Assessing Ride Sharing Use at Boston College

Annie Silk & Sarah Hunkins

Environmental Studies Seminar ENVS4943

May 1st, 2019

Table of Contents

I.   **Abstract**

Riding sharing apps have been in existence now for over ten years. Although they have proven to be convenient and cheaper than a typical taxi, there have been serious concerns surrounding their environmental impact on the planet. As greenhouse gas emissions continue to rise each year, transportation is at the forefront of the conversation as to how to become more eco-friendly and environmentally conscious. This report provides a detailed study and analysis of the habits and perceptions of Boston College students when it comes to ride sharing apps and their environmental awareness surrounding transportation. By gathering over one hundred responses to a survey, the aim of this data collection was to gather information on two distinct questions, "What is the reason for students' desire to transport via vehicle sharing apps over public transportation?" and "How are carbon emissions on campus impacted through the use of vehicle sharing apps?" The research found that there is a need for a "green" pick up locations on campus so that Uber and Lyft drivers do not have to idle for too long with their vehicle running as they wait for their pick up. Another conclusion that was made was the need for increased frequency and awareness of Boston College shuttle busses to grocery stores. A third recommendation that was made based on the survey is the need for a required module for Boston College students to be educated and learn about becoming more environmentally aware. This research will be sent to the head of transportation at Boston College with hopes of making improvements on the transportation efficiency of the campus.

II. Introduction

This study's aim was to build an understanding surrounding the high increase in ride sharing app use on Boston College's campus. Since Uber and Lyfts' creation in the past decade, there have been questions surrounding their impact on the environment. The problem that catalyzed the creation of this project was assessing the motives behind Boston College students' transportation habits. Boston College has shuttle busses that travel around main campus, Newton campus, as well as Brighton campus. There are also shuttle busses that have limited hours that take students to Newton center which has easy accessibility to a grocery store. These options are available at no charge for students; however, there has still been a high increase in the past few years of ride sharing app use. Boston College is also situated directly next to the green B line of the MBTA, providing students with a chance to travel into Boston at a low price. Although these options seem accessible, the low price and convenience of calling a Lyft or Uber seems to attract many students to their platform. Environmental consciousness was also assessed in this study, to look at whether students at Boston College are influenced by their ecological footprint when it comes to choosing their transportation method. The hypothesis for this project was: We believe that as a result of the convenience and low cost of ride sharing apps, there is a larger amount of carbon emissions being released on the Boston College campus coming from idling and more pickups on the actual campus.

The unintended consequences of ride sharing have still not been thoroughly understood or researched; however, there is a steady amount of literature that has been emerging that helps shed light on the impacts of ride sharing apps on the environment as well as trends surrounding use of these services. One of the biggest reasons for wanting to explore the Uber and Lyft habits of Boston College students is because of this lack of research and knowledge surrounding the environmental and social effects of this rising form of transportation in our society. Although the research is limited, Caroline Rodier writes in her analysis, "The Effects of Ride Hailing Services on Travel and Associated Greenhouse Gas Emissions", that there has been a rise in research starting in 2016. She emphasizes that more information surrounding ride-sharing habits can help policy makers make decisions surrounding transportation in the future (Rodier 18). We hope that our research will help provide information for Boston College to become more aware of the

transportation habits on campus and formulate transportation policies to take into account the rise in ride-sharing.

A review of the literature on this topic reveals the pros and cons of innovations such as Lyft and Uber. Juliet Schor points out in her paper "Debating the Shared Economy" that many people believe the sharing economy has ecological benefits yet carsharing has increased emissions due to the expanding access to cars (Schor 6). Schor discusses the importance of paying attention to the ripple effects and not just the surface level changes. She highlights the idea that an airbnb host may use the extra money made to buy high-impact products and this model might lead people to buy more new things (Schor 7). She also brings up the fact that if travel is less expensive, more people might do it increasing ecological and carbon footprints (Schor 7). Lastly, Schor discusses the idea that the low cost of ride services causes people to stray away from public transportation due to convenience. This would also increase carbon emissions.

Murtaza Haider wrote a paper titled, "To Uber or Not to Uber" exploring the pros and cons of this newer service. One important idea they highlight is that taxicab deregulation will likely worsen traffic congestion which in turn will increase tailpipe emissions (Haider 1). With the invention of Uber and Lyft, there are more cars on the road because there are less barriers to entry in this market. Haider points out that pollutants become more heavily concentrated when there is traffic because of the stopping and starting of vehicles (Haider 13). This can increase short-term and long-term morbidity among drivers and households near these roads (Haider 13). This is a critical fact when translated on to BC's campus. Ubers and Lyfts are constantly stopping and starting around campus trying to find their designated students to pick up. Additionally, Uber and Lyft have likely increased congestion on roads like Beacon Street and Commonwealth Avenue. This congestion can negatively affect students on campus that live near these roads. Another important idea Haider et al. discusses is that the level of pollution emitted by public transportation stays constant whether one person or twenty people use it (Haider 14). This means the pollution coming from the T and buses will remain the same while increased congestion will result in increased pollution.

In her paper "Sustainability and Shared Mobility Models" Georgina Santos discusses the challenges of quantifying the impacts made in the shared mobility model. Unlike public

transportation, there are no statistics kept by governments on mobility services (Santos 4). Santos breaks different car sharing services into separate models. Model 3 is the typical Lyft or Uber model while Model 4 is the carpooling model such as Lyft Line or Uber Pool. She states that a 100% replacement of all bus and car trips by these new modes would result in CO_2 emissions being reduced by 62% (Santos 5). This is a substantial reduction but it would only happen if everyone was using these carpooling modes, which is not always the case.

One article that was found to be especially influential was researched and reported by the Metropolitan Area Planning Council. The report was titled, "Fare Choices: A Survey of Ride-Hailing Passengers in Metro Boston", and highlights the mindset in the shifting transportation industry. They found from their surveys that 42% of passengers would have used public transportation if a ride-hailing app was not available. Their survey also found that about 12% of users would have walked or ridden a bike if the service was not available to them (Gehrke et al, 2018, pg. 14). This amounts to 59% of passengers who would normally find a more sustainable way to travel; however, due to convenience and ease they are helping add additional cars to the road by promoting these app businesses. This adds to Murtaza Heider's research who concluded that public transportation such as a bus will continue to operate whether there is one person or a full bus. Thus, if more people opt for a ride-hailing app as their mode of transportation there will still be the same amount of busses operating--creating an uneven distribution and heightening the level of emissions being emitted (Haider 14).

Interesting trends emerged from the survey that Metropolitan Area Planning Council in Boston created. Their survey found that 82% of the total surveyors were born after the year 1983. (Gehrke et al, pg. 6). This helps back up the claim in this paper that college students are one of the largest cohorts flocking to Uber and Lyft. Thus, looking at Boston College students' habits will help illuminate trends that have emerged among millenials.

One of the aims of this research was to assess the environmental consciousness of Boston College students and if their transportation tendencies have changed due to the higher awareness of fossil fuel emissions. Joireman and his researchers published an article titled, "Who Cares about the Environmental Impact of Cars?: Those with an Eye toward the Future". Their research found that individuals will act eco-friendly based on the extent that those actions impinge on their own personal values that they uphold such as relationships, jobs, and their home (Joireman et al. pg. 7). For example, a person may be concerned that the emissions released from a vehicle

will cause higher rates of pollution and thus their scenery will not be as attractive as before. This will push people to act in a more environmentally friendly way. Assessing what Boston College students value in terms of transportation will help provide solutions that will be effective to the community as a whole.

One of the most misconstrued assumptions is that with the rise of ride sharing apps, more people will be selling or donating their cars in order to fully commit to one mode of transportation. Mishra and Clewlow wrote a thorough research report titled, "Disruptive Transportation: The Adoption, Utilization, and Impacts of Ride-Hailing in the United States" that looks at the way Uber and Lyft have affected the transportation industry and the impacts this has on the changing climate. In their research, they found that 91% of ride hailing users keep their car (Mishra and Clewlow, 2017, pg. 5). This means that there continue to be more cars on the road. However, Clewlow makes a great point when interviewed by *Wired*, saying that what really matters is not if people own cars but how many miles are being driven on the road (Marshall 2018). Mishra and Clewlows research which focused on large metropolitan areas in the United States, found that Uber and Lyft are likely to contribute to a growth in vehicle miles traveled (VMT), leading to higher amounts of fossil fuels being emitted into the atmosphere (Mishra Clewlow pg. 2). This literature has helped provide insight into the questions that should be pursued for this research of Boston College. Researchers around the country have become aware of the drastic implications that Uber and Lyft could have on both the environment as well as human habits and lifestyles.

III. Methods

  Before beginning the research for this study, approval needed to be gained from the Institutional Review Board (IRB), since the research required human subjects to be involved. While this approval was in process, the head of Boston College parking and transportation was contacted in order to gain more insight into transportation habits and statistics on campus. His insight, as well as the advice of Professor Juliet Schor, a professor that researches consumption habits, helped with the creation of survey questions that would be sent out to Boston College students that live on campus. During the approval process, more and more literature was gathered in order to bolster the research of the paper. Once IRB approved the research, a Qualtrics survey was sent out to Boston College students. The students were asked to respond to 21 questions that assessed their Uber and Lyft usage as well as questions that pertained to their environmental awareness. There were 101 respondents to the survey. Once the information was gathered, conclusions were able to be made that led to the creation of recommendations for Boston College to implement.

IV. Results

This section provides insight into the data that was collected from the 101 Boston College students that completed our survey. Figure 1 shows that when students were asked the question, "How has your use of ride share changed since coming to Boston College?" there were 69% of people that felt their use of Uber or Lyft increased "a lot more". Another 24% of respondents felt that there use of these apps had increased a "moderate amount more". Another 8% felt that their use was "about the same". 0% of the participants felt that their ride sharing habits had decreased in any capacity since coming to Boston College.
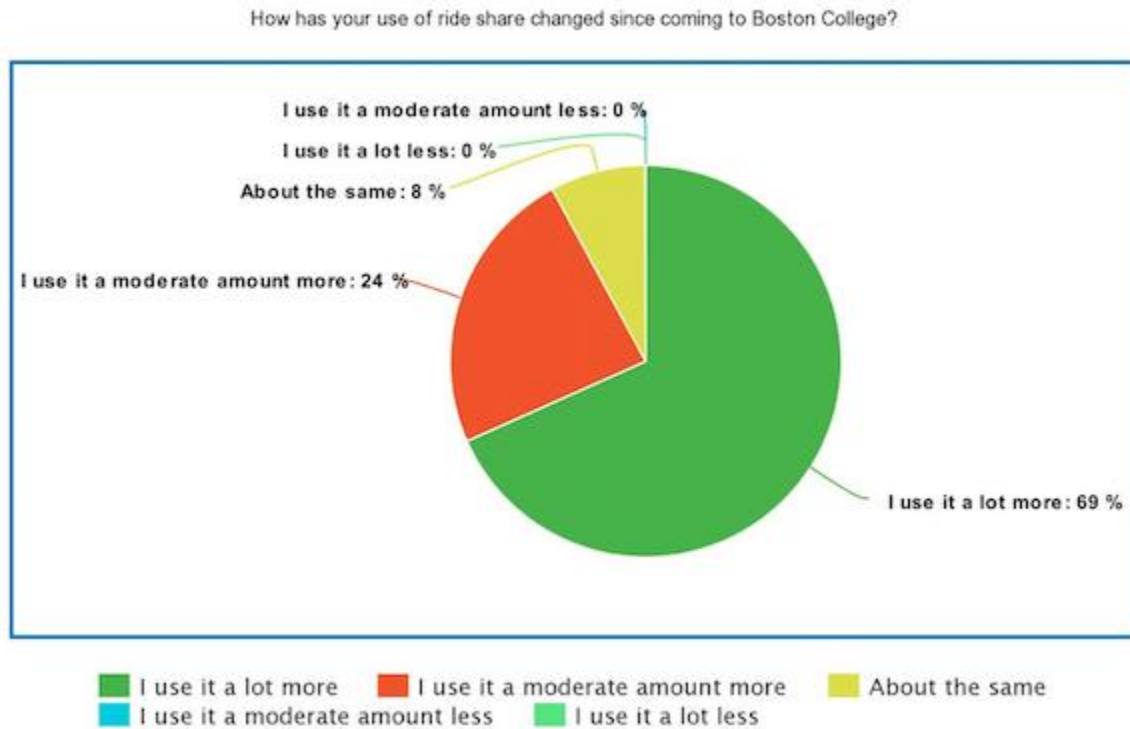

Figure 1: How ride sharing has shifted for the 101 survey participants since arriving at Boston College

Table 1 highlights a comparison between two questions, "How many times did you use one of these ride sharing apps in the past week?" and "Do you have a car on campus (Yes/No)?". This table shows that those with a car on campus use Uber or Lyft a lot less than those without a car. Out of the people that used ride sharing apps 1-2 times in the past week, 36 people (83.72%) did not have a car compared to the 7 people (16.28%) who do have a car on campus.

#	Question	Yes		No		Total
1	Never	26.67%	4	73.33%	11	15
2	1-2 times	16.28%	7	83.72%	36	43
3	3-5 times	13.89%	5	86.11%	31	36
4	6-8 times	25.00%	1	75.00%	3	4
5	8+ times	0.00%	0	100.00%	3	3

Table 1: This table displays ride sharing data for two groups, the first being "Yes" for having a car on campus and the second being "No" for not having a car on campus. Compared to the question, "How many times did you use one of these ride sharing apps last week?".

Figure 2 shows the results to the question, "Have you ever used Uber or Lyft to get from one part of campus to another?". 61.76% of respondents answered that they do use an app service in order to get from one part of campus to another.

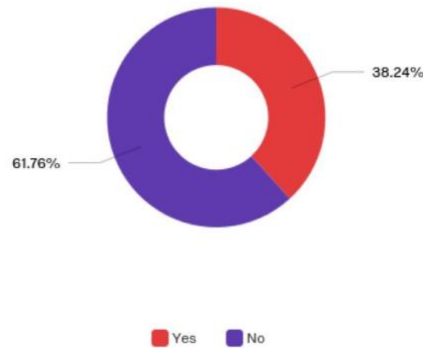**Have you ever used Uber or Lyft to get from one part of campus to another?**

Figure 2: Have you ever used Uber or Lyft to get from one part of campus to

Figure 3 depicts the average Uber or Lyft ride for Boston College students. Out of the students surveyed, 70% responded that their average ride is between 10-20 minutes long. 19% of students responded that their average Uber or Lyft ride was between 5-10 minutes.

Figure 3: How long is your average Uber/Lyft ride?

Figure 4 shows the percentages for the 101 respondents who responded to the questions, "On average, how many minutes is your Uber/Lyft waiting before you get in?". 8.82% of respondents said that they wait up to 5 minutes before reaching their ride. Another 29.41% of respondents said that they wait approximately 3-5 minutes for their ride. A third of the respondents (33.33%) stated that their Lyft or Uber waits around 1-2 minutes before their arrival.
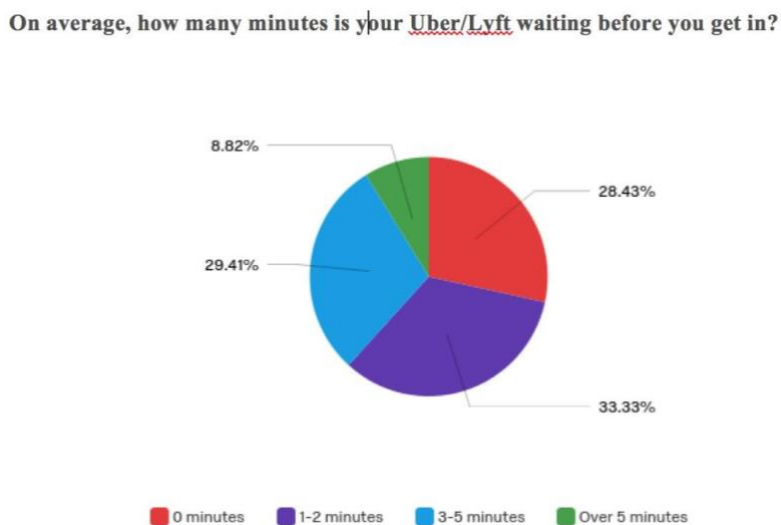

Figure 4: On average, how many minutes is your Uber/Lyft waiting before you get in?

Figure 5 shows the likelihood of students to choose a shared ride over a normal Uber or Lyft. 51 out of the 101 respondents said that they would be extremely likely or somewhat likely to choose a Lyftline or UberPool over a regular Lyft or Uber. 25 respondents said that they would be somewhat unlikely to choose a Lyftline or UberPool over a regular Lyft or Uber.
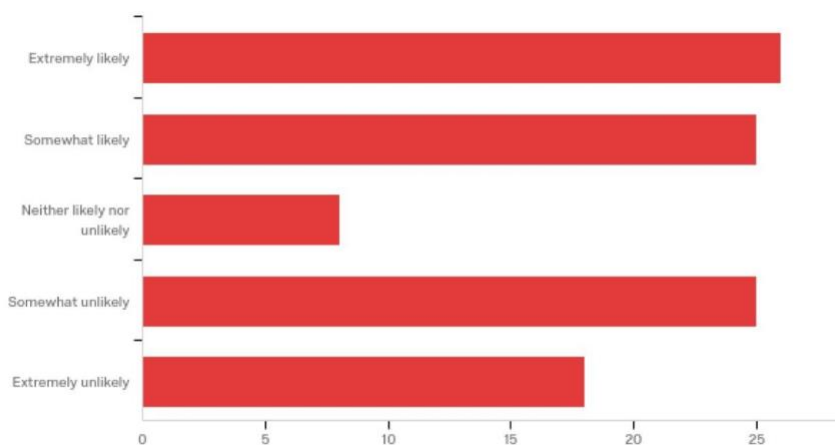

Figure 5: How likely are you to use LyftLine or UberPool over a regular Lyft or Uber?

Figure 6 shows the likelihood that Boston College students would pay more if Lyft or Uber exclusively had electric vehicles. 68% of respondents said that it "depends on how much more". While 25% of students responded saying that they would not pay more for electric vehicles. Only 7% of participants said that they would pay extra for an electric vehicle.
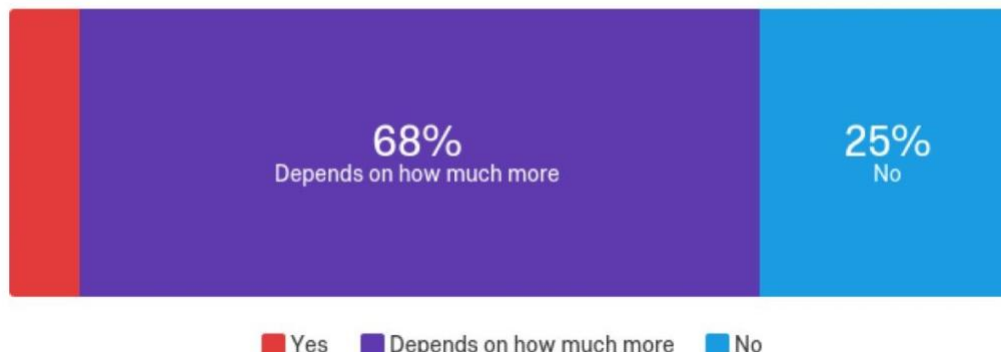

Figure 6: Would you pay more if there was an option on Lyft/Uber exclusively for electric vehicles?

Figure 7 shows the responses to the question, "How often do you take into consideration a company's environmental impact when using or purchasing their product?". Almost a third of participants (32.35%) said that they "never" take into account a company's environmental impact when using or purchasing their product. Almost half of participants (47.06%) stated that they sometimes take into account a company's environmental impacts when making purchasing decisions. Only 4.90% of respondents said that they always take into account the environmental impact of a company.

How often do you take into consideration a company's environmental impact when using or purchasing their product?
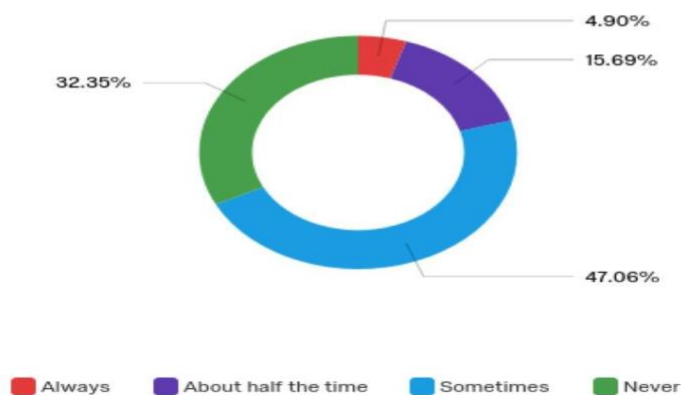

Figure 7: How often do you take into consideration a company's environmental impact when using or purchasing their product?

Figure 8 shows the responses to the question, "Do you think ride sharing is good for the environment?". Almost half of respondents (48) stated "probably yes", that ride sharing is good for the environment. 12 participants said that "definitely yes" ride sharing is good for the environment. 27 of respondents said that they were unsure and that ride sharing "might or might not" be good for the environment. 13 respondents believe that ride sharing is "probably not" good for respondents and only 2 people believe that ride sharing is "definitely not" good for the environment.

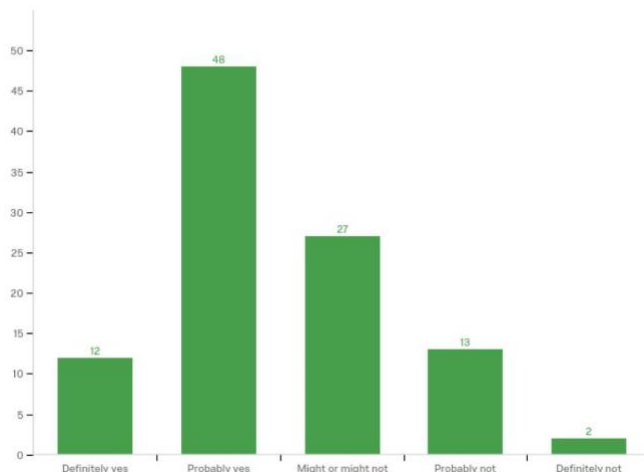Do you think ride sharing is good for the environment?

Figure 8: Do you think ride sharing is good for the environment?

Table 2 shows the effect that weather has on the decision to use Uber or Lyft. 79.41% of participants stated that weather does affect their decision to use these apps. Only 20.59% of people said that it does not impact their decision

Does weather affect your decision to use these apps?

#	Answer	%	Count
1	Yes	79.41%	81
2	No	20.59%	21
	Total	100%	102

Table 2: Does weather affect your decision to use these apps?

Figure 9 shows a comparison between average income of the participants' family and the option to pay more for an electric vehicle if it was available for Lyft and Uber. Almost half of participants (48) have family incomes over $100,000 yearly and would choose an electric vehicle "depending on how much more" it would be. 14 of respondents with family incomes over $100,000 yearly said they would not pay more for an electric car. There were zero participants

that have family incomes of less than $50,000 that would choose to pay extra for an electric vehicle.

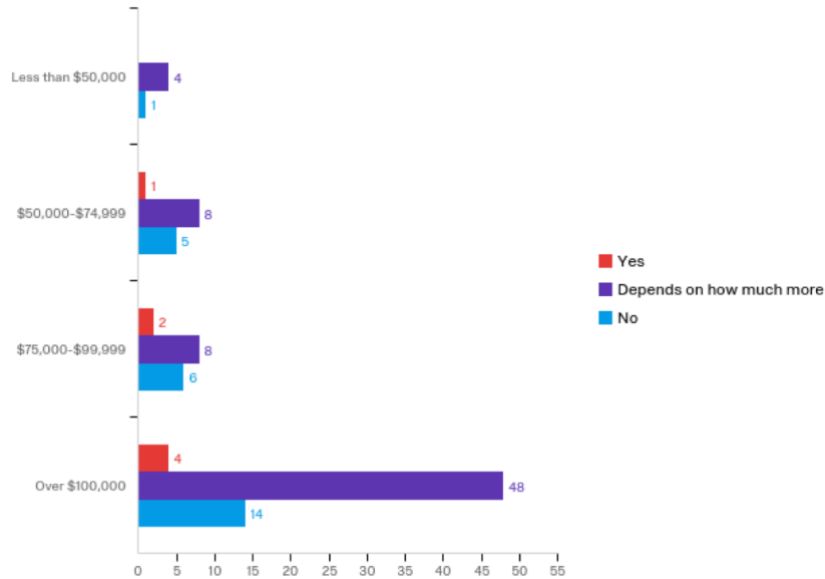Would you pay more if there was an option on Lyft/Uber exclusively for electric vehicles?

Figure 9: A comparison between average family income and likelihood to pay extra for an Uber or Lyft that was electric

Figure 10 shows the likelihood of participants to use Uber or Lyft over public transportation. 34 participants said that they were "extremely likely" to use a vehicle sharing app over public transportation. 44 respondents said that they were "somewhat likely" to use a Uber or Lyft over public transportation. 23 participants said that they were either "neither likely nor unlikely" or "somewhat unlikely" to choose vehicle sharing apps over public transportation. Only 1 participant out of the 101 surveyed stated that they would be "extremely unlikely" to choose a vehicle sharing app over public transportation.
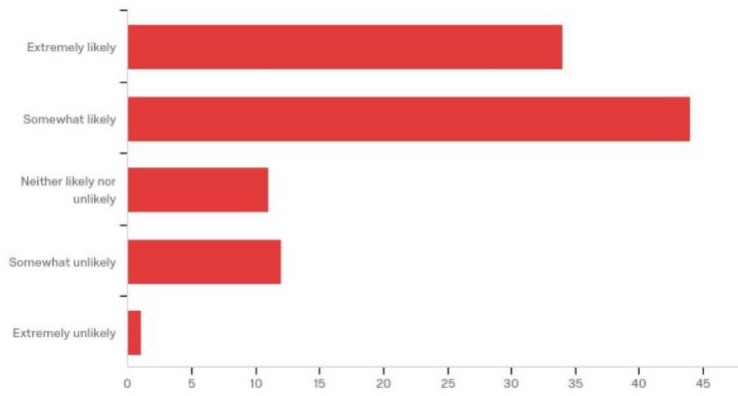
How likely are you to use a vehicle sharing app over public transportation?

Figure 10: How likely are you to use a vehicle sharing app over public transportation?

V. Discussion

Factors That Lead to More Ride Sharing

Based off of our research we found that there has been a dramatic rise in using app services such as Lyft and Uber over other transportation methods that are friendlier for the environment. One reason for this is due to convenience. As is depicted in Figure 10, 78 participants are either extremely likely or somewhat likely to choose a ride sharing app over using public transportation. When asked why they would choose ridesharing over public transportation, survey participants most commonly responded with "convenience" and "efficiency". A Lyft or Uber can pick up their customer right outside their home or dorm so BC students are evidently attracted to to the speed and increased accessibility of this form of transportation. While the MBTA green line is located only a few steps from campus, it has received a reputation for being extremely inefficient and unreliable. Time is immensely valuable to college students so when there is a faster option, it is likely to be the most popular option. It was also revealed in our research that 38.24% of students had taken an Uber or Lyft to get from one part of campus to another (Figure 2). This is over a third of our survey participants which is telling of the way that students decide to use their time. BC's campus is not large relative to the size of the student body. It is easily walkable but even still there are bus and shuttle options offered at no cost through the university. Although there are these two sustainable ways to get around the campus, a significant portion of students are still opting to allocate money towards the quickest, most convenient option. Lastly, Table 2 reveals that 79.41% of survey participants claim that weather affects their decision to use these apps. Almost every single one of these respondents listed "rain" as a reason to use one of these ride sharing apps. This contributes to the idea that students value convenience so they do not want to wait for a bus or walk when it is raining. Our research shows that convenience and ease seems to trump environmental awareness and protection.

Impacts on Human Health and the Environment

This desire for convenience is not only potentially harmful to human health but also to the environment. The majority of students that responded to our survey are using these ridesharing apps to go short distances that they could easily walk or bike. Almost 70% of

surveyed students said their average shared ride was 10-20 minutes and 18.63% of respondents stated that their average Uber or Lyft ride is 5-10 minutes (Figure 3). The majority of students likely take Uber or Lyft 10-20 minute distances because it would take a decent amount of time to walk those distances albeit possible. Using ridesharing to travel 5-10 minutes is definitely a distance students could have walked had these ridesharing apps not offered the speed and convenience that they do. The idea that students are using these apps in excess to save time means they may not be prioritizing their health and physical exercise. Physical exercise is critical to human health but it appears the convenience of ride sharing has decreased the amount of physical activity some students are receiving. The increased use of ride sharing apps is harmful to student health in this regard but is also an environmental hazard as Murtaza Heider points out in his paper. Just because students are calling an Uber or Lyft to get from one part of campus to another does not mean the BC busses and shuttles or the T stops running due to lack of demand. These public forms of transportation will continue to run on schedule whether they are completely full or only carrying one passenger. As Haider said, the increased use of these ridesharing apps will just contribute to an increased level of emissions (Haider, pg. 14). Another revealing statistic that supports this idea of increased emissions is that over 41% of surveyed students that have a car on campus said they used these ride sharing apps 1-2 times in the last week and a little under 30% said they used these apps 3-5 times in the last week (Table 1). This means that students are not getting rid of their cars simply because these apps exist but instead are using them to complement their own vehicle use. At first glance, it appears that the ride sharing model would be extremely beneficial in reducing emissions and therefore environmental degradation, however, a more in depth analysis reveals that this might not be the case.

Another harmful yet understated component of this model is vehicle idling. Due to the fact that an Uber or Lyft driver must find their passenger at a specific pick up location on campus, there is a lot of idling. About 29.41% of Boston College students said it takes them 3 to 5 minutes to reach their Uber or Lyft (Figure 4). This may be due to the fact that students typically wait inside until their driver arrives because of Boston's inclement weather. Additionally, there is often confusion as to where Uber or Lyft drivers can pick students up on campus leading to more waiting around. A wait time of 3-5 minutes may seem insignificant but the aggregate of almost a third of the surveyed population amounts to a range of 90-150 minutes of idling everytime this population calls a Lyft or Uber. This idling presents some serious health

risks such as aggravating asthma and allergies as well as heightening chances of getting respiratory and cardiovascular diseases (NC DEQ). Ride sharing increases the number of individual vehicles idling on campus by a significant amount posing serious health risks to students on campus. Idling also causes the release of more emissions into the atmosphere. When examining the ride sharing model, idling is a component often left out when it should be taken more seriously

Environmental Awareness on Campus

Another significant finding in our research was the environmental awareness of students on BC's campus. One of our original research goals was to understand why students are making certain decisions in terms of transportation in their everyday lives. The survey revealed some interesting habits and choices made by students. For example, when asked if they take into consideration a company's environmental impact when using or purchasing their product, 32.35% of respondents said "never" (Figure 7). Almost half responded "sometimes" and only 4.9% said "always" (Figure 7). This is a really interesting result considering the education and ethics of Boston College students. The majority of students on campus have been exposed to environmental issues to some extent. Additionally, there is a strong emphasis on decision making and ethics embedded into the curriculum at BC. When you take these factors into account, this sample size is most likely skewed towards caring more about environmental issues. This means if you were to take a larger sample size outside of BC's campus, it is possible that the "never" percentage would be even higher.

Another interesting idea is that this generation of young adults is characterized by caring more about the ethics of companies and pushing for more corporate social responsibility. Because of this, some of these results may come as a surprise. The following question asked in the survey was "Would you pay more if there was an option on Uber/Lyft exclusively for electric vehicles?". The majority of students (68%) responded with "depends on how much more" while a quarter of respondents said "no" (Figure 6). Only 7% of students responded with a definite "yes" (Figure 6). When socioeconomic status is taken into account, the results show some interesting statistics. In the family income bracket of over $100,000, slightly over 21% of survey participants said they would definitely not pay for an electric vehicle option (Figure 9). On the other end in the family income bracket of less than $50,000, just 20% of survey respondents said

they would definitely not pay for that option (Figure 9). In the family income bracket from $50,000-$99,999, almost 37% of respondents said they would definitely not pay for this option (Figure 9). The results from the highest income bracket are the most significant given that we had 66 respondents in this bracket compared to only 5 respondents in the lowest bracket. These results show that students may be aware of certain environmental issues but may not have the means to act on them.

The survey results also show, however, that students are making certain decisions without necessarily knowing how they impact the environment. The fact that 48 of our participants believe ride sharing is "probably" good for the environment and 12 participants think it "definitely" is represents the idea that there is imperfect information when consuming goods or services in the economy (Figure 8). These responses prove that the survey respondents are not aware of the potential harms of the ride sharing model. If there was more information easily accessible to students, they could make more informed decisions and know how these decisions affect their health and the environment. For example, more students may take a LyftLine or an UberPool over a regular Lyft or Uber if they knew the environmental benefits. As mentioned in the introduction, Georgina Santos highlights the emissions reductions that would be achieved if all bus and car trips were replaced by the carpool model of LyftLine and UberPool. Our survey found that students' responses were pretty evenly distributed when asked how likely they were to choose one of these services instead of a regular Lyft or Uber (Figure 5). Only 18 respondents said they were extremely unlikely to select LyftLine or UberPool. It would be interesting to see how these decisions might be changed by the exposure to research like Santos'.

Limitations and Concluding Thoughts

This research process did pose some limitations, however, these limitations opened doors for different kinds of research. One of the main limitations was surveying the BC student population and not a larger population. For the purposes of our research it was necessary to conduct a survey involving BC students but this sample size is likely to have some bias attached to it. For example, almost 65% of our participants reported having an approximate family income of over $100,000. This means they have more access to different forms of transportation solely due to socioeconomic status. Additionally, every survey respondent is actively pursuing higher education which also contributes to biased results. The second biggest limitation was limited

access to quantitative data. We reached out to both Lyft and Uber in an attempt to obtain data on the number of pickups and drop offs on or around campus. They unfortunately could not provide this data limiting the amount of quantitative data we could work with. That being said, this limitation shifted our focus to more sociological factors. We decided to create a survey with several questions aimed at understanding how and why students make certain decisions in terms of transportation habits and the environment. The results we received revealed less about the amount of emissions and more about the behaviors of students on campus. There are limitations with every research project so we learned to acknowledge them and then work with them.

Some of the results we received were predicted while some surprised us. We learned how much our surveyed population values time and convenience and is willing to spend the extra money to have these two things. The results also proved our predictions that the ride share market is growing and students are taking advantage of apps like Uber and Lyft. The convenience and reliability of this form of transportation has made Uber and Lyft extremely successful and attractive to many. A review of the literature in conjunction with our results proved that the ride sharing model may be harmful for the environment as well as human health. The results also showed that many people believe that ride sharing is good for the environment meaning this knowledge is not easily accessible to them. We were able to better understand the decision making process of our survey participants through the responses we received. We were surprised by responses that revealed many students do not prioritize the environment when making decisions. However, with this information we have learned how BC students can be more informed consumers and make better decisions not only for themselves but for the environment as well.

VI. Recommendations

Designated "Green" Pick Up Location

After learning about the harms of vehicle idling and how much of it results from the use of ride sharing apps, we believe a designated pick up location would benefit the student body of Boston College. To limit the number of idling vehicles in various locations nearby dorms, BC could create a designated pick up spot for ridesharing vehicles that is not directly next to a dorm and is surrounded by trees. The trees would be there to absorb excess CO_2 and hopefully offset

some emissions. Placing the location away from dorms could limit potential adverse health effects experienced by students as a result of idling vehicles. Additionally, there could be places for students to sit so they might be more inclined to wait for their car outside instead of waiting inside and having their Uber or Lyft driver idle while looking for them. Uber is currently experimenting with "suggested pick up" locations on the app to make the rider experience more seamless (Constine). Because this feature already exists, it would be relatively simple to implement this "green" pick up location on campus.

Increased Frequency and Awareness of Shuttle Services

Many surveyed students listed their primary reason for using ridesharing apps as groceries and errands. BC currently has shuttle services to Star Market and the shops at Chestnut Hill but they only run one and two days a week respectively. Additionally, they only run every hour so if a student only needed a few groceries this student would have to wait a long period of time before the shuttle came back to pick them up. If BC were to increase the frequency of these shuttles, more students may take advantage of these services decreasing the number of individual vehicles on campus. As mentioned above, these shuttles run on schedule even if a small number of students are using them. If students are choosing ride sharing vehicles over the BC shuttles, it is only going to increase the amount of emissions. Another recommendation in regards to the shuttle service is more advertising. Most students are unaware that BC offers these services free of cost. If the shuttles increased their frequency and advertised more often, more students may choose to take advantage of the already operating shuttles rather than taking a separate vehicle.

Required Canvas Module

Considering almost a third of surveyed students said they never consider a company's environmental impact when using or purchasing a service or product, we believe a basic educational module on canvas to increase environmental awareness of BC students would be beneficial. This module could also include the environmental impacts of big companies. This would make students more informed consumers and allow them to make more informed decisions in regards to the environment and their purchasing habits.

Follow-Up Survey

After analyzing the results of our survey we believe implementing the canvas module and creating a follow-up survey could be beneficial. Our research revealed that a significant portion of students do not take environmental factors into consideration when consuming in today's economy. The survey also revealed that students have asymmetric information. It would be beneficial to offer an informative module to our survey participants and then have them take a follow-up survey to see how their decision making might change. This would not only be informative to the researchers but it could also create real change by providing students with more information to make better decisions when purchasing products or services.

VII. References

Clewlow, Regina R., and Gouri Shankar Mishra. "Disruptive transportation: The adoption, utilization, and impacts of ride-hailing in the United States." *University of California, Davis, Institute Transportation Studies, Davis, CA, Research Report UCD-ITS-RR-17-07* (2017).

Constine, Josh. "Uber Is Now Testing 'Suggested Pickup Points' – TechCrunch." TechCrunch, TechCrunch, 8 July 2015, techcrunch.com/2015/07/08/uber-suggested-pickup-points/.

Gehrke, Steven, A. Felix, and T. Reardon. "Fare choices: A survey of ride-hailing passengers in metro Boston." *Metropolitan Area Planning Council* (2018).

Gehrke, Steven, and Timothy Reardon. "Further Evidence of the ride-hailing effect in Metro Boston and Massachusetts." *Metropolitan Area Planning Council* (2018).

Haider, Murtaza. "To Uber or Not to Uber: That is the Question." *Repéré à http://stream1. newswire. ca/media/2015/09/29/20150929_C6395_PDF_EN_508957. pdf* (2015).

Joireman, J. A., Van Lange, P. A. M., & Van Vugt, M. (2004). Who Cares about the Environmental Impact of Cars?: Those with an Eye toward the Future. Environment and Behavior, 36(2), 187–206.

Marshall, Aarian. "Uber and Lyft Haven't Revolutionized the American City-Yet." *Wired*, Conde Nast, 14 Oct. 2017, www.wired.com/story/uber-and-lyft-havent-revolutionized-cities/.

Rodier, Caroline Jane. "The Effects of Ride Hailing Services on Travel and Associated Greenhouse Gas Emissions." (2018).

Santos, Georgina. "Sustainability and Shared Mobility Models." *Sustainability*, vol. 10, no. 9, 2018, pp. 1–13., doi:10.3390/su10093194.

Schor, Juliet. "Debating the Sharing Economy." *Great Transition Initiative*, Oct. 2014, pp. 1–13.

"Why Is Idling Harmful?" North Carolina Department of Environmental Quality, deq.nc.gov/about/divisions/air-quality/motor-vehicles-air-   quality/idle-reduction/why-idling-harmful.