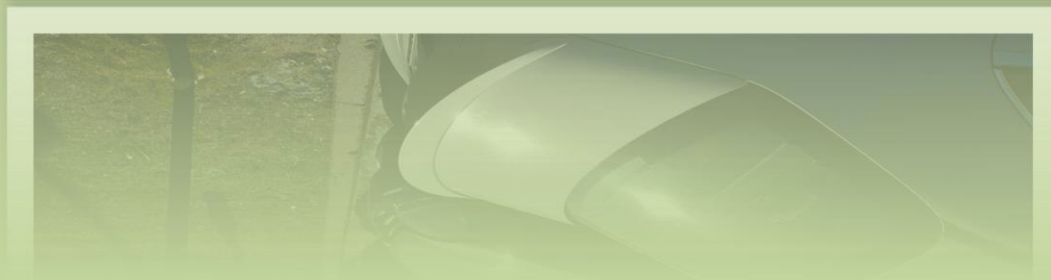
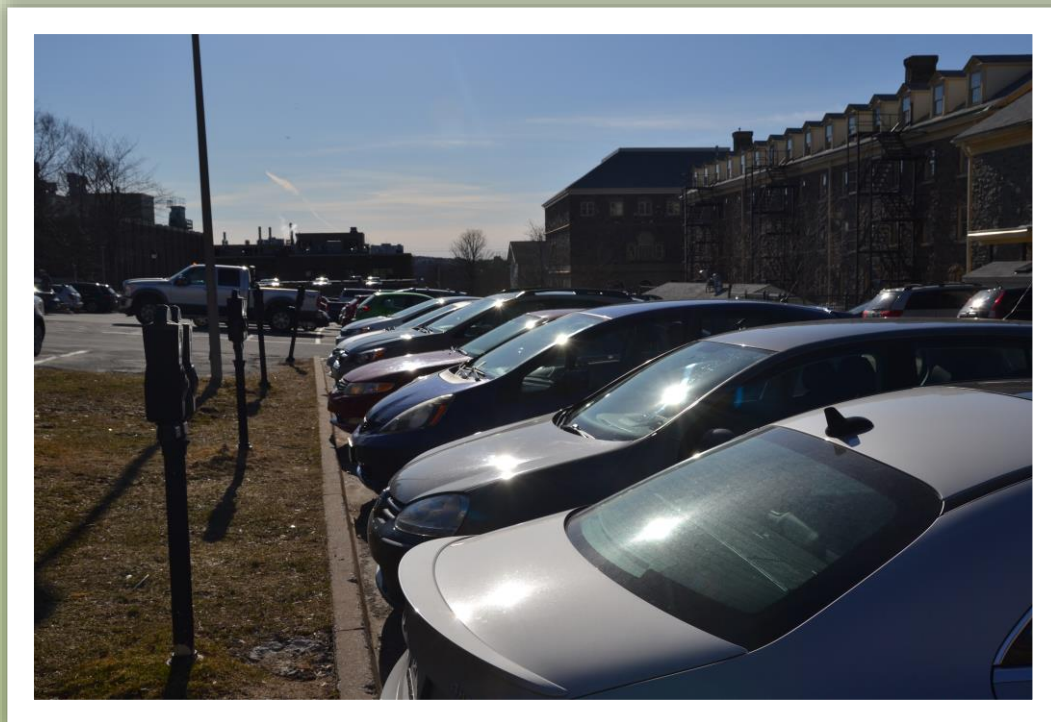


What do students perceive to be the social, economic and environmental benefits of making Dalhousie's Studley campus car-free?

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ABSTRACT

Dalhousie University has published several statements and plans to promote sustainability on campus. In Dalhousie's recent campus master plan, there is a proposal to remove on-street parking along University Avenue to make room for bicycle lanes and to encourage students to cycle to school. Many other universities across Canada are also partaking in similar practices, and are even transforming into car-free zones and pedestrian thoroughfare.

With the removal of parking spaces on Dalhousie campus, this report examines Dalhousie students' desirability of car-free campus. The desirability was determined by several survey questions outlining the social, economic and environmental concerns surrounding cars on Studley Campus. Our survey included a combination of qualitative and quantitative research questions. A total of 199 surveys were completed by students using haphazard and snowball sampling techniques.

Our survey has determined that students at Dalhousie University see some benefit from the elimination of cars on Dalhousie's Studley campus. Our literature has determined that car-free zones contribute to the overall social, economic and environmental well-being of a population. Although, our survey results have concluded that students at Dalhousie University see only social and environmental benefits.

We recommend using the information to further investigate the desirability and feasibility of making Studley campus car-free with the hopes of increasing Dalhousie's reputation as a sustainable university. It is important to note that students are not getting the maximum amount of enjoyment from their social and environmental experience on campus. A majority of the students surveyed in this study see a benefit from car-free campuses, therefore we believe Dalhousie University should further investigate into this topic.

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1.0 Introduction

1.1 Background Information

Vehicular traffic on university campuses is a common occurrence that has the potential of causing many environmental, social and economic issues within the surrounding community. According to a study done in Barcelona, Spain, the contaminants from car exhaust not only affects the air quality of the surrounding microenvironment, but the health of cyclists, pedestrians, and even the drivers themselves (de Nazelle et al., 2012). In addition to health risks, cars on campuses pose safety risks for pedestrians and cyclists, especially during peak hours for the university (Kaplan, 2009). In some cases, universities were originally designed to be pedestrian friendly, so the influx of vehicle traffic causes congestion and reduces pedestrian and cyclist safety (Kaplan, 2009). According to a study done at Kent University in Ohio, 1 in 6 students who cycle and walk to school noted their concern for their safety due to traffic on campus (Kaplan, 2009). Economic concerns that arise from vehicular traffic are the cost of using and maintaining a motor vehicle. Traffic congestion, pollution and accidents also result in significant direct and indirect costs. It is because of these issues that we are focussing our research on the potential benefits of making Dalhousie's Studley campus car-free.

1.1.1 Dalhousie as a Sustainable Campus

In 2010, Dalhousie University developed a Sustainability Operations Plan to promote sustainable initiatives on campus (Salloum, Habib, 2014). Dalhousie University has published several sustainability statements addressing that universities have a tremendous opportunity to influence civic life, and have made commitments to adhere to principles of sustainability that would contribute to society (Salloum, Habib, 2014). Planning, integration, efficiency, continual improvement and innovation have been their guidelines in doing so

(Salloum, Habib, 2014). To integrate these guidelines, Dalhousie University has begun discussing some ideas and plans that may support the eventual removal of cars completely from campus (R. Owens, personal communication, January 12, 2016). In the campus master plan, there is a proposal to remove on-street parking along University Avenue to make room for bicycle lanes and encourage students to cycle to school (Layne, 2015). Additionally, there are notions to close the space on LeMarchant Street in front of the Killam Library and the north side of University Avenue to cars to increase walking space for pedestrians (Layne, 2015).

1.1.2 Car Free Campuses

Campuses across Canada are transforming into pedestrian-only zones, free of all motorized vehicles. University of Toronto, Ryerson, Windsor, McGill and University of British Columbia have piloted successful projects to remove motor vehicles from highly populated pedestrian areas on campus (Johnson, 2014). Pedestrianization is part of a global movement that goes beyond campus, spurred in part by concerns over vehicle emissions and climate change (Johnson, 2014). We compiled information on the challenges or successes experienced in similar projects which helped us gain a better understanding of the acceptability of such a project.

1.2 Research Question and Objectives

This study examines the question of whether students perceive there to be social, economic, and environmental benefits to removing cars from campus. Since there is already a proposal in the University's master plan to remove parking spaces, we wanted to investigate further into whether or not students would support a full removal of cars from campus. Additionally, we wanted to collect data on the different types of transportation students take to get to school, as well as how far they are traveling to and from school. From this, we were

able to identify patterns of how far students are traveling when they drive, and the longest distance students are willing to walk to school. Finally, our objective was to determine if students would support a car-free policy on Studley campus.

2.0 Research Methods

2.1 Experimental Design

Our research was conducted using a combination of qualitative and quantitative methods. This is known as mixed methodology, and is used to improve the credibility and reliability of the results we receive (Crowell, 2009). We conducted short surveys with students on Studley campus, both online and in person in order to understand what students may perceive to be the social, economic and environmental benefits to removing cars from Studley Campus. We used non-probabilistic sampling techniques because a complete representativeness of Dalhousie's entire student body was not statistically possible for the time frame. We used a haphazard method so we could randomly sample students walking by, and then purposefully separated them into driver and non-driver categories. We also used a snowball technique asking students to refer their friends to us both in person and online to reach the widest audience possible.

2.2 Sample Population

The sample population for our research included Dalhousie students, inclusive of undergraduate and graduate students. We did not include Dalhousie staff, faculty members, or alumni in our research in order to limit our scope to the students' perspective. The entire Dalhousie student population is comprised of 18,500 students (ACUDS, 2014). Our study only involved the Studley campus, which has approximately 15,000 students; this excludes the health professions, engineering students and architecture students (ACUDS, 2014).

Based on our population size, a confidence level of 95%, and setting a margin of error between 5% and 10%, our target population sample size was between 96 and 375 participants (Appendix B). In order to complete our study in a timely manner, whilst not sacrificing accuracy, we surveyed a total of 199 students.

2.4 Procedure and Justification

We chose Studley campus because we believed it was the most accessible for our project, and would have the most impact if it were made car-free. Studley campus has the largest student population at Dalhousie University, making it the most feasible to obtain a diverse sample population (ACUDS, 2014). We could not consider Carleton Campus because there are hospitals located on the campus, making it difficult to establish a car-free policy.

A survey was chosen as the most appropriate research tool to gain information from a large number of students over a limited time period. Members of our group distributed the surveys in person in the Killam Library, in various classes, and online. Surveys were distributed in person both in classes in the afternoon, and in the Killam in the evening. Online surveys were posted at 8:00 a.m., and again at 8:00 p.m. The locations were decided based upon the high frequency of students coming from a diverse number of faculties. Students were read an ethics form prior to completing the survey, and given access to it online. The survey required ethical consideration because the questions required the opinion and personal behaviour of the participant. The participants filled out the survey independently, but were able to ask questions to the surveyor if needed. An online version of the survey was made on Survey Monkey, and was distributed on Facebook by the group members. We chose to conduct online surveys via Facebook because it would reach a large number of Dalhousie students immediately, optimizing the number of results we would receive. Furthermore,

online surveys provided the opportunity for students to give more thoughtful answers because they were able to do it on their own time.

The survey was composed of 8 questions. It was found in pilot testing that the survey took on average less than 5 minutes to answer. The survey included a combination of Likert scale, multiple choice, short answer, and a combination of closed and open-ended questions. A copy of the questions can be found in Appendix A.

2.5 Reliability and Validity

Our project was reliable as our procedures were consistent in every survey delivered. Our entire group created a uniform survey that was delivered to various participants. When asking for students to fill out surveys, we all used the same script. One of the issues surrounding reliability was the use of both in person and online surveys. We decided to use both survey methods to reach the widest audience possible. Although we had two different methods of surveying, we tried to keep it uniform. We used the same questions and asking methods for both online and in person surveys

The questions of the survey were designed to gather the most useful information. The beginning of our survey collected demographic information so we could garner an understanding of who was using which forms of transportation and why. This was followed by questions that gave us a firm understanding of student support of a car-free Studley campus and what parameters that may have.

Our research was very dependable. Throughout the survey process we had regular check-ins with our mentor. We reviewed all of the survey questions with our mentor and professor and made necessary changes before distributing them. We piloted all of our survey questions to make sure they all garnered useful information. We discovered that question two was confusing students and we were not getting the answers we were expecting. We

discussed with our mentor and professor how we could best use the data that we collected from this question.

Every survey was stored in a safe location and then uploaded onto an online database. The data was recorded and easily traceable back to each survey, which was given a placeholder number up to 199. We took special care to read the open ended questions and not to change wording so that there was a fair representation of what participants wanted to say. The only open-ended question answers that we didn't take into account were the ones that did not provide meaningful data (joke answers, or swearing). Although the responses were different from our original thoughts (most people didn't actually want to eliminate cars altogether) we made sure that all of our statements and conclusions reflect the data we collected, and not to let our own bias come through.

2.6 Limitations and Delimitations

Throughout our questionnaires we encountered some limitations and a few delimitations. We used haphazard and snowball non-probabilistic sampling methods and encountered the following limitations. Although every effort was made to deliver our surveys to a diverse population, we did not have equal representation of drivers and non-drivers. Another limitation we encountered was participants not fully completing the survey, leaving some answers blank, or giving us unmeaningful data. We tried to deliver our surveys when a high volume of students were on campus, but it was impossible for us to reach every student. As we are using non-probabilistic methods we cannot guarantee our results are the views of the entire general public, but can only suggest that the results are popular opinion.

We have tried to keep our delimitations to a minimum, but in order to keep our scope narrow, a few were inevitable. One of our delimitations was focusing solely on Studley campus instead of looking at all four Dalhousie campuses. We chose to do this because the

other campuses had complications, such as Carleton campus being the location of hospitals and medical facilities, and the Truro campus not being feasibly accessible for us to study. Another delimitation was our survey scope; we only surveyed students, not faculty or staff. We made this decision as we recognized faculty and staff would have different rationale behind their driving, and we wanted to narrow our scope so we could focus on students' reactions and perspectives. Faculty and staff are also less likely to be located in the busy student centres like the Killam Library where we distributed our surveys. Another delimitation we encountered was students wanting to know the specific class this was for. Although we attempted to keep that information private to avoid bias, we answered the students who asked specifically to maintain trust. This may have influenced peoples' responses as they felt we wanted to hear a certain answer.

3.0 Results

Our survey had questions that addressed the social, environmental and economic impacts of having a car-free policy on Studley campus, in order to make it easy to organize the results. Additionally, we had questions that collected information about the demographic and spatial distribution of the participants. The following are the results we collected from our online and in-person surveys.

3.1 Demographic of sample and spatial distribution

Of the 199 surveys conducted, 72% of participants identified as non-drivers who either use a non-motorized form of transportation or carpool to access. The remaining 28% are drivers, indicating the participant drives a motorized form of transportation at least one day of the week. Within the group of drivers, 35% indicated that they commute from outside of the Halifax Peninsula. 58% of drivers live within the peninsula, and of those, 43% live

within approximately 2 km of Studley campus. Within the group of non-drivers, only 2% live outside of the Halifax Peninsula. 93% live within the Halifax Peninsula, and of those, 82% live within approximately 2 km of campus.

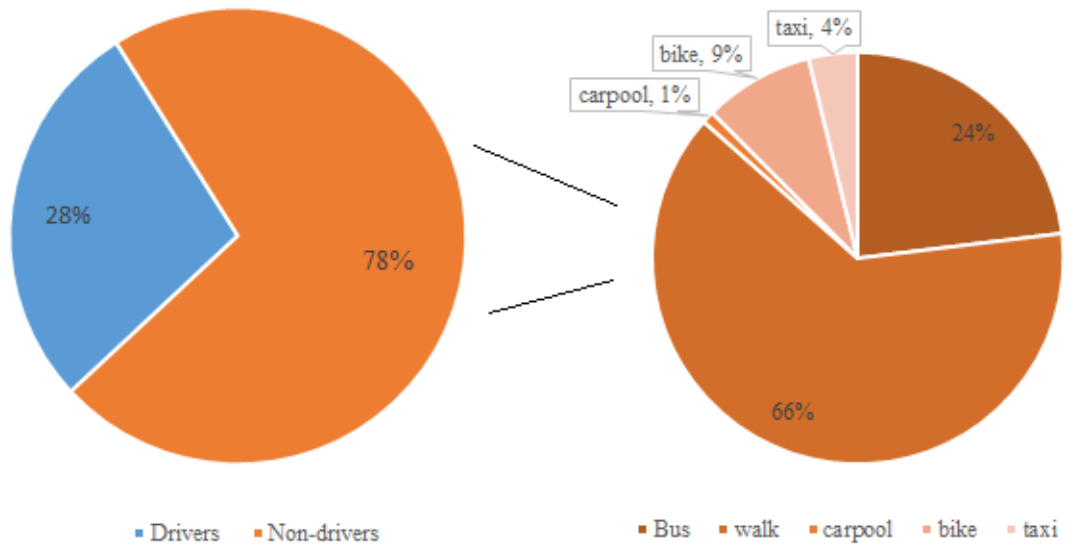


Figure 1 The demographic of the sample population of 199 Dalhousie students: (left) The drivers and non-drivers, (right), the proportion of non-drivers who bus, walk, carpool, bike or taxi.

The figure below illustrates the spatial distribution of the participants we surveyed. We asked participants to provide the closest intersection to where they live so we could have an idea of how far they were commuting each day. We chose to create a map in order to display the difference in distance that drivers and non-drivers commute to get to Studley campus.

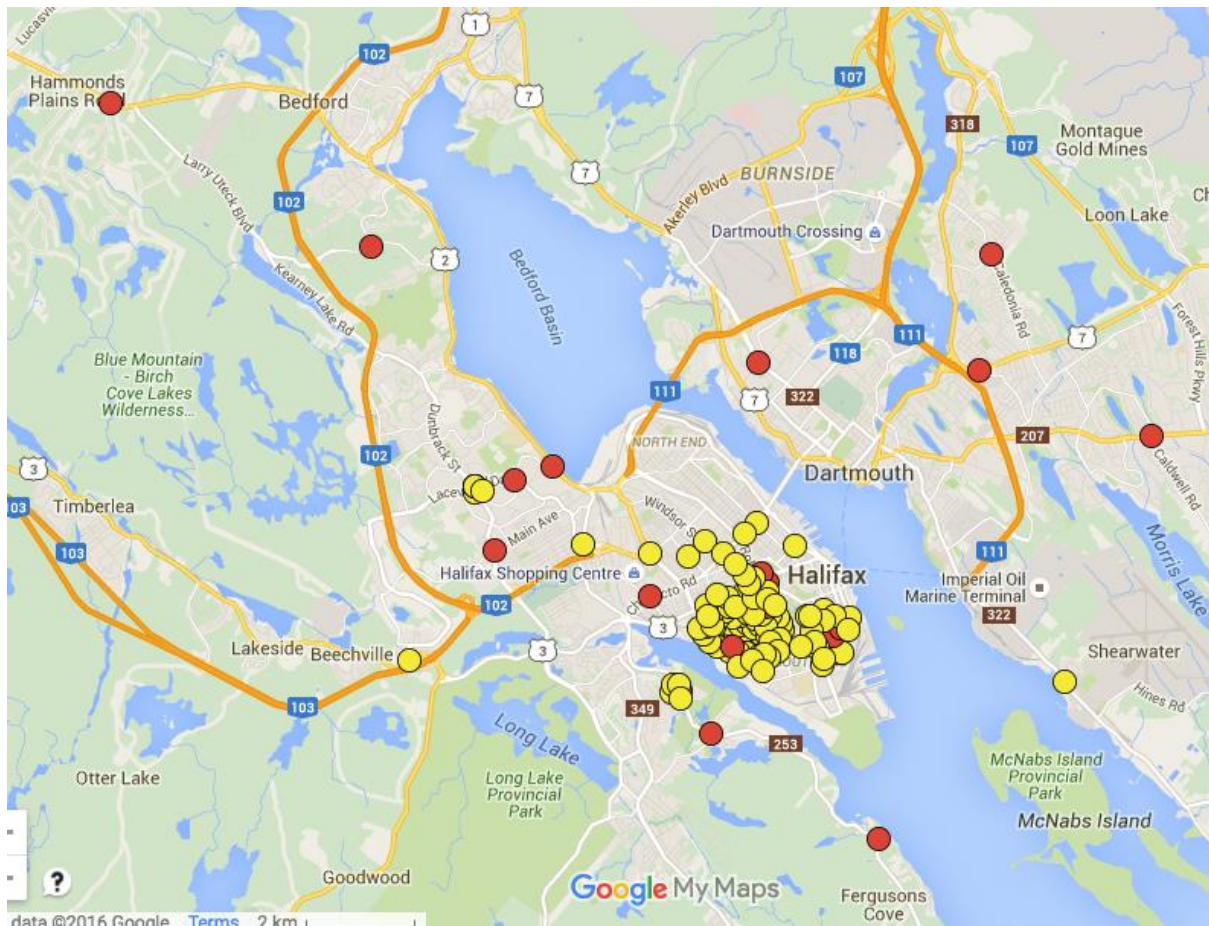


Figure 2: This map depicts the distribution of students. Yellow depicts drivers whereas red depicts non-drivers.

3.2 Economic Benefits

Our survey questions number 4 and 7e, focused on the economic impacts of driving. These questions discuss the total transportation costs and thoughts on whether the elimination of cars would affect these costs.

What is the average cost per month for your primary mode of transportation?

Drivers: Students who are drivers generally spend a higher amount of money on their transportation costs than non-drivers. Drivers spend between \$26-\$75 on gas, \$0-\$25 on parking, and \$0-\$25 on maintenance. Overall, car expenses cost students an average of \$26-\$50 a month.

Non-Drivers: 82% of non-drivers spend an average of \$0-\$25 with additional costs on the occasional taxi or airport shuttle.

Would transportation costs decrease by eliminating cars?

Drivers: Drivers who were coming from outside of the peninsula disagreed or strongly disagreed that the elimination of cars would decrease their transportation costs. Drivers coming from within the peninsula on average agreed that eliminating cars would decrease their costs.

Non-drivers: Non-drivers for the most part disagree/ strongly disagree (57%) that the elimination of cars would not decrease their transportation costs. The students who agreed with this statement all fell under \$75 a month, and those who strongly disagreed were spending under \$25.

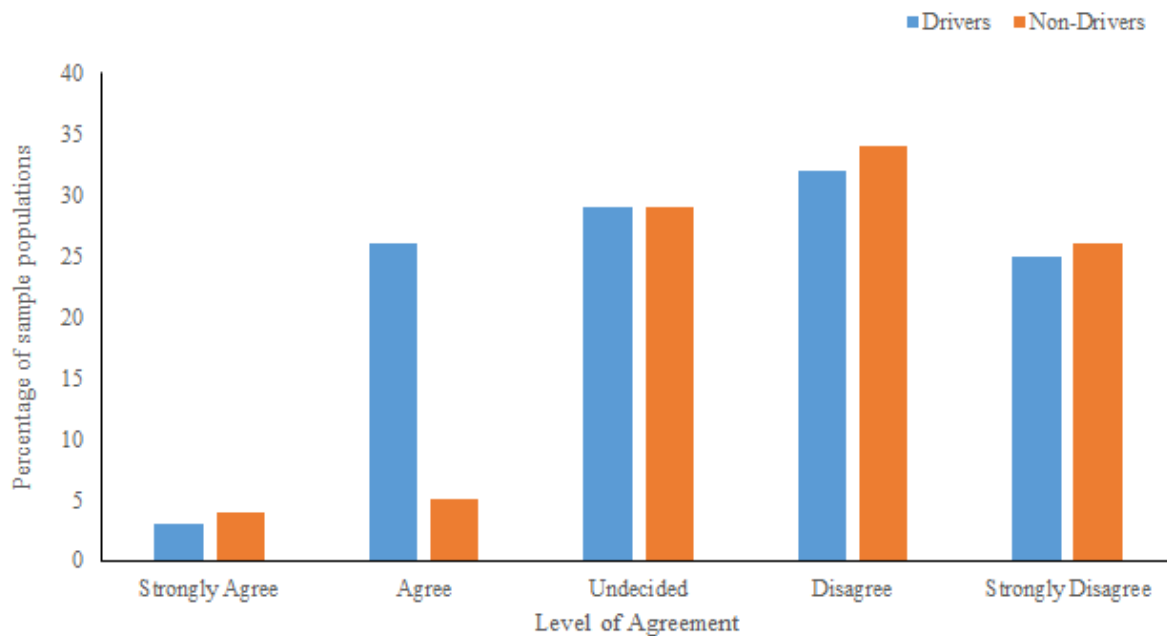


Figure 3: The results separated by drivers and non-drivers to the Likert question: My transportation costs would be decreased if cars on Studley campus were eliminated.

How many days a week did drivers park on University Avenue?

Students who drive to campus for the most part do not park on University Avenue (63%).

The students who did park on University Avenue parked there an average of 2.3 days, with, a mode of 1 day per week.

3.3 Social Benefits

Questions 6, 7a, and 7b, were aimed at gathering information on the social impacts of eliminating cars on campus. We asked participants if eliminating cars would improve the safety and enjoyment of their experience on campus.

Would eliminating cars improve your safety on campus?

Non-drivers agree that eliminating cars will improve the safety on campus, whereas drivers do not perceive it as an issue, or disagree.

Drivers: A majority of drivers believe removing cars would not improve their safety on campus. 34% of drivers were undecided, 26% disagreed, and 30% strongly disagreed with this statement.

Non-drivers: 35% of non-drivers agreed that removing cars would increase the safety of their experience on campus, while 23% were undecided and 21% disagreed with this statement.

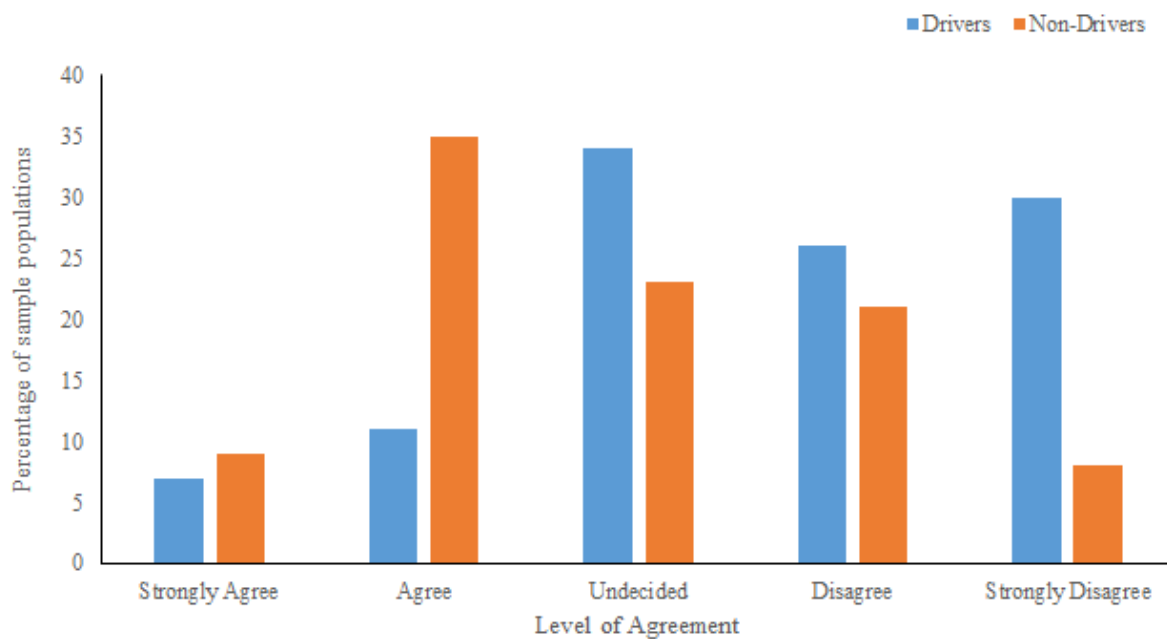


Figure 4 : The results separated by drivers and non-drivers to the Likert scale question: " Eliminating cars on Studley campus would improve the safety of my experience on campus".

Would eliminating cars improve your enjoyment on campus?

More non-drivers see a benefit to their enjoyment by removing the cars from campus than drivers.

Drivers: A majority of drivers disagree with this statement and there is a tie between participants who are undecided and agreed. 32% disagree, while 21% either agree or are undecided.

Non-drivers: A majority of non-drivers believe that eliminating cars would improve their enjoyment on campus. A higher percentage of non-drivers strongly agree with this statement compared to drivers. A quarter of drivers were undecided, while 20% disagreed.

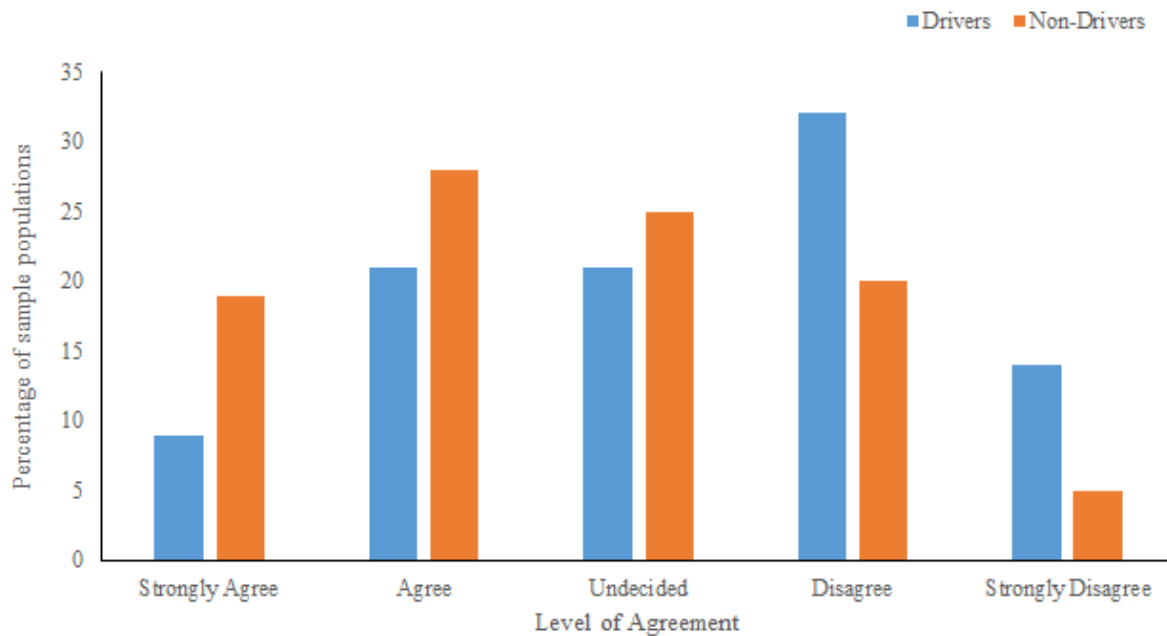


Figure 5: The results separated by drivers and non-drivers to the Likert scale question: "Eliminating cars on Studley campus would improve the enjoyment of my experience on campus".

At what time of the day do you feel most safe on campus?

A majority of participants said they feel safe on campus between the hours of 9:00 a.m. and 6:00 p.m. 38% of participants said they felt either somewhat not safe, or not safe at all during the hours of 9:00 p.m. and 6:00 a.m., and finally, 36% of participants said they did not have an opinion on the safety of campus between the hours of 9:00 p.m. and 6:00 a.m.

3.4 Environmental Benefits

The questions focusing on environmental impacts are 7c, 7d, and 8. These questions explored the perceived impacts cars have on the environment and gauged student reaction to the elimination of cars from campus.

Would eliminating cars improve air quality on campus?

Both drivers and non-drivers agree that eliminating cars on campus would improve air quality.

Non-Drivers: 61% of non-drivers either agreed or strongly agreed, 20% of non-drivers are undecided. The remaining percentages either disagreed or strongly disagreed.

Drivers: 54% of drivers either agreed or strongly agreed, 29% are undecided. The remaining percentages either disagreed or strongly disagreed.

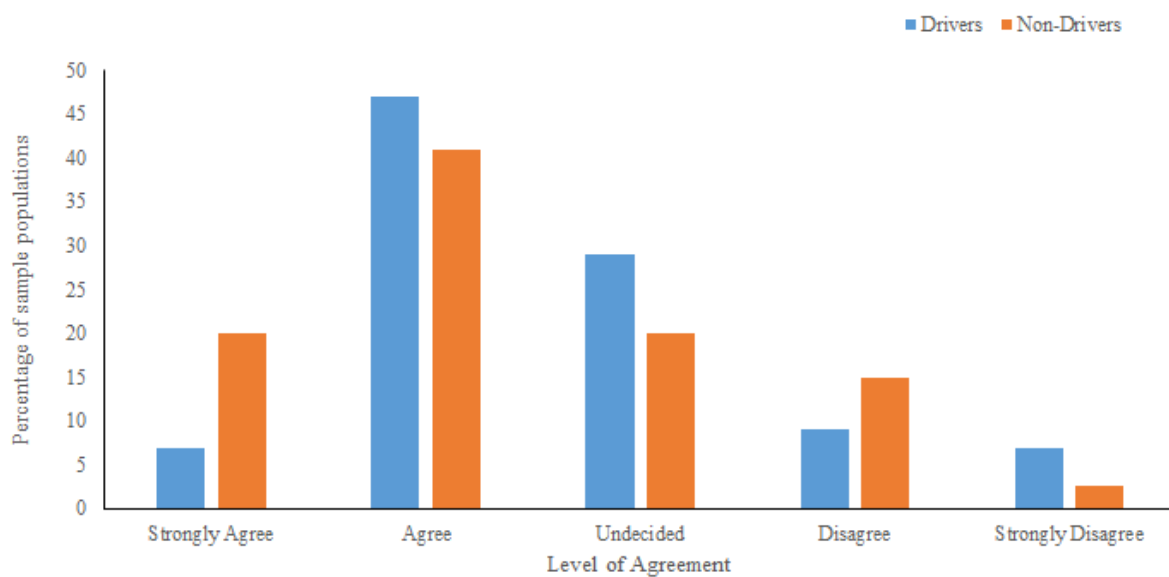


Figure 6: The results separated by drivers and non-drivers to the Likert scale question: "Eliminating cars on Studley campus would improve the enjoyment of my experience on campus".

Would eliminating cars on campus increase Dalhousie's impact on local environment?

Both drivers and non-drivers agree that having cars on Studley campus has an impact on the local environment.

Non-Drivers: 74% of non-drivers either agreed or strongly agreed, 12.5% of non-drivers are undecided. The remaining percentages either disagreed or strongly disagreed.

Drivers: 69% of drivers either agreed or strongly agreed, 16% are undecided. The remaining percentages either disagreed or strongly disagreed.

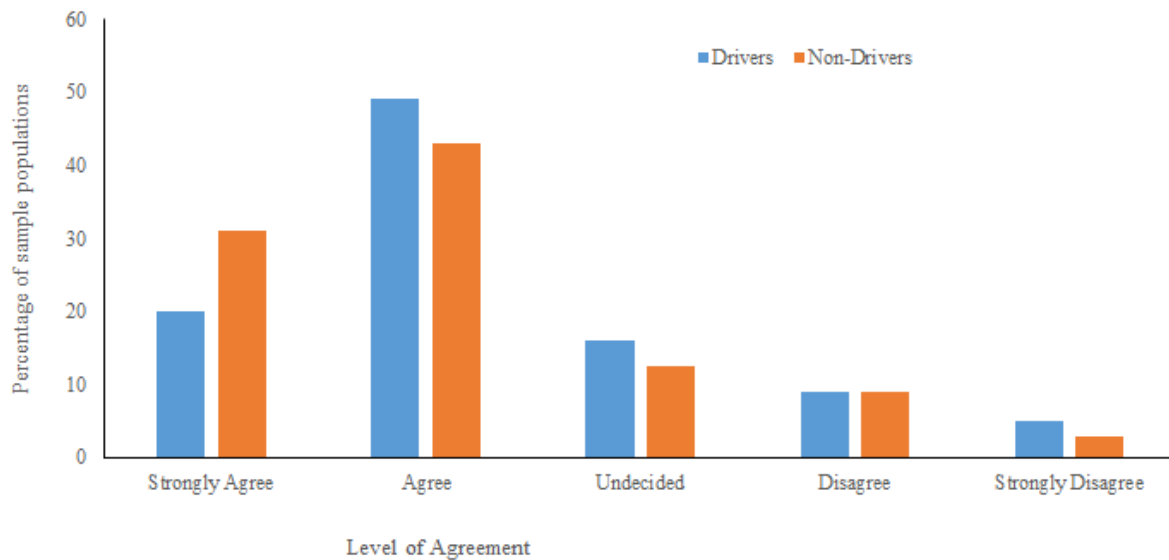


Figure 7: The results separated by drivers and non-drivers to the Likert scale question: "Having cars on Studley Campus increases Dalhousie's impact on the local environment".

Should cars be eliminated from Studley campus?

Drivers: The majority of drivers do not want to eliminate cars from campus. 54% voted against the removal of cars. The majority of students who live outside the peninsula voted against a complete elimination. The reasoning stated for this was: need the parking, not driving is not an option, transit is insufficient, and unfair to students who need to drive as cannot afford housing close to campus. 29% of drivers voted for the partial elimination of cars from campus stating that it would increase the safety, but there would need to be a solution for parking. 14% of drivers voted for a complete elimination, and 92% of these students are located inside the peninsula. Reasoning for this was a better campus experience, and would prevent laziness.

Non- Drivers : The first important statistic to note is that only 2% of non-drivers live outside the Halifax peninsula. 20% of non-drivers want a complete elimination of cars as this is believed to be safer, cleaner, and to follow the lead of other Canadian Universities. 43% of non-drivers, the majority, voted for a partial elimination of cars from campus. The reasoning for this was stated as: traffic during busy pedestrian times is dangerous, banning between 8:00 a.m. and 6:00 p.m. would improve campus life, but students should still be able to have driving as an option. 34% of non-drivers did not want any elimination of cars from campus. They are concerned for students coming from far away, and do perceive cars to be an issue.

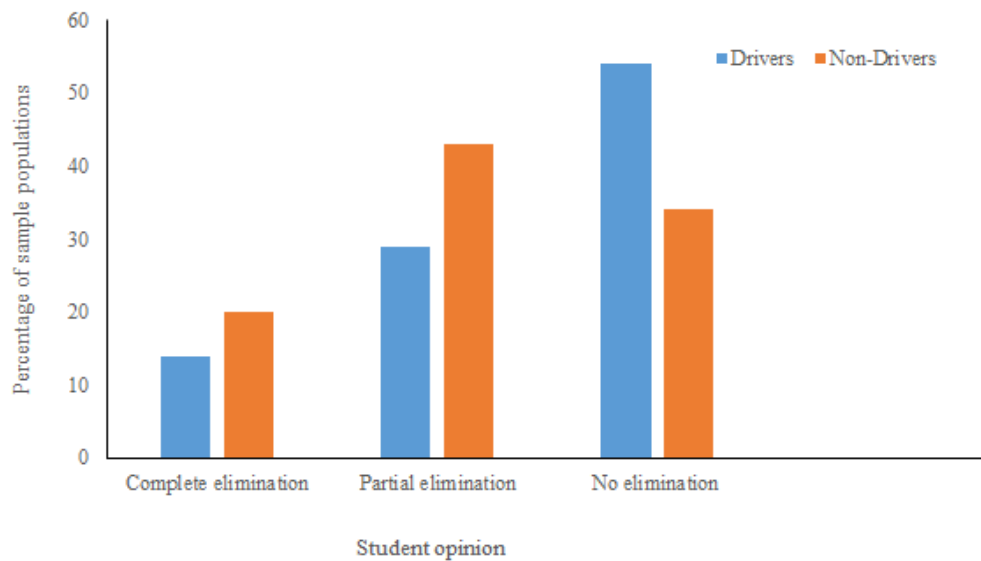


Figure 8: The results to whether a sample population of Dalhousie drivers and non-drivers believe cars should be eliminated from Studley campus: Cars should be completely eliminated on Studley campus (complete elimination), cars should be eliminated for certain time periods on Studley campus (partial elimination), or cars should not be eliminated on Studley campus (no elimination).

Combined: 40% want no elimination, 39% want partial elimination, and 18% want a complete elimination (3% did not respond).

4. Discussion

4.1 Summary of questions

Our survey was organized into questions that collected data on the possible economic, environmental and social impacts of having a car free campus. We chose to do this because we wanted to identify what Dalhousie students perceive to be the benefits of removing cars from Studley campus. The questions about economics determined how much money students believe they spend on transportation costs per month, as well as if they believe eliminating cars would reduce their overall transportation costs. The questions we created for social impacts helped to identify if students believe removing cars would improve their safety and enjoyment on campus. Finally, the questions we asked regarding environmental impacts asked if students believed there were air quality impacts of cars on campus and if removing them would improve the overall sustainability of Dalhousie. We also asked questions that allowed us to understand the demographic of our sample population, their traveling behaviours and how far they live from campus.

4.2 Significant findings

The first significant finding from this report is that the majority of students surveyed are non-drivers and almost all of them live within the peninsula. A majority of drivers commute from within the peninsula as well. Drivers spend more money than non-drivers on their transportation expenses, but neither group felt the elimination of cars would benefit them financially. The sub-group of students that felt the elimination of cars would help them financially tended to live closer to the Dalhousie campus. We think this may be because they would stop using their cars and adopt a new method of getting to school.

From a safety perspective, non-drivers did feel the elimination of cars on campus would improve their safety, but drivers did not. This may be because non-drivers are more concerned about getting hit by a car. One student actually cited an accident where they were hit by a car and were badly injured, and demonstrated their support for the elimination of cars from campus. The majority of drivers stated that the elimination of cars would not improve their enjoyment on campus. Non-drivers however, felt their enjoyment of campus would be improved by the elimination of cars. We suspect this is due to safety and air quality.

Drivers and non-drivers alike were aware of the environmental impact cars have on campus. Both drivers and non-drivers agreed that eliminating cars will improve air quality, although a higher percentage of non-drivers agreed. The majority of both groups believe that having cars on campus effects Dalhousie's impact on the local environment.

By focusing on these three sections, it is evident that both drivers and non-drivers can see the social and environmental benefits of a car-free campus, but do not agree that there are economic benefits. Overall, there was minimum support for a car-free campus, however, non-drivers were in more support of the elimination of cars at certain times. We identified a pattern that non-drivers were concerned about drivers not being able to commute to school, and therefore did not support the full elimination of cars. Many drivers were not in support of the elimination of cars, especially students living outside of the peninsula because it is too far to walk or there are not any bus routes that stop near them. For local students who reside at home, driving is often the only option and taking away that mode of transport becomes an accessibility issue. Drivers living inside the peninsula were more in support of the elimination of cars on campus because they thought it would encourage them to walk or get other forms of exercise. However, those who stated they were not in support were credited to an unreliable public transit system.

4.3 Considerations

Some of the findings from our study were unanticipated and need to be taken into account when analyzing results. Firstly, many students driving to campus do not believe that the elimination of cars would affect their travel costs. At first, we were confused because it can be assumed that alternative transportation would be cheaper than driving. We later realized that students who live far and do not have alternative modes of transportation would probably still drive into city but park outside of campus. Secondly, we did not operationalize our definition of safety. Some students felt safety represented their safety around a large volume of cars, whereas others felt it was referring to their safety when walking alone. This influenced how respondents replied to the questions on safety, so it is hard to get a comprehensive result. Lastly, students' responses to the final question that asked about the elimination of cars on Studley were often not consistent with their other responses. Many respondents noted the various benefits of a car free campus, but were not in support of a car free campus.

4.4 Comparison to research studies

The purpose of our study was to investigate the desirability of what students at Dalhousie perceived to be the social, economic and environmental impacts of making Studley campus car-free. The research and literature gathered prior to conducting our study highlighted the benefits of pedestrian only zones and car-free zones, whereas we investigated the desirability of the population.

Our preliminary findings in our research have made the benefits of car-free zones evident. With our study, we hoped to investigate students' desirability for a car free campus and to find out why students choose their form of transportation. Our survey was able to

identify where a majority of our sample population lives, how they travel to Studley campus, and how often they choose those types of transportation.

Our preliminary findings had also shown that several universities across campus have gone completely car-free, whereas our study looked at only making Studley campus car free. According to a study done in Barcelona, Spain, the contaminants from car air quality of the surrounding microenvironment and the health of cyclists, pedestrians, and even the drivers themselves. 54% of our driving population, and 61% of our non-driver population, agree that eliminating cars from campus would improve air quality. A study done at Kent University revealed that 1 in 6 pedestrians, both walking and cyclists, noted concern for their safety. Our survey results had revealed that more non-drivers agree that eliminating cars would improve the safety on campus, where as drivers do not perceive it as an issue.

5. Conclusion

Car-free zones contribute to the overall social, economic and environmental well being of a population. Students at Dalhousie University see some benefit to the elimination of cars from Studley campus, however, a majority of our survey responses did not agree to the full elimination of cars from the campus. It is important to note that our survey results concluded that students are not getting the maximum amount of enjoyment from their social and environmental experience on campus.

5.1 Recommendations

We recommend using the information in our report to investigate the feasibility of implementing a car-free campus and to further Dalhousie's reputation as a sustainable university. Further investigation into the feasibility of this report would include looking into the Halifax Regional Municipality's jurisdiction surrounding the removal of cars from urban spaces.

Several drivers included in this survey stated that public transportation in the HRM was not reliable. We recommend an investigation into current public transportation modes in the HRM in order to determine a more efficient system that will benefit more students.

Many of our participants recognized the direct social and environmental benefits, but not the economic benefits of a car-free campus. We believe if students are educated on the all impacts of establishing a car free zone, the benefits would be clearer and there would be a higher rate of acceptability.

References

- Dalhousie University. (2012). In . (Ed.), *TRANSPORTATION DEMAND MANAGEMENT PLAN FOR DALHOUSIE UNIVERSITY* (pp. 1-9). Halifax, Canada: Author.
- De Nazelle, A., Fruin, S., Westerdahl, D., Martinez, D., Ripoll, A., Kubesch, N., & Nieuwenhuijsen, M. (2012). A travel mode comparison of commuters' exposures to air pollutants in Barcelona. *Atmospheric Environment*, *59*, 151–159. <http://doi.org/10.1016/j.atmosenv.2012.05.013>
- Johnson, T. (2014, August 6). Transforming the campus with car-free pedestrian zones. *University Affairs*. Retrieved from <http://www.universityaffairs.ca/features/feature-article/unpaving-paradise/>
- Kaplan, D. H. (2009). *Getting Around Campus in a Sustainable Way: How Can We Change Travel Behavior?* Association of American Geographers, 1710 16th St, NW Washington, DC 20009 USA. Retrieved from <http://search.proquest.com/espm/docview/1093441623/BFA3DF44999A4910PQ/16>
- Layne, M. (2015, August). PARKING CHANGES FOR 2015/16. *Dal News*. Retrieved from <http://www.dal.ca/news/2015/08/27/parking-changes-for-2015-16.html>
- Layne, M. (2015, April 11). Changes due to capital construction and other initiatives. *Dal News*. Retrieved from: <http://www.dal.ca/news/2015/08/27/parking-changes-for-2015-16.html>
- Salloum, S., & Habib, M. A. (2014, June). Travel Behaviour of Dalhousie University Commuters. In *Dalhousie University*. Retrieved from Dalhousie Libraries.
- Tolley, R. (1996). Green campuses: cutting the environmental cost of commuting. *Journal of Transport Geography*, *4*(3). Retrieved from ScienceDirect (10.1016/0966-6923(96)00022-1)

Appendices

Appendix 1

1) Which forms of transportation are available for you take to Studley Campus? (Check all that apply).

Bus	
Walk	
Drive car	
Drive motorcycle or moped	
Carpool	
Bicycle	
Other (please explain):	

2) On a typical week in fall 2015, how many days did you use the following modes of transportation to get to and from Studley campus:

Mode	0 days	1 day	2 days	3 days	4 days	5 days	6 days	7 days
Bus								
Walk								
Drive car								
Drive motorcycle or moped								
Carpool								
Bicycle								
Other (please explain):								

3) What is the closest major intersection to your home? (example: Jubilee & Oxford)

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- 4) In a typical month in the fall of 2015, how much money did you spend on the following possible transportation costs, excluding your University Bus Pass (check all that apply)?

	\$0-\$25	\$26-\$50	\$51-\$75	\$76-\$100	\$101-\$125	\$126+
Gasoline						
Bicycle tune ups						
Parking						
Car maintenance						
Other (please explain):						

- 5) In a typical week in the fall of 2016, how many days did you park on University Ave?

0 days	1 day	2 days	3 days	4 days	5 days	6 days	7 days

- 6) How safe do you feel on Studley campus at the following times?

	Very safe	Somewhat Safe	Somewhat Not Safe	Not Safe at All	Don't Know
6am – 9am					
9am – 12pm					
12pm – 3pm					
3pm – 6pm					
6pm – 9pm					
9pm – 12am					
12am – 6am					

7) For the following statements, please circle the answer that applies to you the most.

a) **Eliminating cars on Studley campus would improve the safety of my experience on campus.**

a) Strongly agree b) Agree c) Undecided d) Disagree e) Strongly Disagree

b) **Eliminating cars on Studley campus would improve the enjoyment of my experience on campus.**

a) Strongly agree b) Agree c) Undecided d) Disagree e) Strongly Disagree

c) **Having cars on the Studley Campus impacts the air quality.**

a) Strongly agree b) Agree c) Undecided d) Disagree e) Strongly Disagree

d) **Having cars on the Studley Campus increases Dalhousie's impact on the local environment.**

a) Strongly agree b) Agree c) Undecided d) Disagree e) Strongly Disagree

e) **My transportation costs would be decreased if cars on Studley campus were eliminated.**

a) Strongly agree b) Agree c) Undecided d) Disagree e) Strongly Disagree

8) **Circle the statement that you most agree with.**

a) Cars should be completely eliminated on Studley campus.

b) Cars should be eliminated for certain time periods on Studley campus.

c) Cars should not be eliminated on Studley campus.

Please explain:

Appendix B**Funding Breakdown**

Type of Expense	DSUSO Budget	Notes
Photocopies of survey (200)	\$10	We will be printing surveys to hand out to people in order to collect data. We are aiming to do 200 surveys
Food incentive for doing surveys	\$30	We believe people will be more interested in completing our survey if there is food offered
Total:	\$40	

Sample Size Calculation

$$Sample\ Size = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \left(\frac{z^2 \times p(1-p)}{e^2 N}\right)}$$

<p>N= Population Size: 15,000 Confidence level: 95%. corresponding z-score: 1.96 e= Margin of Error: 5- 10% p= 0.5</p>	<p>$n = \left\{ \frac{[(1.96)^2 \times (0.5)(1-0.5)]}{(ME)^2} \right\} / \left[1 + \frac{[(1.96)^2 \times (0.5)(1-0.5)]}{(ME)^2 (15,000)} \right]$</p> <p>n(ME 5)= 375 n (ME 7)= 194 n(ME 10) = 96</p> <p>ME= margin of error of 5, 7, and 10%</p>
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Funding Breakdown

Type of Expense	DSUSO Budget	Notes
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(200)		to people in order to collect data. We are aiming to do 200 surveys
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Total:	\$40	

Appendix C

ENVIRONMENTAL PROGRAMMES
FACULTY OF SCIENCE
DALHOUSIE UNIVERSITY

APPLICATION FOR ETHICS REVIEW OF RESEARCH INVOLVING HUMAN PARTICIPANTS

UNDERGRADUATE THESES AND IN NON-THESIS COURSE PROJECTS

1. Title of Project: Evaluating the Feasibility of a Car-Free Studley Campus

2. Faculty Supervisor(s) Tarah Wright
Department: Environmental Science
Ext: (902) 494-3683
E-mail: tarah.wright@dal.ca

3. Student Investigator(s): Haley Landry
Department: Environmental Science
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Student Investigator(s): Brittany Wilson
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Student Investigator(s): Elizabeth Donaldson
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Student Investigator(s): Alison Bishop
Department: Environmental Science
E-mail: al937377@dal.ca
Local Telephone Number: (902) 488-7392

GENERAL INFORMATION

4. Level of Project:

Non-thesis Course Project [] Undergraduate[X] Graduate []

Specify course and number: ENVS/SUST 3502

5. a. Indicate the anticipated commencement date for this project: March 14th, 2016

b. Indicate the anticipated completion date for this project: April 1st, 2016

SUMMARY OF PROPOSED RESEARCH

1. Purpose and Rationale for Proposed Research

Briefly describe the purpose (objectives) and rationale of the proposed project and include any hypothesis(es)/research questions to be investigated.

Research question: What do students perceive to be the social, economic and environmental benefits of making Dalhousie's Studley campus car-free?

Our purpose is to determine the feasibility of making Dalhousie's Studley Campus car-free, to investigate the environmental, economic and social benefits, and to gauge and understand the level of social acceptability for such a project.

2. Methodology/Procedures

a. Which of the following procedures will be used? Provide a copy of all materials to be used in this study..

- Survey(s) or questionnaire(s) (mail-back)
- Survey(s) or questionnaire(s) (in person)
- Computer-administered task(s) or survey(s)]
- Interview(s) (in person)
- Interview(s) (by telephone)
- Focus group(s)
- Audio taping
- Videotaping
- Analysis of secondary data (no involvement with human participants)
- Unobtrusive observations
- Other, specify _____

b. Provide a brief, sequential description of the procedures to be used in this study. For studies involving multiple procedures or sessions, the use of a flow chart is recommended.

Our study will require the use of a survey to determine the response of Dalhousie students to making Studley campus car-free. These survey questions aim to get an understanding of how students are getting to school, whether they walk/ take public transportation or drive to school, and if they drive, how far they are driving to get to school.

Our questions will give us a sense of how students would feel socially, economically and environmentally about making Studley campus car-free.

3. Participants Involved in the Study

a. Indicate who will be recruited as potential participants in this study.

Dalhousie Participants:

- Undergraduate students

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Non-Dal Participants:

- Children
 Graduate students
 Faculty and/or staff
 Adolescents
 Adults
 Seniors
 Persons in Institutional Settings (e.g. Nursing Homes, Correctional Facilities)
 Other (specify) _____

b. Describe the potential participants in this study including group affiliation, gender, age range and any other special characteristics. If only one gender is to be recruited, provide a justification for this.

Potential participants will include any current undergraduate or masters students attending Dalhousie University.

c. How many participants are expected to be involved in this study?

We are expecting to have a sample size of 100-150 students.

4. Recruitment Process and Study Location

a. From what source(s) will the potential participants be recruited?

- Dalhousie University undergraduate and/or graduate classes
 Other Dalhousie sources (specify): At the Dalhousie SUB and Killam Library
 Local School Boards
 Halifax Community
 Agencies
 Businesses, Industries, Professions
 Health care settings, nursing homes, correctional facilities, etc.
 Other, specify (e.g. mailing lists) _____

b. Identify who will recruit potential participants and describe the recruitment process.

Provide a copy of any materials to be used for recruitment (e.g. posters(s), flyers, advertisement(s), letter(s), telephone and other verbal scripts).

We will pair up on alternating days outside of the Killam Library and the Student Union Building. We will have printed copies of our survey and a consent sheet to be signed by participants.

We will be providing snacks to provide incentive for participation.

5. Compensation of Participants

Will participants receive compensation (financial or otherwise) for participation? Yes No

If Yes, provide details:

If provided funds from DSUSO from a proposal submitted February 6th, 2016, participants may receive candy as compensation for their participation.

6. Feedback to Participants

Briefly describe the plans for provision of feedback and attach a copy of the feedback letter to be used.

Wherever possible, written feedback should be provided to study participants including a statement of appreciation, details about the purpose and predictions of the study, contact information for the researchers, and the ethics review and clearance statement.

Note: When available, a copy of an executive summary of the study outcomes also should be provided to participants.

We will be providing participants with contact information for Tarah Wright and our mentor, Adam Cheeseman

POTENTIAL BENEFITS FROM THE STUDY

1. Identify and describe any known or anticipated direct benefits to the participants from their involvement in the project.

Participants will be given the opportunity to express concern regarding pedestrian safety on Dalhousie Campus, as well as any other interests/ feelings they may have regarding driving, accessibility, convenience or walkability.

2. Identify and describe any known or anticipated benefits to society from this study.

This study could potentially reduce the amount of vehicles driving throughout and to Dalhousie's Studley campus, reducing pedestrian safety concerns throughout busy hours, could increase walkability and biking incentives, and could decrease greenhouse gas emissions by students and staff at Dalhousie.

POTENTIAL RISKS TO PARTICIPANTS FROM THE STUDY

1. For each procedure used in this study, provide a description of any known or anticipated risks/stressors to the participants. Consider physiological, psychological, emotional, social, economic, legal, etc. risks/stressors

No known or anticipated risks

Explain why no risks are anticipated:

Minimal risk

Description of risks: Participants who drive may become defensive about their driving habits and feel as though they are being accused of wrongdoing.

Greater than minimal risk

Description of risks:

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2. Describe the procedures or safeguards in place to protect the physical and psychological health of the participants in light of the risks/stresses identified in Question 1

To minimize stress to participants, we have worded our survey to be as neutral as possible, aiming not to make any of our participants feel as though they are right or wrong.