

Cycling Towards a Healthier Community



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Cycling Towards a Healthier Community

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ABSTRACT

Our project aimed to grow the Bike Bus community and foster more cycling in Worcester. To learn about the Worcester Bike Buses, we conducted surveys, interviews, and focus groups with various groups, both participating and non-participating in the program. We identified challenges to attendance, including traffic safety, bad weather, and morning schedule conflicts. To help grow Bike Buses, we developed a guidebook that can be distributed to interested parents to learn about how to join, create, and grow a route. Recommendations included distributing our guidebook for promotion, developing a WhatsApp channel for parent leads, incorporating additional routes, promoting the program at the school gates, increasing school bike storage, and hosting test rides for non-participating parents.

EXECUTIVE SUMMARY

Introduction

Riding a bicycle is the most energy efficient mode of personal transport (Tucker, 1975), and cycling considerably improves cardiovascular health while providing social and environmental benefits. To incorporate these benefits into day-to-day activities, local organizations have formed group bike rides so participants can travel to a shared destination. One example of these group rides is a Bike Bus which is a chaperoned ride to school (Bike Bus World, n.d.). Globally, there are numerous Bike Bus programs which encourage community cycling and help get kids to school in a safe and active way.

In Worcester, England, a grassroots organization known as Bike Worcester aims to increase cycling in the city. This organization supports parent-led Bike Buses at the city's schools. While Bike Bus programs are effective in Worcester, there are still some barriers that affect participation. Not everyone in the community is benefiting from this program as only half of the city's schools participate, and some who do have low or inconsistent ridership. To aid Bike Worcester, our goal was to help grow the Bike Bus community and foster more cycling in Worcester. To do so, we identified how Bike Buses affect the community and which factors influence participation to make biking to school a safe, popular, and accessible choice for more children in Worcester.

Background

Active transportation consists of different modes of travel that rely on human power, such as walking and cycling (Harrington et al., 2024). These methods of travel help incorporate physical activity into daily routines, like commuting to work and school via walking or cycling instead of driving. Choosing active travel helps to promote a pedestrian and cycling-friendly environment and encourages others to shift away from motor vehicles as the main form of transportation.

While active transportation has positive effects for individuals at any age, there are many factors that influence a student's choice to use active travel to school (ATS). Common barriers to utilizing ATS include distance, parental fear of traffic safety or crime, and family scheduling

constraints (Stewart et al., 2012). To mitigate some of these potential concerns and increase ATS, Bike Buses have been implemented at schools around the world.

A Bike Bus is an active, sustainable, and fun way to get to school that also promotes and advocates for cycling friendly cities. These group bike rides are often organized by parents, teachers, or cycling organizations. They are led by volunteer marshals and are designed for families or groups of families to join at a set starting location or along a route to school. There are several hundred Bike Buses around the world varying in attendance, route length, and ride frequency, but despite differences, they are typically motivated by raising awareness for safer roads and promoting local change.

In Worcester, England, national and local organizations have implemented policies and initiatives to create safer routes and increase cycling across the city. In 2023, Active Travel England (ATE), an organization that aims to increase active transportation, stated that the Worcestershire County Council lacked obvious local leadership for active travel and had no significant plans in place. Since then, the organizations have worked together to make improvements to Worcester's travel plans, one example being the Kepax Bridge, a new walking and cycling bridge over the River Severn, completed in 2024 (Worcestershire County Council, 2024). Similar initiatives are promoted by Bike Worcester, a grassroots organization working to increase cycling as a main transportation method in the city.

One way Bike Worcester has contributed to the cycling community is by supporting Bike Buses in the city. Worcester Bike Buses were started in 2022 at one school with four children and have since expanded to 11 of the 22 primary schools with over 100 participating children. Bike Bus participation begins with parents interested in leading a route at their school. These parent-leads handle promotion and communication for their route, and Bike Worcester supports them by providing volunteers, signage, and equipment like stickers and high-vis vests. To support the Bike Bus program as a whole, Bike Worcester moderates WhatsApp channels for all routes, promotes Bike Buses through social media and cycling events, and fosters relationships at the Global Bike Bus Summit, which Worcester hosted in 2025.

Methodology

The goal of this project was to help grow the Bike Bus community and foster more cycling in Worcester. To address this goal, the following objectives were identified:

1. Identify factors affecting Bike Bus attendance and the program's influence on participants
2. Assess schools' involvement with Bike Buses
3. Develop a Bike Bus guidebook for Bike Worcester to distribute to parents

To meet the first objective, interviews and focus groups were conducted with participating parents and volunteers to learn how the program has affected them and why they are involved. Surveys were also distributed to both participating and non-participating parents, volunteers, and children. Additionally, our team attended each of the Bike Bus routes to directly observe what affects participation.

For the second objective, an online survey was distributed to Worcester schools where Bike Buses take place. This survey was sent to school administrators to share with other school faculty to learn about the level of school involvement the school has with Bike Buses. A separate online survey was sent to schools that do not have Bike Buses to assess whether a Bike Bus would benefit their school community.

Our team then created a guidebook for parents, based on results of findings from the prior objectives, to help Bike Worcester support future program growth. The guidebook includes four sections outlining how to start biking, join a route, create a route, and grow a route.

Results

We learned from our research findings that Bike Bus attendance is more strongly dictated by parents than any other participating group. To learn more about parent involvement, we investigated the barriers non-participating parents face to joining a Bike Bus. These parents indicated that morning schedule conflicts and distance to school were the largest obstacles preventing Bike Bus participation. Looking further into attendance, volunteers shared the largest factor that decreased attendance was weather. They also stated during our direct observation that accessibility to routes is another major issue, as parents may wish to participate but are unable due to the distance from their house to the Bike Bus. We then investigated challenges that families face during a Bike Bus. Most participating parents stated they face no challenges on a Bike Bus, but other parents expressed difficulty with traffic while cycling along the route.

Even with these concerns, parents who regularly attend Bike Buses reported their children benefit from participation in several ways. The highest personal benefits noted were improved well-being and energy levels. Another benefit identified for both children and adults is the social connections a Bike Bus provides. During our observations, we noted the community of Bike Bus volunteers and parents is tight-knit and supportive. We also observed fun aspects of a Bike Bus, such as the distribution of student-made stickers and a custom radio station that both participating and non-participating children enjoy. Not only are Bike Buses fun, but volunteers create a safe environment for children to improve their cycling confidence and skills by stopping traffic at junctions and safeguarding children from vehicles along the route.

To meet our second objective, we distributed surveys to school faculty to learn about the effects a Bike Bus has on their school. Schools were not responsive to our efforts to connect with them, resulting in a lack of data; however, interviews with parents and volunteers confirmed that schools do not play a role in helping a Bike Bus grow. This can have a negative impact on Bike Bus operation as volunteers noted that attendance could be improved if there was more program promotion through the schools. A lack of bike storage at some schools was also identified as a barrier to participation.

Using the data we compiled from our prior objectives and suggestions from volunteers, our team created a Bike Bus Guidebook for Bike Worcester and a flyer with a QR code for accessing it online. We utilized Canva for this task as it is an easy-to-use tool for creating high quality infographics. The guidebook is a short six-page digital document that provides essential information about Bike Buses with an intended audience of participating and non-participating parents. The guide has four main sections that briefly explain how to start biking, join a route, create a route, and grow a route.

Recommendations

Based upon the findings from the above research, our team developed the following recommendations to best support growth of the Bike Bus program.

1. Bike Worcester should widely distribute the Bike Bus Guidebook.
2. Bike Worcester should develop a WhatsApp channel for parent leads.
3. Bike Worcester should incorporate additional routes.

4. Bike Worcester should suggest parent leads promote the program at the school gates after drop-off.
5. Bike Worcester should work with the Worcester City Council and school leaders to place more bike storage adjacent to school grounds.
6. Bike Worcester should promote and host ‘test’ rides to provide an opportunity for families to try out a Bike Bus.

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1.0 INTRODUCTION

Riding a bicycle is the most energy efficient mode of personal transport (Tucker, 1975), and cycling considerably improves cardiovascular health while providing social and environmental benefits. To incorporate these benefits into day-to-day activities, local organizations have formed group bike rides so participants can travel to a shared destination. One example is a Bike Bus which is a chaperoned group ride for children to travel to school together (Bike Bus World, n.d.). Globally, there are numerous Bike Bus programs which encourage community cycling and help get kids to school in a safe and active way.

There are Bike Buses currently operating on five continents; average rides have ten children, travel three kilometers, last twenty minutes, and run once a week (Bike Bus World, n.d; Simón-i-Mas et al., 2024). However, no two Bike Buses are the same, as these numbers vary greatly with each location's specific interests and challenges. Not only are they designed as a fun and sustainable alternative transportation mode, but their success also advocates for cycling-friendly cities (Bike Bus World, n.d; Simón-i-Mas et al., 2024).

In Worcester, England, a grassroots organization known as Bike Worcester is working towards a similar goal of increasing cycling as a main transportation method in the city. They advocate for better cycling infrastructure, promote healthy lifestyles, and strive to make biking a main form of transportation. Bike Worcester also supports parent-led Bike Buses, which fosters a safe environment for children to bike to school together with trusted adults guiding them along a specified route. While Bike Bus programs have been effective both in Worcester and at schools globally, there are still some barriers that affect participation. Some routes in Worcester are well-attended weekly, while others have low or inconsistent ridership, and only half of the city's schools participate. Our goal was to help grow the Bike Bus community and foster more cycling in Worcester.

To accomplish this goal, we conducted research to meet the following objectives:

1. Identify factors affecting Bike Bus attendance and the program's influence on participants
2. Assess schools' involvement with Bike Buses
3. Develop a Bike Bus guidebook for Bike Worcester to distribute to parents

2.0 BACKGROUND

In this chapter, we begin with a discussion about active transportation and factors influencing the use of these travel methods, with a focus on Bike Buses. Bike Buses are organized group rides to school that provide a healthy and social alternative to children being driven to school. We then review successful Bike Bus programs around the world and present research about benefits and barriers to participation as well as features of successful initiatives. Finally, we review and document government and local initiatives regarding the current cycling community in Worcestershire, England, including those managed by Bike Worcester and the Bike Bus Worcester program.

2.1 Active Transportation

Active transportation consists of different modes of travel that rely on human power, such as walking and cycling (Harrington et al., 2024). These methods of travel help incorporate physical activity into daily routines, like commuting to work and school via foot or bike instead of by vehicle. Choosing active travel helps to promote a pedestrian and cycling-friendly environment and encourages others to shift away from motor vehicles as the main form of transportation.

2.1.1 Why Choose Active Transportation

Active transportation has numerous benefits for the environment. While active transportation can take various forms, cycling in particular helps minimize environmental impacts due to its potential to replace longer trips otherwise requiring a car. A study of six European cities showed that transitioning 35% of all travel to cycling could reduce carbon emissions, depending on the city, anywhere between 2,500 to 26,400 metric tons per year (Rojas-Rueda et al., 2016). These results demonstrate that even moderate changes in transportation forms can lead to significant environmental improvements.

In addition to environmental benefits, active transportation improves travelers' overall physical health. Unlike sedentary modes of travel, such as driving, walking, and cycling, require physical exertion. Research measuring exercise intensity in metabolic equivalents (METs) shows that cycling involves significant amounts of energy (Jetté et al., 1990). The average

person uses approximately 4.8-9.8 METS when cycling compared to 1 MET when sitting at rest, like when driving. The amount of energy spent during an exercise directly correlates to health improvements. By improving physical well-being and reducing carbon emissions, active transportation serves as a valuable alternative to motor vehicle transportation in urban areas. Cities can improve the health of their citizens and environment by supporting the needs of pedestrians and cyclists, thus enabling active transportation.

2.1.2 Cycling Needs Are Not the Same as Walking Needs

A walkable city is not necessarily a cycling-friendly city, as each transportation method has different features and requirements. Walking and cycling share several similarities, such as a higher likelihood of recreational purposes than motorized travel, physical capabilities needed to participate, and additional exposure to the environment; however, they are dissimilar in other ways (Muhs & Clifton, 2016). Distinct differences include travel speeds, distances, barriers to entry, infrastructure needs, and mode transfer—the process of changing from one mode of transportation to another. Pedestrians travel much slower than cyclists, averaging around 4.9 kilometers per hour as opposed to the average cyclist’s 13.1 kilometers per hour. Furthermore, pedestrians travel much shorter distances, with many walking trips consisting of only a few city blocks. Mode transfer is also easier for pedestrians than cyclists who need to store their bikes on buses, trains, and cars to include these transit types in their journey. Cyclists additionally need access to both a bike and bike parking facilities for storage when not traveling, presenting a greater obstacle to participation than walking.

Beyond accessibility and travel behavior, infrastructure further distinguishes walkability from bikeability. Pedestrians can be safely accommodated on sidewalks or pavement with limited vehicle interaction, whereas cyclists have to operate with varying levels of traffic exposure and street density (Cervero et al., 2009). Conditions range from sharing lanes with motor vehicles to riding in buffered bike lanes, with each producing significantly different levels of comfort and safety for the rider (Muhs & Clifton, 2016). Cities, however, may support walking without providing the specialized infrastructure necessary to ensure connectivity to important destinations, which is crucial for daily cycling (Beenackers et al., 2012). Investments in bike-specific architecture are essential for the success of consistent ridership, as cyclists face unique barriers that pedestrians do not.

2.1.3 Factors That Influence Cycling

There are several factors that can influence whether one chooses to cycle. Adverse infrastructure, geographic conditions, and environmental factors are significant considerations that strongly affect cycling participation. When it comes to cycling to school, additional challenges arise, including personal responsibilities and social obligations that may further discourage cycling.

Cycling-friendly cities typically depend on infrastructure quality and separation from vehicle traffic. Cities that have proper infrastructure to support cycling, such as separated bike lanes, have improved safety statistics and reduced bicycle-vehicle crashes (Lusk et al., 2013; Muhs & Clifton, 2016). The utilization of separated bike lines improves visibility of the rider, which increases driver reaction time and lowers the risk of motor vehicle and cyclist collisions. While certain infrastructure can improve safety, others can decrease it. For example, roadside parking in dense urban areas reduces visibility for bikers and drivers and could require crossing through a bike lane to enter or leave a parking space (Saphioğlu & Aydın, 2018). These safety factors can greatly impact a person's decision to choose cycling over other transportation methods. Therefore, improving infrastructure that supports safe cycling directly correlates to increasing ridership, but not all barriers are within human control as climate and topography also affect participation.

Regular bike use is affected by geographic conditions such as local weather patterns and terrain, which influence the comfort and feasibility of cycling. A comparative study of public bike sharing programs across 40 cities, 16 countries, and five climate zones determined that temperature and precipitation were the top two most consistent predictors of cycling activity (Pojani et al., 2021). Cycling rates tend to increase as temperatures rise, though this plateaus around the high 20°C, where ridership will begin to decline. This study additionally discovered that precipitation negatively affects female ridership more than male ridership, which exacerbates an already present gender gap in cycling as discerned by a comprehensive review paper (Muhs & Clifton, 2016). One extensive overview of transport, health, and biometeorological studies about the effect of weather on daily activities and travel found temperature and wind to greatly impact cycling (Böcker et al., 2013). The impact of seasonal patterns can also be observed—with bike use peaking in warmer, drier months and falling in colder, wetter months. In addition to climatic factors, topography can greatly influence ridership.

Hilly terrain discourages routine cycling due to heightened physical effort, specifically in less experienced riders (Pojani et al., 2021). Cycling tends to increase most with a temperate climate and relatively flat land, however other barriers can impact certain demographics, such as children cycling to school.

In the United Kingdom, barriers and facilitators that influence cycling to school stem from personal obligations, social obligations, and logistical factors. In a recent study conducted across the UK (Boland et al., 2025), the most significant personal barrier to cycling to school was gender. They found that girls were less likely to cycle to school than boys due to factors such as different school uniforms or influence of their friends (Moore et al., 2014). Other barriers found were age, the lack of access to a bicycle or its accessories, preference for other forms of transport, too much equipment to take and store at school, and lack of confidence to ride (Boland et al., 2025). While some barriers were personal or social, others were logistical factors including a child's distance from home to school or infrastructure issues such as a lack of cycle paths or funding to make roads safer (Boland et al., 2025). While there are many barriers to cycling to school, advocacy groups across Europe are striving to make this mode of transportation a safer option for students through policy work.

2.1.4 Policy Efforts to Improve Biking Conditions

Regular participation in cycling greatly benefits from policy innovation and political assistance, as supported by advocacy coalitions. For instance, advocacy groups like the [European Cyclists' Federation \(ECF\)](#) monitor national cycling strategies (NCS) and evaluate policy progress to determine where cyclists are supported by initiatives and where more work is needed (Figure 1). The 2025 ECF report highlights Welsh cycling policy as a leading example of excellent policy innovation (European Cyclists' Federation, 2025). Wales passed the [Active Travel Act](#) in 2013 and the Environment Act in 2024, which boosted cycling at the national level. They accomplished this by providing local authorities with specific instructions to support cycling and promote active transportation as a method to reduce or limit air pollution (Active Travel (Wales) Act 2013 | Law Wales, n.d.). Examples like this demonstrate how political support works in tandem with advocacy to increase investments in bike infrastructure, education programs, and national cycling strategies. An analysis of policy evolution in Boulder, Colorado; Portland, Oregon; and Davis, California determined that high levels of ridership depend on “a

strong advocacy coalition, clear identification of problems facing bicyclists, nourishment of political will, and development of policy solutions” rather than ideal geography and proximity to universities (Buehler & Handy, 2008). Both American and European analyses of bike initiatives caution against allowing cycling policies and political commitment to weaken as cycling rates are demonstrated to plateau or decline, and progress in active transportation can reverse. Though consistent work from policymakers is influential for increasing bike use, local initiatives such as school cycling programs can also increase active transportation and improve the cycling community.

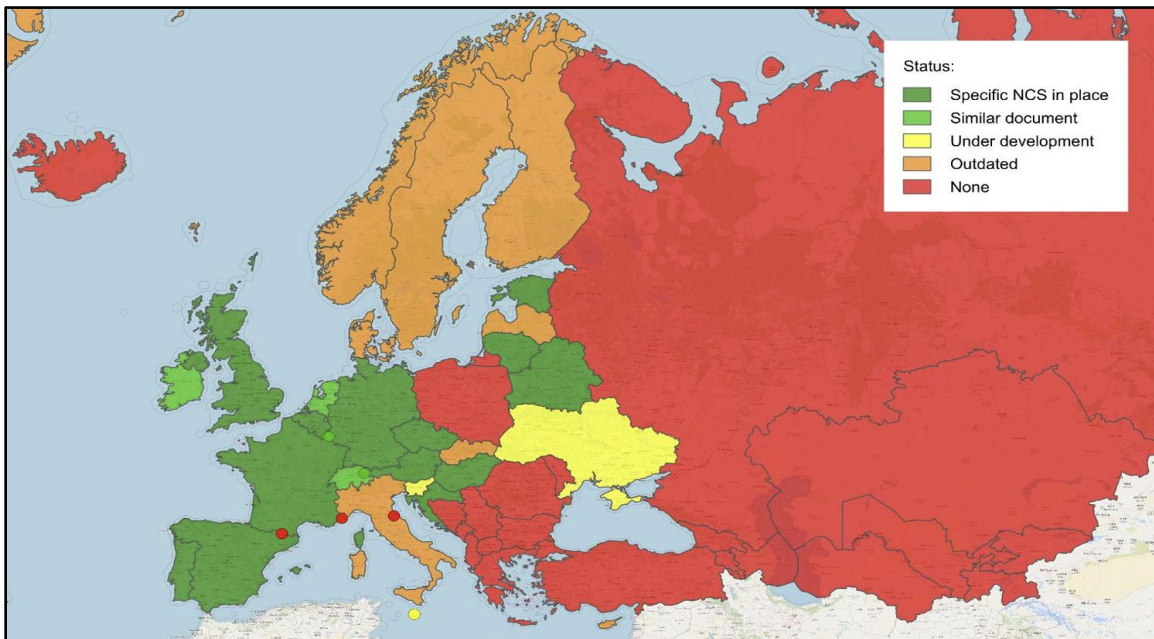


Figure 1. Cycling Policy Support Across Europe as of 2025, ECF

2.1.5 Active Transportation to School

While active transportation has positive effects at any age, there are many factors that influence a student’s choice to use active travel to school (ATS). Common barriers to utilizing ATS include distance, parental fear of traffic safety or crime, family values and resources, weather, community culture, school characteristics and policies, and family scheduling constraints (Stewart et al., 2012). Not all schools promote cycling or only have short term initiatives in place, which also creates limitations to participation in active travel to school

(Boland et al., 2025). To mitigate some of these potential concerns and increase ATS, Bike Buses have been implemented at schools around the world.

2.2 Bike Buses

Bike Buses are group rides where children and parents travel to school in the morning along a predetermined route (Bike Bus World, n.d). The group is led by volunteer marshals, who are often parents or those from local bike programs, and families join at various points along the ride. They are designed to be a fun, social, and sustainable form of active transportation. Several organizations and communities have formed to support Bike Buses as they have gained popularity over recent years through news reports, social media, and other forms of outreach (Bike Bus World, n.d; Simón-i-Mas et al., 2024). Bike Buses are a relatively modern initiative with the first being traced back to Belgium in 1998 (Simón-i-Mas et al., 2024). Since then, programs have expanded to schools across North and South America, Europe, Asia, and Australia (Bike Bus World, n.d.). While the general concept of a Bike Bus remains consistent, each initiative is unique in its own ways. To learn more about each program, [City Lab Barcelona](#) (2024) surveyed 403 routes globally, and they discovered that an average Bike Bus has ten children and seven adults, travels three kilometers, lasts twenty minutes, and runs once a week. However, there can be drastic differences in these categories. For example, the number of participants ranged from a few families to several hundred people and frequency spanned from daily to monthly rides. They also found that they were typically organized by parents, teachers, cycling organizations, and/or local governments. While the reasons for participating depended on individuals and families, many credited their involvement to advocating for cycling-friendly communities (Bike Bus World, n.d; Simón-i-Mas et al., 2024). Not only are participants advocating for a better future, but there are several benefits for children who join.

2.2.1 Benefits of Participation in a Bike Bus

Bike Buses offer the benefit of increased traffic safety awareness, physical activity, and social connections for children. Based on survey results from Howington et al. (2025), Bike Bus organizers indicated that one of the most common benefits of children participating was their ability to learn road safety. When asked if cycling in a group increases a sense of safety, 92% of

organizers either agreed or strongly agreed with this statement (Simón-i-Mas et al., 2024). These rides foster a safe environment for teaching traffic awareness due to an increase in group visibility and adult supervision that students would not have otherwise. Other commonly reported benefits of participation include good exercise, which improves health, and an increase in socialization (Bike Bus World, n.d.; Howington, 2025; Sach et al., 2025; Simón-i-Mas et al., 2024). Another potential benefit is improved academic success; however, current research shows mixed results of correlating active transportation to performance in school. Despite numerous benefits, some children face difficulties in attempting to join these initiatives.

2.2.2 Barriers to Participation in a Bike Bus

Road safety, logistics, and accessibility are commonly reported barriers to Bike Bus participation. A lack of cycling infrastructure, such as bike lanes, and dangerous intersections cause major concern for parents (MacArthur, 2024; Simón-i-Mas et al., 2024). Due to this concern, 72% of parents globally report riding with their children to provide direct supervision. A significant reason for these concerns is that 75% of surveyed routes around the world share roads with motor vehicles, so driver awareness impacts the safety of riders (Simón-i-Mas et al., 2024). Another barrier is that Bike Bus participation often impacts the logistics of a family routine, such as longer commute times or additional morning preparation, which can be unfeasible for some (MacArthur, 2024; Sach et al., 2025). Furthermore, accessibility is essential for participation, but not everyone has equal access for various reasons. Commonly reported requirements for Bike Buses include ownership of a bicycle, bicycle storage space, feasible route offerings, and adequate social outreach; lack of these may prevent involvement and can be caused by discrimination relating to gender, class, or race (MacArthur, 2024; Sach et al., 2025; Simón-i-Mas et al., 2024). While many families face barriers to joining Bike Buses, several successful routes demonstrate common ways to overcome certain challenges and increase participation.

2.2.3 Features of Successful Bike Buses

Two main features of organizing a successful Bike Bus are the design of the route and social outreach. Prior to any cycling, organizers who put careful consideration into choosing a safe and accessible route experience an increase in participation (Bike Bus World, n.d.). [Bike](#)

[Bus World](#), an organization that provides resources for starting Bike Buses, found that selecting residential streets with minimal motor vehicle traffic and keeping the route between half a mile to three miles generally contributed to gaining participation. Additionally, families can join along the ride or at a set starting location, so Bike Bus World recommends keeping the route within four blocks of participants' homes or having small group branches ride to the Bike Bus together. Design choices like these impact how easy and safe it is to join a Bike Bus and therefore play a role in the success of routes. Another significant contributor to increasing attendance is social outreach in the community. Bike Bus organizers advertise their routes through fliers, emails, word of mouth, newsletters, social media, and other forms of communication (Bike Bus World, n.d.; Sach et al., 2025; Simón-i-Mas et al., 2024). By utilizing various methods to advertise a Bike Bus, different audiences can be reached, which ensures more people are aware of and given the opportunity to join (Bike Bus World, n.d.; Sach et al., 2025). One of the best ways to reach a broad audience is through the school system. In Portland, Oregon and New York City, support from Parent Teacher Associations, sharing information in school newsletters, and posting fliers are a few ways that schools have contributed to an increase in participation (Finlay 2024; MacArthur, 2024). Overall, increasing Bike Bus participation helps promote cycling in the community, which Worcester, England has aimed to achieve through its own programs.

2.3 Cycling in Worcester, England

Worcester is a small English city, situated south of Birmingham, that is 33.28 square kilometers (12.75 square miles) and home to about 104,000 people (Fung & Rice, 2023). Its topography features a relatively flat flood plain which can reduce challenging rides and promote daily cycling, as shown in Figure 2. Additionally, Figure 3 reveals the mild climate of Worcester supports nearly year-round cycling with an average maximum temperature of 19 °C (66 °F) in the summer and an average minimum of 0 °C (32 °F) in the winter (Met Office, 2025). This lack of extreme temperatures provides consistent and comfortable cycling weather and helps cyclists anticipate expected conditions (Poiani et al., 2021).

Worcester commonly faces flooding along the River Severn, which affects parts of the city on the flood plains ([Heath, 2024](#)). This flooding can interrupt cycling in affected areas and decrease bike use during these times. Despite flood concerns, however, Worcester has strong potential to develop into an 'active transport' city thanks to its gentle topography—illustrated in

Figure 3—and climate. To support the transition to active transportation, different policies and organizations aim to promote cycling culture in the community.

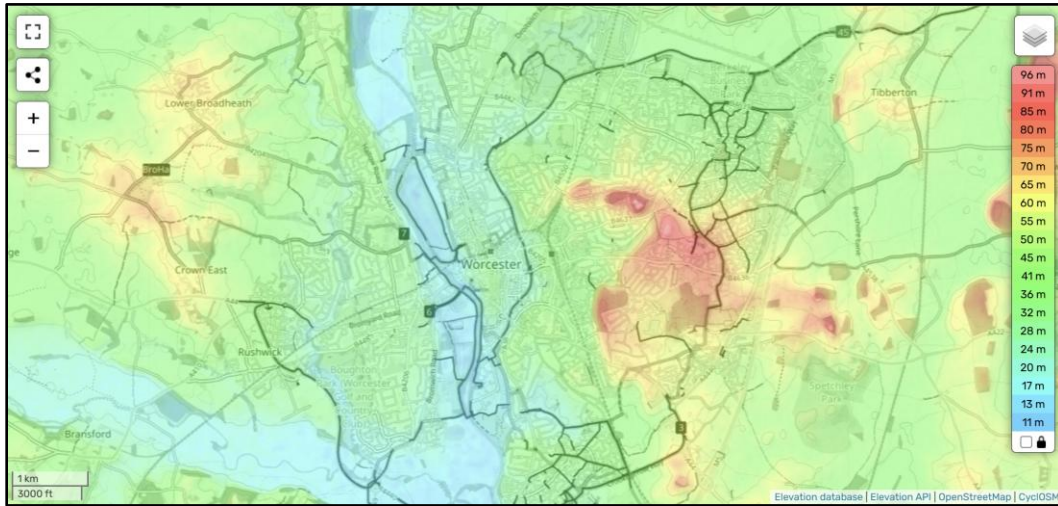


Figure 2. Topographic Map of the City of Worcester

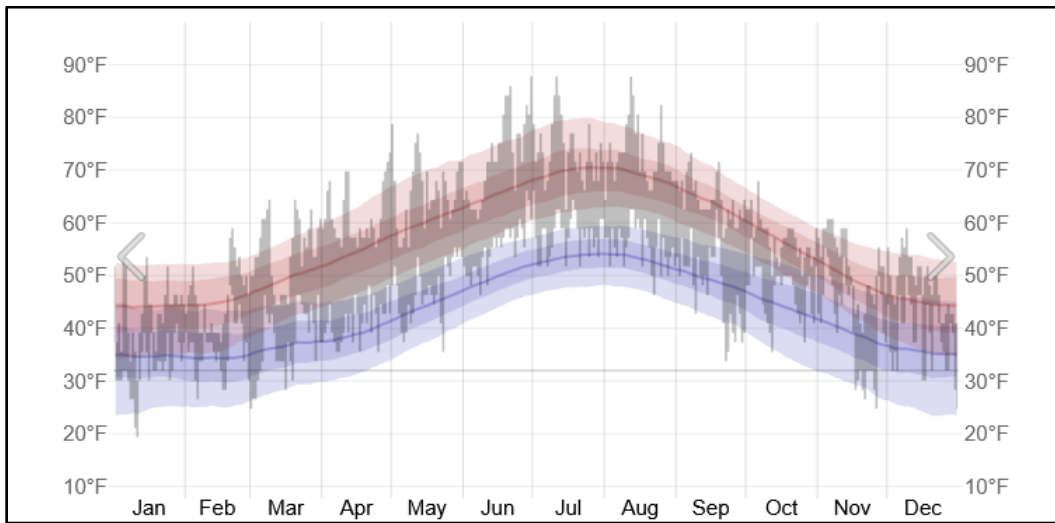


Figure 3. Median Temperature Change in Worcestershire, in Fahrenheit in 2025

2.3.1 Federal Policy and Local Organizations

[The Worcestershire County Council](#) has outlined and started implementing key steps to improve active transportation in the community. In 2020, the English Parliament unveiled [Gear Change](#)—a plan which aims to increase active transportation throughout the nation (Department for Transport, 2020). Their vision included four main themes: better streets for cycling and people, cycling at the heart of government decision-making, empowering and encouraging local

authorities, and enabling people to cycle and protecting them when they do. The goal of the Gear Change plan is for 50% of short journeys to use active transportation by 2030, and their promises and plans outline the thorough steps to achieve this goal. One such action was the founding of [Active Travel England \(ATE\)](#), an executive agency tasked with upholding the standards and plans laid out in Gear Change. In 2023, ATE released active transportation assessment ratings of local governments. On a scale from zero to four, zero being insignificant support and four being strong support, Worcestershire County Council (2024) received a rating of zero. As a result, the Council partnered with ATE to improve their commitment to active transportation with defined planning, development, and deliverable action items. While several projects are currently in progress, one recent, significant infrastructure improvement in Worcester is the [Kepax Bridge](#), a walking and cycling bridge across the River Severn completed in December 2024 (Bike Worcester, 2024; Worcestershire County Council, 2024). While further progress is needed by the local government to increase active transportation in Worcester, other organizations are also contributing to change and improving cycling culture.

Various initiatives are promoting [Safe Routes to School \(SRTS\)](#), a movement encouraging safe and active travel options to school, by supporting necessary infrastructure changes and providing education tools and information (Birdsall, 2008). One known program is [Sustrans](#), now known as Walk Wheel Cycle Trust, headquartered in Bristol, England, that promotes programs across the United Kingdom. This charity believes that successful SRTS are child-centered, require direct work with the students and schools, are built on small steps to raise awareness, and motivate change in travel behavior. In a 2008 interview with the Director of School Travel from the Sustrans charity, Paul Osborne, he shared the observation that many underestimated travel time by car while overestimating travel time by active transportation. He also believes people need a strong community network to change their routines or mindset. While some programs are easier to implement than those with large infrastructure investments, Sustrans supports SRTS by providing training and resources aimed at the school community, such as fact sheets, videos, and sample travel plans. Sustrans demonstrates that promoting active transportation can look different depending on the organization, and in Worcester, England, one such organization focused on increasing cycling is Bike Worcester.

2.3.2 Bike Worcester

[Bike Worcester](#) is a grassroots organization striving to increase the safety, accessibility, and popularity of cycling in Worcester, England (Bike Worcester, 2026). They are centered on supporting improved cycling infrastructure, encouraging healthy and sustainable lifestyles, and making cycling a preferred method of transportation. Their team consists of volunteers who are passionate about promoting cycling in Worcester, and they receive funding and donations from local authorities and companies. Bike Worcester has numerous offerings, such as hosting monthly events, organizing learn-to-ride trainings and repair workshops, developing various maps for cyclists, refurbishing and selling bicycles at an affordable price, and much more. While they contribute to cycling initiatives for the entire community, they also promote cycling to school by supporting local Bike Buses.

2.3.3 Worcester Bike Buses

Rob and Kate Collier founded [Worcester Bike Buses](#) on March 27th, 2022, to advocate for a healthy and safe alternative to driving children to school and to promote an increase in cycling infrastructure and local government support (Justice, 2025). The program began with four children riding to North Worcester Primary Academy. By the 2024-2025 school year, 340 children had participated in 697 group rides at 13 different schools, as shown in Figure 4 (Bike Worcester, 2025). Bike Worcester's support contributed significantly to this growth, as the organization provides volunteers to lead Bike Buses and any necessary equipment for the ride (Bike Worcester, n.d.). Additionally, Bike Worcester promotes Bike Buses in-person and online through social media, school assemblies, school newsletters, merchandise, and signage. Bike Worcester also helps make the program fun for the children by having volunteers play music from a custom radio channel and pass out stickers and pins, designed by children, to students at the school gates. Furthermore, Bike Worcester is involved in the global Bike Bus community as they attended the first international Bike Bus Summit in Barcelona in 2023, where they contributed to the development of a common mission for Bike Bus in the [Barcelona Declaration](#) (Bicibús, 2023). Additionally, Rob and other Bike Worcester volunteers organized and hosted the third international Bike Bus Summit in Worcester in 2025 and are attending the 2026 Summit

in Portugal. The Worcester City Council and Worcester County Council support Bike Worcester with funding to ensure continued Bike Bus interest and program sustainability.

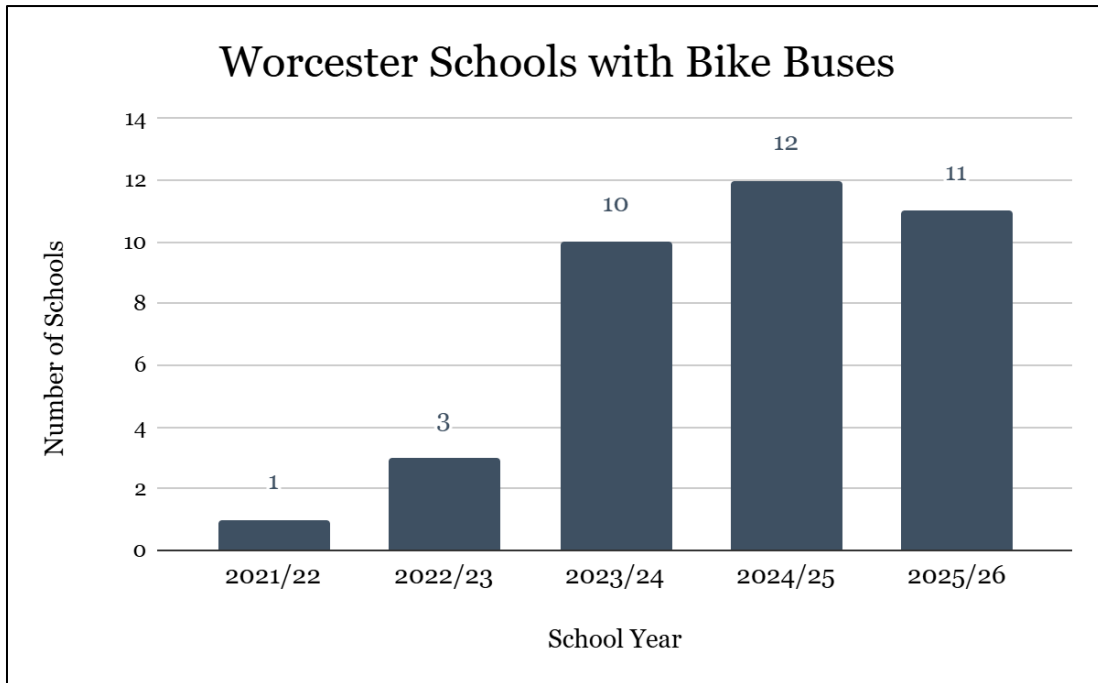


Figure 4. Number of Participating Schools in Worcester 2022-2026

As of March 2026, 11 of the 22 Worcester primary schools have active Bike Buses (Table 1 and Figure 5). Routes are created when a parent demonstrates interest in starting a Bike Bus at their child's school. These parents, referred to as parent leads, handle promotion and communication for their route and are responsible for ensuring it runs each week. Bike Worcester leaders support them during the creation process by riding with them along a potential route while conversing about logistics. Bike Worcester's website includes route information for those interested in joining or getting involved in Bike Buses. Communication and route information for the different schools are organized on WhatsApp, which is overseen by Bike Worcester. Routes are chaperoned by two to four Bike Bus volunteers to maintain an ideal one-to-one ratio of adults to students. These volunteers ride in the front and back of the group and block traffic at intersections. Parents are typically required to ride with their children but may ask for their child to ride with a trusted adult if they are unable to attend. Routes evolve with new parent interest, safety and accessibility concerns, or even for the fun of a ride. While the program

is successful, Bike Worcester hopes to continue growing the Bike Bus community and fostering more cycling in Worcester.

Table 1. Weekly Schedule of the Bike Bus Routes in Worcester, as of March 6th, 2026

School Names	Weekday
Stanley Road Primary School and Nursery	Monday
Cherry Orchard Primary School	Monday
Northwick Manor Primary School	Monday
St. Barnabas C of E Primary School	Monday
Oldbury Park Primary School	Wednesday
Nunnery Wood Primary School	Thursday
North Worcester Primary Academy and Pre-School	Friday
Redhill C of E Primary School	Friday
St. George's Catholic Primary School and St. George's C of E Primary School	Friday
Carnforth School	Friday

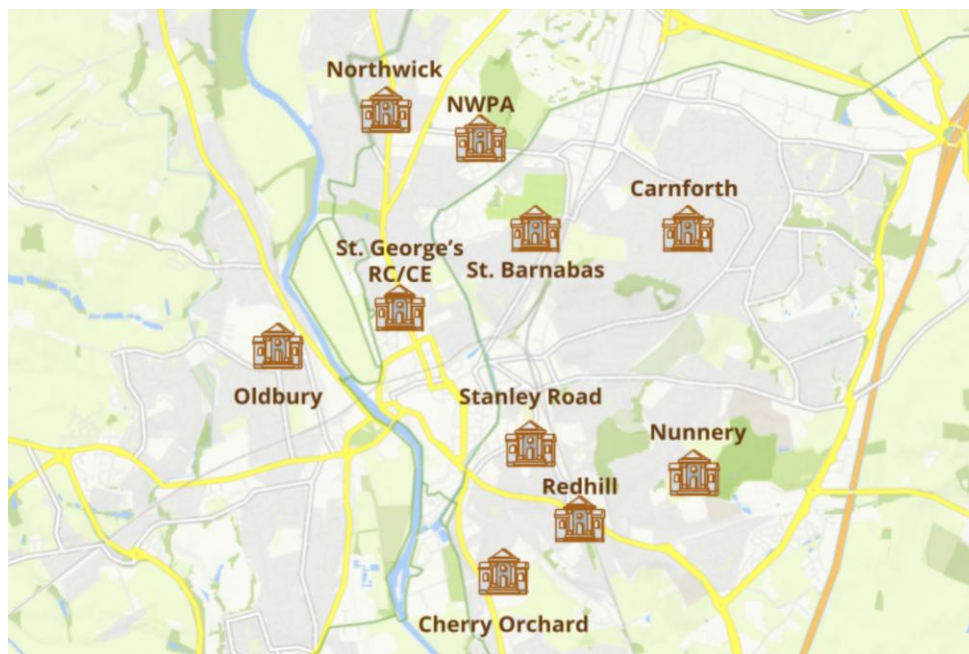


Figure 5. Map of Bike Bus Schools with Routes in Worcester

3.0 METHODOLOGY

The goal of this project was to help grow the Bike Bus community and foster more cycling in Worcester. To address this goal, the following objectives were identified:

1. Identify factors affecting Bike Bus attendance and the program's influence on participants
2. Assess schools' involvement with Bike Buses
3. Develop a Bike Bus guidebook to promote and grow the program

3.1 Identify Factors Affecting Bike Bus Attendance and the Program's Influence on Participants

To achieve this objective, we utilized surveys, focus groups, and interviews for parents, students, and volunteers as well as conducted direct observation of the Bike Buses.

3.1.1 Parents' Perspective

To meet this first objective, we conducted an in-person focus group with Bike Bus parent leads to learn how the program affected them and why they are involved. To form this group, we reached out to multiple route leaders and asked if they would be interested in participating in a group discussion. To record data from the focus group, three members of our team led the discussion (refer to Appendix A for the individual questions), while the other two members wrote down answers and different visual cues associated with each question. Permission to record the session for further analysis and reference was gathered before the focus group convened. An Informed Consent statement (Appendix K) was also read and signed by each parent participant before questioning began.

An in-person interview was also conducted with a parent lead who could not attend our focus group (refer to Appendix B for specific questions). One team member asked questions while another member recorded their answers and took note of visual cues. Permission to record the session for further analysis and reference was obtained before the interview was conducted. An Informed Consent statement was also read and signed by the parent before questioning began.

We distributed online surveys to parents through the Bike Bus parents' WhatsApp groups, the Worcester Mums Facebook group, and through in-person interactions. The survey included separate questions for participating and non-participating parents (refer to Appendix C for the online survey questions). Our consent statement was included at the beginning of the survey.

3.1.2 Students' Perspective

Students were another integral component of the participant group outlined in our first objective. Our team employed surveys to learn how students view Bike Buses, why they participate, and how the program influences them. We also wanted to determine what barriers prevent students from participating in the program.

An online survey was distributed to children as an attachment to the parent survey, so that team members were not directly involved with minors. This allowed parents to administer the survey to the child after they completed the parent survey. A requirement we set for this method was that there was an adult to administer the survey, both verbally and instructionally, so that the child understood the questions and could answer easily. Questions were designed with the primary school student audience in mind, and consisted of yes or no, and short answer responses. While primary school children were the target for the survey, we also wanted to pay close attention to the responses of years 4 through 6 as our sponsor has reported that they lost interest in the program at that age. See Appendix D for the children's survey questions. Our consent statement was included at the beginning of the survey.

3.1.3 Volunteers' Perspective

Surveys, a focus group, and expert interviews were conducted with Bike Bus volunteers. Our consent statement was included at the beginning of the survey and was also read and signed by each volunteer before questioning began for the focus group and interviews.

An online survey was distributed through a volunteer channel in a Worcester Bike Bus WhatsApp group. The focus of this survey was to collect quantitative and qualitative data on characteristics of the route(s) they lead, such as attendance, distance, time, and safety, and to gauge interest in participating in a focus group. The full survey can be found in Appendix E.

A focus group comprised of Bike Bus volunteers was held at Worcester’s public library, The Hive. The team recruited volunteers via quota sampling containing two groups – volunteers leading low attended routes and volunteers leading high attended routes. We considered a high attended route as having, on average, five or more children while a low attended route was fewer than five. To conduct the focus groups, the team elected three members to facilitate while the other two members transcribed the discussion. The questions targeted personal experiences of volunteering, the successes or failures of past and present initiatives, and observed promoters of and barriers to participation. For sample questions, refer to Appendix F.

Lastly, semi-structured expert interviews were conducted with key Bike Worcester volunteers. The guiding questions focused on the history of Worcester Bike Buses and cycling in the community, operation and development of the program, and current obstacles to increasing attendance. Refer to Appendix G for interview questions.

3.1.4 Direct Observation

The team used direct observation while riding along with the Bike Buses to supplement our findings from interviews, surveys, and focus groups with specific, perceived statistics, as a form of data triangulation. Data was recorded in a Google Form after each Bike Bus and linked to a spreadsheet. To organize this data and ensure consistency, the questions first involved reporting specific measures, such as temperature and wind, and then ranking observations on a 1-5 scale. An additional comments section was also included for noteworthy observations from each ride that could influence attendance. The full form can be found in Appendix H.

3.2 Assess Schools’ Involvement with Bike Buses

To address this objective the team distributed an online survey to schools that participate in Bike Buses in Worcester (Table 1). Surveys were sent to school leaders for distribution to other faculty and staff. By collecting this data, the team hoped to identify patterns and trends about Bike Buses at each of the schools. The survey was also designed to help us to identify which schools have Bike Bus participation and how much administrative support is provided by the schools. Survey questions can be found in Appendix I. Our consent statement was included at the beginning of the survey.

An additional online survey was distributed to administrators and teachers at Worcester schools that do not have a Bike Bus to identify if a Bike Bus would be a benefit to their school community. The survey was also designed to assess if school faculty would help to support a Bike Bus if one was created. Survey questions can be found in Appendix J. Our consent statement was included at the beginning of the survey.

3.3 Develop a Bike Bus Guidebook to Promote and Grow the Program

To achieve this objective, our team drew upon the results of the prior objectives to create a guidebook which Bike Worcester can use to support future marketing and program growth. To create the guidebook, we met with volunteers to ask what should be included in our guide and had them review the draft.

4.0 RESULTS AND DISCUSSION

In this chapter, we will discuss the outcomes of our research. Data from our direct observation, surveys, interviews, and focus groups (Appendices A-J) were analyzed to find common responses regarding participation barriers and the influence Bike Buses have on the school community. We then used the data to facilitate the creation of a Bike Bus guidebook (Appendix L) for parents interested in starting or growing a Bike Bus program at their child's school. Our data sets were limited as the Bike Bus organization consists of a small number of volunteers and participating parents. Therefore, statistical analysis of our survey responses was unfeasible and finding participants for focus groups or interviews was challenging, thus the reason these results are mainly focused on interviews and some survey data.

4.1 Results for Objective One: Bike Bus Attendance and Influence

Our first objective, "Identify factors affecting Bike Bus attendance and the program's influence on participants" had enough common findings between participant responses to organize the results first by factors affecting attendance and then by the program's overall influence.

4.1.1 Factors Affecting Attendance

From the focus group and informal conversations during direct observation with Bike Bus volunteers, our team learned that parent hesitancy to participate is the largest obstacle to growing Bike Buses. During an interview, a Bike Bus volunteer shared that they attended school assemblies to speak about Bike Buses. While doing so, the volunteer asked the children to raise their hands if they participated in a Bike Bus, which was often followed by a few hands. Then, the volunteer asked how many would want to participate in a Bike Bus, and many children raised their hands. This volunteer and others noted this was a common theme amongst schools, highlighting children's interest in Bike Buses, but the challenge of involving parents. Therefore, the team emphasized data collection from parents and focused on factors affecting their participation.

Our parent survey revealed that the largest barriers preventing them from joining a Bike Bus were scheduling logistics and distance. Of the 31 non-participating parent responses, 14

reported that their morning schedule prevented them from joining a Bike Bus—the highest reported barrier (Figure 6). One parent noted in an interview that job flexibility allows them to participate, but not all parents have the luxury of an accommodating start time or the option to work from home.

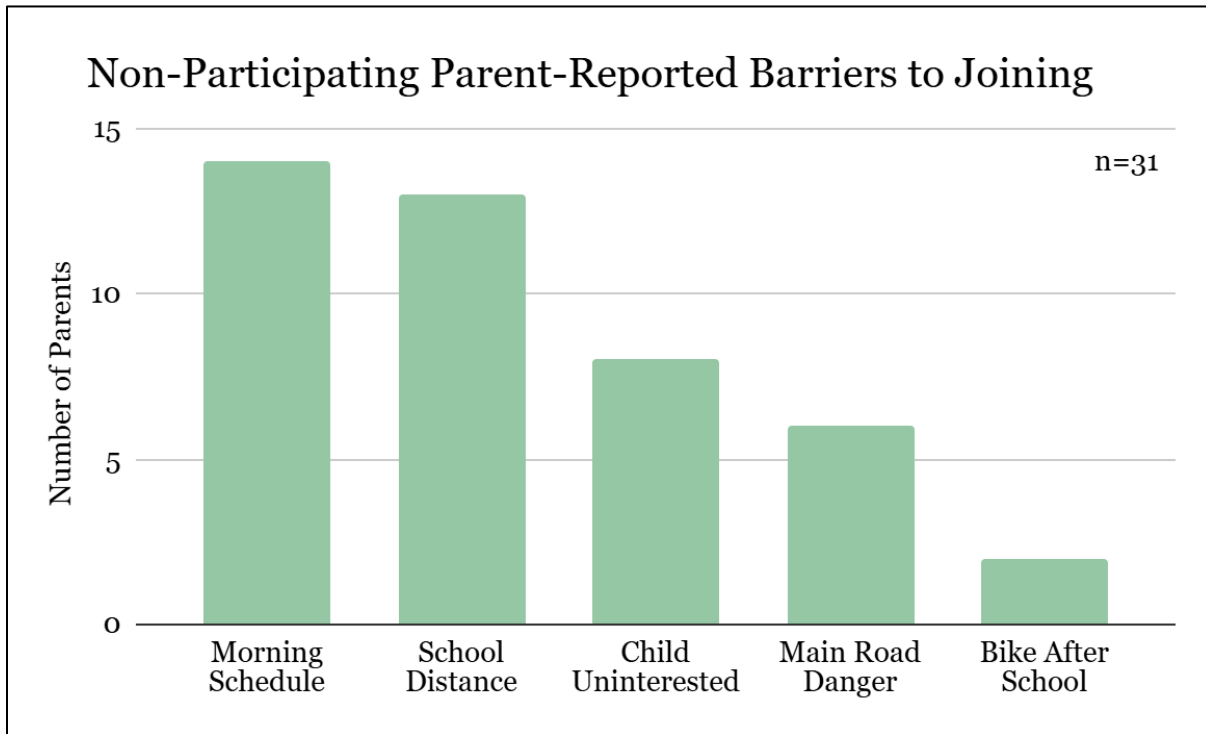


Figure 6. Factors Preventing Bike Bus Participation According to a Parent Survey

The second highest reported barrier to joining was distance to school, which 12 of the 36 parents selected in our survey (Figure 6). Some families are located too far away to cycle to school. Other families are too close and joining a Bike Bus would significantly add time to their travel to school. Not only was distance to school a reported barrier, but so was distance to a Bike Bus route. While many children bike to school, they often do so independently as they live far from a Bike Bus route. A single route is unable to provide for children traveling from all directions around a school area and therefore is not always accessible for students who may want to join. Volunteers and parent leads shared during a focus group that having a route run from an additional direction and then joining together would provide more students with the opportunity to join and would increase Bike Bus participation. From our direct observation, the two routes with the highest attendance, Oldbury and Redhill (Figure 7), are notable for having multiple

parent leads who operate routes from varying directions. This helps more students join the Bike Bus than if only one route is offered. The North Worcester Primary Academy (NWPA) route also has multiple converging routes, but Figure 7 only considers the attendance for one of the three routes as we could not attend the other two.

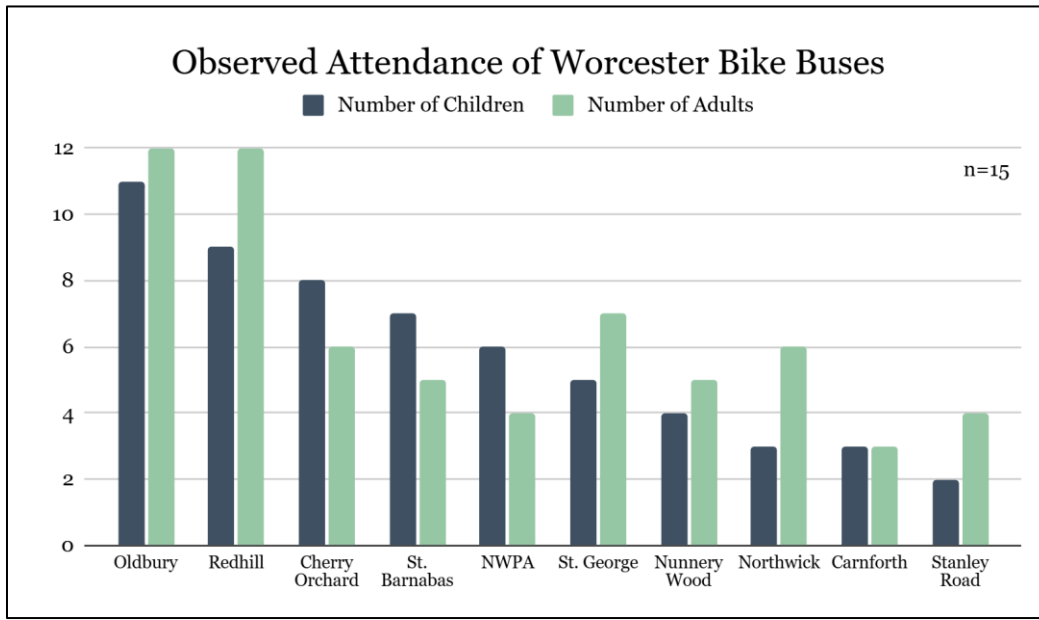


Figure 7. Worcester Bike Bus Attendance

Another commonly reported barrier to joining is main road danger, as illustrated by responses from six non-participating parents (return to Figure 6). In an interview, a volunteer noted that Bike Buses would not exist if the roads were perfectly safe for children to ride, which is where the need for having one arises. Traffic remains an issue as noted by eight participating parents (Figure 8). Since many of the Bike Bus routes travel across or along major roads during rush hour traffic, there have been reports from volunteers where road crossings and sharing the road with drivers was difficult. Additionally, many of the routes we observed had multiple cars pass the group of riders, which requires increased awareness from the volunteers when keeping the students safe.

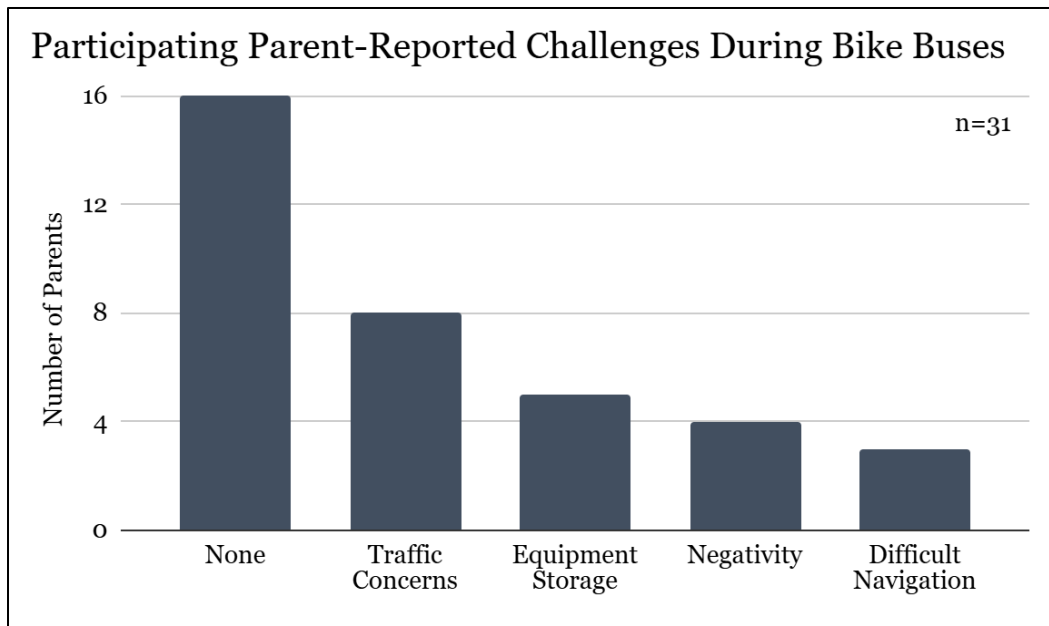


Figure 8. Challenges Encountered During Bike Buses According to a Parent Survey

Despite shared enthusiasm among participants, the highest reported factor that lowered attendance was weather conditions. According to 11 of the 12 volunteer survey responses, daily attendance was hindered by unfavorable conditions, such as rain or cold temperatures (Figure 9). One volunteer stated in an interview that the weather the day before the Bike Bus can affect the attendance more than the day-of weather, particularly regarding rain. Seasonality also influences attendance, showing a dip in winter participation as temperatures drop. Many volunteers, however, stated that participants will layer up and bike during cold weather but are less willing to do so in the rain. During a morning WhatsApp conversation of who would attend the Redhill C of E Primary School Bike Bus, multiple parents cited rain as the reason their children would not join. Though weather is beyond the control of Bike Worcester and Bike Bus leads, understanding the disruption to attendance is worth noting.

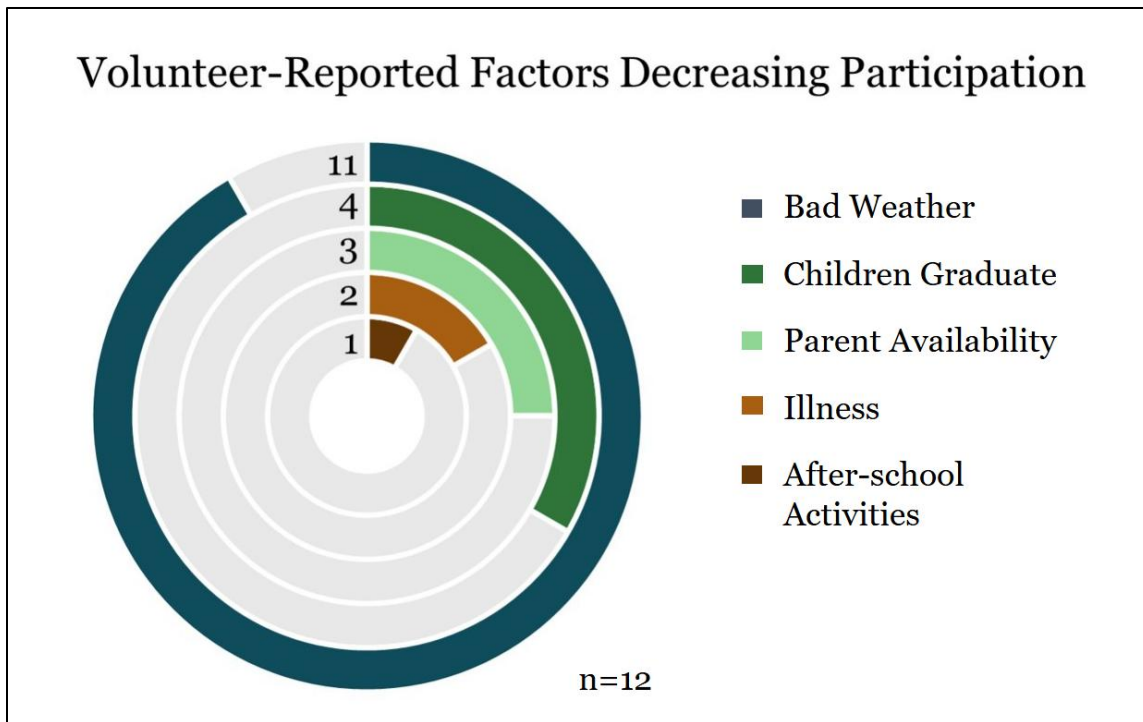


Figure 9. Factors Decreasing Bike Bus Participation According to a Volunteer Survey

4.1.2 Program Influence

Through our research findings, we discovered that there are many positive benefits to participation, including improved well-being, a sense of community, and road safety education for the student participants.

The highest reported personal benefits to Bike Bus participation were well-being and energy levels. Of the 29 participating parent responses, 22 parents noted improved well-being of their child and 12 noted increased energy levels (Figure 10). While Bike Bus rides only occur once a week, they create a positive and happy environment in the mornings and prepare children for the school day. One parent noted that Monday, their school’s Bike Bus day, is their child’s favorite day of the week.

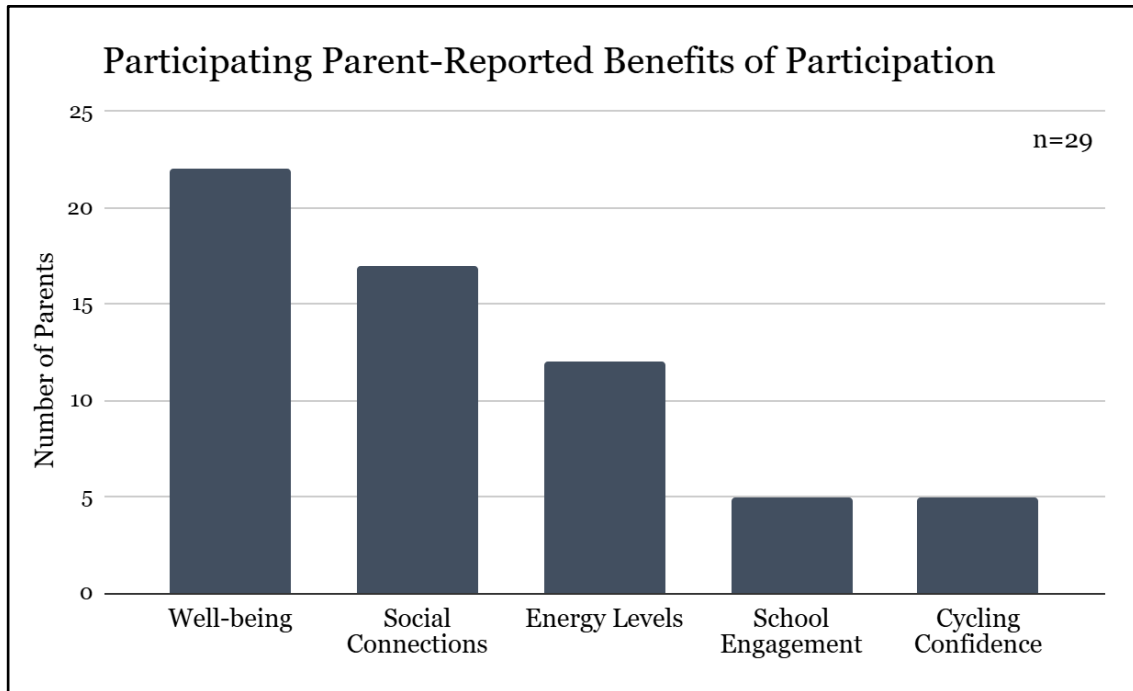


Figure 10. Benefits Participating Parents Report Their Children Experience from Bike Buses

Additionally, the community building aspect of the program creates a positive environment both on and off the Bike Bus as discovered through data collection from participants. The second highest benefit to participation reported in the parent survey is social connections as noted by 17 parents (Figure 10). This was supported by our child survey where seven of the nine children stated they made new friends on the Bike Bus. On the 15 Bike Bus routes we observed, all children were enthusiastic and excited about participating. We also observed that Bike Bus stickers, custom radio channels, and passports—with children receiving a star for each day they attend—built enthusiasm and encouraged attendance. The stickers and radio are popular amongst students when riding along; even non-participating children enjoyed these additions. One volunteer brings their dog along on rides, and another brings a large stuffed animal. Volunteers both contribute to and benefit from the Bike Bus community. During interviews, some volunteers accredited their start in Bike Worcester to joining or starting a Bike Bus. The volunteers foster team relationships through weekly coffee meetings and Bike Worcester programming. The fun elements that volunteers bring to the program boost engagement from participating and non-participating families, as well as bringing joy to local families in the morning.

Not only are Bike Buses fun for children, but they also offer a safe environment for them to learn road awareness skills. Recognizing parent concerns regarding traffic, Bike Bus volunteers increase safety by wearing high-vis vests, blocking vehicles when crossing main roads, and separating children from adjacent cars. During a focus group, one volunteer stated, “It is great to be able to take up space on the road for the children in a safe way, which would be impossible to do if we weren’t in a big group, so cars can’t dismiss us easily.” This testimony highlights the safety in numbers aspect as groups are more visible on the road. The group aspect also creates a controlled riding environment where children are learning the rules of the road as mentioned in five parent survey responses and multiple interviews.

4.2 Results for Objective Two: School Involvement

Our second objective was to assess school faculty’s observations about the effects a Bike Bus has on their school. The 11 schools (Table 1) that participated in Bike Buses were contacted and sent a survey (Appendix I) via email to gain insight into how Bike Buses affect daily education and how schools are currently supporting the Bike Bus program. We also attempted to connect with schools through parents and a University of Worcester faculty member, but these efforts were unsuccessful. Each Bike Bus is parent-led and does not require permission from the school to run, allowing operation without school support or resources. From both volunteer and parent interviews, we learned that many of the schools do not play a role in helping Bike Buses grow. This can have a negative impact on Bike Bus operation from the volunteers’ perspective, as promoting through the school could boost additional attendance. Of the 62 surveyed parents who stated they knew about Bike Buses, 10 parents reported learning about them through school assemblies and newsletters, though many—56.5%—learned simply from seeing a Bike Bus go by in the morning (Figure 11). Schools were not responsive to our efforts to connect with them, resulting in no data collection for this method. We learned from volunteers and parents that there is little to no involvement from schools in Bike Buses. Through an interview with our sponsor and multiple parent surveys, we learned that some schools do not support a cycling culture; one parent stated that their child’s school does not allow students to cycle to school.

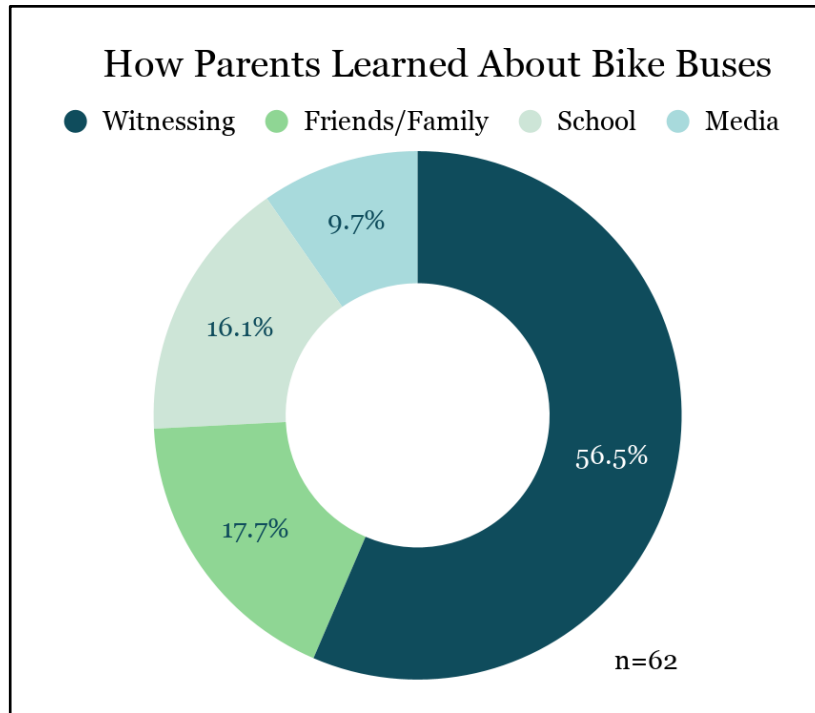


Figure 11. Ways Bike Buses are Learned About According to a Parent Survey

A Northwick Manor Primary School parent communicated that there is not enough bike storage for the children who currently cycle, with bikes having to be left unlocked on the ground. As bike storage is already a barrier to entry, prospective cyclists do not have an easy answer to the problem of bike storage during school. The parent also reported the school has been apprehensive about adding more bike storage, claiming an issue with space, though the parent believes it is likely more of a funding issue. Furthermore, the land at the front gate is City Council owned property rather than the school's, so the installation of bike racks requires approval and investment from the local government. The parent leading this route believes their Bike Bus attendance could increase if there was more storage since there is a lot of interest in cycling to school, however this would require additional support from the school.

4.3 Results for Objective Three: Bike Bus Guidebook

Our team created a Bike Bus Guidebook (Appendix L) for Bike Worcester using the data compiled from our prior objectives. We utilized Canva to design the guidebook as it is an easy tool to create high quality infographics. We produced a short, six-page digital document that provides essential information about how to get involved with Bike Buses and is intended for

participating and non-participating parents. We also created a modified version of the cover page with a QR code to the full guidebook for use as a one-page flyer (Figure 12, refer to Appendix M for the flyer). In alignment with volunteer and parent lead suggestions, we made the guidebook short and easy to read, included quotes and photos to capture the community, highlighted the best local resources for cycling, and referenced Bike Worcester’s website to align with their branding. Bike Worcester volunteers reviewed our drafts and provided feedback throughout the creation process. The final design of the guidebook includes an introduction to Bike Buses; Bike Worcester resources for purchasing, repairing, and learning to ride a bike; a link to currently operating Bike Buses; information on creating a Bike Bus and contacts for getting started; promotion and modification strategies to help grow a Bike Bus; and a conclusion to capture the spirit of the Bike Bus community.

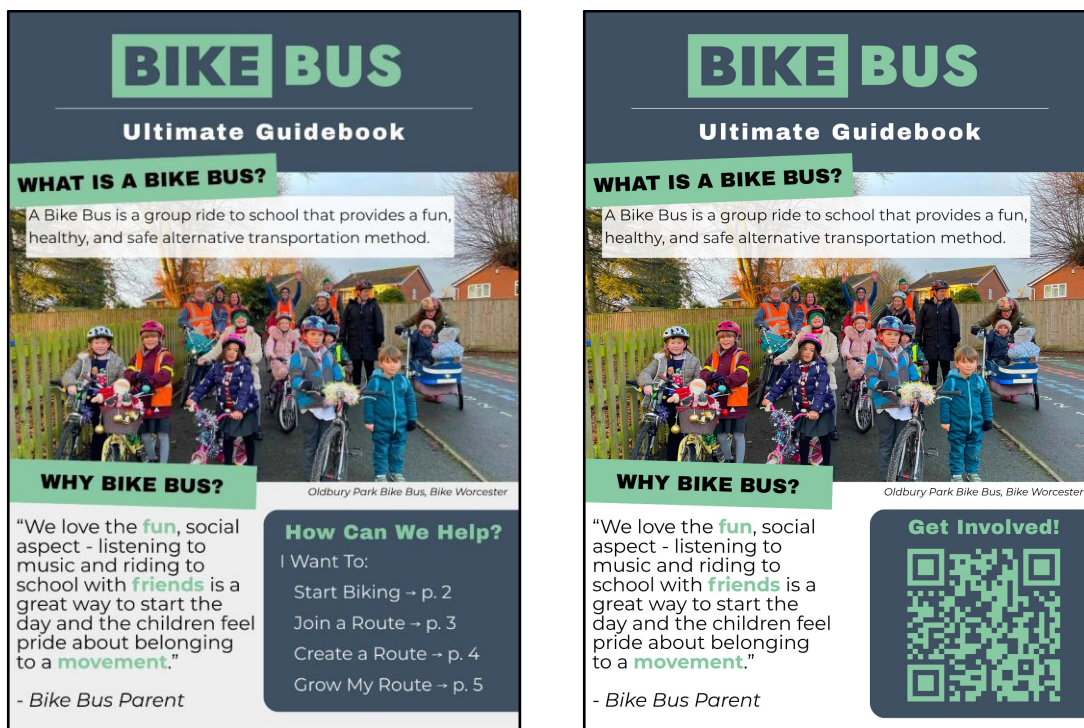


Figure 12. Cover Page of the Bike Bus Guidebook (Left) and a Flyer for Distribution (Right)

4.4 Limitations

Our study was conducted over eight weeks from March 16th through May 6th, which overlapped with a two-week primary school Easter school break from March 27th through April 13th. This break limited access to school administrators and hindered our data collection efforts.

Since multiple Bike Buses run on the same day, this posed a problem for observation as participating in every Bike Bus for a given day would require us to individually split up which would introduce bias in our direct observation documentation. To reduce bias, we required at least two team members to attend a given bus to ensure the data is discussed and agreed upon by multiple observers. This limited our participation to two attended Bike Buses a day since we have five team members. As a result, we only attended each route once, except for Oldbury—the only Bike Bus to occur on a Wednesday. The Easter break also halted our school data collection attempts, as school faculty were unable to respond to our communications during that time. It also hindered our parent data collection as some parents left on vacation and were hard to reach. Despite this, we used this time to conduct interviews as some parents and volunteers had more free time to speak with us.

4.5 Conclusions

The key findings from our research are as follows:

- The largest obstacle to increasing attendance is parent involvement.
- Parents' morning schedules and distance were the main barriers to joining a Bike Bus.
- Both participating and non-participating parents identified traffic concerns as a major challenge, however Bike Buses take significant steps to create a safe environment for cycling to school.
- Volunteers noted that weather is the largest factor affecting daily Bike Bus attendance.
- Bike Buses with multiple routes have higher Bike Bus attendance.
- Major benefits for children include improved wellbeing, energy levels, and social connections.
- Most parents learn about Bike Buses by witnessing them.
- The lack of data from schools reinforced our observations that they are not involved, but previous research indicates participation is likely to increase if schools assist in program growth.
- Schools that have more bike storage have higher Bike Bus attendance.

5.0 RECOMMENDATIONS

Based upon the findings from the above research, our team developed the following recommendations to best support growth of the Bike Bus program.

Recommendation 1. Bike Worcester should widely distribute the Bike Bus Guidebook.

Bike Worcester can best support Bike Buses through consistent promotion. First, the guidebook should be posted on the Bike Worcester website and social media channels. Then, information about the Bike Bus guidebook can be distributed as a one-page flyer with a QR code (Appendix M) to locations around the city and along common cycling paths. Lastly, the guidebook should be distributed through Worcester primary schools' newsletters, especially those without Bike Buses. Broadly promoting the guidebook can help develop interest in Bike Buses, which can attract more parent leads, increase the number of parents who join rides, and grow the number of routes.

Recommendation 2. Bike Worcester should develop a WhatsApp channel for parent leads.

We recommend Bike Worcester create a dedicated WhatsApp channel for parent leads to share information, ask questions, offer advice, and plan gatherings. For example, if a parent is seeking advice on promotional methods, they could utilize the channel to find out what works best at other routes. This channel will help streamline communication and further connect the Bike Bus community.

Recommendation 3. Bike Worcester should incorporate additional routes.

With more parent leads involved, new branches of a route could be created to accommodate more interested students who live far from the existing route. The starting location of a route is often built around the needs of the parent lead; however, families are located in different neighborhoods near the school with many not close to the current route, thus making it difficult to join. By adding more starting locations, the barrier of distance to a route can be alleviated.

Recommendation 4. Bike Worcester should suggest parent leads promote the program at the school gates after drop-off.

Parent leads can take advantage of this time to speak with others about the benefits of the program and promote the concept of Bike Buses. Currently, the main way to join a Bike Bus WhatsApp channel is to be invited through word-of-mouth. Handing out stickers and having a QR code to the WhatsApp group alleviates the need for prospective parents to take the initiative to approach the Bike Bus. While promoting at the school gates, they can also establish a relationship with the school faculty who assist with morning drop-off. This in turn could improve the Bike Bus's connection with the school and can lead them to promote the Bike Bus via assemblies or newsletters.

Recommendation 5. Bike Worcester should work with the Worcester City Council and school leaders to place more bike storage adjacent to school grounds.

At some schools, there is little to no adequate bike storage on campus grounds. However, the responsibility of adding bike storage varies between the City Council and school administration. Providing more space for children to store their bikes or scooters could assist in increasing active transportation to school. We recommend that Bike Worcester and the schools work together to approach the city about this need.

Recommendation 6. Bike Worcester should promote and host 'test' rides to provide an opportunity for families to try out a Bike Bus.

We recommend enabling families to participate in a Bike Bus route on a non-Bike Bus day or time so they can experience the safety a Bike Bus provides. These rides would occur with prospective families and Bike Bus volunteers during an off-peak time. Additionally, we recommend hosting a themed ride once per term that is offered to each school community, including those that do not have Bike Buses. These rides could help introduce the Bike Bus program to more families.

REFERENCES

- Active Travel (Wales) Act 2013* | *Law Wales*. (n.d.). Retrieved February 4, 2026, from <https://law.gov.wales/active-travel-wales-act-2013>
- Beenackers, M. A., Foster, S., Kamphuis, C. B. M., Titze, S., Divitini, M., Knuiman, M., van Lenthe, F. J., & Giles-Corti, B. (2012). Taking up cycling after residential relocation: Built environment factors. *American Journal of Preventive Medicine*, 42(6), 610–615. <https://doi.org/10.1016/j.amepre.2012.02.021>
- Bicibus. (2023, April 23). The Barcelona Declaration. *Bicibus*. <https://bicibus.eu/en/declaration-of-barcelona/>
- Bike Bus World*. (n.d.). Bike Bus World. Retrieved February 17, 2026, from <https://bikebus.world>
- Bike Worcester. (2025). *Bike Bus Recap 2025*. <https://www.youtube.com/watch?v=2qTubySpRN4>
- Bike Worcester*. (2026, January 18). Bike Worcester. <https://www.bikeworcester.org.uk>
- Birdsall, Michelle S. (n.d.). *International Safe Routes to School Programs: Examining a Charity's Efforts Across the United Kingdom*. Retrieved January 26, 2026, from <http://ezproxy.wpi.edu/login?url=https://www.proquest.com/scholarly-journals/international-safe-routes-school-programs/docview/224893683/se-2?accountid=29120>
- Böcker, L., Dijst, M., & Prillwitz, J. (2013). Impact of everyday weather on individual daily travel behaviours in perspective: A literature review. *Transport Reviews*, 33(1), 71–91. <https://doi.org/10.1080/01441647.2012.747114>
- Boland, P., Nowland, R., Tellis, K. D., Adams, M., Westwood, J., Crook, D., Larkins, C., & Ridley, J. (2025). Barriers and facilitators to cycling to school for children in the UK: A systematic review. *Active Travel Studies*, 5(1). <https://doi.org/10.16997/ats.1553>
- Brothwell, D. (2024, December). Kepax bridge opens...but what next for Worcester? *Bike Worcester*. <https://www.bikeworcester.org.uk/blog/kepax-bridge-opensbut-what-next-for-worcester>
- Buehler, T., & Handy, S. (2008). Fifty years of bicycle policy in Davis, California. *Transportation Research Record*, 2074(1), 52–57. <https://doi.org/10.3141/2074-07>
- Cervero, R., Sarmiento, O., Jacoby, E., Gómez, L., Neiman, A., Social, F., & Colombia, B. (2009). Influences of built environments on walking and cycling: Lessons from bogotá. *International Journal of Sustainable Transportation*, 3, 203–226. <https://doi.org/10.1080/15568310802178314>
- de Raadt, A., Warrens, M. J., Bosker, R. J., & Kiers, H. A. L. (2021). A comparison of reliability coefficients for ordinal rating scales. *Journal of Classification*, 38(3), 519–543. <https://doi.org/10.1007/s00357-021-09386-5>
- Department for Transport. (2020). *Gear Change: A bold vision for cycling and walking* (p. 52). Department for Transport. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/904146/gear-change-a-bold-vision-for-cycling-and-walking.pdf

- European Cyclists' Federation. (2025). *The State of National Cycling Strategies in Europe (2025)* (The state of national cycling strategies in Europe 5th edition, p. 64). European Cyclists' Foundation. https://ecf.com/media/resources/2026/2025_Report_National_Cycling_Plans_v2.pdf
- Fung, M., & Rice, M. (2023). *2021 Census – Analysis of Initial (phase 1) Release* (Census Worcestershire, p. 14). Worcestershire City Council. https://www.worcestershire.gov.uk/sites/default/files/2023-03/census_first_release_jsna.pdf
- Harrington, D., Bardid, F., Cory, K., Dixon, J., Dodd, S., Ferguson, N., Roberts, J., & Bonner, J. (2024, October 22). *(Two) Wheels on the Bus: Road User Perceptions of a Bike Bus and How This Links to Addressing Global Health Challenges*. (Two) wheels on the bus: Road user perceptions of a bike bus and how this links to addressing global health challenges. <https://journals.humankinetics.com/view/journals/jpah/21/12/article-p1382.xml?content=fulltext>
- Heath, L. (2024, January 5). *Why Britain floods so much, and how climate change is making it worse*. The i Paper. <https://inews.co.uk/news/why-britain-floods-so-much-climate-change-2839280>
- Howington, E., McNeil, N., & MacArthur, J. (2025). Bike buses: An evaluation of an emerging active transportation to school intervention. *Transportation Research Record*, 2679(6), 869–881. <https://doi.org/10.1177/03611981251322459>
- Jetté, M., Sidney, K., & Blümchen, G. (1990). Metabolic equivalents (METs) in exercise testing, exercise prescription, and evaluation of functional capacity. *Clinical Cardiology*, 13(8), 555–565. <https://doi.org/10.1002/clc.4960130809>
- Justice, K. (2025, October 13). “Worcester bike bus gives the school run back to kids.” BBC. <https://www.bbc.com/news/articles/c874gex40q7o>
- Lusk, A. C., Morency, P., Miranda-Moreno, L. F., Willett, W. C., & Dennerlein, J. T. (2013). Bicycle guidelines and crash rates on cycle tracks in the United States. *American Journal of Public Health*, 103(7), 1240–1248. <https://doi.org/10.2105/AJPH.2012.301043>
- MacArthur, J., McNeil, N., & Howington, E. (2024). *Exploring Bike Bus Programs in the United States* (NITC-RR-1597). National Institute for Transportation and Communities.
- McCullagh, P. (1980). Regression models for ordinal data. *Journal of the Royal Statistical Society: Series B (Methodological)*, 42(2), 109–127. <https://doi.org/10.1111/j.2517-6161.1980.tb01109.x>
- Met Office. (2025). *Monthly minimum air temperature in the United Kingdom (UK) from April 2015 to December 2024 (in degrees Celsius) [Graph]*. <https://www.statista.com/statistics/584885/monthly-minimum-temperature-in-uk/>
- Moore, H. J., Nixon, C. A., Lake, A. A., Douthwaite, W., O'Malley, C. L., Pedley, C. L., Summerbell, C. D., & Routen, A. C. (2014). The environment can explain differences in adolescents' daily physical activity levels living in a deprived urban area: cross-sectional study using accelerometry, GPS, and focus groups. *Journal of Physical Activity and Health*, 11(8), 1517–1524. <https://doi.org/10.1123/jpah.2012-0420>

- Muhs, C. D., & Clifton, K. J. (2016). Do characteristics of walkable environments support bicycling? Toward a definition of bicycle-supported development. *Journal of Transport and Land Use*, 9(2), 147–188. <https://www.jstor.org/stable/26203225>
- Pojani, D., Corcoran, J., & Bean, R. (2021). How does weather affect bikeshare use? A comparative analysis of forty cities across climate zones. *Journal of Transport Geography*, 95. <https://doi.org/10.1016/j.jtrangeo.2021.103155>
- Rojas-Rueda, D., Nazelle, A. de, Andersen, Z. J., Braun-Fahrländer, C., Bruha, J., Bruhova-Foltynova, H., Desqueyroux, H., Praznocy, C., Ragetti, M. S., Tainio, M., & Nieuwenhuijsen, M. J. (2016). Health impacts of active transportation in Europe. *PLOS ONE*, 11(3), e0149990. <https://doi.org/10.1371/journal.pone.0149990>
- Sach, A. A., Honey-Rosés, J., & Simón-i-Mas, G. (2025). Whose streets? Our streets! Bicibús in Barcelona through a justice lens. *Mobilities*, 20(6), 1184–1202. <https://doi.org/10.1080/17450101.2025.2498759>
- Saplıoğlu, M., & Aydın, M. M. (2018). Choosing safe and suitable bicycle routes to integrate cycling and public transport systems. *Journal of Transport & Health*, 10, 236–252. <https://doi.org/10.1016/j.jth.2018.05.011>
- Sharabiani, M. T. A., Bottle, A., & Mahani, A. S. (2025). *OGBoost: A Python Package for sharabiani Ordinal Gradient Boosting* (arXiv:2502.13456). arXiv. <https://doi.org/10.48550/arXiv.2502.13456>
- Simón-i-Mas, G., & Honey-Rosés, J. (2024). A global overview of Bike Bus: A journey toward a child-friendly city. *International Journal of Sustainable Transportation*, 18(12), 1012–1025. <https://doi.org/10.1080/15568318.2024.2432654>
- Simón-i-Mas, G., Honey-Rosés, J., & Bautista, S. (2024). *Global Survey of Bike Bus Initiatives*.
- Stewart, O., Vernez Moudon, A., & Claybrooke, C. (2012). Common ground: Eight factors that influence walking and biking to school. *Transport Policy*, 24, 240–248. <https://doi.org/10.1016/j.tranpol.2012.06.016>
- US Army. (2012). *Military Mountaineering FM 3-97.61 (2012 Edition)*. Scribd. <https://www.scribd.com/document/110268921/US-Army-Military-Mountaineering-FM-3-97-61-2012-Edition>
- Worcester topographic map, elevation, terrain*. (n.d.). Topographic Maps. Retrieved February 18, 2026, from <https://en-gb.topographic-map.com/map-zx8d3q/Worcester/?center=52.19104%2C-2.188&zoom=14>
- Worcestershire County Council. (2021, December 15). *The Worcestershire County Council (Kepax Bridge) Scheme 2020 Confirmation Instrument 2021*. https://www.worcestershire.gov.uk/sites/default/files/2023-01/the_worcestershire_county_council_kepax_bridge_scheme_2020_confirmation_instrument_2021.pdf
- Worcestershire County Council. (2024). *Environmental Overview and Scrutiny Panel Update on Active Travel in Worcester* (ENVIRONMENT OVERVIEW AND SCRUTINY PANEL, p. 5). Worcestershire County Council. <https://worcestershire.moderngov.co.uk/documents/s53759/05+Item+6+Active+Travel.pdf>

APPENDIX A: Focus Group Questions for Bike Bus Parent Leads

The research team asked the following questions to Bike Bus parent leads. The consent statement below was read to the participants before they signed the full Informed Consent statement (Appendix K).

You are being asked to participate in a research study that will be published in an academic database. Before you agree, however, we wish to inform you about the purpose of the study. Our research group, Team BIKE, will be identifying factors that influence Bike Bus participation and how Bike Buses affect the Worcester school community. The focus group discussion will take approximately 45 minutes. The discussion will be voice-recorded only for the team to reference details if needed when writing. Some of your answers may be directly quoted or paraphrased, in which case you will be referred to simply as ‘parent lead’ to avoid any identifying characteristics. This conversation is completely voluntary; you may ask to skip questions, not answer questions, and stop at any time. Before we begin, are there any questions you have about this discussion or the overall study?

1. What led you to start your Bike Bus, and how did you create it?
2. How do you invite others to join or gain new riders?
3. What is your favorite part about leading a Bike Bus?
4. What motivates you to continue leading a Bike Bus, and why should other parents consider leading a route?
5. Are there any changes to Bike Buses that you think might benefit ridership?
6. What resources would have best assisted you in starting a Bike Bus?
7. Is there a plan for sustaining your Bike Bus after your child leaves primary school?
 - a. If so, would you mind sharing that plan? What has best worked with the formation of that plan?
8. Can you tell us about having multiple routes that meet together?

APPENDIX B: Interview Questions for Parent Leads

The research team asked the following questions to a Bike Bus Parent Lead. The consent statement below was read to the participant before they signed the full Informed Consent statement (Appendix K).

You are being asked to participate in a research study that will be published in an academic database. Before you agree, however, we wish to inform you about the purpose of the study. Our research group, Team BIKE, will be identifying factors that influence Bike Bus participation and how Bike Buses affect the Worcester school community. The interview will take approximately 30 minutes. Some of your answers may be used in direct quotes or paraphrased, in which case you will be referred to as 'parent'. This interview is completely voluntary; you may ask to skip questions, not answer questions, and stop at any time. Before we begin, are there any questions you have about this interview or the overall study?

1. Why did you start a Bike Bus and how did you do it?
 - a. Why do Bike Worcester volunteers not join the Bike Bus?
2. How do you advertise your Bike Bus to those who don't participate?
 - a. Newsletter? WhatsApp? Email? Other?
 - b. What methods work best? What doesn't work well?
3. What are some things that may be outside of your control that could change to increase ridership?
4. What is your favorite part of, or what motivates you to continue, leading a Bike Bus?
5. Are there any challenges you face with leading a route?

APPENDIX C: Survey Questions for Parents

The research team used the following survey questions for participating and non-participating parents. The survey was administered using Qualtrics. Below is the statement included in each survey to inform consent.

We are students from Worcester Polytechnic Institute in the United States participating in a research project to learn about Bike Buses. You are being asked to participate in a research study that will be published in an academic database. Before you agree, however, we wish to inform you about the purpose of the study. Our research group, Team BIKE, will be identifying factors that influence Bike Bus participation and how Bike Buses affect the Worcester school community. The survey should take no more than 5 minutes. The report will not contain any identifying characteristics of the participants. This survey is completely voluntary, you may skip any questions, not answer questions, or stop at any time. Thank you!

By agreeing to participate in this research, you acknowledge that you have been informed about and consent to be a participant in this study.

Section 1: Participating Parents

1. Do you know what a Bike Bus is?
 - a. *Yes/No*
 - i. *If no, include the following text: What is a Bike Bus? A Bike Bus is an organized group ride to school in the morning that provides a healthy and social alternative transportation method.*
2. How did you first hear about Bike Buses?
 - a. *Friends/Family*
 - b. *Social Media*
 - c. *School*
 - d. *Witnessing a Bike Bus*
 - e. *Other: _____*
3. Do you have a child who participates in a Bike Bus?
 - a. *Yes/No*
4. What school does your child attend?
 - a. *Short answer*
5. What year is your child in?
 - a. *Short answer*
6. On an average day, how many children participate in your local Bike Bus route?
 - a. *0-4*
 - b. *5-8*
 - c. *9-11*
 - d. *12+*
7. Do you personally participate in a Bike Bus?
 - a. *Yes, I personally participate*
 - b. *Sometimes I participate, but not every time my child does*
 - c. *No, another person accompanies my child*
8. How often do you or your child usually participate in a Bike Bus?
 - a. *Always (4-5 per month)*
 - b. *Frequently (2-3 per month)*
 - c. *Infrequently (0-1 per month)*

- d. *Other:* _____
- 9. Have you noticed any benefits to your child's daily life due to their Bike Bus participation?
 - a. *Energy levels*
 - b. *Well-being*
 - c. *Social connections*
 - d. *School performance*
 - e. *Other:* _____
- 10. Have you noticed any negative changes to your child's daily life due to their Bike Bus participation?
 - a. *Energy levels (disrupting sleep)*
 - b. *Well-being*
 - c. *Social connections*
 - d. *School performance*
 - e. *Other:* _____
- 11. Have you experienced any challenges while attending a Bike Bus? If so, what are they?
 - a. *Difficult navigation*
 - b. *Traffic issues*
 - c. *Equipment storage difficulties*
 - d. *Other:* _____
- 12. What is your favorite aspect of your local Bike Bus?
 - a. *Short answer*
- 13. Do you have any suggestions to improve the Bike Bus program?
 - a. *Short answer*
- 14. Is there anything else you would like to share about your Bike Bus experience?
 - a. *Short answer*

Section 2: Non-Participating Parents

- 15. What method of transportation does your child usually take to school?
 - a. *Walking*
 - b. *Driving*
 - c. *Biking/Scootering*
 - d. *Other:* _____
- 16. Select all of the statements that are true:
 - a. *I own a bike*
 - b. *I have an adequate place to store a bike*
 - c. *I am comfortable biking*
 - d. *I enjoy biking*
 - e. *Other:* _____
- 17. Is there anything preventing you from participating in Bike Buses?
 - a. *Morning scheduling constraints*
 - b. *Getting your student and their bike home after school*
 - c. *Child does not wish to participate*
 - d. *Distance to school*
 - e. *Other:* _____
- 18. Is there anything that would encourage you to participate in a Bike Bus?
 - a. *Short answer*
- 19. Are you interested in joining a Bike Bus?
 - a. *Yes/No*
- 20. Is there anything else you would like to share about Bike Buses?

APPENDIX D: Survey Questions for Participating Children

The research team used the following survey questions for participating children. The survey was administered using Qualtrics. This survey was attached to the parent survey, so the consent form had already been agreed to.

1. Do you enjoy riding on the Bike Buses?
 - a. Yes / No
2. Is there anything that prevents you from regularly riding in a Bike Bus?
 - a. Yes / No
3. *If Yes:* Would you be comfortable sharing the reason? (such as bike troubles, afterschool programs, or anything else)
 - a. Line for short response
4. How often do you bike outside of Bike Bus?
 - a. All the time / Most of the time / Some of the time / Rarely / Never
5. Does Bike Bus make you want to bike more?
 - a. Yes/No
6. Have you gotten better at biking because of the Bike Bus?
 - a. Yes/No
7. Does Bike Bus make you excited to go to school?
 - a. Yes/No
8. Do your friends ride on the Bike Bus?
 - a. Yes / No
9. *If No:* Do you know why your friends do not ride on the Bike Bus?
 - a. Line for short response
10. Would you like for you and your friends to ride the Bike Bus together?
 - a. Yes / No
11. Have you made new friends on the Bike Bus?
 - a. Yes/No
12. Is there anything that would make Bike Buses more fun?
 - a. Small line for one sentence
13. Is there anything else you want to share about Bike Buses?
 - a. Line for short response (Optional)

APPENDIX E: Survey Questions for Bike Bus Volunteers

The research team used the following survey questions for Bike Bus Volunteers. The survey was administered using Qualtrics. Below is the statement included in each survey to inform consent.

We are students from Worcester Polytechnic Institute in the United States participating in a research project to learn about Bike Buses. You are being asked to participate in a research study that will be published in an academic database. Before you agree, however, we wish to inform you about the purpose of the study. Our research group, Team BIKE, will be identifying factors that influence Bike Bus participation and how Bike Buses affect the Worcester school community. The survey should take no more than 5 minutes. The report will not contain any identifying characteristics of the participants. This survey is completely voluntary, you may skip any questions, not answer questions, or stop at any time. Thank you!

By agreeing to participate in this research, you acknowledge that you have been informed about and consent to be a participant in this study.

1. How many Bike Bus routes do you volunteer for?

Using functionality of the survey software, we will have the participant answer questions 2-13 for each route they attend

2. What is the name of the route?
3. Approximately how much time does the Bike Bus take?
4. What is the total travel distance from the start to the end of the route?
5. On average, how many children attend this Bike Bus?
6. On average, how many adults attend this Bike Bus?
7. How is this Bike Bus advertised? Please list all forms of communication used to do so:
8. Does this route include any separated bike lanes or footpaths?
9. Is there anything you notice that increases or decreases the number of participants in this Bike Bus?
10. Is there anything else you'd like to share about this Bike Bus (unique aspects, fun traditions, etc.)

Rate the following (with optional explanation for each)

11. On a scale of 1-5, please rate the safety of this route in terms of road quality (i.e potholes, cracks, etc) [1 (Very unsafe) - 5 (Very safe)]
12. On a scale of 1-5, please rate the safety of this route in terms of intersections [1 (No dangerous intersections) - 5 (Many dangerous intersections)]
13. On a scale of 1-5, please rate the safety of this route in terms of motor vehicle traffic volume [1 (Little to no traffic) - 5 (Bumper to bumper traffic)]
14. Would you be open to participating in a focus group with other Bike Worcester volunteers? The purpose of this focus group is to learn more about the experiences of Bike Bus volunteers. If yes, please provide your name and the best email to reach you at.

APPENDIX F: Focus Group Questions for Bike Bus Volunteers

The research team asked the following questions to Bike Bus volunteers. The consent statement below was read to the participants before they signed the full Informed Consent statement (Appendix K).

You are being asked to participate in a research study that will be published in an academic database. Before you agree, however, we wish to inform you about the purpose of the study. Our research group, Team BIKE, will be identifying factors that influence Bike Bus participation and how Bike Buses affect the Worcester school community. The focus group discussion will take approximately 40 minutes. The discussion will be voice-recorded only for the team to reference details if needed when writing. Some of your answers may be directly quoted or paraphrased, in which case you will be referred to simply as ‘volunteer’ to avoid any identifying characteristics. This focus group is completely voluntary; you may ask to skip questions, not answer questions, and stop at any time. Before we begin, are there any questions you may have about this discussion or the entire study?

1. How did you get involved in Bike Buses, and why do you continue to volunteer?
2. What do you think impacts attendance on Bike Buses the most? Daily? Overall?
3. What methods of advertising a Bike Bus have had the most and least success?
4. How much responsibility do you think volunteers should have with leading and managing a Bike Bus?
5. What do you think would best grow attendance on Bike Buses overall?
 - a. (Explain guidebook) What can we include in our guidebook to do so?

Extra questions if time permitting:

6. Favorite quotes/anecdotes/stories?
7. In one or two words, what immediately comes to mind when you think of Bike Buses?

APPENDIX G: Interview Questions for Bike Bus Volunteers

The research team asked the following questions to a Bike Bus volunteer. The consent statement below was read to the participant before they signed the full Informed Consent statement (Appendix K).

You are being asked to participate in a research study that will be published in an academic database. Before you agree, however, we wish to inform you about the purpose of the study. Our research group, Team BIKE, will be identifying factors that influence Bike Bus participation and how Bike Buses affect the Worcester school community. The interview will take approximately 30 minutes. Some of your answers may be used in direct quotes or paraphrased, in which case you will be referred to as ‘volunteer’. This interview is completely voluntary; you may ask to skip questions, not answer questions, and stop at any time. Before we begin, are there any questions you may have about this interview or the entire study?

Interview with Volunteer 1

1. How and why did you start Bike Buses in Worcester?
2. How did Bike Worcester get affiliated with Bike Bus?
3. What are the rules regarding parents riding with children?
4. How are Bike Buses currently advertised to families?
5. What is the process to start a new Bike Bus? How is the route determined?
6. How are volunteers coordinated along each route?
7. Why was the Honeywell route discontinued?
8. Given St. Barnabas C Of E First & Middle School’s location in Pershore, how did they get involved/connected with Bike Worcester?
9. What are your opinions on the cycling infrastructure in Worcester and its impact on Bike Bus?
10. What will Bike Worcester be doing at the 2026 Bike Bus Summit in Portugal? How did the 2025 summit impact Worcester Bike Buses?
11. How did the Bike Bus Summit come to Worcester?
12. What sort of outreach programs have you done to help promote Bike Buses? What has been successful?
13. *Explain our plan for Bike Bus Guidebook (Create, maintain, sustain) and asked for thoughts or ideas*
14. What is the best way to reach school leaders/Would you be able to connect us with any?
15. Is there anything we may not have considered yet that you think is important?
16. Is there anything you would specifically like us to look into or focus on?

Interview with Volunteer 2

1. How are Bike Buses currently advertised to families?
2. What has been successful?
3. Have there been any themed rides or special events on a Bike Bus that excite participants?
4. Do you think having schools more involved could help grow the program?
5. Explain our plan for Bike Bus Guidebook (Create, promote, maintain/sustain)
 - a. First thing that jumps to your mind, what do you think we should add? What would have helped you in starting your Bike Bus?
 - b. What do you think would be a good way to approach the tone? Rob mentioned dialing up the human aspect with quotes and pictures, allowing the prospective parent lead to almost feel guided and welcome by other parent leads. This could certainly include quotes & photos from women leads, like Rosie as you mentioned.
 - c. What should the scope of this guidebook be? (e.g. Like how a parent could even get a

bike through Bike Worcester? How could they potentially solve some of the barriers to participation?)

- d. What contacts/resources should be included?
 - e. What questions should be included for parents to start thinking about designing a new route?
6. Would you be able to put the parent survey in the general school parents' WhatsApp group? Facebook Worcester mums' group?
 7. Ask about how many bike buses ran 2022-2023 - we have a gap in our data (maybe photos/pr materials too?)
 8. What will Bike Worcester be doing at the 2026 Bike Bus Summit in Portugal?
 9. Is there anything we may not have considered yet that you think is important?

APPENDIX H: Direct Observation Recording Features

During direct observation, we filled out a Google Form containing the following questions. Our answers were stored in a connected Google Sheet.

Identification			Participants				Climate			Topography		Safety				Notes	
Timestamp	Riders	Route	Children	Adults	Time	Interest	Temperature	Wind	Rain	Hills	Cover	RoadQuality	RoadSeparation	Intersections	Crime	Accessibility	Notes
Form Responses																	
Timestamp	Ride	Ro	Childr	Adi	Ti	Do th	Temperat	Wi	Wi	W	Whi	How safe	Where did this	Does the r	Ho	How accer	Any additional comments?

Timestamp: What date did this Bike Bus take place?

Riders: Which members of Team BIKE attended this Bike Bus?

Route: What school is the Bike Bus traveling to/which of the routes did this Bike Bus place?

Children: What is the total number of children that attended the Bike Bus?

Adults: What is the total number of adults (non-children) that attended the Bike Bus?

Time: What is the total time, in minutes, it took to complete the route from start to finish?

Temperature: What was the temperature, in Fahrenheit, for this Bike Bus? (Use a Weather app.)

Wind: What was the wind like, in miles per hour, for this Bike Bus? (Use a Weather app.)

Rain: What was the rain like for this Bike Bus?

|—1—|————|—2—|————|—3—|————|—4—|————|—5—|

- 1: Storm downpour
- 2: Heavy rain
- 3: Standard Rain
- 4: Sprinkling/Mist/Fog/Spotty Rain
- 5: No rain

Interest: Do the children on this Bike Bus seem to be interested and happy or is involvement mostly their parents' choice?

|—1—|————|—2—|————|—3—|————|—4—|————|—5—|

- 1: None of the children seem personally interested and happy.
- 2: Few children seem personally interested and happy.
- 3: Half of the children seem personally interested and happy.
- 4: Most children seem personally interested and happy.
- 5: All the children seem personally interested and happy.

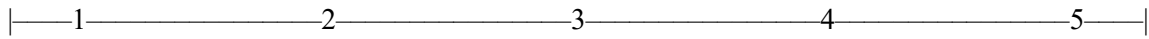
Hills: What were the hills like for this Bike Bus?

|—1—|————|—2—|————|—3—|————|—4—|————|—5—|

To ensure consistency when reporting on hilly terrain, as this can be quite a subjective ranking, we will adapt a method of classification from the military to fit our purposes. Based on an elevation map of the local area (Worcester Topographic Map, Elevation, Terrain, n.d.), Worcester is largely a flat city, thus we will adjust the terrain parameters for a much softer gradient. Taking inspiration from the Mountaineers' Table (US Army, 2012), we consider the grades and offer a 7 gear city bike as a gauge:

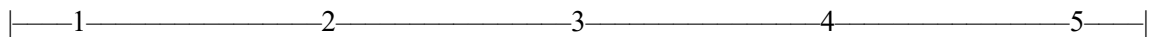
- 1: Extreme incline (Gear 1-2)
- 2: Steep incline (Gear 3)
- 3: Incline (Gear 4-5)
- 4: Slight incline (Gear 6)
- 5: Flat (Gear 7)

Cover: What was the overhead cover like for this Bike Bus? (i.e., protection from rain and sun)



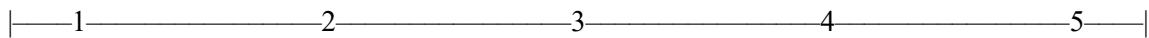
- 1: Zero cover
- 2: Few trees, or overhangs
- 3: Covered about half the time
- 4: Covered most of the time, but with a few clear openings
- 5: Full or nearly full cover throughout the entire route

RoadQuality: How safe was this Bike Bus in terms of damaged roads and/or sidewalks? (e.g., potholes, cracks, faded road markings)



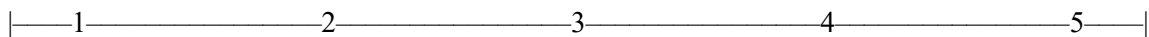
- 1: Extremely torn up, affecting riding
- 2: Many damages, mostly avoidable
- 3: A few damages, almost all avoidable
- 4: One or two damages, avoidable
- 5: No visible damage whatsoever, conditions perfect

RoadSeparation: Where did this Bike Bus take place, in terms of a shared road, bike lane, or sidewalk?



- 1: Entirely on roads
- 2: Mostly on roads
- 3: 50/50 on roads
- 4: A few stints on the roads
- 5: Total separation from roads

Intersections: Does the route have any intersections or road crossings? Are they dangerous?



- 1: Multiple major busy intersections or road crossings
- 2: One busy intersection or road crossing, along with multiple potential minor crossings
- 3: A few minor road crossings or intersections
- 4: One or two minor road crossings or intersections
- 5: Nothing difficult at all in terms of intersections and crossings

Crime: How safe was this Bike Bus in terms of observed crime? (e.g., used needles, shattered or boarded windows, street harassment, police activity, extreme litter)

|—1—2—3—4—5—|

- 1: Crime is obvious or ongoing, extremely uncomfortable
- 2: Crime is visible and unavoidable, uncomfortable
- 3: Crime is visible, but avoidable, slightly uncomfortable
- 4: One or two notable moments but bearable and not obstructive
- 5: Zero observed issues, clean and safe

Accessibility: How accessible could this Bike Bus be for a young, inexperienced rider?

|—1—2—3—4—5—|

- 1: Inaccessible, children would have to get off bike or take another route
- 2: Child would most likely have to get off their bike, or have extreme difficulty
- 3: Strenuous but doable
- 4: Only a couple moments of winding roads or increased effort
- 5: Accessible, group is together and without issue

Notes: Are there any additional, important details from this ride?

APPENDIX I: Survey Questions for Participating Schools

The research team used the following survey questions for participating school faculty. The survey was administered using Qualtrics. Below is the statement included in each survey to inform consent.

We are students from Worcester Polytechnic Institute in the United States participating in a research project to learn about Bike Buses. You are being asked to participate in a research study that will be published in an academic database. Before you agree, however, we wish to inform you about the purpose of the study. Our research group, Team BIKE, will be identifying factors that influence Bike Bus participation and how Bike Buses affect the Worcester school community. The survey should take no more than 5 minutes. The report will not contain any identifying characteristics of the participants. This survey is completely voluntary, you may skip any questions, not answer questions, or stop at any time. Thank you!

By agreeing to participate in this research, you acknowledge that you have been informed about and consent to be a participant in this study.

1. What is the name of your school?
 - a. *Short answer*
2. Are you aware that your school has a Bike Bus?
 - a. *Yes/No/Prefer not to answer*
3. Has your school ever promoted or advertised Bike Bus in any of the following ways?
(Select all that apply)
 - a. *School newsletter*
 - b. *Assemblies*
 - c. *Emails*
 - d. *Other: _____*
 - e. *None of the above*
4. Is there an approval process for starting a Bike Bus at your school?
 - a. *Yes/No/Prefer not to answer*
5. Have Bike Buses negatively impacted traffic flow at arrival/dismissal?
 - a. *Yes/No/Prefer not to answer*
6. What feedback have you received from parents, if any?
 - a. *Short answer*
7. What is the culture around Bike Buses in your school?
 - a. *Extremely negative*
 - b. *Negative*
 - c. *Neutral*
 - d. *Positive*
 - e. *Extremely positive*
8. What observations have you noticed about students that participate in Bike Buses in the following areas:
 - a. *Energy level?*
 - i. *Lower energy*
 - ii. *Slight decrease in energy*
 - iii. *No change from peers*
 - iv. *Slight increase in energy*
 - v. *More energy*

- b. *Overall well-being?*
 - i. *Very bad*
 - ii. *Bad*
 - iii. *No change from peers*
 - iv. *Good*
 - v. *Very Good*
 - c. *Attendance?*
 - i. *Extremely adverse to attend school*
 - ii. *Adverse to attend school*
 - iii. *No change from peers*
 - iv. *Excited to attend*
 - v. *Extremely excited to attend school*
9. Is there anything else you would like to share about Bike Buses?
a. *Short answer*
10. Thank you for completing this survey. Would you be interested in setting up a short interview with us? If so, please include your email.

APPENDIX J: Survey Questions for Non Participating Schools

The research team used the following survey questions for non-participating school faculty. The survey was administered using Qualtrics. Below is the statement included in each survey to inform consent.

We are students from Worcester Polytechnic Institute in the United States participating in a research project to learn about Bike Buses. You are being asked to participate in a research study that will be published in an academic database. Before you agree, however, we wish to inform you about the purpose of the study. Our research group, Team BIKE, will be identifying factors that influence Bike Bus participation and how Bike Buses affect the Worcester school community. The survey should take no more than 5 minutes. The report will not contain any identifying characteristics of the participants. This survey is completely voluntary, you may skip any questions, not answer questions, or stop at any time. Thank you!

By agreeing to participate in this research, you acknowledge that you have been informed about and consent to be a participant in this study.

1. What is the name of your school?
 - a. *Short answer*
2. Do you know what a Bike Bus is?
 - a. *Yes/No*
 - i. *If no, include the following text: What is a Bike Bus? A Bike Bus is an organized group ride to school in the morning that provides a healthy and social alternative transportation method.*
3. Do you think having a Bike Bus would benefit your school community?
 - a. *Yes/Maybe/No*
4. Would you be in favor of your school supporting a Bike Bus?
 - a. *Yes/Maybe/No*

APPENDIX K: Informed Consent Statement

Below is our Informed Consent statement that was read and signed by participants during study.

Informed Consent Agreement for Adult Participation in a Research Study

Investigator: Team BIKE - Karinne Aiello, Eric Tomaino, Anabelle Clemence, Maria Fragione, and Graeme Johnston

Contact Information: gr-uk26bike@wpi.edu

Title of Research Study: Cycling Towards a Healthier Community

Sponsor: Prof. Fleur Visser, University of Worcester, Bike Worcester

Introduction:

You are being asked to participate in a research study that will be published. Before you agree, however, you must be fully informed about the purpose of the study, the procedures to be followed, and any benefits, risks or discomfort that you may experience as a result of your participation. This form presents information about the study so that you may make a fully informed decision regarding your participation.

Purpose of the study:

Bike Buses are an active, social, and sustainable transportation method to school, but many in the Worcester community are not benefiting due to low ridership. Team BIKE will be identifying factors that influence Bike Bus participation and how Bike Buses affect the Worcester school community in order to grow the Bike Bus community and foster more cycling in Worcester.

Procedures to be followed:

Interviews with participants will be no more than an hour and will generally fall around 30 minutes depending on answers and follow-up questions. We are seeking information on personal opinions regarding Bike Buses and their operations, which will be gained through structured questioning.

Risks to study participants:

Participation in the interview process will entail a conversation in which questions are asked, considerations are made so that the interview is comfortable so that there are no risks to be broadly considered.

Benefits to research participants and others:

Participants will be receiving no benefits besides sharing their experiences for the purpose of improving the cycling community in Worcester.

Record keeping and confidentiality:

Records of your participation in this study will be held confidential so far as permitted by law. However, the study investigators, the sponsor, or its designee and, under certain circumstances, the Worcester Polytechnic Institute Institutional Review Board (WPI IRB) will be able to inspect and have access to confidential data that identify you by name. Any publication or presentation of the data will not identify you.

When using information from interviewees, identifying characteristics or names will not be used. The report will use wording such as “a parent of a child who participates in the Bike Bus”, and other related terminology. Interviews will be with two or more group members and answers will be recorded through writing. Voice recording will be taken with a group member’s phone to reference after the interview when analyzing the data collected.

Compensation or treatment in the event of injury:

You do not give up any of your legal rights by signing this statement. The research does not involve risk of injury or harm.

For more information about this research or about the rights of research participants, or in case of research-related injury, contact:

Student Team: gr-uk26bike@wpi.edu
IRB Manager: Ruth McKeogh, Tel. 508 831- 6699, Email: irb@wpi.edu
Human Protection Administrator: Gabriel Johnson, Tel. 508-831-4989, Email: gjohnson@wpi.edu

Your participation in this research is voluntary. Your refusal to participate will not result in any penalty to you or any loss of benefits to which you may otherwise be entitled. You may decide to stop participating in the research at any time without penalty or loss of other benefits. The project investigators retain the right to cancel or postpone the experimental procedures at any time they see fit.

By signing below, you acknowledge that you have been informed about and consent to be a participant in the study described above. Make sure that any questions you have about the study are answered to your satisfaction before giving consent to participate. You are entitled to retain a copy of this consent agreement.

_____ Date: _____
Study Participant Signature

Study Participant Name (Please print)

_____ Date: _____
Signature of Person who explained this study

Additional clauses to add to Consent Agreements, as appropriate:

Should a participant wish to withdraw from the study after it has begun, the following procedures should be followed: All recordings, both written and online, will be removed from our data collection and analysis. Any information given by the participant will not be included in our finding or any of our reports.

There will be no consequences for early withdrawal for the subject.

Special Exceptions:

Under certain circumstances, an IRB may approve a consent procedure which differs from some of the elements of informed consent set forth above. Before doing so, however, the IRB must make findings regarding the research justification for different procedures (i.e. a waiver of some of the informed consent requirements must be necessary for the research is to be “practicably carried out.”) The IRB must also find that the research involves “no more than minimal risk to the subjects.” Other requirements are found at 45 C.F.R. §46.116.

APPENDIX L: Bike Bus Guidebook

Our team developed a guidebook for promotion of Bike Buses, which was designed in Canva.



BIKE BUS

Ultimate Guidebook

WHAT IS A BIKE BUS?

A Bike Bus is a group ride to school that provides a fun, healthy, and safe alternative transportation method.

WHY BIKE BUS?

“We love the **fun**, social aspect - listening to music and riding to school with **friends** is a great way to start the day and the children feel pride about belonging to a **movement**.”

- *Bike Bus Parent*

How Can We Help?

I Want To:

- Start Biking → p. 2
- Join a Route → p. 3
- Create a Route → p. 4
- Grow My Route → p. 5

Oldbury Park Bike Bus, Bike Worcester

Start Biking

Need a Bike?

Bike Worcester offers refurbished bikes at affordable prices. Click [here](#) to browse available bikes or join the mailing list.



What If My Bike Needs Repair?

Beginners' Bike Repair Sessions take place every Tuesday at 19:30 at Friary Walk, open to all!



Dedicated Women's Bike Repair Sessions run the **first Tuesday of every month** at 19:30 at Friary Walk.



How Can I Be More Confident On Roads?

Bike Buses offer a safe and fun place to gain experience, as you have the benefit of safety in numbers. There are also sessions to help people improve their skills available through [this form](#).

BIKE BUS

Join a Route

What Do Parents Say About Bike Bus?

“Very inclusive, you don’t have to be a great cyclist”

————— ” —————

“Feels like being a part of a family”

————— ” —————

“Easier to get the kids into school – they’re happier to go in”



Find a Bike Bus

View all active routes here:

bikeworcester.org.uk/bikebus



No Bike Bus? No Problem

You can be the next Local Legend to write your own Bike Bus epic—all it takes is a little commitment and a positive attitude.

BIKE BUS

Create a Route

IMAGINE YOUR ROUTE

- Is there a lot of traffic on this route? Focus on left turns.
- How long will it take? Aim for 10-15 minutes.
- Which roads are accessible for young riders?
- Where do I need to cross?
- Are there other cyclists along this route?



MAKE IT A REALITY

Reach out to Rob Collier to learn more and set up a ride-along to help plan your Bike Bus route



Email:
info@bikeworcester.org.uk



Consistency is Key

Once created, all you need is to ride each week!

BIKE BUS

Grow My Route

Be a Presence

Talk to people that cycle
at the school gate

Communicate in your
child's year group chat
and with your school

Does My Route Need to Be Adapted?

- Should the current route change to reach other interested families?
- Could you work with another parent to start another route from another direction?

“Turning up with the noise, with the kids, with the badges and the stickers, with the dog, like we make a spectacle of ourselves.”



*Leisa Taylor,
Bike Bus
Volunteer*

Find other interested riders by joining a **Kidical Mass** family ride [here](#)

**KIDICAL
MASS**



BIKE BUS

Welcome to the Community!



Global Bike Bus Summit 2025, Cycle Sprog

“Woof, you should join Bike Bus, woof!” - Kiki, Bike Bus Dog”

Joyful **Good Fun** Outdoors

Independence



Freedom **Empowerment**

“I love doing Bike Bus each week. It’s lots of fun and sometimes we even have bicycle themed music playing from one of the bikes.”
- Lukas, Bike Bus Participant



APPENDIX M: Bike Bus Guidebook Flyer

Our team developed a one-page flyer for promotion of our guidebook, which can be accessed through the QR code.

BIKE BUS

Ultimate Guidebook

WHAT IS A BIKE BUS?

A Bike Bus is a group ride to school that provides a fun, healthy, and safe alternative transportation method.

WHY BIKE BUS?

“We love the **fun**, social aspect - listening to music and riding to school with **friends** is a great way to start the day and the children feel pride about belonging to a **movement**.”

- *Bike Bus Parent*

Get Involved!

Oldbury Park Bike Bus, Bike Worcester