

UBC Social Ecological Economic Development Studies (SEEDS) Sustainability Program

Student Research Report

**Why Not Bike? Exploring the Cycling Behaviours of UBC Cyclists**

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**University of British Columbia**

**KIN 464**

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## Executive Summary

The University of British Columbia (UBC) sees over 76,000 trips to and from its campus on a daily basis. These trips occur through many means of transportation, ranging from personal vehicles, public transportation, cycling, and walking, to name a few. Despite the city of Vancouver and UBC's efforts to improve infrastructure and interest, minimal improvements have been made regarding the percentage of those who cycle to campus. Within this group is an even smaller community of those who cycle regularly (2-5 times a week), leading most to cycle infrequently, or irregularly (less than twice a week). Past research has identified barriers such as perceived safety, confidence, and experience of the cyclists being reason to their infrequency (Kelarestaghi, Ermagun, & Heaslip, 2019). The goal of this study is to identify the cycling behaviours of UBC commuter cyclists and to determine the barriers that prevent more commuters, specifically irregular cyclists, from increasing their cycling frequency. We also aim to provide insight to UBC and other relevant organizations, governments, and stakeholders involved in the cycling community to improve cycling infrastructure and promotion.

The online platform 'Qualtrics' was utilized to create an online survey consisting of multiple choice and fill-in-the-blank questions to allow a wide distribution to many UBC students, faculty, and staff. The questions included in the survey evaluated sociodemographic factors of the respondents as well as more specific questions regarding their cycling habits and improvements they would like to see regarding cycling infrastructure and promotion. The incentive of a gift card prize draw was provided to increase interest. In total we received 88 responses with only one response from a non-student, which led us to discard that singular response to improve consistency.

Correlation between opinions and age/gender were found, as well as consistency among cyclists and non-cyclists regarding their views on factors such as barriers and required improvements. The largest barriers identified by the group were not having a functional bicycle, distance from their residence to campus, and adverse weather the city of Vancouver faces. The majority of respondents had no experience cycling to campus. Lack of bicycle ownership was an issue in this instance. Within the group that did cycle to campus, barriers to cycle more frequently included personal safety such as feelings of safety although no further detail was provided.

Major limitations of the study include sampling bias and providing more in depth questions to explain behaviour. The study was not distributed widely enough to receive responses from individuals from a variety of different sectors of UBC meaning that our sample is not representative of the population. Furthermore, although our questions were descriptive they did not provide enough detail to explain behaviour of respondents such as why males felt more unsafe cycling than females. Our recommendations include providing education to cyclists to improve their confidence and feelings of safety and providing monetary incentives to increase interest in cycling. Regarding our research process, adjusting our survey to provide more specific questions to irregular cyclists to explain their behaviours and accessing a more representative population of UBC would be recommendations.

## Introduction & Literature Review

Located on the Western-most point of Vancouver, the University of British Columbia Vancouver (UBC) Vancouver campus sees approximately 78,000 visits each day, predominantly by means of public transport, driving, carpooling, walking, and cycling (Chiong et al., 2018; Winters, Hosford, & Javaheri, 2019). In recent years, the city of Vancouver has implemented over CAD\$100 million to improve cycling infrastructure, and introduced supplementary bikeshare services such as ShawGo and HOPR to increase cycling frequency throughout the city (DailyHive, 2017). Despite these additions, the University of British Columbia experienced an increase of only 7% in those who cycle to campus (inclusive of anyone that travels to campus such as but not limited to students, professors, and other staff) (Chiong et al., 2018). Furthermore, a smaller percentage of this group do so regularly, to access the University of British Columbia Vancouver campus (Chiong et al., 2018).

The primary goal of the study is to evaluate why some cyclists commute to campus only part of the time, or “irregularly” (less than twice a week), and how the University, community, or municipal governments can help increase their cycling frequency. Further aspects will include gathering data related to possible barriers to cycling, improvements wanted, and concerns regarding cycling to campus. A clear understanding of these factors may provide the opportunity to educate the UBC community about the benefits of cycling to campus while simultaneously providing useful data that may help to improve UBC’s cycling infrastructure and to address the barriers listed by the UBC community, particularly irregular cyclists. Sociodemographic factors such as age and gender, as well as aspects such as faculty will be included to provide an in-depth understanding of possible barriers these factors may be related to as well as utilizing these factors to assist in resolving the possible issues.

The University of British Columbia Vancouver is often acknowledged for its work in improving student and faculty wellbeing, as well as focusing on environmental and community sustainability (UBC Launches Wellbeing Strategic Framework, 2020). This is seen through programs such as the “Wellbeing Strategic Framework”, which aims to advance well-being through 6 main factors including *Physical Activity* and *Built and Natural Environments* - important factors when considering the frequency of sustainable modes of transportation and active transportation initiatives (UBC Launches Wellbeing Strategic Framework, 2020). Although improved fitness and well-being may be incentive enough for some, they are not powerful enough to change behaviour in most (Damant-Sirois & El-Geneidy, 2015). Despite educational programs providing compelling information regarding the advantages to cycling more frequently, factors such as feeling unsafe and not knowing proper routes overtakes the personal benefits (Damant-Sirois & El-Geneidy, 2015). This is partially supported by a study conducted by the University of British Columbia in 2019 which showed that the number of individuals cycling to campus did not increase despite implementing bike share programs, promotion, and education. Identifying barriers to students, faculty, and all those that commute to UBC is integral to improving the frequency and ability of those individuals cycling to campus.

A major barrier when exploring cycling frequency in any aspect is the individual’s perceived safety (Kelarestaghi, Ermagun, & Heaslip, 2019). This includes aspects such as the presence of other road users, separated bike lanes, overall cycling infrastructure, and bike theft (Kelarestaghi, Ermagun, & Heaslip, 2019). Despite UBC taking precautions over the years to account for these considerations, including integrating cycling lanes, storage racks and the development of a “lock your bike” program, the number of those cycling to campus have not markedly improved (University of British Columbia [UBC], 2019). A possible concern may be

regarding the user-friendliness of these implementations. McElhanney conducted a transportation survey across Vancouver in 2018 that concluded students have concern with the accessibility and usability of infrastructure. Furthermore, sociodemographic factors such as gender play a role in a cyclist's perceived safety, as women choose to cycle less frequently or not at all compared to men due to safety concerns regarding other road users (Damant-Sirois & El-Geneidy, 2015). A different approach must be investigated that considers these factors, which may not be accounted for in UBC's current cycling infrastructure and recent implementations such as improved bikeshare and UBC programming.

Confidence and experience of the cyclist must also be taken into account as a possible barrier (Sersli et al., 2019). Factors such as adverse weather, vehicular traffic, and varying terrain are all components affecting an individual's desire to cycle to UBC (Kelarestaghi et al., 2019). This is all relevant to an individual's experience with cycling; bicycle skills training programs have been found to increase confidence in children and adults, which is especially important to consider as those with cycling experience as children have substantially more confidence than those who did not and chose to begin cycling later in life (Sersli et al., 2019). Training programs are successful in areas such as teaching newer cyclists proper techniques and safety precautions as well as providing education on road safety procedures. Individuals who cycle frequently in other areas of their life such as to work, to the grocery store, or for recreational purposes are more confident to cycle longer distances and in adverse terrain and weather conditions (Sersli et al., 2019).

After evaluating the literature, the relevance of our study can be identified as analyzing the gap between commuters who cycle regularly and those who do so irregularly. We have evaluated the main factors which are related to an individual's ability and desire to cycle to UBC. These

include barriers (i.e., confidence, available time and resources), sociodemographic factors (i.e., gender, age) and evaluating the success of programming already in place (i.e., UBC “Wellbeing Strategic Framework”). Understanding that these aspects are each unique yet interconnected is key in determining a solution to the issue at hand, such as that the gender experience will not be the exact same for each individual in their respective community but gender will generally relate to the confidence and feelings of safety an individual will encounter while cycling (Kalarestaghi, Ermagun, & Heaslip, 2019). These factors are important to consider when examining individual’s that cycle only *some* of the time, as barriers may differ from those who cycle none of the time or all of the time. Questions such as whether the time of day impacts cycling frequency (light or dark out, rush hour or not rush hour), or whether an individual only cycles on days that they have a cycling partner are important to consider in this instance. This leads us to the gap in knowledge being the question of what barriers differ or are the same for individual’s that cycle only some of the time and how are we able to use this knowledge to determine solutions that are relevant to all.

Our study aims to further the general knowledge regarding who cycles to UBC, whether that be students, faculty, staff, etc., and how often they do so. More specifically, we are exploring why those who only some of the time do not cycle to campus all of the time. Through this, we aim to identify further specific barriers that inhibit those that cycle to campus only some of the time from doing so more frequently. We will gather data related to sociodemographic factors such as age and gender and relate these to other points of personal information such as faculty to determine any correlation related to cycling frequency. Furthermore, our study will provide insight gathered by university students for university students which may offer a more personal point of view and allow for a unique observation perspective compared to a larger

research study conducted by non-university students that may not share the same knowledge and experiences. Through these means, our study will advance knowledge on the topic of evaluating individuals who cycle to campus only some of the time with the goal to provide new information related to the barriers that inhibit these individuals from cycling to campus all of the time, eventually using this acquired information to further improve various areas such as infrastructure, feelings of confidence of the cyclists, and education with an eventual objective of increasing percentage of those who use cycling as their main means of transport to UBC.

### Methods

The survey was generated using an UBC online survey tool, Qualtrics. The survey was administered through Qualtrics due to the ease of distribution to a large number of people, as well as the ability of respondents to further distribute the survey to others. Questions were constructed by evaluating various points of interest such as current commuting methods, perceived barriers to cycling, and sociodemographic factors. Through these considerations, our survey consisted of 12 questions (Appendix A). The initial portion of the survey included one paragraph regarding consent, indicating that any individual not wishing to participate in the survey did not have to do so, and that they may exit the survey at any point. Consent forms contained names and signatures and thus, participants' survey responses were kept separate, and each survey response was coded by a unique number to ensure participant confidentiality. Furthermore, the consent portion indicated that by continuing with the survey and submitting their responses they are consenting to take part in the research. This consent information was provided again prior to official submission.

A description followed by the link was written to explain the purpose of the survey, which was to explore student's attitudes, motives, and concerns about biking to campus. Participants will be given a detailed summary of our study to ensure proper informed consent. The survey included simple multiple choice close-ended questions as well as open-end questions that were meant to offer more insights into participants' attitudes regarding cycling to UBC. Moreover, the survey was designed to be relatively short so that it would not take more than 10 minutes of participants' time, ensuring the quality of the responses.

The survey was completed by each member of our group. Following our own completion to ensure proper flow and sensibility of the questions, the survey was distributed. This was done so by distributing the survey among our own communities such as but not limited to friends, online social groups, work groups, and any other relevant individuals who could provide data. The survey was distributed across various social platforms such as Facebook, Instagram and WhatsApp. Furthermore, the questionnaire was also distributed to our teaching assistant (TA) to disperse to any individual or group he determined would be beneficial. All possible participants were informed about the prize draw incentive to increase involvement. Initially, we had planned to hand out posters containing the QR code which would direct users to our survey. By doing so, we aimed to reach a broader group of UBC students, faculty, and staff, which would have provided us with an extensive amount of data from sources we would not have otherwise been in contact with. This did not occur and all data collected was predominantly from sources from our own relevant communities.

Focus of the initial questions was placed on gathering sociodemographic information related to respondents in order to spot differences between regular and irregular cyclists. Specifically, we sought to examine whether sociodemographic factors affect the presence of

barriers to increasing cycling frequency. For example, females have been found to have different experiences than males with regards to perceived safety when on a bicycle, which may play a role in the underrepresentation of female cyclists (Kelarestaghi et al., 2019). Thus, the questionnaire began with questions pertaining to demographics such as gender, age, and faculty.

Following these were questions more specific to transportation, such as the individual's main method of commuting to campus and their cycling frequency (to campus). Further questions relevant to only those who cycle to campus were included to determine their frequency and possible barriers that inhibited them from cycling all of the time. Questions relevant to those that do not/have not cycled to campus were also included, such as what inhibits them from doing so and what changes they may like to see to current infrastructure and initiatives. This allows us to determine differences in responses not only among regular and irregular cyclists, but also between irregular cyclists and non-cyclists. Thus, questions specific to each group were provided, being those who have not/do not cycle to campus and those that do (regularly or irregularly). This also provides us with interesting information that may be used in future research and literature.

Finally, participants were able to provide their email at the end of the survey for a chance to win an assortment of gift cards provided by our professor, Dr. Andrea Bundon, intended to incentivize people to take part in the survey.

Analyzing the data first began with exporting the raw data into an excel file that could be organized (Appendix B). Selection of responses that were generally demographic in nature were easily grouped based on the possible responses and the frequency of responses were determined, as well as the percentage proportionate to the total number of respondents. This allowed us to compare demographic proportions among cycling groups relative to total respondents. For

example, we can determine the male to female ratio among regular cyclists and compare it to the ratio among total respondents. Open-ended responses were grouped into similar themes to understand the general trends pertaining to commuting, perceived safety, and barriers. This allows us to gain insight into the perceptions and attitudes of respondents and compare them between different demographic groups or between regular and irregular cyclists. Numerical data was gathered, particularly in the form of frequency, and then imported into several charts to create visual representations that are more easily investigated (Appendix C). Following this process, the results were discussed among group members to discuss interesting points and findings, to resolve any unclear responses, and to determine our next course of action for relaying the data.

## Results

Over the course of four weeks, 88 responses were recorded, with 87 respondents being students, one respondent being a faculty member, and no responses provided from any other group member such as university staff and those who work on campus but not for the University. Thus, the faculty member's response was discarded and the remainder of the study focuses on student responses to increase generalizability of the study to a particular demographic. There was a near-equal amount of male and female respondents, with 46 males and 41 females. The vast majority of respondents were between the ages of 20-23 (67), with most of the remaining respondents being between the ages of 18-19 (11) or 24-26 (7). Two respondents were between the ages of 27-30 (2). The respondents came from a wide range of faculties, with Arts (25), Science (25) and Kinesiology (23) being the dominating faculties. Business students accounted for 7 responses, and the remaining 10 were either in Applied Sciences (3), Land and Food Systems (2), Forestry (1), or Medicine (1). Of 87 respondents, only 4 cycle as their main mode of

transportation to campus, while 16 use a personal vehicle, 28 walk, and 39 take public transportation. Despite this, 23 respondents cycle at least once a year, and 15 of these are irregular cyclists.

The survey data was first broken down to find demographic trends (Appendix B). Women were slightly underrepresented as irregular cyclists (6/15), but heavily underrepresented among regular cyclists (1/8). Contrary to perceived responses in previous portions of this report, men reported more worry about their safety when cycling compared to their female counterparts. Age differences were also found, with older respondents being more likely to cycle regularly. Respondents between the ages of 24 and 27 only made up 9% of total respondents, but consisted of half of regular cyclists in the survey (4/8). In addition, not a single cyclist (regular or irregular) was below the age of 20, despite them making up 13% of total respondents. Finally, the various faculties were represented fairly equally across all levels of cycling frequency, with an exception among science students, who were more likely to be regular cyclists (4/8).

Next, general differences among non-cyclists, irregular cyclists, and regular cyclists were analyzed (Appendix C). Irregular cyclists tend to cycle for many reasons ranging from health, convenience, environment, and enjoyment, with health making up the largest number of responses. On the other hand, regular cyclists generally cycle for either convenience or enjoyment. Irregular cyclists point to weather and having no working bicycle as the major reasons preventing them from cycling to campus more often. Meanwhile, half of the regular cyclists cycle already cycle daily, with the remainder of regular cyclists pointing to weather, inconvenience, and lack of a bike due to utilizing a rental service. Interestingly, in response to the question asking what the municipal governments or university could do to increase cycling frequency, irregular cyclists chose infrastructure, despite it only being mentioned by one

irregular cyclist as a barrier to increasing cycling frequency. Non-cyclists had a more varied spread of responses, but the most popular were monetary incentives, better infrastructure, and no change. Finally, in regards to safety, irregular cyclists were generally more concerned about their personal safety during their cycling commutes compared to regular cyclists.

In order to determine the differences in barriers to cycling between cyclists and non-cyclists, we also asked non-cyclists which barriers prevent them from beginning to cycle to campus, and these responses were not limited to a single answer, allowing for percentages to total above 100%. Most respondents stated reasons such as not having a functioning bicycle (53%), or uncontrollable factors such as distance (39%) and weather (38%). Theft and safety combined only amounted to 8% of responses. In addition, 10% of respondents said cycling to campus was too difficult and another 8% said they were simply not interested. Finally, 14% of respondents said they live on campus and walking is simply more convenient when compared to purchasing, storing, and locking bicycles.

### Discussion

The majority of respondents (64/87) had no experience cycling to campus, and this was consistent with the findings presented in the 2017 Vancouver Transportation Survey (Mathewson & Cheyne, 2017) that 75% of their participants (including UBC students, faculty member and staff) had never travelled to campus by bike. This indicated that UBC students generally lack experience cycling to campus, signaling the need for UBC Campus + Community Planning (C+CP) to target those who never cycled to campus. Among those who have cycled to campus, the majority of them (15/23) were irregular cyclists. This demonstrates that a significant number of students have the ability to cycle to campus, but choose to do so irregularly, which according

to our study, is mostly due to weather or lack of a functioning bicycle. Thus, UBC C+CP should focus on addressing the needs of irregular cyclists, who we expect to be the population most likely to increase their cycling frequency if their needs are met, due to their experience and commitment to cycling to campus. According to our results, the largest needs specified by irregular cyclists are the development of more bicycle lanes, as well as the implementation of anti-theft initiatives and safer bicycle parking, signaling these to be the focus of future initiatives taken on by the university. It is important to note that there were two answers that specifically referred to the need for a bike lane on West 16th avenue, giving insight into the areas of Vancouver that are lacking proper cycling infrastructure. In terms of demographics, UBC C+CP should focus on students under the age of 20 due to their complete non-representation among cyclists in our study. Furthermore, it should also be reported that lack of a functioning bicycle was the most common barrier preventing non-cyclists from beginning to cycle to campus. This finding suggests that a lack of bike ownership could be a major issue to address in order to improve cycling frequency of both irregular cyclists and non-cyclists. Interestingly, this finding also shows that a reasonable number of irregular cyclists utilize a bike share program or borrow a bicycle when commuting to school. Addressing this issue could be done by monetary incentives such as tax rebates, student discounts on bike share memberships, or student discounts on bicycle purchases. However, more research must be done to determine whether monetary incentives will actually lead to an increase in cycling frequency.

In terms of safety concerns while cycling, there was a gender difference that male respondents expressed slightly more concern regarding personal safety compared to their female counterparts. This was an interesting finding that is quite opposite from current literature, such as the findings of Kalarestaghi, Ermahun, & Heaslip (2019), which found that female college

students were more worried about safety and environment-related obstacles compared to their male counterparts. However, this may simply be a product of our small sample size. Per the results of our study, irregular cyclists were generally more worried about their physical safety. These findings imply that making irregular cyclists feel safer might be important in increasing the cycling behaviour of irregular cyclists.

One of the major limitations within this study was sampling bias. We distributed the survey to our close contacts including friends, classmates, and a teaching assistant. Furthermore, we asked these subjects to further pass on the survey to others. The data showed that half of the regular cyclists were between the age 24 to 26 despite only 8 responses from this age group being recorded, thus a drastic overrepresentation of older students (aged 24-26). Similar was also true for irregular cyclists. The data for cyclists might be skewed due to the involvement of the teaching assistant in the data gathering process, who himself was an avid cyclist and was asked to pass the survey along to other cyclists. The lack of involvement of staff and faculty members in the survey would also be another limitation. Although we had a sample size of 88, only one respondent was not a student. Not being able to reach out enough staff and faculty members not only decreased the external validity of our finding, it also did not align with the specific group of commuters we should focus on. The specific population intended to study were all those who commute to UBC on an irregular basis, including faculty, staff members, and students. Due to the incredibly unconvincing sample size from staff and faculty members, we changed the focus of our study to only students who commute by bike some of the time.

Another limitation in our study was the omission of questions pertaining to confidence level, which has been be a major barrier preventing people from increasing their overall cycling frequency (Sersli et al., 2019). Despite confidence level and the implementation of bicycle skills

training programs being mentioned in the literature review, we had forgotten to include these topics within the survey. Gathering this data may have played a crucial role in linking cycling confidence to cycling frequency, with weather playing a mediating role in the relationship (Kalarestaghi, Ermagun, & Heaslip, 2019). This is especially important due to weather being chosen as the largest barrier to cycling among irregular cyclists.

### Recommendations

Primarily, one of the main findings was that almost half of irregular cyclists are worried for their physical safety when cycling to UBC, highlighting an important barrier that should be addressed when attempting to increase cycling frequency among this population. Providing education has proven to be successful in prior studies to increase cyclist confidence regarding not only their biking abilities but also their presence on the road (Sersli et al., 2019). Providing education can also improve cyclist's knowledge on safety precautions such as how and where to lock up their bicycle as well as what measures to take to improve their physical safety (Sersli et al., 2019). Increasing the skill level of cyclists could help to increase confidence, which could lead to a higher cycling frequency on rainy days (Kalarestaghi, Ermagun, & Heaslip, 2019).

Monetary incentives were also reported as one of the most influential points of increasing cycling presence to campus among those who cycle irregularly. Addressing this need may also help to increase the number of cyclists overall as well. This incentive would address another one of the largest barriers among irregular cyclists, which was the lack of a functioning bicycle. Monetary incentives, such as resources or actual money, that promote fixing or purchasing of a bicycle could be enough to promote irregular cyclists into using their bicycles more often. Possible concepts could include a proposal to the city towards reducing carbon emissions of Vancouver by

incentivizing more individuals to own bicycles with a rebate program for bicycles within a certain price range. This proposal may be an effective action by the government to increase bicycle ownership as it is similar to the current successful electrical vehicle incentives in Canada which encourage individuals to switch over to greener commuting alternatives (Electric Vehicles: Government Incentives, 2020). Cities such as New York City successfully introduced similar programs incentivizing bike sharing to make up for the imbalance of cyclists to other forms of active transport (Chung, Freund, & Shmoys, 2018). The other alternative to increasing bicycle ridership is by expanding the discount benefits of students when signing-up bicycle sharing programs. Currently, some students or corporate staff can sign up for a Mobi bicycle sharing program for a discounted membership rate, however there are currently no Mobi bicycle stations on any university campuses (How it Works: What is Bike Share?, 2020). Expanding the membership discount program to bike share companies that operate on campus will further encourage students to cycle to, from, and within campus.

Furthermore, although it was not addressed in the survey, providing education regarding cycling etiquette may be beneficial. Providing education on geographic aspects of the city, technical information regarding cycling, and road etiquette have been proven to be beneficial in other cities (Damant-Sirois & El-Geneidy, 2015). This can be seen through motives to improve an individual's confidence not only regarding their abilities but in their presence on the road. The motive may not initially be to cycle to campus as a form of transportation but to increase cycling frequency in other aspects of the individual's life. This would be supporting the goal of providing more experience and eventually aiming to cycle to campus as a mode of transportation in the future due to enhanced confidence and experience which has proven to be a successful scheme (Sersli et al., 2019).

In addition to these recommendations, adjustments regarding our actual survey are important to note. Questions specific to those who cycle irregularly could be improved to provide more detail. This could include questions regarding if the cyclist is less or more likely to bike at a certain time of day, during a certain season, or during different weather patterns. The questionnaire could also have questions regarding cycling patterns in the respondent's everyday life, such as if they usually bike for fun, to work, to the store, etc. Questions such as these would have provided more insight to those who cycle infrequently, which was the main aspect of the research and this project. Furthermore, having this data would have possibly revealed more barriers that we may have missed or not considered previously as well as provided beneficial information regarding why an individual cycles infrequently. This would have allowed for a more detailed data analysis and would have provided further detailed information.

Finally, our means of sampling was problematic and should be resolved should the research be duplicated. This can be seen by the overrepresentation of certain demographics in the data, notably among age and faculty, and no data from individuals other than students was provided (one faculty member responded but the data was removed for reasons discussed previously). Therefore, we recommend future replications of this study, with more effort put into increasing the sample size and better representing the demographics of UBC to maximize the generalizability and validity of the study. In addition, more of an emphasis should be placed on targeting cyclists, and this could be done by handing out surveys to clients at the UBC Bike Kitchen. Furthermore, studies should be done on other university campuses around Vancouver that may be less isolated and easier to commute to by cycling.

## References

- Chiong, R., Molina, M., Liao, S., & Wang, A. (2018). Cycle City: Investigating why UBC bikes. *Vancouver: University of British Columbia Library*. doi: 10.14288/1.0377583
- Chung, H., Freund, D., & Shmoys, D. (2019). Bike Angels: An Analysis of Citi Bike's Incentive Program. *ACM Digital Libraries, 1*(5). doi: 10.1145/3209811.3209866
- Damant-Sirois, G., & El-Geneidy, A. (2015). Who cycles more? Determining cycling frequency through a segmentation approach in Montreal, Canada. *Transportation Research Part A Policy and Practice, 77*. doi: 10.1016/j.tra.2015.03.028
- Electric Vehicles: Government Incentives. (2020). *Canadian Automobile Association*. Retrieved from: <https://www.caa.ca/electric-vehicles/government-incentives/>
- How it works: What is Bike Share? (2020). *Mobi Bikes*. Retrieved from <https://www.mobibikes.ca/en/how-it-works>
- Kalarestaghi, K., Ermagun, A., & Heaslip, K. (2019). Cycling usage and frequency determinants in college campuses. *Cities, 90*. doi: 10.1016/j.cities.2019.02.004
- Mathewson, C., & Cheyne, N. (2017) *2017 Vancouver Transportation Survey*. Retrieved from [https://canvas.ubc.ca/courses/37437/files/6776145?module\\_item\\_id=1630599](https://canvas.ubc.ca/courses/37437/files/6776145?module_item_id=1630599)
- McElhanney. (2018). Summary Report. *2018 Vancouver Panel Survey*. Retrieved from <https://academicanswers.waldenu.edu/faq/73164>
- Sersli, S., DeVries, D., Gislason, M., Scott, N., & Winters, M. (2019). Changes in bicycling frequency in children and adults after bicycle skills training: A scoping review. *Transportation research Part A: Policy and Practice, 123*. doi: 10.1016/j.tra.2018.07.012

University of British Columbia. (2019). *Campus Bike Share Pilot Survey Summary Report*.

Retrieved from [https://planning.ubc.ca/sites/default/files/2019-](https://planning.ubc.ca/sites/default/files/2019-12/2019%20Bike%20Share%20Survey%20Report.pdf)

[12/2019%20Bike%20Share%20Survey%20Report.pdf](https://planning.ubc.ca/sites/default/files/2019-12/2019%20Bike%20Share%20Survey%20Report.pdf)

UBC Launches Wellbeing Strategic Framework. (2020). *The University of British Columbia*.

Retrieved from: <https://wellbeing.ubc.ca/examples-and-research/ubc-launches-wellbeing-strategic-framework>

Winters, M., Hosford, K., & Javaheri, S. (2019). Who are the ‘super-users’ of public bike share?

An analysis of public bike share members in Vancouver, BC. *Preventive Medicine*

*Reports*, 15. doi: 10.1016/j.pmedr.2019.100946

## Appendix A: Survey Questions

1. Are you a student, faculty member, or staff?
2. What is your age?
3. What is your gender?
4. What faculty are you in?
5. What is your main mode of transportation to campus?
6. If you cycle to campus, how often do you do so?
7. If you cycle less than 2 times a week, what are the barriers preventing you from cycling more often? (if you do not cycle to campus put down "I do not cycle")
8. If you do not cycle to campus, what barriers inhibit you from doing so? (i.e., distance, weather, don't have a bike, physical ability, etc.)
9. What are some changes that UBC or the municipal governments could implement that would increase your cycling frequency?
10. If you do cycle to campus (any amount of times per year), what are your opinions on the current infrastructure provided by UBC and the city of Vancouver? (if you do not cycle to campus put down "I do not cycle")
11. If you do cycle to campus, have you ever been concerned of your safety? Why or why not? (if you do not cycle to campus put down "I do not cycle")
12. If you do cycle to campus, what are the main reasons for doing so? (i.e., health, enjoyment, environment, etc.; if you do not cycle to campus put down "I do not cycle")

## Appendix B: Organized Response Data

<b>Relation to UBC</b>	Student(87)	Faculty Member (1)						
<b>Age</b>	18-19 (11)	20-23 (67)	24-26 (8)	27-30 (2)				
<b>Sex</b>	Male (47)	Female (41)						
<b>Faculty</b>	Applied Sciences (3)	Arts (25)	Business (7)	Kinesiology (23)	Sciences (25)	LFS (2)	Forestry (2)	Medicine (1)
<b>Main method of transport to UBC</b>	Cycling (4)	Personal Vehicle (17)	Public Transport (39)	Walking (28)				
<b>Cycling Frequency</b>	Daily (4)	2-4 times a week (4)	A few times a month (7)	A few times a year (8)	Never (64)			
<b>Barriers to Higher Cycling Frequency</b>	Broken/No Bike (5)	Distance or Difficulty (2)	Inconvenient (2)	Infrastructure (1)	Physical Safety (0)	Theft (2)	Weather (7)	None (4)
<b>Barriers to Begin Cycling</b>	Broken/No Bike (34)	Difficulty (7)	Distance (25)	Live on Campus (9)	No Interest (5)	Theft (5)	Weather (24)	
<b>Changes To Increase Cycling Frequency</b>	Better Infrastructure (27)	Better Bike Share Options (7)	Monetary Incentives/Discounts on Bicycles or Bike Share Options (17)	More Anti-Theft Initiatives (11)	Nothing (27)			
<b>Current Opinions on Cycling Infrastructure</b>	Good (11)	Needs Improvement (5)	Needs more anti-theft protection (3)					
<b>Thoughts on Safety According to Cyclists</b>	No Worries (14)	Worried About Safety (8)	Worried About Theft (3)					
<b>Main Reason for Cycling</b>	Convenience (11)	Enjoyment (4)	Environment (2)	Health (6)				

Table 1: Response Data Grouped by Similar Responses and Themes

Appendix C: Supporting Charts and Figures

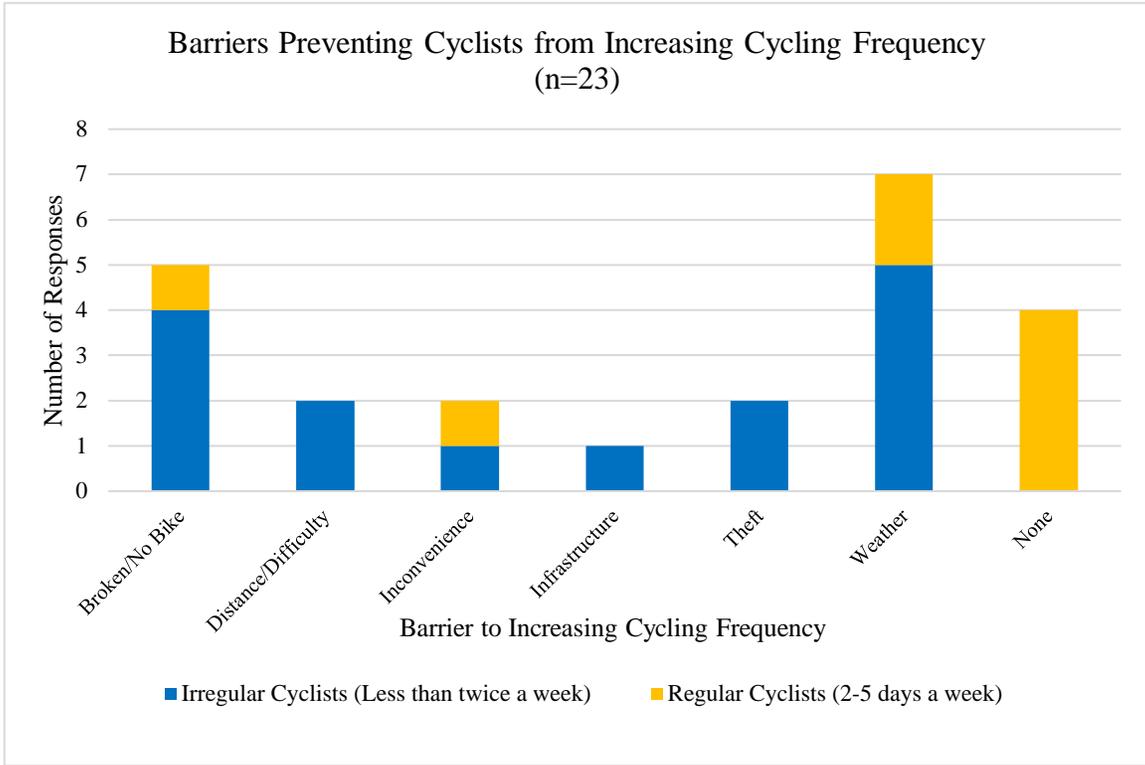


Figure 1: Barriers Preventing Cyclists from Increasing their Cycling Frequency

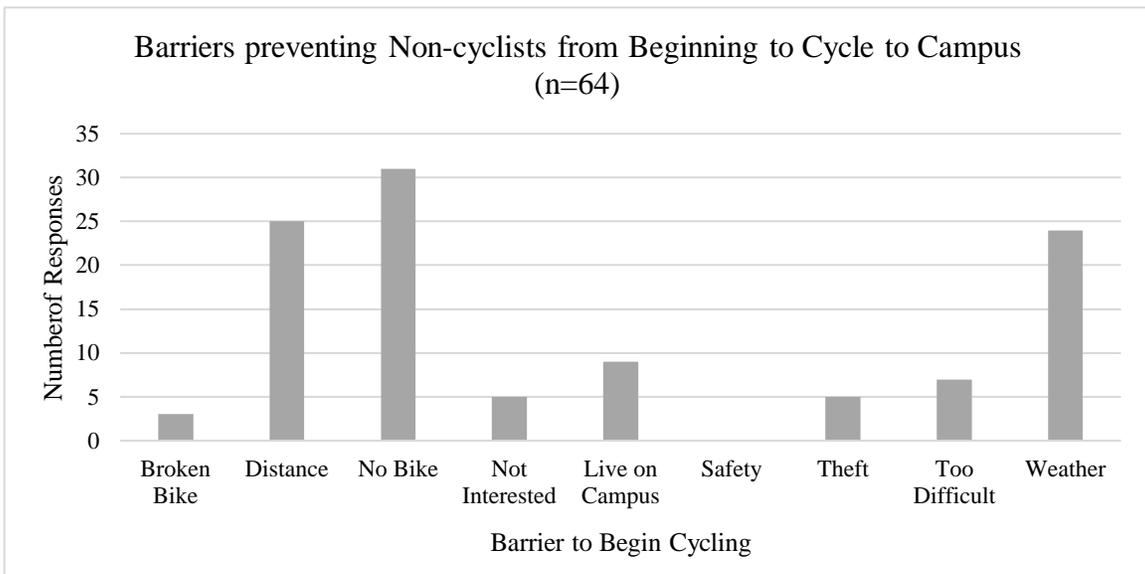


Figure 2: Barriers preventing Non-cyclists from Beginning to Cycle to Campus

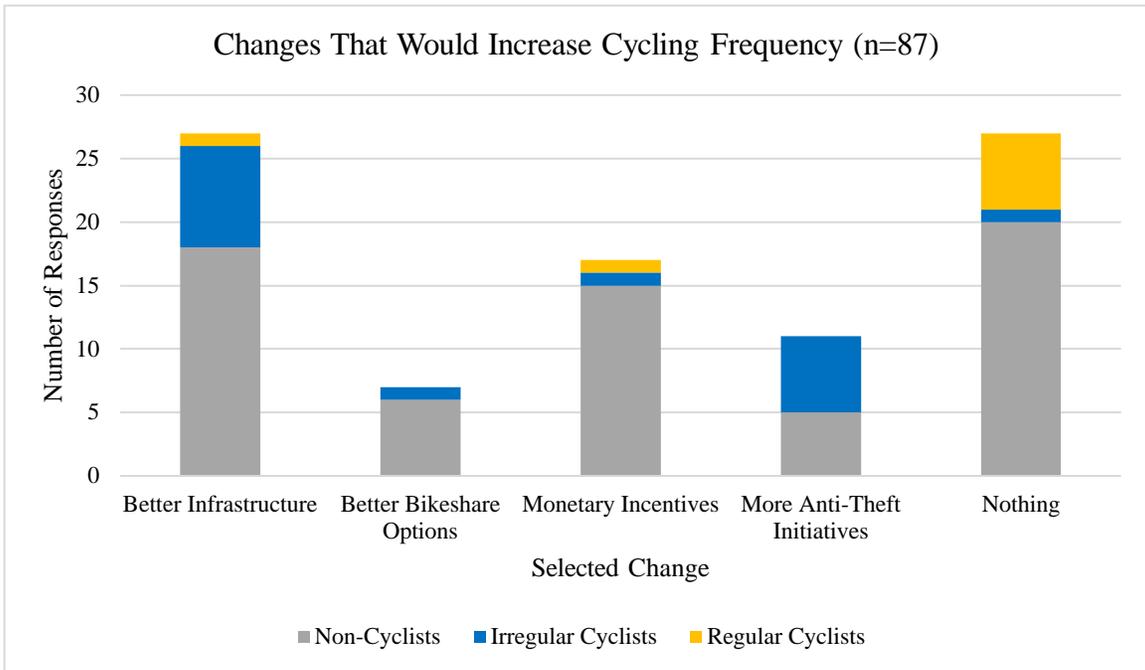


Figure 3: Changes That Would Increase Cycling Frequency Per All Respondents

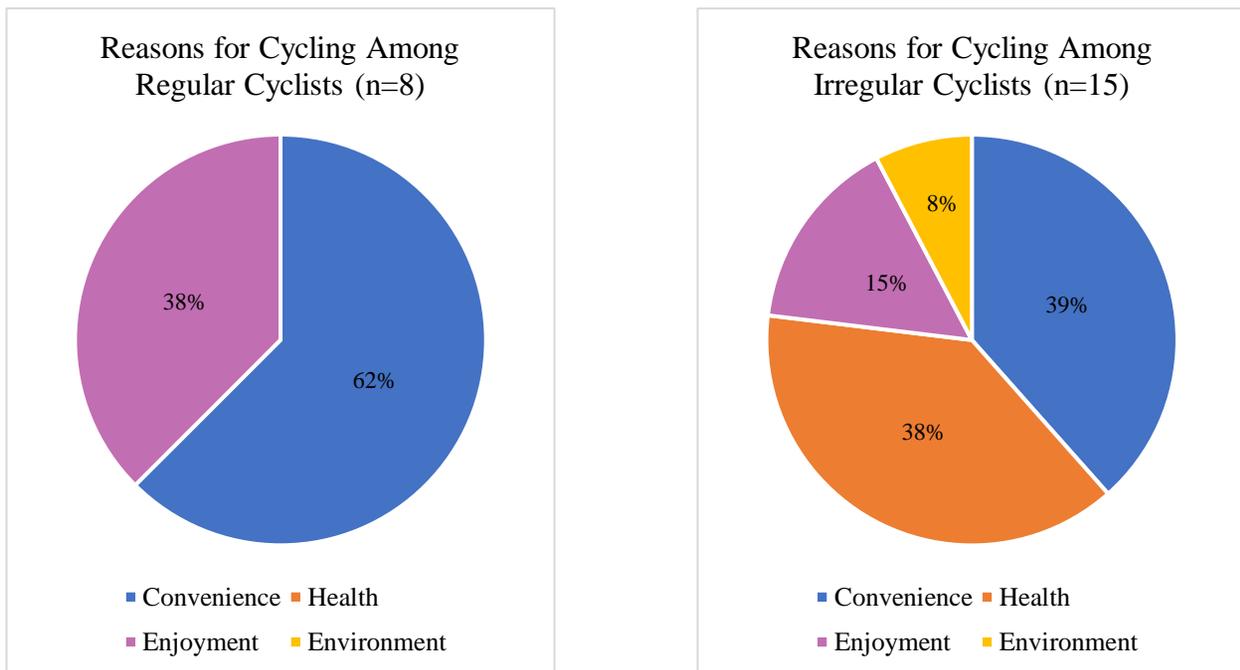


Figure 4: Reasons for Cycling Among Regular and Irregular Cyclists

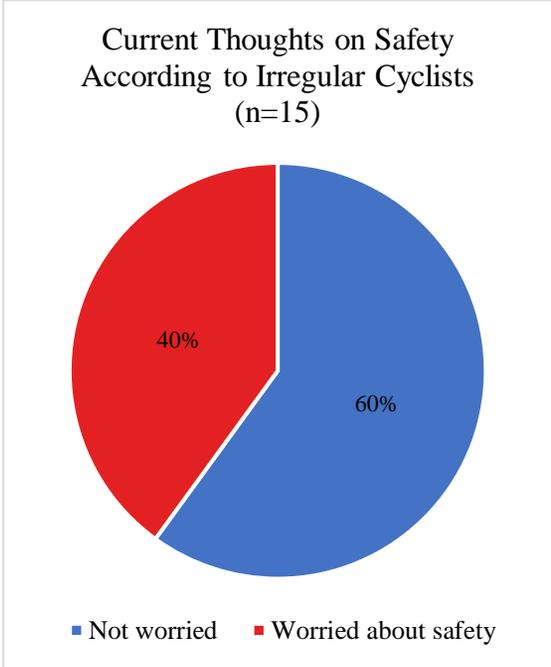
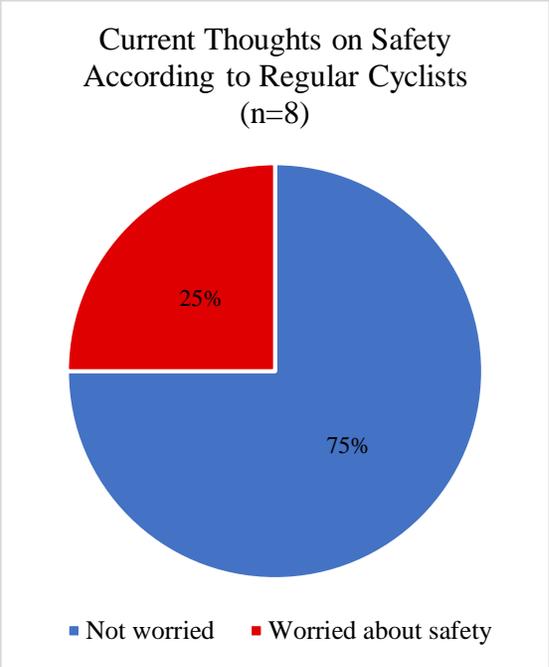


Figure 5: Perceived Safety Among Regular and Irregular Cyclists

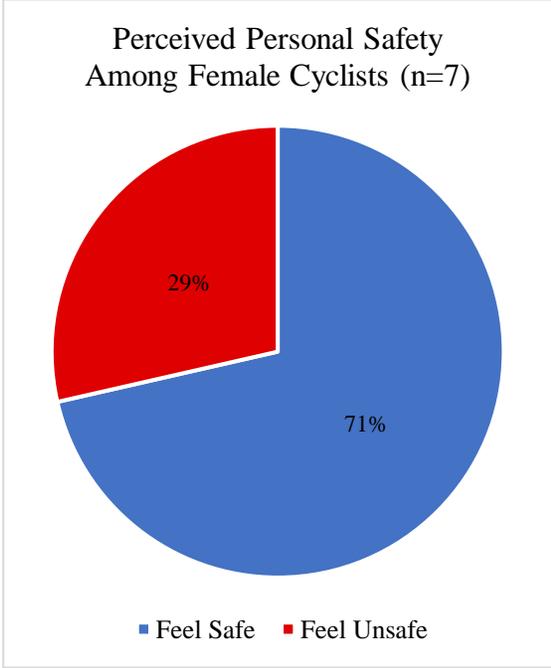
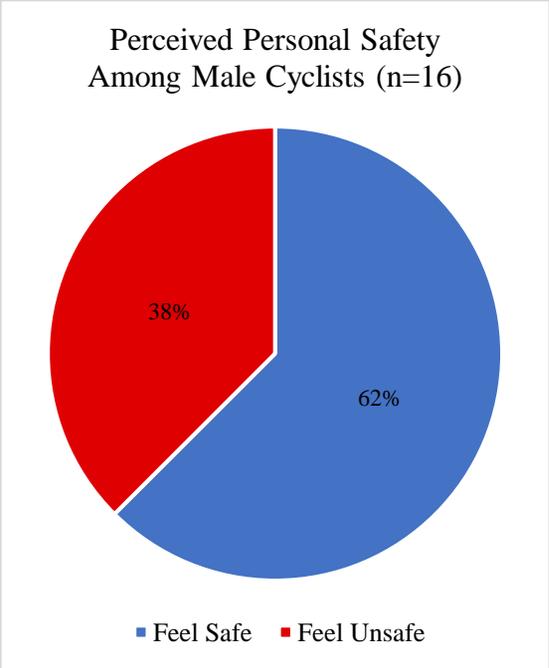


Figure 6: Perceived Personal Safety Among Male and Female Cyclists

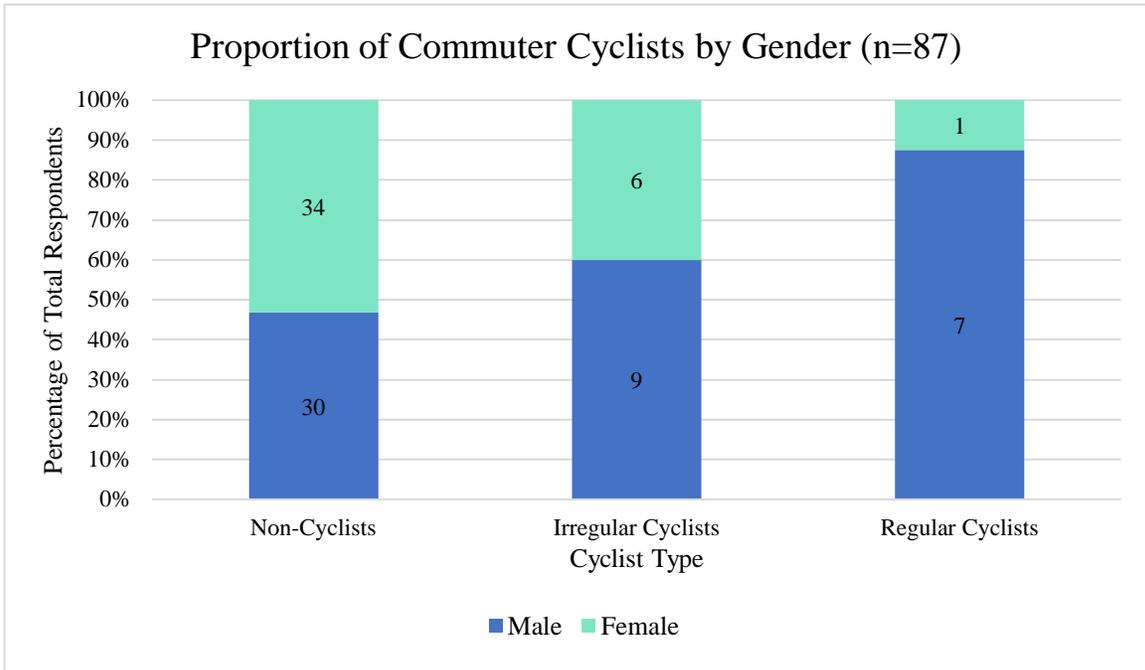


Figure 7: Proportion of Commuter Cyclists by Gender

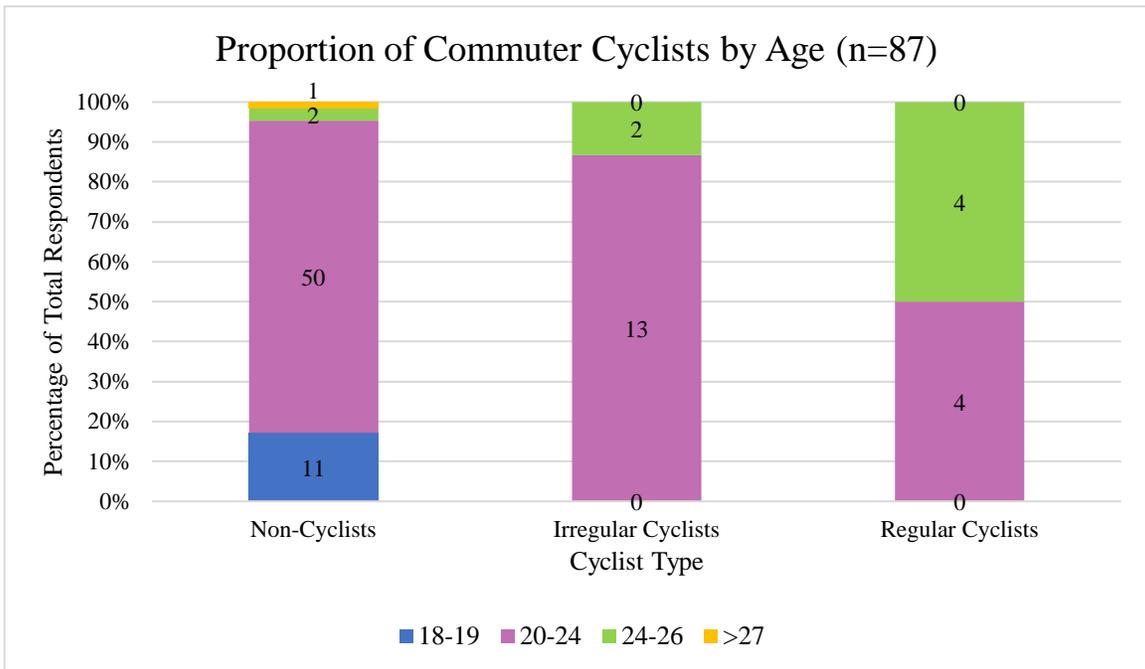


Figure 8: Proportion of Commuter Cyclists by Select Age Groups

