groups by posting on Facebook pages frequented by each demographic, as well as administering the survey in person with smart phones in Lincoln Square in Gettysburg. Our survey generated 134 responses, 86 of which were students, 27 locals, and 21 tourists. Our research showed that, demographically, successful programs occur in areas with high traffic from college students and tourists, as well as support from the local population. On the technical side, successful programs have 10-30 bikes per 10,000 residents with bike stations that range from 1-2 miles apart, averaging 4-8 trips per day, per bike. Our survey showed that a bike share program in Gettysburg would receive heavy support from our three demographics. It also showed that the largest concern from each demographic was bike related travel during the winter months which is consistent with the other programs we studied. Based on our research, we propose that the G-Bikes program should have 5 stations located at the top five intended locations of visitation, Gettysburg Town Center, Gettysburg College, Little Round Top, The Observation Tower, and on Steinwehr Avenue near the National Cemetery. Based off the overall population we recommend that the program start with a minimum of 20 bikes. We also recommend that the bike models follow the

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Introduction:

As greenhouse gas emissions continue to contribute to global climate change, greener forms of transportation are becoming more prevalent in cities across multiple countries and continents. The convenience of bicycle travel has become a front-runner as an alternative means of transportation. Major cities such as New York City and Boston have successfully implemented bike share programs that allow riders to navigate heavily trafficked areas at low costs while avoiding daily traffic buildups. The borough of Gettysburg is frequented by a combination of students, tourists and locals, each demographic travelling distances that are manageable by bike. The driving force behind revenue and tourism, bringing people from across the country, are the battlefields. As of current day, the most effective way to traverse the battlefields is via motorized vehicle or bicycle. Road systems connect all the biggest landmarks that are most frequently visited; However most locations possess limited parking which results in cars lining streets and creating congestion. Countless tourists visit over the course of the year, each viewing the town and battlefields from their car with more than the occasional bicycle rider accompanying the traffic. A bike share program in Gettysburg

would effectively reduce both traffic within the town center and battlefields as well as the carbon footprint of tourist, residents and students alike. We believe the town of Gettysburg and the surrounding battlefields present a unique opportunity for a successful bike share program due to the demographics of tourists, students and residents (Krykewycz 2010). The purpose of this study is to create a framework of criteria for successful programs that already exist, and to compare that criteria to Gettysburg and the surrounding battlefields. Providing an easily accessible bike program would allow students, locals and tourists to replace some of the car rides they make throughout the day with less polluting bike rides. Another benefit that has been observed with bike programs is a decrease in car on bike and car on car collisions, ultimately making Gettysburg safer (Miller 2016). Similar programs are beginning to sprout up in major cities across the United States. Bike share programs now dominate the transportation and leisure activity landscape in New York, Boston, Chicago, Milwaukee and the District of Columbia. Rates and fares for bike rentals vary from city to city, but each program provides its city with an affordable alternative form of transportation (Demaio 2009).

The goal of this project is to assess the intended usage of such a program in Gettysburg by multiple groups of interest as well as to determine what an effective program would look like and how much it would cost to create. Millennials in major cities across the country are increasingly taking advantage of alternative forms of transportation. Recent studies are providing insight into bikes becoming more prevalent among young commuters (Wang et al 2018). This will be determined by surveying

different groups within the town, comparing rates to other programs involving bikes or scooters. We will also determine if the distances between battlefield attractions and the center of town are manageable distances for different models of bikes.

Methods:

In order to identify the best practices for a bike share program to be conducted in Gettysburg, we researched bike share programs, their history, and places where they have been successful. The main focus of this research was to determine if the Gettysburg community has the demographics of people who either enjoy riding bikes, or are in need of other forms of transportation (Fishman et al 2014); whether they be college students or local citizens.

Our research allowed us to understand the characteristics of what a successful bike share program looks like in a big city, based off of the programs in New York (Wang et. al 2018) as well as internationally (Fishman et. al 2014). Additionally, there were several programs in small, tourist towns that we looked at to help round out our idea of what success in a bike share looks like in other college towns or smaller communities that possess a similar demographic dispersion (Krykewycz et. al 2018). Based off of this criteria, we will determine which characteristics fit the Gettysburg Community, and include those in the survey in question form. This information was compared to data from currently active bike share programs for similarities and relevance in demographic, geographic, economic, and social tendencies.

Survey and Distribution:

In order to evaluate Gettysburg as a prospective site, we conducted a google forms survey. In forming the survey questions, we first looked to determine whether or not a bike share would be appealing to different demographics of people in Gettysburg broke down into three groups: students, locals, or tourists. Additional concepts like rental prices, biking availability, locations (Educo 2014), and feasibility (Krykewycz et. al 2010) were also considered in the construction of the survey. The final survey asked 14 questions: 8 questions with a single response, 4 questions with “select all that apply” responses, and 2 opened ended responses.

In order to distribute this survey widely and generate responses from all demographics, we determined it would be beneficial to post the survey in various Facebook groups, as well as do some field work and administer the survey in person. This was the main reason we developed a user friendly, fairly quick to take survey on Google Forms. We requested access to and posted in all of the Gettysburg College Class of 2019-2022 Facebook groups, as well as a local issues group called Borovent Gettysburg. Ultimately the students were the only demographic to respond to online surveys so in order to reach our other demographics, we administered the survey to tourist and locals in Lincoln Square outside of popular restaurants and shops on Saturdays throughout the study period. We spent about 3-5 hours over the course of 3 weekends distributing the survey by hand and found this to be the most successful means of administering surveys to locals and tourists.

The discussion section of our paper takes the form of a proposal, for potentially the city council, school board, or anyone inclined to create a bike share program in Gettysburg to consider. Correlations from our survey on what an ideal and successful bike share program looks like is the foundation of our proposal (Demaio 2009), and based on our hypotheses being supported by our research, our comparisons to characteristics found in Gettysburg through the surveys have provided us with conclusive results regarding the functionality and usage of our program. Included in the proposal will be the financial aspect, a sense of popularity and feasibility through the surveys, a proposed map containing ideal locations for bike storage and ideal routes for the borough modeled to maximize coverage area while catering to the popularity of the Gettysburg College Campus, and battlefields. It is our plan to present this proposal to those who have the capabilities of implementing this program and get the opportunity to assist in any way the progress of a potential program.

Results:

Developing Criteria for Successful Programs: In order to determine if the greater Gettysburg area is a suitable area for a bike share program we developed a table with key statistics from six currently successful bike share programs across North America.

(Table 1). Successful Bike Share Program Data

Program:	City, State	Coverage Area	Pop	# of Stations	Average distance per Trip	Avg Trips per Day	Average Cost per Trip	# of Bikes
Capital Bikeshare	Washington D.C.	68 sq miles	~70,000,000	500	3.12 miles	5700+	\$1.52	4300
Blue Bikes	Boston, MA	89 sq miles	~68,500,000	180	1.13 miles	1,150	\$3.09	1600
Bixi Toronto	Toronto	243 sq miles	~2.7 million	360	n/a	n/a	\$3.25	3,750
Citi Bike	New York, NY	302 sq miles	~8 million	750+	1.04 miles	62,000	\$3.00	12,000
Denver B-Cycle	Denver, CO	155 sq miles	~70,000,000	89	2.1 miles	900	\$3.22	737
Visit Bobcaygeon	Kawartha, Canada	5 sq miles	~35,000	2	n/a	n/a	\$5	10

As a result of our research we were able to conclude that while many of our programs possess a higher target population in a larger city, tourism plays a key role in continued usage. With the program located in Kawartha, Canada able to support itself in a smaller city with a much smaller population, communities with popular tourist attractions and high traffic could implement such a program. This coupled with the huge boost in daily visitors as a result of tourism coincides with many of the key demographic trends of larger programs (Fishman 2015.) From this chart we were able to use the

overwhelming support received in our survey to deduce key trends among potential users in Gettysburg.

Survey Results: The results from our survey, overall, support our goal of establishing Gettysburg as a strong candidate to potentially have a successful bike share program. The first question in the survey asks the responder to define their role in Gettysburg, of our 134 responses, 86 (64.2%) were Students, 27 (20.1%) were Locals, and 21 (15.7%) were Tourists (Figure 1).

How would you define your role in Gettysburg?
134 responses

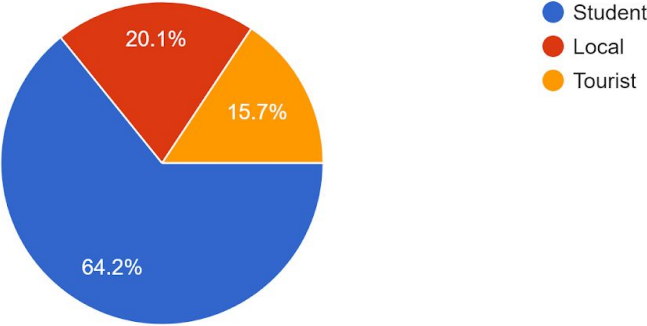


Figure 1. Distribution of demographics of survey responses.

The second question asks responders to describe their current mode of transportation in Gettysburg: 95 people selected Walking, while 79 selected Car, and only 17 said Bike, while 12 selected Freedom Transit, answers were in “Check all that apply...” form (Figure 2). We also had 2 insignificant results.

What is your current mode(s) of transportation for travel that occurs entirely in Gettysburg Borough or the surrounding area? Check all that apply...

134 responses

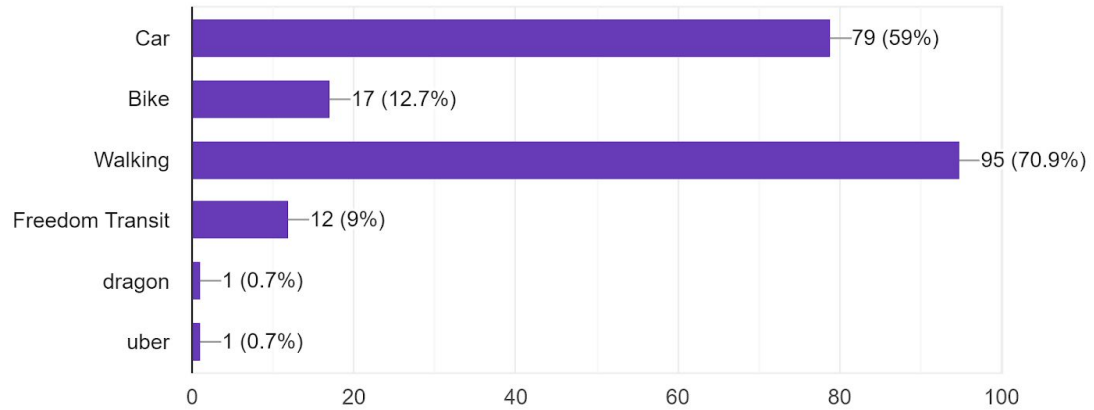


Figure 2. Most popular modes of transportation.

The following question asks whether or not the survey responder owns or has access to a bike, and the majority, 91 (67.9%) of responders, said No, while only 43 (32.1%) answered Yes (Figure 3).

Do you own or have access to a bike?

134 responses

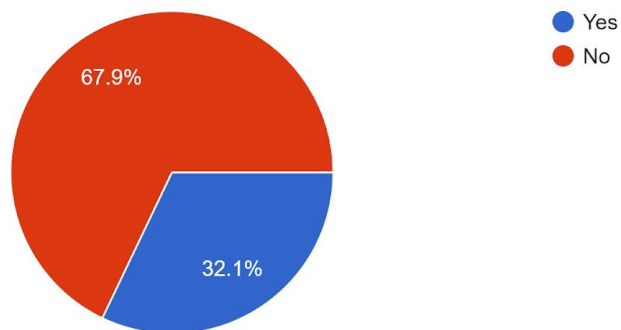


Figure 3. Accessibility of Bikes in Gettysburg

The next question asks the survey responders if a bike would be an appealing form of transportation in Gettysburg, outstandingly, 111 (82.8%) answered Yes, while only 23 (17.2%) answered No (Figure 4). In terms of each individual demographic, 100% of Locals, 84% of Students, and 87% of Tourists surveyed answered “Yes” (Figure 4).

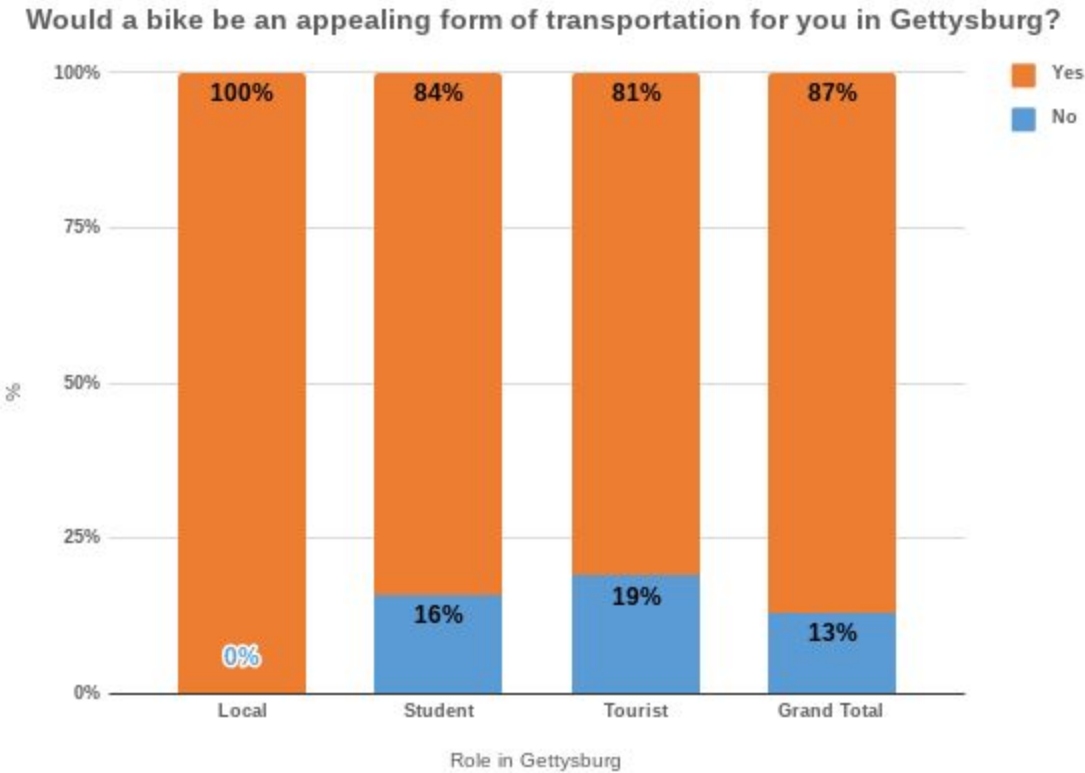


Figure 4. Potential Popularity of Biking

The following question is open ended and asks, in a follow-up to question #3, why or why not biking would be appealing to the responder. Many of the responses

were one or two words: “Quick” one said, “Ease” another answered, “Save money”. Many other answers were the same in the positive response section, while only a few negative ones claimed biking would not be appealing.

In an exactly similar distribution of answers from Figure 3., 91 (67.9%) of respondents answered Yes to be willing to trade car transport for bike transport, while only 43 (32.1%) said No (Figure 5.).

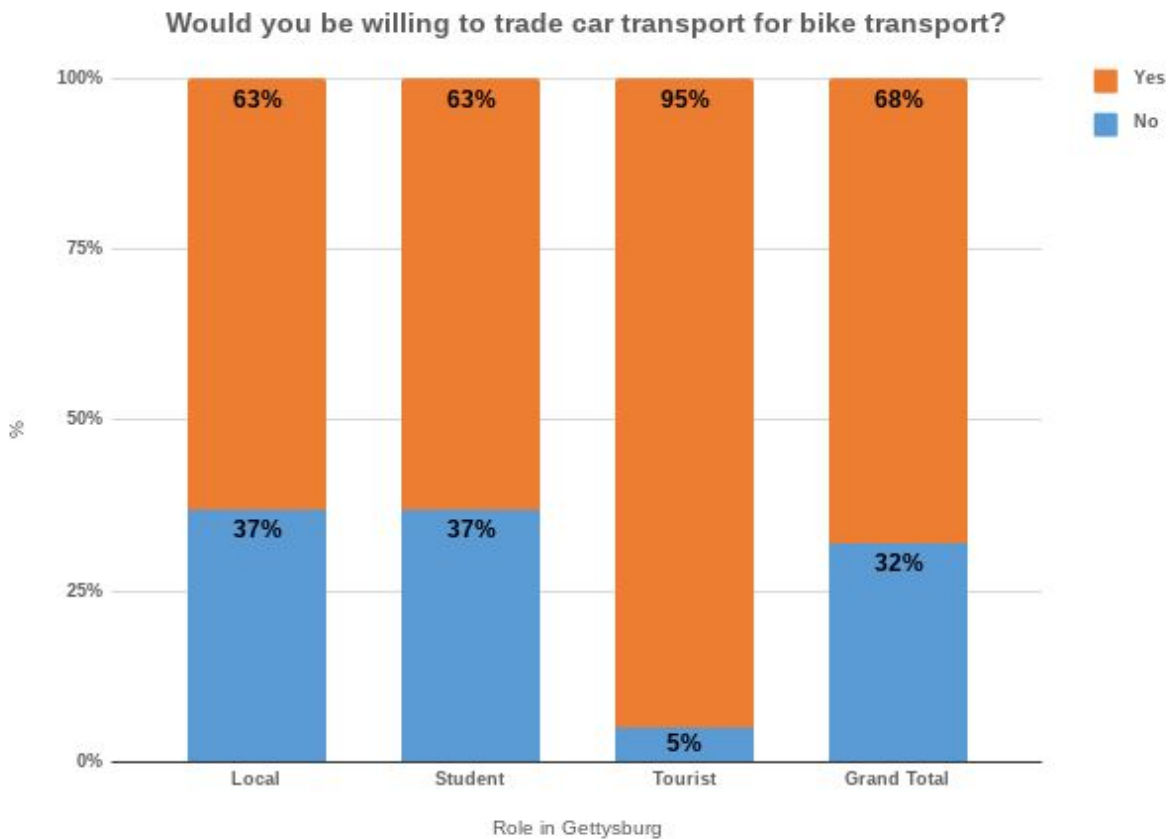


Figure 5. Willingness to change modes of transportation.

To gauge the severity of competition a potential bike share program may face, the next questions asks the responder if they have ever rented a bike from a store in Gettysburg: 125 (93.3%) answered No, while only 9 (6.7%) answered Yes (Figure 6.).

Have you ever rented a bike from a store in Gettysburg?

134 responses

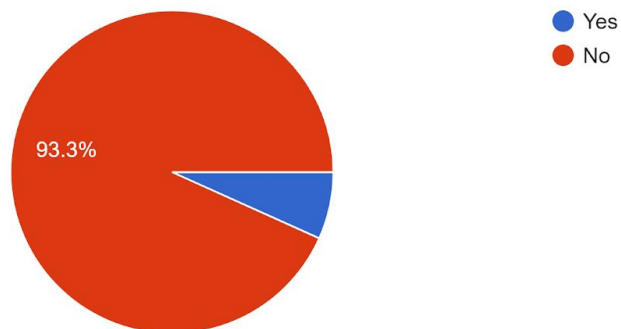


Figure 6. Current Bike Rental Popularity

In another “Check all that apply...” question, we asked the surveyed people to discuss what barriers prevented them from biking more often. The highest response was Weather, as 53% of people checked that box off, followed by Lack of available bikes at 43.3%, Cost of bikes at 38.1%, Time at 31.3%, Pedestrian Traffic at 14.2%, and Safety Concerns at 11.2%. There were several answers with only 1 (0.7%) response, these are insignificant (Figure 7.).

What barriers prevent you from biking more often? Check all that apply...

134 responses

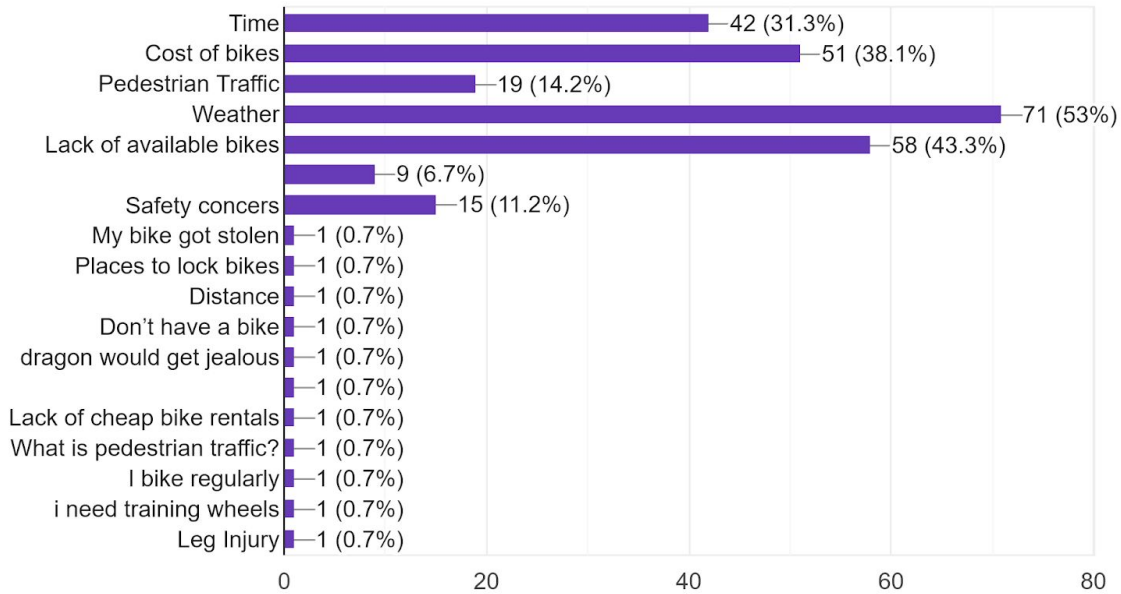


Figure 7. Potential limiting factors of Biking.

To assess the potential actual usage of a bike share program in Gettysburg, the next question asks how likely the responder is to use a bike share program: 41 people (30.6%) answered Very likely, 62 people (46.3%) answered Likely, while only 23 people (17.2%) answered Not likely, and only 8 (6%) answered Definitive no (Figure 8). By demographic, 95% of Tourists, 70% of Students, and 86% of Locals answered either “Very Likely” or “Likely” (Figure 8).

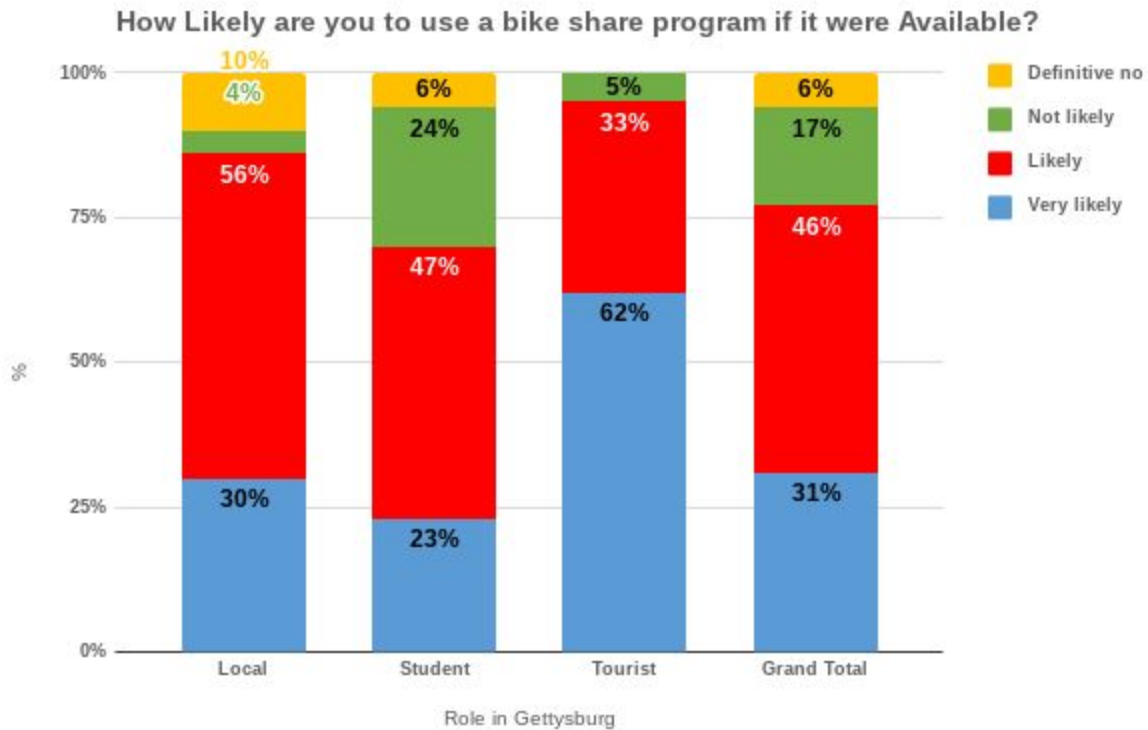


Figure 8. Potential Usage and Popularity percentage.

Next, we asked survey responders to “Check all that apply...” in response to what exactly they would use a bike share program for in Gettysburg. The leading response with 81 (60.4%) of responses was Commuting to work or class, followed closely by Tourism/battlefield activities at 70 responses (52.2%), Leisure was the next highest with 64 (47.8%) of responses, then Exercise with 48 (35.8%) and Shopping with 29 (21.6%) of responses. There were several N/A answers that are insignificant (Figure

9).

What would you use a bike share program for if one were currently available in Gettysburg? Check all that apply...

134 responses

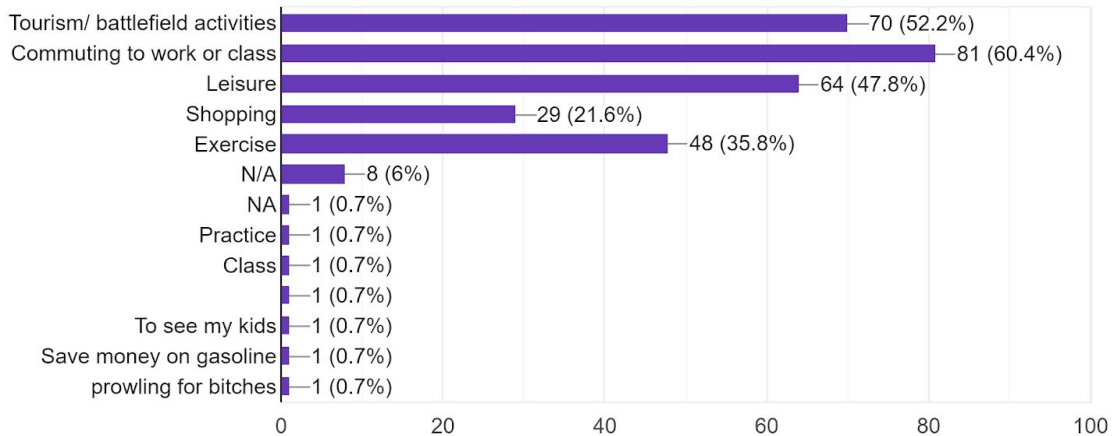


Figure 9. Bike Share Program Specific Usage

Following this question, we asked survey responders to voice their opinion on supporting a bike share program financially. Only slightly higher than the second response, the leading answer with 65 responses (48.5%) was Yes, even if it was funded by taxpayer dollars. Second to that, 58 people (43.3%) answered Yes, but only if it pays for itself, and only 9 (6.7%) said No (Figure 10).

Would you support a bike share program in Gettysburg?

134 responses

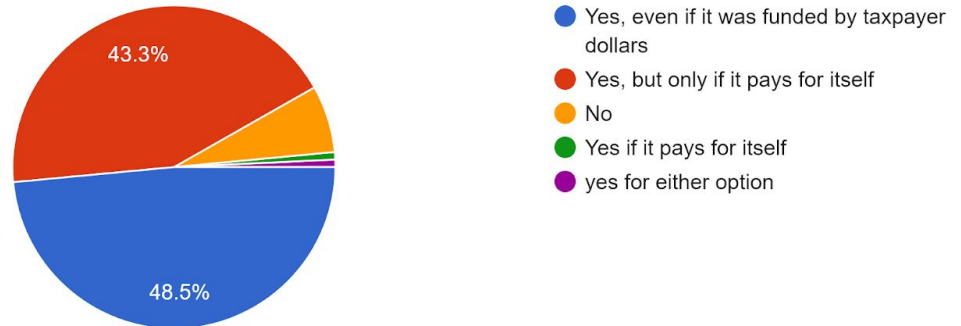


Figure 10. Financial Support for Bike Share.

In terms of rate of payment, we broke it down into 5 categories based off of the numbers in Table 1. 44 people (32.8%) opted for the \$5 per day plan, 41 (30.6%) chose \$1 per hour, 21 (15.7%) opted for the \$20 per month payment, only 9 (6.7%) of people chose \$90 per year, and 19 (14.2%) of people said they would not pay a fee (Figure 11).

What rate of payment would be most likely to use for a bike share program?

134 responses

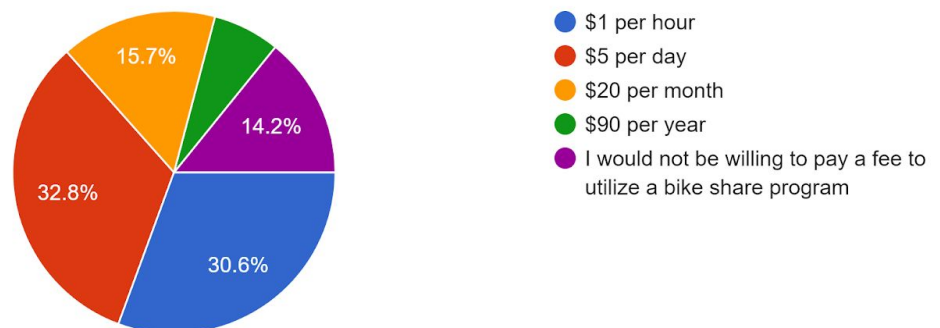


Figure 11. Rate of Payment Possibilities.

Our final question dealt with the geography of where people would be biking in Gettysburg in a “Select all that apply…” format. The most popular potential locations for bike travel in Gettysburg according to each demographic are Gettysburg College, the Battlefield Landmarks, and Gettysburg Town Center (Figure 12). 90% of Tourists answered that they would be interested in biking the battlefields, 84% of Students said they would use it on the college campus, and nearly 50% of all three demographics said they would use it around the town center (Figure 12).

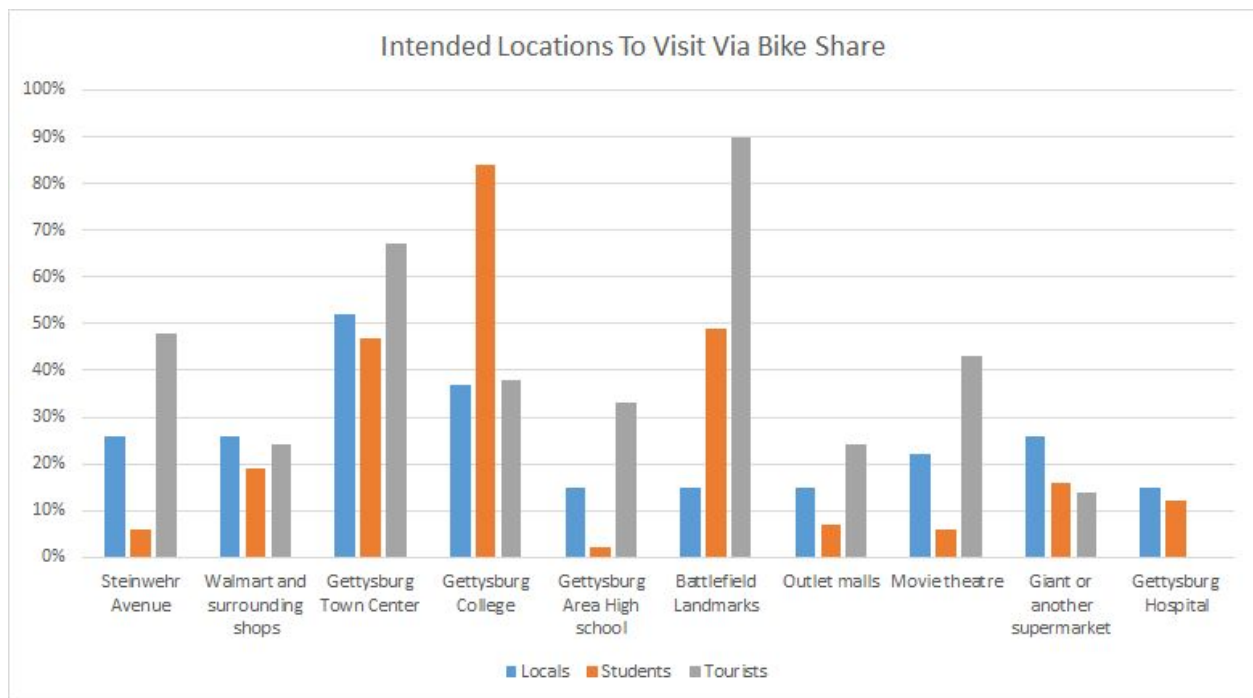


Figure 12: Demographic breakup of intended locations to visit.

In our open answer response for “why would biking be an appealing form of transportation for you?” 64% of responses illicit the opinion that Gettysburg’s Battlefields

(a major tourist attraction) would be most effectively view via bike for tourist purposes. Of these responders, approximately 95% of surveyed peoples expressed plans to use the bike share program to not only tour the battlefield, but to frequent popular historical shop centers located on Steinwehr Avenue in within the Gettysburg Town Center. The intended visitation locations and responses regarding the usage for bike rental mirror those of successful programs in both Washington D.C. and New York City. The other key Demographic that expressed heavy interest in both supporting (95%) and likely to very likely usage (92%) were the students surveyed at Gettysburg College. Even individuals who own or had access to a bike on campus expressed the desire to have a safer, more reliable method of travel. 80% of student responses for why a bike would be appealing to them listed the bike share as a form of convenience or mentioned Gettysburg College and the surrounding town being the ideal size to travel by bikes. We were also able to discern that many individuals surveyed would find biking as an appealing form of transportation even in the absence of a bike share program; as 42% listed a lack of available bikes being a prohibitor while 38% listed cost being the number one factor in why an individual chooses not to bike.

G-Bikes Proposal:

The results of our study, between research into other programs as well as the distribution and results of our survey, support the creation of a bike-share program in the greater Gettysburg Area. We propose to implement a program, called G-Bikes, that has the potential to change the way people in Gettysburg travel in their everyday lives. Through our analysis of the survey distributed to people in Gettysburg, it is clear that

there would be support of a bike-share program in the community as 77% of all people surveyed said they would either be likely or very like to use a bike share program if it were available (Figure 8). Using the same data points as Table 1, the proposed G-Bikes program data can be seen in Table 2.

(Table 2). Proposed Gettysburg (G-Bikes) Program Data

Program:	City, State	Coverage Area	Pop.	# of Stations	Average distance per Trip	Average Trips per Day	Average Cost per Trip	# of Bikes
G-Bikes	Gettysburg, PA	20 sq miles	~7500	5	~2 miles	80-160	\$1 per ride \$5 per day	20-25

The minimum coverage area for a successful program based off our analysis of the 6 programs in Table 1. would be around 5 square miles, based on the success of the small, 10 bike program in Kawartha, Canada (Vameer 2017). The Gettysburg borough and surrounding battlefields combined is nearly 20 square miles (Table 2), providing a large enough area for bike travel. The number of bikes on average for successful programs is around 10-30 per 10,000 residents in the area (ITDP 2014). We propose, for G-Bikes, a starting goal of 20-25 bikes as Gettysburg has around 7500 residents (Table 2). The average number of daily uses for other programs is between 4-8 trips per day, per bike (ITDP 2014). We propose that with the goal of 20-25 bikes, the average daily rides for the G-Bikes program would be somewhere between 80-160 rides per day (Table 2).

Based off of the results of our survey we were also able to conclude which 5 locations would be most ideal to serve as potential locations of racks. These areas were Gettysburg College, Little Round Top, the Observation tower, Steinwehr Avenue, and the Gettysburg Town Center. All of these locations received the most surveyed interest. The common areas frequented by multiple demographics serve to ensure that the bikes are constantly in supply for active users and minimizing time spent idle. We propose, specifically, to have a G-Bikes rack located near the Observation Tower in the Gettysburg National Military Park, outside of the College Union Building on Gettysburg College campus, on one of the corners of the Gettysburg town center circle, near the Gettysburg National Cemetery on Steinwehr Avenue, and one in the proximity of Little Round Top in the Gettysburg National Military Park. These stations would be less than 2 miles apart from each other, centrally located throughout the greater Gettysburg area in order for G-Bikes to allow users to cover the most ground and traverse any and all areas they so desire. Areas of heavy congestion also serve as locations to add more bikes upon review of the program once implemented (ITDP 2014). It is important to distribute bikes according to the highest potential volume locations (ITDP 2014), therefore we propose having 5-8 bikes at the Gettysburg College location, 5-8 bikes at the Little Round Top location, 4-6 bikes in the town center, 3-5 bikes on Steinwehr Avenue, and 2-3 bikes at the observation tower.

In terms of pricing, around 63% of responses to our survey question about what rate of payment would be ideal said either \$1 per ride, or \$5 per day (Figure 11). The majority of our survey answers came from Gettysburg College students, who would

generally be casual users (ITDP 2014), less willing to pay for long standing subscriptions because of the seasonal tendencies of being in Gettysburg during the school year. The same can be said for tourists, as they would be casual riders, more willing to pay for a ride or a day of riding than a month long or more payment plan (ITDP 2014). For G-Bikes, we propose a payment rate option of either \$1 per trip or \$5 per day (Table 2) in order to attract the most potential users based on the demographics present in Gettysburg.

In addition to these demographic and geographic characteristics, there are other logistical criteria we are also proposing that will help G-Bikes become a successful program. Technology like a fully-automated locking system, wireless tracking and location system (GPS), and real time monitoring capabilities for available bikes are staples of quality bike share programs and can be easily accessed through the use of a smartphone app or browser link (Chardon et al 2016). The typical bike model for successful programs relies on single speed bike movement on a comfort-over-speed framed bike in order to counter potential risks like theft or vandalism (ITDP 2014). We propose to use the same model used in programs like New York's Citi Bike (Wang et al. 2018), as well as the one touch locking system used in other programs (Fishman 2015).

Challenges:

There were multiple limitations regarding the implementation of our survey to achieve equal responses from our focus groups. Firstly, creating a template that would be understandable and appealing to our three main demographics; which were local,

tourist and students proved difficult because as the survey results showed, locals had an entirely different prerogative regarding bike usage that was centered entirely around leisure or visitation of areas outside of the intended boundaries of the program. They also listed a majority of usage intentions that focused around longer trips. Another limitation we faced was achieving an equal balance of surveyed individuals from targeted demographics. We were able to achieve a high number of student surveys due to the accessibility of Gettysburg College Facebook groups. This was the opposite case for our other two focus groups, and the majority of surveys were solicited in public areas using the authors' handheld mobile phones. This incurred repetitive answers as most of the tourists were with their families and expressed similar views on most survey topics.

Conclusion:

Globally, bike share programs has shown varied success in cities of vastly different population and geographical sizes. The two most frequent indicators of a successful program are a constant influx of participants from outside the city or community, usually in the form of tourists, and a highly mobile working class that possess a commute where at least of a portion of their daily travel could be completed by bicycle; whether it be the last leg of travel from the subway station to the office, or a limited time lunch break to a cantina around the corner from the office. The two major indicators are not only prevalent in Gettysburg, they created the largest demographic of intended use derived from our survey. Overall, our study has led us to conclude that Gettysburg has the potential to implement a successful bike-share in the G-Bikes

program, and it would have a positive impact on the greater Gettysburg area community, environment, and transportation.

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Appendix A: Google Forms Bike-share Survey PDF

Appendix B: Survey Response Raw Data Spreadsheet