Cycling Towards Sustainability: Evaluating the Impact of Bike Rack Infrastructure on Student Transportation Choices at Dalhousie University

Groves, M., Smith, D., Josey, H., Guo, X., Peplinski, M.

Department of Environmental Science, Dalhousie University

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Dr. Franklin

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ABSTRACT

Student commuting habits have impacts on Dalhousie's community and environment. Cycling infrastructure significantly impacts commuting choices and transportation methods throughout the city of Halifax and HRM as a whole, therefore understanding methods of improvements is important to sustain transportation networks throughout the city. This study delves into how improvements in bike rack infrastructure can influence Dalhousie University undergraduate students' travel choices. The purpose of the study is to identify student perceptions and motivations for improvements in bike rack infrastructure. Gauging both allows room for analysis and discussion on the influence on Dalhousie's undergraduate students. Mixed methods of data collection allowed a solid scope of information to be gained to produce final influences caused by improvements in bike rack infrastructure. Distribution of surveys through posters and word of mouth helped gather information from a bulk of quantitative questions. Data collection continued with a small portion of qualitative questions to gather further details. Qualitative research was carried out in form through in-person interviews with students throughout the Studley Campus. Results gathered from the mixed method research method carried into analysis where correlation calculations gave us final gauges on student perceptions. The study amplifies the importance of reliable, supportive, and protective cycling infrastructure on the Dalhousie Studley campus. Through data collection and analysis, we determine there is not a specific urgent need for bike rack coverings to be implemented throughout Studley Campus, however dividing data from those with bikes as opposed to without bikes was key in final thoughts and discussions for our research. Those with bikes provided useful information on likeliness to commute via bike due to implications such as weather and infrastructure. However, those without bikes provided good information on possible further research into student access to bikes and cycling amenities. Overall, information gathered holds implications for new improvements

throughout the campus to support the biking culture and environment, with sustainable choices increasing amongst students.

Keywords: Infrastructure, Cycling, Dalhousie Studley Campus, Undergraduate, Commute, Transportation, Bike Racks

1. INTRODUCTION

In the realm of urban sustainability and transportation planning, the promotion of cycling as a mode of transport has gained significant traction. This shift towards sustainable mobility is crucial in addressing the environmental challenges posed by vehicular emissions and the spatial constraints of urban development. Encouraging active transportation on university campuses through Transportation Demand Management (TDM) strategies has been highlighted as significant, especially following an evaluation of their effectiveness at Eastern Mediterranean University, which underscored the importance of infrastructure and commuter propensities towards active modes of transportation (Dehghanmongabadi & Hoşkara, 2018). This finding is foundational, as it sets the stage for understanding the complex dynamics of promoting cycling in academic settings. Urban bike lanes play a crucial role in enhancing cyclist safety and convenience, a fact underscored by a study in St. Louis which, however, also noted that infrastructure alone might not directly lower stress levels among cyclists (Boettge, Hall, & Crawford, 2017). This suggests that while infrastructure is crucial for cyclist safety and convenience, it may not be entirely sufficient on its own. This underscores the need for comprehensive approaches in infrastructure planning, as improvements have been shown to significantly enhance the safety and attractiveness of cycling, particularly for short trips. Such enhancements underscore the indispensable role of physical infrastructure in promoting cycling, pointing to the necessity of integrating these improvements within broader urban planning strategies (Wei & Lovegrove, 2013).

The literature also indicates a positive relationship between bikeway networks and cycling levels (Buehler & Dill, 2016), suggesting that more extensive networks encourage cycling. This evolution from individual lanes to complex networks represents a significant shift in the research landscape, highlighting the need for empirical studies that link bikeway infrastructure directly to cycling behavior. This shift is crucial for understanding how to design

infrastructure that effectively promotes cycling. Additionally, it has been shown that the implementation of bike shelters in urban areas has increased the overall aesthetic appeal, thus encouraged an increase in biking in the city and on school campuses (Messori & Morello, et al., 2019). The enhancement of biking infrastructure and shelters has been linked to an increase in positive public perception, particularly among students who perceived these shelters as safer. This relationship underscores the importance of thoughtful infrastructure in improving safety perceptions and encouraging cycling (Messori & Morello et al., 2019).

Contradictory findings emerge in the literature, particularly concerning the impact of environmental and social-psychological factors on cycling. Studies have shown that environmental design significantly influences walking and cycling rates, suggesting a complex interplay of factors affecting transportation choices (Saelens, Sallis, & Frank, 2003). The importance of perceptions, attitudes, and social environments in influencing cycling decisions has been underscored, indicating that social and psychological factors play a significant role in shaping these choices. This highlights the complexity of cycling behavior, which is not solely determined by physical infrastructure but also by the broader social context (Willis, Manaugh, & El-geneidy, 2015). Despite the growing body of literature on the subject, a notable gap remains in our understanding of how specific infrastructural elements, such as bike racks and their coverings, influence cycling choices among university populations. This oversight is significant given the unique transportation dynamics and needs of university campuses, which serve as microcosms for larger urban settings. The current discourse lacks a detailed examination of how the provision and design of bike parking facilities, particularly at educational institutions like Dalhousie University, affect students' decisions to cycle.

This research seeks to bridge this gap by posing the question: How does the availability and design of bike rack infrastructure impact the cycling habits of students at Dalhousie

University? By focusing on this question, the study challenges the prevailing emphasis on bike lanes and paths, directing attention instead to the end-point facilities that might equally influence cycling uptake.

The purpose of this research is to evaluate the effect of bike rack infrastructure, including the presence of coverings or sheds, on the transportation choices of students at Dalhousie University. This inquiry is novel in its specific focus on bike parking as a critical component of cycling infrastructure, an area that has received limited attention in the literature. The significance of this research lies in its potential to inform sustainable transportation policies and campus planning at Dalhousie University and beyond, by providing empirical evidence on the preferences and needs of the student cyclist population.

2. METHODS

2.1 SAMPLING METHODS

The sampling method utilized in our study on undergraduate perceptions on bike infrastructure on Dalhousie's Studley campus was the probabilistic random sampling method. We chose to complete our data with this method as our sample size required 376 undergraduate students to accurately represent the undergraduate population at Dalhousie.

The purpose of our method to collect data from an anonymous survey and 20 interviews is that the focus of our study is based on student opinions regarding sustainable bike infrastructure at Dalhousie's Studley campus. To reach the largest possible audience, we decided to use a survey for the general opinion of the representative population of undergraduate students. This survey consisted of categorical, Likert-scale, rating, open-ended, and demographic questions (APPENDIX 1.2). Simultaneously, we considered anonymous interviews as valuable, as using that format allowed students to offer more nuanced opinions regarding our proposed idea

to implement bike rack shelters on campus. These two methods of data collection were most appropriate as we aimed to garner the opinion of a large group of students. Additionally, students who may be passionate about sustainability or biking infrastructure may not have access to functional bicycles or may live too close/far away from campus, so this method of data collection would fit best with our sample size. Finally, when creating our survey, we submitted an Ethics Application that was approved by the Department of Earth and Environmental Sciences.

We utilized most of these tools to create and distribute our survey and posters. Google forms were required in the creation of our survey, as it allowed for anonymous entries, with a simple format that is accessible to students. After our survey was formulated, we created an eye-catching poster through Canva, with a QR code and link to our associated survey (APPENDIX 1.3). The Dalhousie Bike Society agreed to partner with us in dispersing posters and promoted our survey to their audience and the Loaded Ladle. In tandem with our surveys, we collected data through anonymous interviews. Data collection from our survey began on March 11th and ended on March 21st, and the interviews took place on March 13th. Our group circulated Dalhousie's Studley campus, approached students and recorded audio for transcription before deleting the files.

2.2 ANALYTICAL METHODS

Following the end of our survey and interview period, we aimed to conduct two separate methods of data analysis that utilized both qualitative and quantitative means. To do this, we used Microsoft excel to perform multiple correlation analyses to understand the relationship between multiple variables. An example of some of our variables included the influence of weather and students' motivation to bike, perception of bike safety with bike shelters, etc. In our analysis, we used a general guide (Table 1) that determined which values showed high correlation between variables. Using the correlation value interpretation, we were able to understand the relationships between the variables we tested.

Table 1:

The range of correlation values and their associated strength

Correlation Value Interpretation (+/-)	
0.000 – 0.199	Very Weak
0.200 – 0.399	Weak
0.400 – 0.599	Medium
0.600 – 0.799	Strong
0.800 – 1.000	Very Strong

Once we determined our variables and conducted the correlation analysis in Excel, we inputted the data we collected into Python. This enabled us to create graphs that effectively displayed our data from our correlations as an image. These graphs aided us in our interpretation

and understanding of the data, as we compared survey responses from students that owned bikes, students that did not, and the total population of survey respondents.

Finally, use utilized Microsoft Word to efficiently code all our open-ended and interview questions through posteriori methods. We first coded each survey question/interview and took recurring words or ideas and grouped them together in a coding tree. Our subsequent coding trees went through the ranking process of the fewest to most mentioned keywords in both the interview and survey. Using a coding tree allowed us to interpret the data collected from the interview/survey questions more effectively, without room for misinterpretation.

2.3 LIMITATIONS

Limitations that we encountered in our study included the method of surveying and interviewing. The method we chose to collect data via survey could have been improved. This is partially due to the open-ended answers allowing students who did not care for the survey to submit answers that were irrelevant to our study. To improve this, we could have converted our open-ended section to a ‘multiple selection’ format. Additionally, the sample size collected was not adequate to represent the entire undergraduate population on Dalhousie’s Studley campus. This may lead to our data not showing significant results due to the lack of student responses.

3. RESULTS

The data collection process yielded 84 survey responses and a total of 20 interviews were conducted. Of the 84 survey responses, 4 were nullified as they were either not undergraduate students or did not consent to their results being used in the study. To begin the analyses, we compared the student’s commuting method of choice on a bi-monthly basis (Figure 1). This

comparison found that the number of students who biked to campus fluctuated the most bi-monthly compared to other commuting methods of choice. It also demonstrated that the smallest number of students biked to campus between the months of January and February and the largest number biked the most between September and October. All other methods of transportation remained relatively stable throughout each group of months, with only minor variations in numbers.

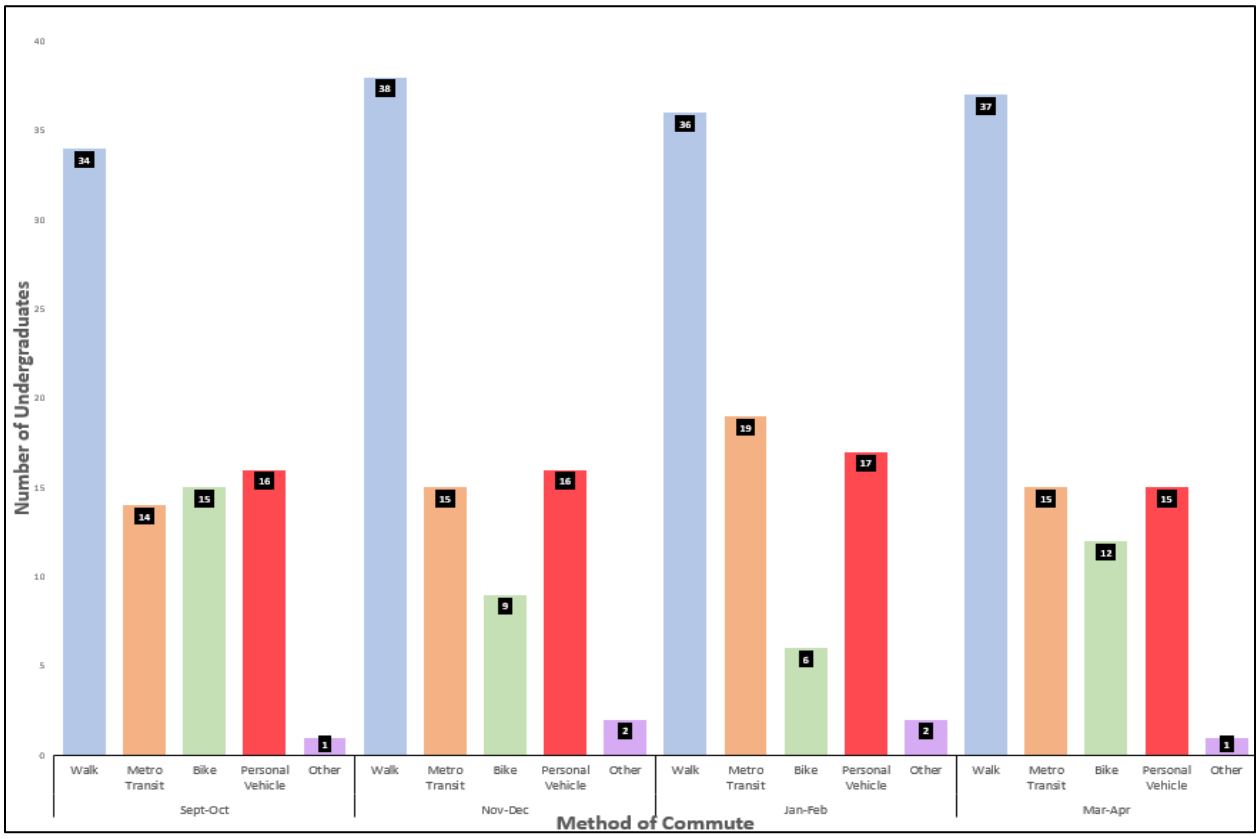


Figure 1. The bi-monthly commuting habits of undergraduate students on Dalhousie Universities Studley Campus. Data was collected through survey responses and analyzed by Daniel Smith on March 27th, 2024.

To better understand the relationship between students' motivations and their likelihood to bike to campus, a series of correlation analyses were performed. Four pairs of variables underwent a correlation analysis. Each analysis was executed three times, one using the entire population, one using results only of students who stated they bike to campus, and one using

those who stated they did not bike. The set of correlation analyses done on the entire population, found that all variables were very weakly correlated (Figure 2). The analysis found that weather influence and bike covers had a correlation value of 0.231; months biked, and bike covers had a correlation value of -0.046; weather influence and length of commute had a correlation value of -0.125; and bike covers and safe lock had a correlation value of 0.183.

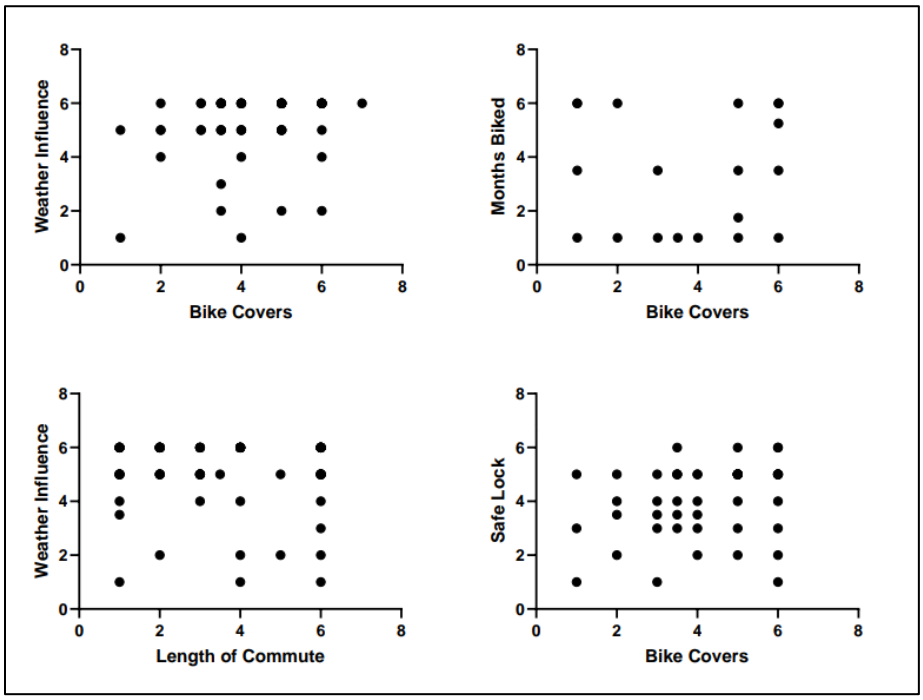


Figure 2. Correlation analysis tables of all survey respondents, both those who own and do not own a bike. Data was captured using survey responses and was analyzed by Xiaolong Guo and Daniel Smith on March 28th, 2024.

The set of correlation analyses done using only the population of students who stated they biked to campus had stronger results when compared to those found for the entire population (Figure 3). The analysis found that weather influence and bike covers had a correlation value of 0.239; months bikes and bike covers had a value of -0.103; weather influence and length of commute had a value of -0.377; and bike covers and safe lock had a correlation value of 0.337. The final correlation analyses done only for students who do not bike to campus, found very weak results (Figure 4). The analysis found that weather influence and bike covers had a value of

0.097; months biked and bike covers had a non-numerical number, as the denominator for the analysis was 0; weather influence and length of commute had a value of 0.013; and bike covers and safe lock had a correlation value of 0.129.

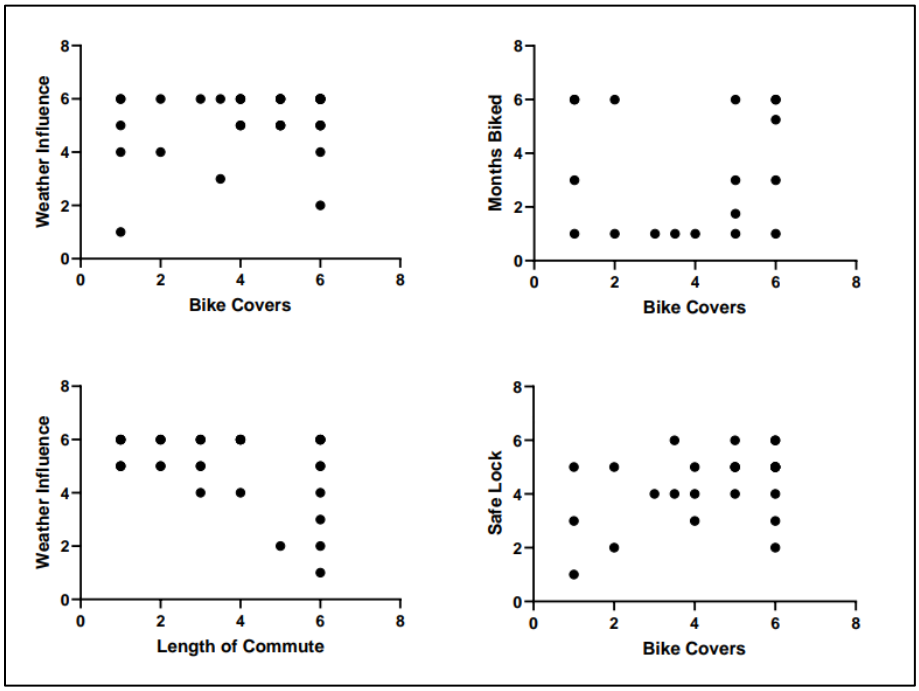


Figure 3. Correlation analysis tables of survey respondents who own a bike. Data was captured using survey responses and was analyzed by Xiaolong Guo and Daniel Smith on March 28th, 2024.

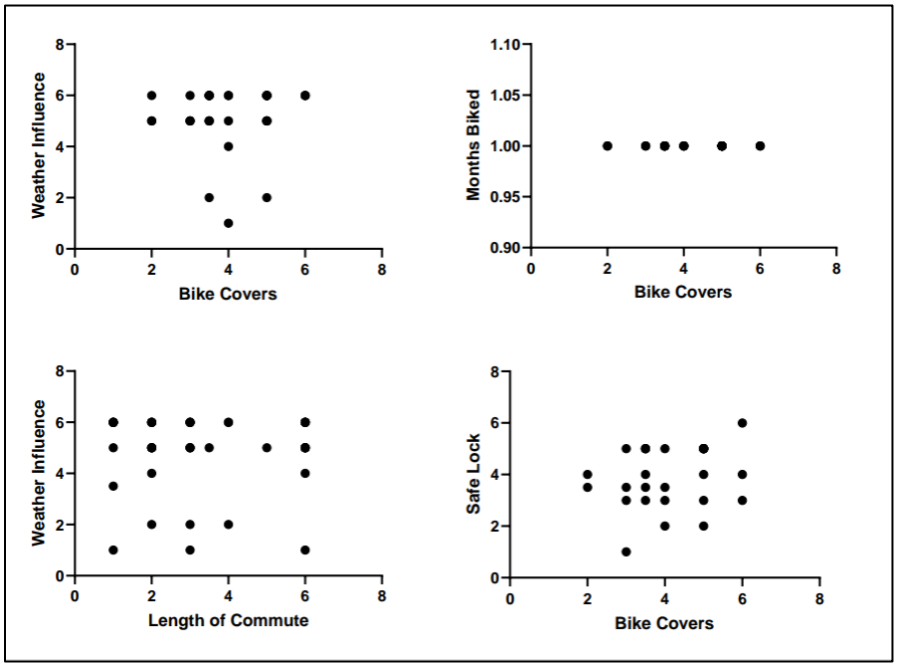


Figure 4. Correlation analysis tables of survey respondents who do own a bike. Data was captured using survey responses and was analyzed by Xiaolong Guo and Daniel Smith on March 28th, 2024.

The open-ended questions of our survey were then analysed using a posteriori coding of all 80 respondents' answers and were summarized in a coding tree (Figure 5). The results of coding found that in response to the question "What would motivate you to bike to Studley Campus more often?", students replied the most frequently with access to bikes and house location. They also repeated a combination of words like weather, safety, bike lanes, commute, bike storage, and live further to describe other motivators of biking to Studley campus. Words the least used in response to this question were health, traffic, consistency, bike supplies, public transit, bike maintenance, Sexton campus, and electric bikes. For the question "Why do you or do you not commute to campus via cycling", the words the most mentioned in the responses were close to campus, walk, and far from campus. Other common words found in the responses included uncomfortable, bike storage, weather, no bike, unreasonable, and already bikes. Words the least used in response to this question include exercise, unable, commute, terrain, traffic, bike lanes, bike culture, unsure, and does not.

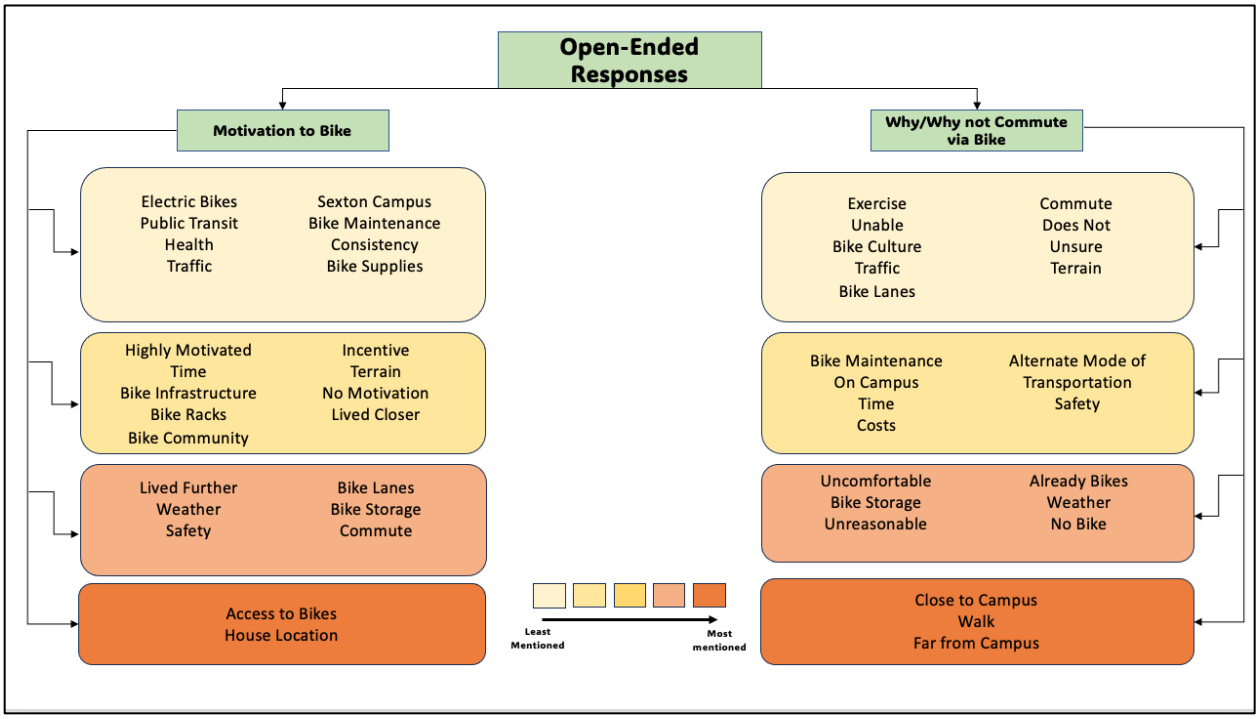


Figure 5. A coding tree of undergraduate students open-ended responses to questions seven and eight within the

survey. On the left is question seven, "What would motivate you to bike to Studley Campus more?" and on the right is question eight," Why do you or do you not commute to campus via cycling?".

The 20 interview responses were subsequently analyzed using a posteriori coding and were summarized in the coding tree (Figure 6). Through coding it was discovered that the most common word used in response to the question if weather influenced their choice to bike to campus was weather. Rain, snow, and unpredictable were also commonly used by students. For the second question, which asked if bike rack coverings would change their answer to the previous question, the most frequent words used were weather resistant, followed by safety. The third question asked student what sustainability decisions they would like to see around campus. Accessibility was the most popular word choice among students, with rack coverings and bike lanes close behind. The last interview question asked students their commuting method of choice and the rationale behind this decision. Walking and convenience were the most frequently used words, along with metro transit/bus.

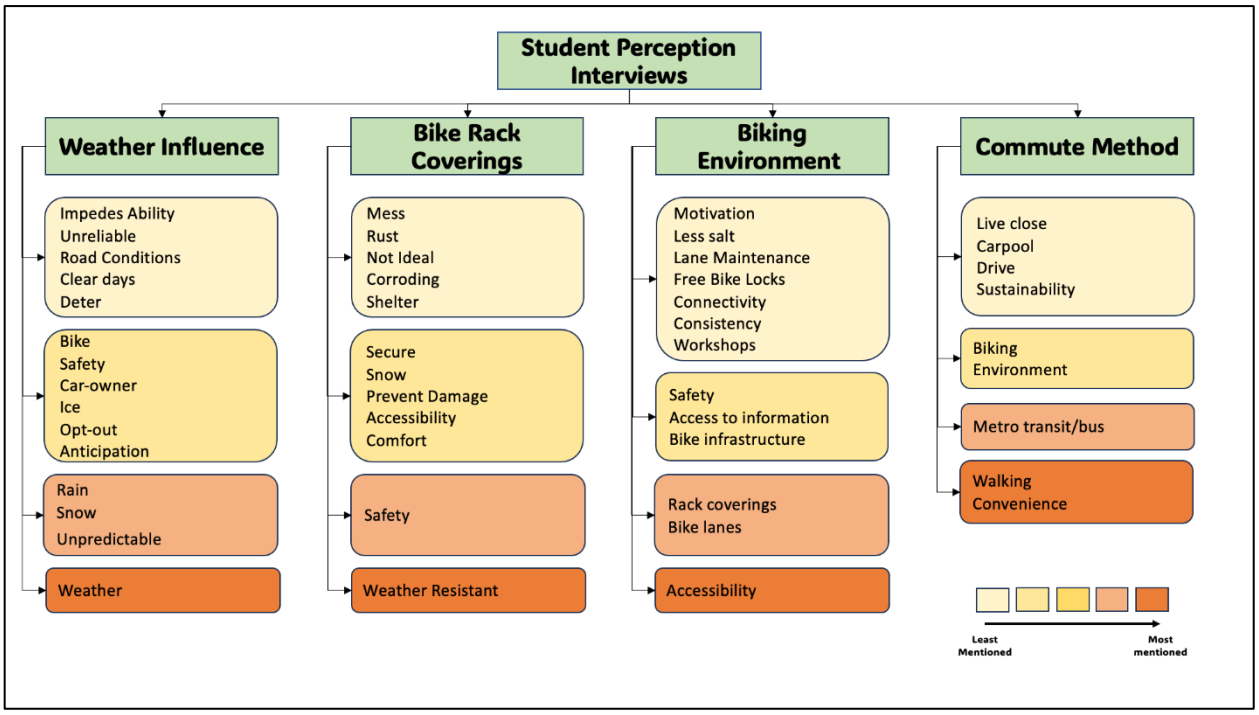


Figure 6. A coding tree of undergraduate students' interview responses describing their perceptions of biking on

Dalhousie's Studley campus and bike rack coverings. Interviews were done by the entire group on March 13th, 2024. The data was analyzed and coded by Maya G. and Mayah P. All interview questions are in order from left to right and full questions can be found in appendix 1.2.

From the 80 survey responses we analyzed, we note that 80% of the analysed responses claimed to have not biked at all in the months of September through April. Furthermore, we note that 45% of our analysed sample population owns a bike while only 20% of our sample population claimed to have ridden them during the September-April period. Overall, in our interview responses, 90% of students stated that the weather influences their methods of commuting to campus. In total, 60% of students responded that bike rake shelters would/could influence their decision on what commuting method they choose. Regarding what sustainability decisions they would like to see around campus, 70% responded with suggestions regarding bike infrastructure at Dalhousie, 78% mentioned accessibility issues regarding bike infrastructure, and a further 57% mentioned concerns about bike lane infrastructure. Finally, the results of the fourth question found that 30% of students bus to campus, 65% walk, 20% bike, and the last 10% drive to campus.

4. DISCUSSION

Reviewing all methods and the results of correlation analysis it appeared that the correlation values we calculated had a similar trend of scoring quite low. According to our interpretation chart (Table 1), we cannot give any correlation value a greater interpretation than weak, regardless of the negative or positive correlation. We found the greatest absolute value to be -0.3768 (Table 1) which is from our correlation of length of commute and the weather influence on biking among our population who owns bikes. The value is only a few hundredths off meeting the threshold for our medium bracket in Table 1. With a weak negative correlation we believe that there must be some relationship showing people who live closer to campus are

more heavily impacted by the weather in their commuting routine to Studley Campus. Another value that stands out is 0.3375 from the correlation of people who feel safe locking their bike on campus and people who think bike rack coverings would be a good addition to Studley Campus, among our population who actively own bikes. We perceive this represents that bike riders on Dalhousie's Studley campus would feel safer locking their bikes in some sort of infrastructure on campus rather than the bike racks we currently have installed. However, while there is a correlation, we cannot say it is an urgent need due to how weak the correlation is. Just because it's one of the strongest correlations we calculated, we attempt to analyse each value separate from the rest to stay consistent and level.

While looking at Figure 3, we saw an expected decline in cyclers among the winter months, while the walkers stayed somewhat consistent. The majority of those who discontinued biking during the winter months appeared to favour metro transit as their primary commuting method: We observed that as biking decreased in the winter months, that transit increased by a similar amount. To further back up this trend, we noticed that our interviewed population mentioned frequently how bike rack coverings would influence them to bike to campus in the rainy days, but their decision would not be impacted whatsoever during the snowy days. This does not come as a shock to our analysis as we expected to see a dip in bikers during the winter months, and we cemented that biking infrastructure is not going to influence more students to bike during the winter months (December through February). We did receive comments during the interviews about how the bike rack coverings would influence some of our sample population to bike to campus during the rainy days. They clarified that their issue with biking to campus on rainy days does not lie with actively biking in the rain, but rather they do not feel comfortable leaving their bicycle in the rain to rust.

Using our coding trees from the open-ended survey (See Figure 2), similarities amongst open-ended survey responses provided insight into student motivations and reasonings for — or for not — cycling to campus were displayed. Motivations frequently fell into the realm of commute distance from campus due to dwelling locations and the time required to commute. We found that students either lived too far away (an hour or longer commute) or they lived too close (under 3 minutes) to validate biking to campus. Therefore, motivations had the potential to change if students' dwellings either increased or shortened their distance to Studley. The dwellings distance from Studley campus was the reoccurring factor not only for students' motivation but also for why — or why not — they commute by cycling. Fewer students mentioned living closer to campus instead of living further from campus, leading us to believe that many undergraduate students in our sample live near the Studley campus. Therefore, they have a shorter commute and the time spent commuting doesn't differ significantly. So why make the effort to bike? If the incentive of time saving is not present, we do not see many from our sample population cycling to Studley Campus.

Accessibility was gathered to be the second most common factor amongst undergraduate students (See Figure 2) for what would make them more motivated to bike to Studley Campus. We believe access issues come down to cost and resources. The lack of access to resources for students could be renting, borrowing, or fixing bikes. Without access to these accommodations, it leaves those able to purchase a bike with the option to commute via cycling, while leaving all others without the option to cycle at all. No bikes leave students with no options. Other factors frequently mentioned throughout responses reassured us that improving bike infrastructure throughout campus would lead to a more robust biking culture amongst Dalhousie students. In particular, an interviewed undergraduate student at Dalhousie stated they would like to see a bigger bike help centre as the current one located on Sexton campus is far too small in terms of

workspace. We also noticed that lots of interviewed students mentioned how there was little to no cohesiveness regarding the bike lanes on Studley Campus, they are randomly tossed on the campus without thought as to how we might get from one bike lane to the other. Students want to avoid added stress regarding safety during commute and impacts on their bikes and other belongings. They seek a shelter or protection from the elements and the significant amounts of rain we receive in Nova Scotia. The open-ended survey response coding tree (See figure 1) gave us a deeper understanding of student perceptions. Students constantly commute to campus; therefore, encouraging sustainable choices such as cycling instead of walking will be influenced by increased access to reliable biking infrastructure.

We noted prior that 45% of our analysed sample population owns a bike while only 20% of our sample population claimed to have ridden them during the September-April period. This data gives us the impression that 25% of our sample population owned bikes and were not inspired to ride them in the fall to springtime period. We could infer that the lack of bikers could be from the lack of infrastructure on campus surrounding both bike rack infrastructure and bike lanes infrastructure.

We must mention however that while all our data is properly assessed, coded, and calculated, we did not meet our threshold of survey results and furthermore not all of our results can be confirmed as undergraduate students. Since it was an anonymous survey we are basing our research from trusting that our population were not falsifying information. We would like to acknowledge that given more time (a longer data collection window) we could have seen more precise results on a greater sample size.

5. CONCLUSION

In conclusion, this study has shed light on the potential of infrastructural improvements, such as the implementation of bike rack coverings, to encourage cycling among Dalhousie University undergraduate students. The findings reveal a significant interest among students in such amenities, suggesting that addressing specific barriers to cycling can positively influence commuting habits. Despite the enthusiasm for bike rack coverings, the absence of a direct statistical link between this interest and an increase in cycling frequency underscores the complexity of commuting behaviors and the multifaceted nature of transportation decisions.

Given the importance of sustainable and active transportation modes for both environmental and health benefits, these insights carry considerable weight. They highlight the necessity for university administrations and urban planners to adopt a holistic approach to promoting cycling. This approach should not only focus on infrastructural improvements but also consider other influential factors such as safety, accessibility, and cultural attitudes towards cycling.

Recommendations for Action:

1. Implement Bike Rack Coverings: Based on the expressed interest, universities and city planners should prioritize the installation of bike rack coverings as a step towards creating a more cycle-friendly environment.
2. Comprehensive Cycling Infrastructure: Develop and enhance cycling lanes, ensure the availability of secure bike storage, and implement safety measures to address the broader concerns affecting cycling habits.
3. Awareness and Incentive Programs: Launch campaigns to raise awareness about the benefits of cycling and introduce incentive programs to encourage students and faculty to adopt cycling as a commuting method.

4. Engage in Further Research: Conduct longitudinal studies to assess the impact of infrastructural changes over time and expand research to include diverse contexts and populations for broader insights.

By adopting these recommendations, universities and urban areas can make substantial strides towards fostering a more sustainable, healthy, and environmentally friendly transportation ecosystem. This study contributes valuable insights into the role of infrastructural improvements in promoting cycling, offering a stepping stone towards more informed decision-making in urban and campus transportation planning.

REFERENCES

Boettge, B., Hall, D., & Crawford, T. (2017). Assessing the Bicycle Network in St. Louis: A PlaceBased User-Centered Approach. *Sustainability*, 9, 1-18. https://doi.org/10.3390/SU9020241.

Buehler, R., & Dill, J. (2016). Bikeway Networks: A Review of Effects on Cycling. *Transport Reviews*, 36, 27 - 9. https://doi.org/10.1080/01441647.2015.1069908.

Dehghanmongabadi, A., & Hoşkara, Ş. (2018). Challenges of Promoting Sustainable Mobility on University Campuses: The Case of Eastern Mediterranean University. *Sustainability*. https://doi.org/10.3390/SU10124842.

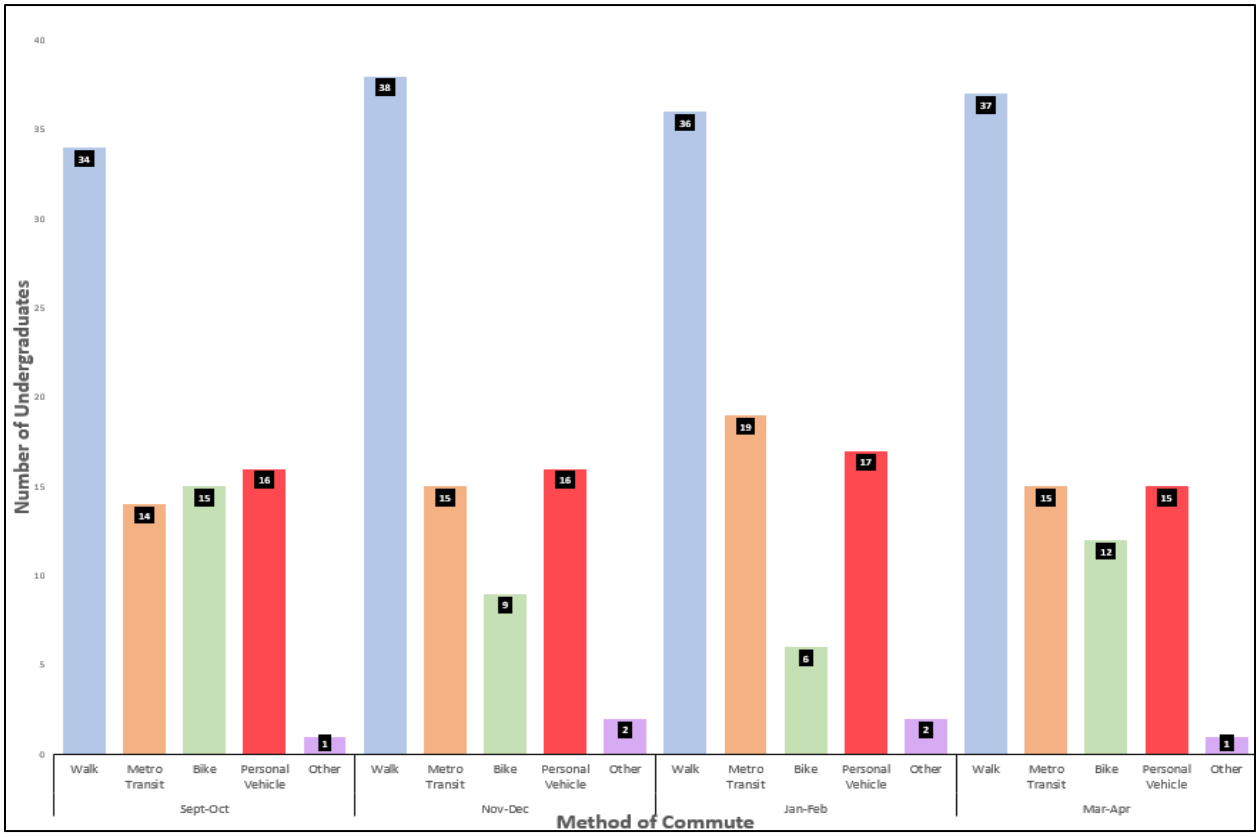
Messori, G., Morello, E., Perotto, E., Infussi, F., Mondini, G., Faroldi, E., Tolentino, S., & Ugolini, M. (2019). Mobility management at Politecnico di Milano: New infrastructures and behavioural change. *IOP Conference Series.Earth and Environmental Science, 296*(1)https://doi.org/10.1088/1755-1315/296/1/012013

Saelens, B., Sallis, J., & Frank, L. (2003). Environmental correlates of walking and cycling: Findings from the transportation, urban design, and planning literatures. *Annals of Behavioral Medicine*, 25, 80-91. https://doi.org/10.1207/S15324796ABM2502_03.

Wei, F., & Lovegrove, G. (2013). An empirical tool to evaluate the safety of cyclists: Community based, macro-level collision prediction models using negative binomial regression. *Accident analysis and prevention*, 61, 129-37. https://doi.org/10.1016/j.aap.2012.05.018.

Willis, D., Manaugh, K., & El-geneidy, A. (2015). Cycling Under Influence: Summarizing the Influence of Perceptions, Attitudes, Habits, and Social Environments on Cycling for Transportation. *International Journal of Sustainable Transportation*, 9, 565 - 579. https://doi.org/10.1080/15568318.2013.827285.

APPENDIX 1.1



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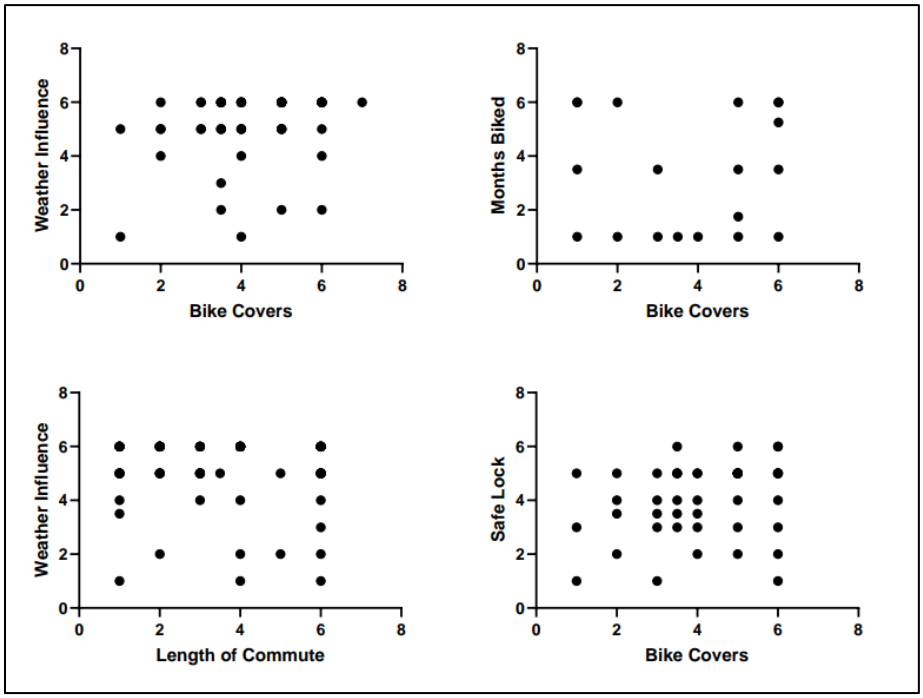

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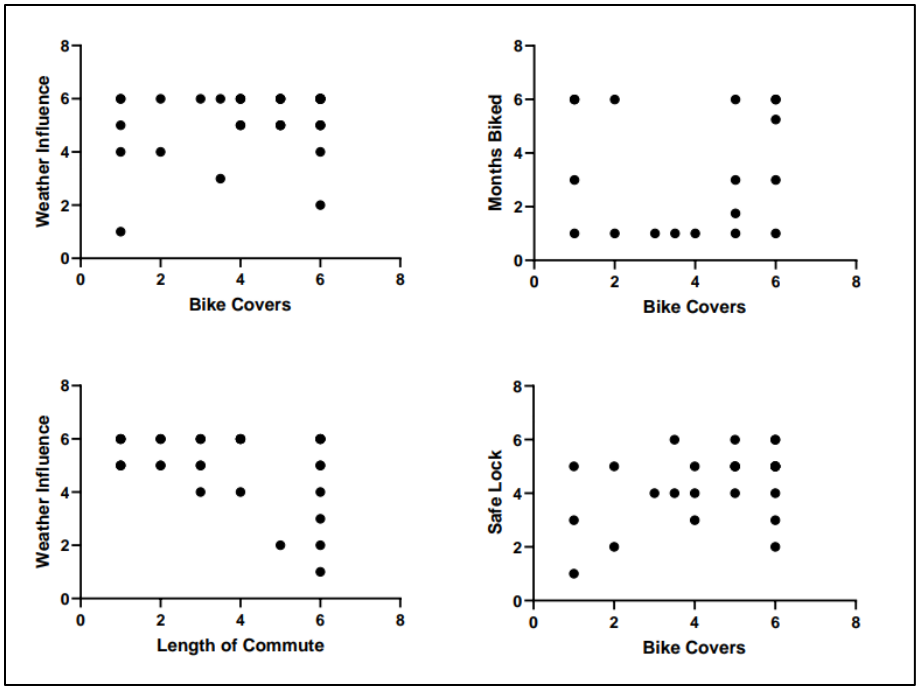

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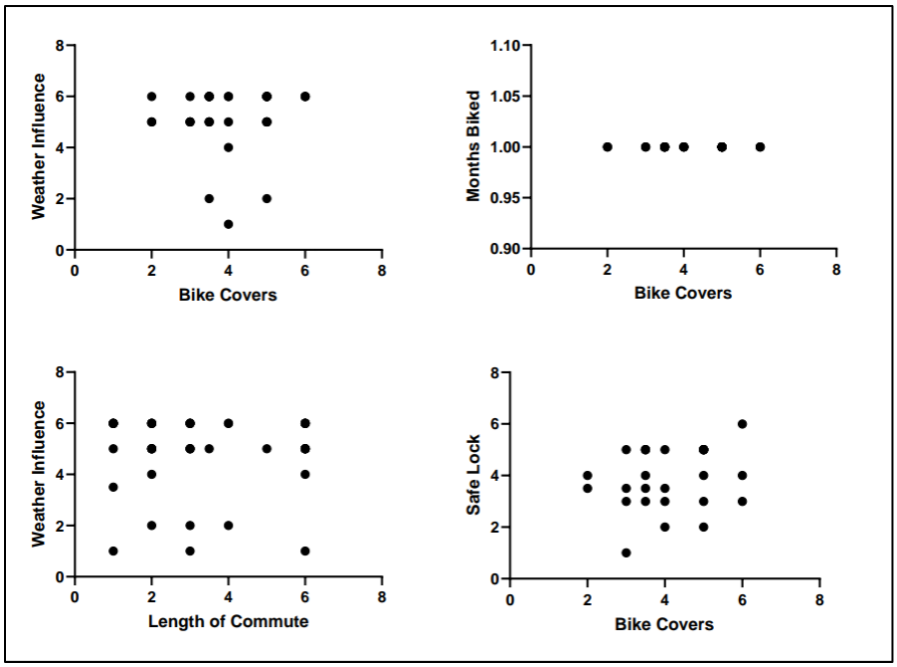

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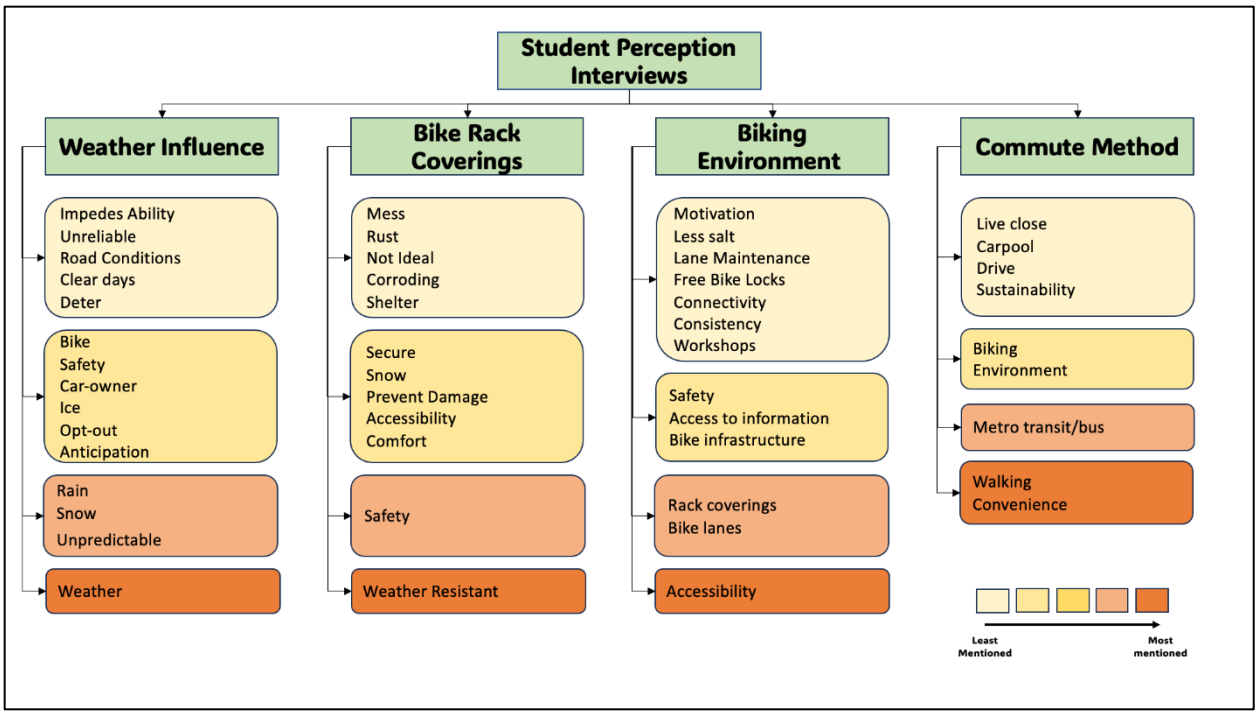

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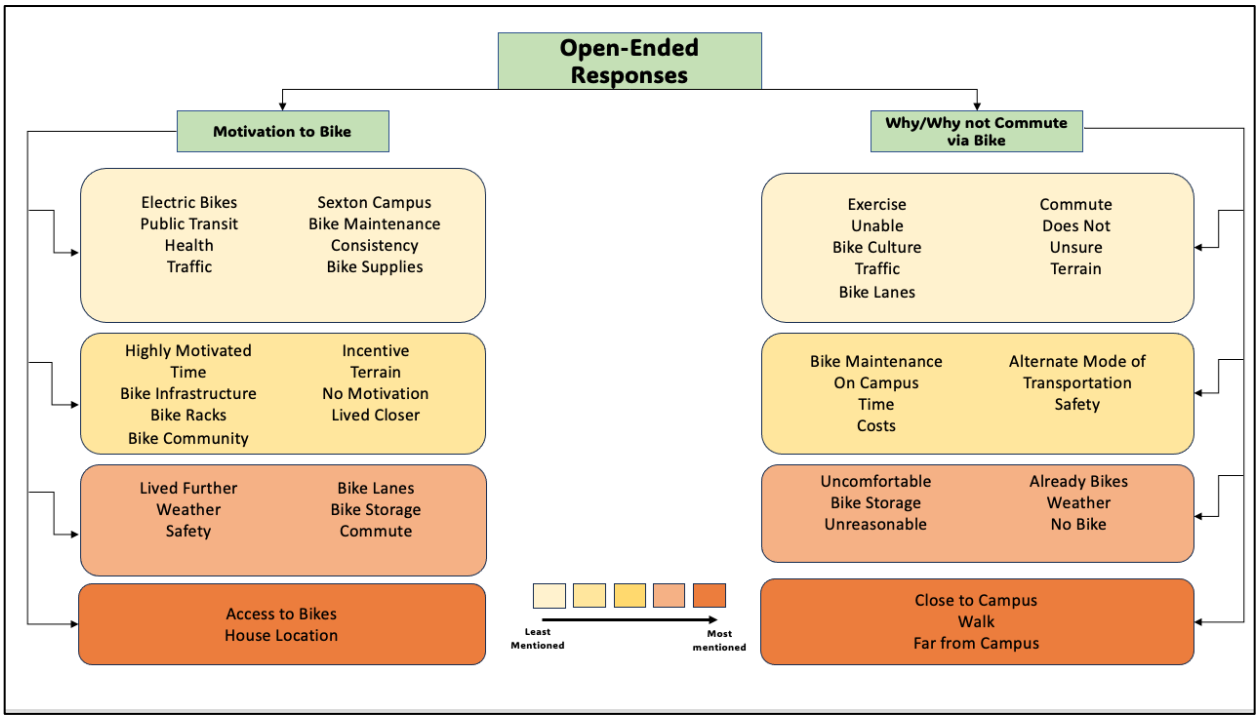

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APPENDIX 1.2
Survey Questions

CONSENT FORM

You are invited to take part in a research study being conducted by, Daniel Smith, Xiaolong Guo, Maya Groves, Hannah Josey, Mayah Peplinski in Earth and Environmental Science at Dalhousie University. We invoke that only undergraduate students who attend Dalhousie University complete the survey.

If you choose to participate in this research, you will be asked to answer a short anonymous survey revolving around commuting to campus. The survey should take approximately 5-7 minutes.

Your participation in this research is entirely your choice. You do not have to answer questions that you do not want to answer (by selecting Not Applicable or Unsure), and you are welcome to stop the survey at any time if you no longer want to participate. All you need to do is close your browser. We will not include any incomplete surveys in our analyses. If you do complete your survey and you change your mind later, we will not be able to remove the information you provided as we will not know which response is yours.

Your responses to the survey will be anonymous. This means that there are no questions in the survey that ask for identifying details such as your name or email address. All responses will be saved on a secure Dalhousie server. Only Daniel Smith will have access to the survey results. You can contact Daniel Smith at dn349694@dal.ca if you have any concerns whatsoever.

This research was approved by The Department of Earth and Environmental Sciences at Dalhousie University.

Do you currently attend Dalhousie University as an undergraduate student?

Do you currently live off Studley Campus?

How many days a week, on average, do you commute to the Studley Campus?

When we say commute to campus, we are referring to how you would get from your dwelling to the campus (assuming you do go to campus).

How long, on average, would it take you to walk to Studley Campus from your home?

Do you own a bicycle in Halifax?

How do you most often commute* to Studley Campus in **September and October**?

How do you most often commute* to Studley Campus in **November and December**?

How do you most often commute* to Studley Campus in **January and February**?

How do you most often commute* to Studley Campus in **March and April**?

Open-Ended: Why do you **or** do you not commute to campus via cycling? (~50 words)

Open-Ended: What would motivate you to bike to Studley Campus more often? (~50 words)

To what degree do you agree with the following statements?

1. Poor weather conditions (rain, snow, sleet, wind, etc) have a major influence on if I would bike to Studley Campus
2. Dalhousie has a bike friendly environment on Studley Campus
3. I have access to a bike rack near **all of my classes** on Studley Campus
4. I would feel safe locking my bike up on Studley Campus
5. There are not enough bike racks **per building** on Studley Campus
6. I would bike to Studley Campus more often if the bike racks had covers

Interview Questions

1. Can you describe your thoughts on if the Nova Scotian weather prohibits your choice to bike to campus? Would this change with a bike rack covering?

2. What kind of new sustainability decisions around Dalhousie Studley Campus would you be interested in seeing surrounding the biking environment?

3. How do you usually commute to Studley Campus? Is this for convenience's sake or is it a

conscious decision to prioritize active transportation?

APPENDIX 1.3


SUST3502: RESEARCH PROJECT
RESEARCH TEAM: HANNAH JOSEY, XIAOLONG GUO, MAYAH PEPLINSKI, MAYA GROVES, & DANIEL SMITH
CO-INVESTIGATOR: KIMBERLY JACOBS
APPROVED BY THE DEPARTMENT OF EARTH AND ENVIRONMENTAL SCIENCES
CYCLING TOWARDS SUSTAINABILITY
WE ARE EVALUATING THE IMPACT OF BIKE RACK INFRASTRUCTURE ON STUDENT TRANSPORTATION CHOICES AT DALHOUSIE UNIVERSITY ON THE STUDLEY CAMPUS! LET'S HELP EACH OTHER CREATE BETTER HABITS!
MORE QUESTIONS? REACH OUT!
CONTACT: DN349694@DAL.CA
SURVEY
YOUR THOUGHTS MATTER!
https://tinyurl.com/bv3phmn6