

Winter Cycling Trail Use and Maintenance Preferences in Guelph

**Applied Human Geography
Winter 2017
University of Guelph**

**Cindy Huynh
Laura Lisso
Jacob Moggy
Matt Schieck**

Introduction

With global greenhouse gas emissions at an all time high worldwide, there is much concern about the rate we are emitting at, resulting in a lot of research into alternative methods and strategies to reduce our emissions. One method for emission reduction that is being used around the world is finding methods of transportation alternatives to cars. As more people are choosing cycling and walking as their primary mode of transportation, there has been an increase in trail usage in cities. Throughout many major cities an increasing number of trails are starting to be developed to encourage people to walk or bike to work. Similar to roads, these trails have to be maintained so that people are able to use them without hassle so they will want to continue using them.

The goal of the research project was to discover how age, gender, and occupation influence trail usage and maintenance preferences in the east end of Guelph. Discovering how these three factors affect the use and preference of the trails would aid in making them attractive and accessible to all.

Some important facts to highlight are that the amount of trails in Guelph has increased 4 times from 2000-2010, ranging from 20 to 85 km (City of Guelph, 2012. p.13). This shows that more people are wanting to use trails as an alternative means of transportation, which opens the door for city planners to make the comfort and accessibility of trail users a priority. Being able to create an atmosphere that is enjoyable and comfortable on the trails will increase the consistency of trail usage. For people to change their lifestyle and choose to bike to work instead of drive, they will have to want to, which means making them feel comfortable while using the trails is essential.

The research question was how does age, gender, and occupation influence trail use and maintenance preferences. Questions about what improvements could be made to ensure comfort while using the trails, frequency of trail use, and type of trail use were asked of participants. The main goals were to find out who was using the trails, what they were using them for, how often they were using them, and how they felt about the maintenance of the trails. Data was collected in two areas to maximize results and was then analyzed to find the recurring trends and themes, which can be used to improve the trail maintenance and increase future usage based on appeal. From the research surveys it is concluded that occupation, gender and age have minimal influence on trail users preferred method of maintenance. However, the frequency of trail use and method of trail use can be linked to the demographics of our participants, as some correlations were apparent: gender and use frequency, age and type of use. It was clear that the trail users prefer the snow to be cleared from the trails with an application to reduce ice. The overall

maintenance preference favoured a snowplow method with a traction substance (40 percent chose salt, 35 percent chose sand) over a snow packed method.

Literature Review

There has been a shift in society that focuses on more efficient, alternative methods of transportation (Iseki & Tingstrom, 2014), which has resulted in a significant amount of research done around cycling. After reading the available literature, it is evident that there isn't a clear consensus on preferences for cyclists and walkers regarding trail preferences but there were some major themes that continuously appeared throughout which will be addressed.

The first predominant theme is that people want to feel safe while they are cycling whether they are going to work or for leisurely purposes. This idea of personal safety is incredibly important to people because if they do not feel safe, they will simply not use these trails. In a survey done in Portland, 60% of the people said they were interested in cycling, but did not because they felt it was not safe (Geller, n.d.). Under this category of personal safety, it revealed a lot of sub-categories that would help address the issue of people not feeling safe or comfortable enough to cycle on trails. Having appropriate lighting so that trails are not dark was a major issue; people who are biking early in the morning or late at night home want to have the ability to see what they are riding into to avoid a sense of danger (Li, Wang & Lui, 2012). Another reason people do not feel safe or comfortable using trails is because the trail is located by a large commercial area (Li, Wang & Lui, 2012). Cyclists do not want to be using the same space as pedestrians next to large roadways because there are a lot of added distractions and things to watch out for while these pedestrians are in the same space. For example, having a large traffic flow right beside pedestrians leads to a major decrease in the perceived personal safety (Geller, n.d.). This tells us that having trails separate from roadways and better connectivity to other trails will lead to higher perceived personal safety which will help to make the trail users more comfortable and use them more frequently.

The second major theme was about the actual physical structure of the trail. Connectivity is a major motivator for cyclists to use the trail (Iseki & Tingstrom, 2014), meaning that if the trail leads to major parts of the city (such as a downtown) they will be more likely to use it because it is a convenient route to take. Being connected to main parts of the city also allows for the commuters to use this as a legitimate alternative to get to work.

As for the physical makeup of the trail, there are many aspects that affect the trail user's experience. The width of the trail had a large impact on cyclists feeling comfortable; if the trail is too narrow then it becomes congested and is associated with negative reviews for wanting to use that trail (Li, Wang & Lui 2012). Having the right amount of space so that people are not colliding with each other or constantly feeling constricted to a certain section of the trail will increase user comfort and in turn keep people coming back to the trails (Li, Wang & Lui, 2012).

Another physical factor that has an impact on comfort levels is the topography - this primarily concerns the slope of the trail (Chatterjee et al., 2012). A trail with a steep slope is less likely to be used by commuters and leisurely pedestrians because it is more of a workout and being sweaty and tired is undesirable before a person even gets to work. From research findings, it is much more unlikely for people who have to wear formal attire to work for them to use the trails to commute (Khan et al., 2014).

There is also a need for more facilities to accommodate cyclists, especially those who use it as a means of transportation to work, for example having more buildings that have bike storage and have a location you can shower in and change into your working attire would be beneficial in helping these personal appearance factors (Khan et al., 2014). By adding these facilities it will give the commuters the resources they need to get to work and be comfortable doing it.

The overall feeling of trail users is that for them to want to use the trail, it has to be quiet and peaceful which shows the importance of trail separation from roadways (Geller, n.d.). Therefore a small amount of bus stops, major intersections, and high traffic areas along the way allows users to enjoy the commute, helping to constantly increase the population of trail users.

Methods

In order to obtain information about how age, gender, and occupation influence trail use and trail maintenance preferences, the research methods proposed were an exploratory participant observation to determine the popularity of the trails, followed by interceptive surveys conducted in two locations with a target sample size of 20-30 people. Due to the combination of our objectives and the environment the research occurred in, surveys were the optimal choice because of their short time commitments and ability to obtain the most relevant information over a large geographically dispersed population (Hay, 2016). The first interceptive survey occurred on the trails in the east end of Guelph at varying times, while the second occurred at a popular bike rack on the University of Guelph campus which is referred to as “bike resources” in between classes to optimize the participation. Both surveys covered a variety of closed and combination questions in order to give the individual the ability to specify their thoughts if they did not agree with the proposed options (Hay, 2016). Any adult encountered that was using the trails in the east end or were cyclists on the University of Guelph campus at the bike resource location were included in the sampling.

The exploratory participant observation occurred in order to determine a relative sample size and to understand the trails so the survey questions pertaining to the trails would be of relevance (Hay, 2016). This method proved to be very beneficial in discovering how little use that the trails in the east end actually get, noticed by absolutely no footprints on a day-old snowfall, signifying the necessary additional data collection method to reach a point of saturation which would indicate enough data was collected (Hay, 2016).

The first interceptive survey approach was conducted at the busiest points on the trail determined by observation, during the busiest time intervals in accordance with a standard nine to five work day, such as weekday mornings, weekdays at rush hour, and weekend mornings to optimize findings. This also allowed different types of trail users to be encountered. A quick, interceptive survey was ideal for this research in order to quickly obtain relevant information from users of the trail (Hay, 2016). A survey was better than an interview in this case due to the cold weather that people did not want to stand around in, the smaller time commitment, and the likeliness that trail users were more inclined to stop and answer a few quick yes/no or multiple choice questions rather than having to create their own responses (Hay, 2016).

The days of research conducted in the field can be found on the calendar (figure 2) listed in the appendix. Initial days were removed and then added again in accordance

with very poor weather conditions. The rationale for choosing these specific days was that choosing a variety of different days and different times (such as weekdays versus weekends and morning or evenings) to do research insured that different variables—such as how often a person may use the trails, during what time people are most likely to use the trails, and what specific day or days and times people may be busy or not and therefore use the trails, are being accounted for and therefore provided broad coverage of the use of trails in the east end.

Two different locations were chosen with similar but varying survey questions due to the belief that the bike resource location would have more bikers that were not found in the east end, and that trail users were not cyclists. With both surveys, they start with similar general demographic questions to give a starting point that everyone can answer. These included the individual's age, gender, and occupation which was necessary for the demographics being analyzed in the research question. The fourth and fifth questions for both were fairly similar in asking frequency of use and general trail questions. The bike resource survey asked about frequency of biking, while the on trail survey asked about the frequency of trail usage due to the lack of cyclists anticipated from the exploratory observation. The last few questions focused on physicality's of the trail such as maintenance preferences and substance preferences.

For data analysis, the demographic portion of data collected (i.e. age, gender, and occupation), categorized age into ten year increments in the form of interval data to avoid skewing the numbers (Hay, 2016), looked at gender and general occupation, and made comparisons and found trends with preferences on trail use and trail maintenance. Data was analyzed in an ordinal, and categorical way to provide different perspectives and build descriptive conclusions off of demographics (Hay, 2016).

Findings

Before findings are discussed a disclaimer must be made due to the small sample of people in locations, time limitations, weather limitations and the focus on just two locations. As a result of these limitations this data may not be a true indicator of trends and more research could be done in order to get a better picture of trends of both trails and bike racks at the University of Guelph.

Trails

This trail data was obtained through intercept surveys done in the East end of Guelph between March 3rd and March 12th of 2017. The trail data was first analyzed by the three desired areas the research question covers, which includes trail use that can be split between frequency of use and purpose of use, and maintenance preference, along with how they are using the trails.

Since the majority of people who were asked were walker's $\frac{7}{8}$ no trends will probably show up. This is seen in figure 3.

When looking at trail maintenance, snow being plowed was a necessity seeing as 87.5% chose an option that included snow plowing shown in figure 4. The spread between the additional substances was fairly even with 3 people of the 7 choosing additional salt and the remaining 4 people of the 7 choosing sand; it is a possibility that analyzing some demographics will not find any significant trends.

Comparing trail maintenance and gender, the preferred maintenance method of salt vs sand was fairly close with 3 females choosing sand (60%) and 2 females choosing

salt (40%). When looking at the male distribution a similar trend appears. Both can be seen in (figure 5).

Comparing trail maintenance to occupation looking at occupation distribution in figure six which is spread out with the only category with more than one person was the retired category, and even then the sample size is too small for any trends as seen in (figure 6) seeing as both retired people chose plowed but both chose different additional treatment between salt and sand.

Comparing trail maintenance to age, there is a small trend that shows people in the middle age ranges of 30-39, 40-49, 50-59 is higher in (figure 7) , but since the number of surveys was so small this may or may not be significant. Looking at these age ranges a small trend may have been found for 40-49 year olds as both people in this age range chose snow plowed and salt and 50-59 year olds chose snow plowed and sand. These trends can be seen in (figure 8).

Looking at frequency of trail use in figure ten, half responded with having use between 2-3 times a week (moderate trail use) which may become significant when comparing frequency of use with other demographic statistics analyzed in the research question.

Comparing frequency of use and gender, the spread between frequency of trail use is fairly evenly distributed for females with 40% with little to no trail use per week (0-1 times), 40% with moderate trail use per week (2-3 times), and 20% being fairly often trail use (4-6 times). For males this spread is even more prominent. This data can be seen in (figure 11).

Comparing frequency of trail use with occupation no real trends emerge due to the spread of occupations and the frequency of both retired people being from little to no trail use per week or moderate trail use as seen in (figure 12).

Comparing frequency of use and age besides the 50-59 range where both participants choose moderate trail use (2-3 times), no real trends show up in terms of age and frequency. This is seen in (figure 13).

When looking at motivators of trail use as seen in figure 14, the majority of people were motivated by leisure while the remaining were motivated by exercise.

Comparing motivator to gender females had a 40-60% spread between leisure and exercise. In terms of the males, a trend appeared where all three males chose leisure as the motivator for trail use. This may be significant, but again the small numbers may skew data and more research should be put into this area in order to get a better picture of whether or not this is true for this area. These statistics can be seen in (figure 15).

Comparing motivation with occupation, no real trends emerge due to the occupation spread and the spread of answers in the retired group.

Comparing motivation and age besides the 50-59-age range where both people choose exercise as seen in (figure 16) while no other trends were found.

Bike Resources

Data for bike resources was gathered from March 2nd to March 16th 2017. Data was analyzed in a similar format as to how data was analyzed for trails. Some interesting things shone through when looking at general statistics involving gender occupation and age majority who were surveyed between the age of 20-30 as seen in figure nineteen, were students as seen in figure twenty, and interesting enough there was a two to one ratio of guys to girls as seen in figure twenty-one.

Looking at figure 17 there is a fairly large spread between plowed and sanded, plowed and salted, and snow plowed so the chance of trends appearing may be low.

Comparing trail preference and gender, the male spread is even with four choosing plowed and sanded, three choosing plowed and salted and one other. For females a trend appeared where all four females chose plowed and sanded and two of the four chose additionally plowed and salted. These trends can be seen in (figure 18).

Comparing trail preference with occupation, the spread of students was evenly spread out similar to the spread for males with three choosing plow & salt, four choosing plow & sand and one with packed down. Another interesting trend while looking at occupation was both people who chose environmental as occupation chose packed down. These trends can be seen in (figure 19).

Comparing trail preference and age the spread was even for people in the age range of 20-29 with 4 choosing sand 4 choosing packed down, 2 choosing salted, and one choosing other. As for the age range of 60+ both chose plowed and sanded. These trends can be seen in (figure 20).

Looking at frequency of winter cycling, the actual spread was very similar to that of the trail's, the only difference was that one person said they always biked as seen in (figure 21).

Comparing frequency and gender, a trend was found, 5 of 8 males biked moderately 2-3 times a week, 2 of the 8 chose often cycling and the remaining one was constantly cycling. As for females 3 of the 4 females little to no cycling in the week at 0 to 1 times and the remaining one with often cycling at 4-6 times a week. These trends can be seen in (Figure 22).

Looking at frequency and occupation, 4 students bike moderately, 2 chose rarely, and 1 chose often. For environmental workers the spread was fairly even. Trends can be seen in (Figure 22).

Comparing frequency and age, 4 people bike moderately in a week, 3 did little to no cycling weekly, 1 often cycled and one person always cycled in the 20-29 year age category. For both people who fell in the age category of 60+ both cycled fairly often per week.

In terms of purpose of trail use 75% of people at the bicycle racks said the route being the fastest was important, and there was an even spread of 4 to 4 for both exercise and recreation, shown in (figure 23).

Comparing motivation and gender for females the spread of fastest route and recreation were tied at two people per location and one person choosing exercise and one choosing other as in commuting. For males 75% of males said fastest route was important and one remaining said exercise and the remaining one had no opinion. One male also said all three were important factors. These statistics are seen in (figure 24).

Looking at motivation and occupation 75% of students were motivated by fastest route. Three students choose exercise as an important factor as well. 2 out of three environmentalist also said fastest route was a key factor. These statistics can be seen in (figure 25).

Lastly for age and motivation, 5 people in the age range of 20-29 said that fastest route was the main motivator for trail use, 2 said recreation, 1 said exercise/recreation, and the remaining participant circled other. This data can be seen in (figure 26).

Discussion

The original research question had a focus on the east end of Guelph, but after scouting the location using an observational method, it was noticed that the area was not busy, trails were short and not connected to each other, and the weather was undesirable to be outside in. Due to these factors, a second location on the University of Guelph campus was added with a similar survey, the initial purpose being to find people who had used the trails in the east end of Guelph and what they thought of them. With this it was discovered that only 25% of the people surveyed at the bike resource location had ever been on the trails in the east end, so the research question was changed from “how does age, gender, and occupation influence trail use and maintenance in the east end of Guelph?” to “how does age, gender, and occupation influence trail use and maintenance?”. The focus on one singular area was lost, but this allowed for comparisons between two very different age groups and occupations.

From the two locations surveyed, there were different themes present throughout the two. Age and gender were significant in the responses from the survey conducted on the trails in the east end of Guelph whereas age and occupation were significant in the response from the survey conducted at the bike resources on the University of Guelph Campus. Reasons for using the trails and frequency of trail use were more significantly connected to the location the survey was conducted, but also in connection with age while trail maintenance preferences were important in relation to occupation.

Beginning with the east end of Guelph, the area is a suburban neighbourhood with many single-family, detached homes, which led to the importance of age in this area. The older age groups were much more predominant on the trails and they were using the trails for either leisure or exercise. This is where the physical structure comes in as important as mentioned in the literature by Chatterjee et al. (2014). When discussing with the leisurely users, which were mostly male, they enjoyed that there was no steep hills that would make them tired and that there was more than enough room to walk along the trails and have people pass by at a reasonable distance. The low-intensity structure and high capacity of the trail provided the users with a more enjoyable walk. The participants that use the trail for exercise were all females and all over the age of 35. This could be a factor of simple convenience. The trails are near their homes which means no time spent on traveling to another exercise facility and is also a simple and cheap way to get some quick exercise in which would be important to the working class.

In relevance to both the leisurely and the exercise users, the factor of safety is key due to the proximity to major commercial areas as discussed in the literature by Li, Wang, and Liu (2012). As mentioned before, the east end of Guelph is largely suburban with a few schools in the secluded neighbourhoods, meaning it is fairly quiet and has few significant commuter roads. Due to this, using the trails does not require crossing any busy roads. This gives the users a higher perception of safety as well as provides a quiet and peaceful trail for them to use which is important according to Geller when wanting to increase the amount of trail users (n.d.).

The average amount of times the trails are used per week is 2-3 times and reflects the reason why people are using the trails (leisure and exercise). If there were more commuters, this average would be higher in acknowledgement of the more regular use. Knowing the structure of the trails in the east end, there is a lack of connectivity to other trails leading to major areas of the city as well as a lack in consistency of trail material.

Fixing these two things, as well as promoting knowledge of the trails could lead to more commuters, meaning more trail use overall.

All but one participant in the east end preferred what could be called a “full” maintenance of the trails, that being either snow plowed and salted or snow plowed and sanded. Both of these options provide traction and would give the trail users the very important high perception of safety mentioned by Geller (n.d.). A concern for these methods would be whether or not a single overall maintenance method would have an effect on the different trail substances, causing an increase in the lack of consistency.

Moving on to the bike resource area on the University of Guelph campus in which the majority of the population is young adults, the demographics age and occupation were important at this location. Most of the participants were in their 20’s and appeared to be quite busy seeing as every individual had to check to see if they had enough time to answer the survey. This is not surprising for the area chosen due to the amount of students and has a direct correlation with most people choosing to use the trails to commute because they are the fastest route to their destination. Rather than following the traffic flow on the roadways, shortcuts can be found cutting through parks and residential areas. This once again brings back the conversation of Geller’s importance of pedestrians having a high perception of personal safety (n.d.), as well as Li, Wang, and Liu’s conversation of the proximity to large commercial areas lessening one’s perception of safety (2012) which can be seen by the use of the trails in favour of the on-road bike lanes in the most congested areas.

The majority of the participants were cycling more than once a week in the winter due to it being their method of commuting. Given most of the participants identified their occupation as a student, they had the ability to choose to commute by cycling in terms of their clothing. It is not necessary for them to change out of their winter cycling gear which would then not infringe on their choice to bike in the winter. This reflects Khan et al.’s point about people that wear formal attire are less likely to bike, and attending lectures being a fairly informal event, cyclist clothing causes very few problems for the user (2014).

Khan et al. also proposes that more facilities to store bikes are needed (2014) and the university has supported this through the creation of the large, covered bike storage area at a central hub near one of the largest lecture halls on campus. The resources needed were supplied and students frequently commute to this resource, displaying its importance.

In terms of maintenance preferences for the trails, there is an even split between snow plowed and salted, snow plowed and sanded, and snow packed down. Two of the four participants that preferred the method of maintenance to being snow packed down had an environmental occupation. This could be attributed to the method being the most environmentally conscious action while still receiving enough maintenance to bike in the winter and have the important perception of safety (Geller, n.d.). A further reflection on this could be done by asking about their environmental perspective, their preferred maintenance method, and what they think the maintenance method should be.

The connectivity to major areas and maintenance of the trails were the most chosen options when asked what would encourage one to use the trails from surveys done at the bike resources. Although the age, gender, and occupation of the participants varied from each location and had varying results, the lack of connectivity the trails had was the

most prominent issue concerning the low trail usage through all demographics and further options should be explored.

Conclusion

After analyzing the research methods and findings, the limiting factors that had an influence on the results will be highlighted. First, the biggest limitation for collecting data was the weather. Unfortunately in the three weeks that the data was collected on the trails, it was freezing cold with snowstorms and wind, this most likely reduced the willingness for people to be out on the trails, especially biking. Another limiting factor was the location of the area. The initial focus was in the east end of Guelph, but because this is a suburban area that is not located close to downtown or near the university, it reduced the amount of “traffic flow” on the trails because it is not near the hotspots of Guelph. Another limiting factor was connectivity. The east end of Guelph has a lot of trails; the only problem is that they don’t have very good connectivity to the main parts of Guelph such as the university or downtown. This has a big effect on the type of trail users that were likely to be found. Since the trails do not connect well with major parts of Guelph, all of our participants we found identified as “leisure/exercise” users, and no one said they were using the trails for commuting purposes. This is the issue in the east end for cycling, for the most part people who are commuting will be on their bike because it is the fastest method to get to their destination, but because the east end has a lack of connectivity with major parts of Guelph, there were no cyclists on the trails. The final limitation was the overall age of the area, the east end is suburban with families, the user groups that are using the trails are different than students that use trails to get to and from the university, and this has an effect on whether they would be cycling or walking.

Based on these limitations and our research findings, there are a few recommendations that would increase the frequency of trail use in the east end, as well as increase the amount of cyclists using these trails. From the data on the bike resource surveys, what was found was that for those who hadn’t ever used the trails in the east end, a factor for this was their lack of knowledge of the trails.

More trail awareness to the general public about the trails in the east end and where they lead to would help to increase the frequency of trail use because people would then have knowledge on where the trails actually connect to when planning their route.

Another recommendation would be to increase the connectivity to major areas in Guelph. With the lack of connectivity to the downtown and university areas, it is hard for people who are commuting to use these trails because they don’t allow for fastest route. Being able to connect these trails to the major areas would increase the ability for cyclists to configure their route to use trails in the east end to get to there destination.

There are a lot of people using the trails every day in Guelph for many different purposes from commuting, to exercise, to just out for a Sunday morning walk. With a few changes to the trails in the east end, there is huge potential to increase the frequency of use, as well as making these trails more accommodating for commuters.

References

- Chatterjee, K., Christensen, J., Marsh, S., Sherwin, H., & Jain, J. (2012). Evaluation of the Cycling City and Towns Programme: Qualitative Research with Residents. *Report to Department of Transport by AECOM, Centre for Transport & Society and the Tavistock Institute*, 8-83.
- City of Guelph. (2012). Bicycle-Friendly Guelph: Cycling Master Plan. *City of Guelph*, 3-66.
- Geller, R. (n.d.). Four Types of Cyclists. *Portland Office of Transportation*.
- Hay, I. (2016). *Qualitative Research Methods in Human Geography*. Don Mills: Oxford University Press.
- Iseki, H., & Tingstrom, M. (2014). A new approach for bikeshed analysis with consideration of topography, street connectivity, and energy consumption. *Computers, Environment and Urban Systems*, 166-177.
- Khan, M., Kockelman, K. M., & Xiong, X. (2014). Models for anticipating non-motorized travel choices, and the role of the built environment. *Elsevier*, 117-126.
- Li, Z., Wang, W., & Liu, P. R. (2012). Physical environments influencing bicyclists' perception of comfort on separated and on-street bicycle facilities. *Elsevier*, 256-261.

[
]

5i) If you bike how often do you bike in the winter?

- a. 0-1 Times a week
- b. 2-3 times a week
- c. 4-6 times a week
- d. 7+ times a week

6) Are you satisfied with the maintenance of this trail?

- a. Always
- b. Often
- c. Rarely
- d. Never

7) What is your preferred trail substance?

- a. Paved
- b. Gravel
- c. Grass or dirt
- d. Other (please specify below)

[
]

8) What is your preferred maintenance method for winter?

- a. No treatment
- b. Snow plowed and salt
- c. Snow plowed and sand
- d. Snow packed down
- e. I don't have a preference
- f. Other (please specify below)

[

]

Survey Questions: Bike Resources

1) What is your age as of January 1st 2017? []

2) Gender

- a. Male
- b. Female
- c. Other

3) Occupation

- a. Retail
- b. Factory
- c. Business/Management
- d. Education
- e. Food Service/Production
- f. Health
- g. Construction/Development
- h. Environmental
- i. Other (please specify below)

[
]

4) How often do you bike in the winter?

- a. 0-1 Times a week
- b. 2-3 times a week
- c. 4-6 times a week
- d. 7+ times a week

5) Which bike trails have you biked on before? (Select all the may apply)

- a. In the east end of Guelph
- b. In the south end of Guelph
- c. Downtown
- d. Around the university
- e. In West end of Guelph
- f. In North end of Guelph
- g. I have not biked on any trails
- h. Other (please specify which trail and where it is in Guelph)

[
]

6a) If you have biked on trails before, what was the driving factor of using the trail?

- a. Fastest Route
- b. For recreational purposes
- c. Exercise
- d. Other (please specify below)

[
]

6b) If you have not biked on trails before, what would drive you to possibly bike on these trails in the future? (Select all that may apply)

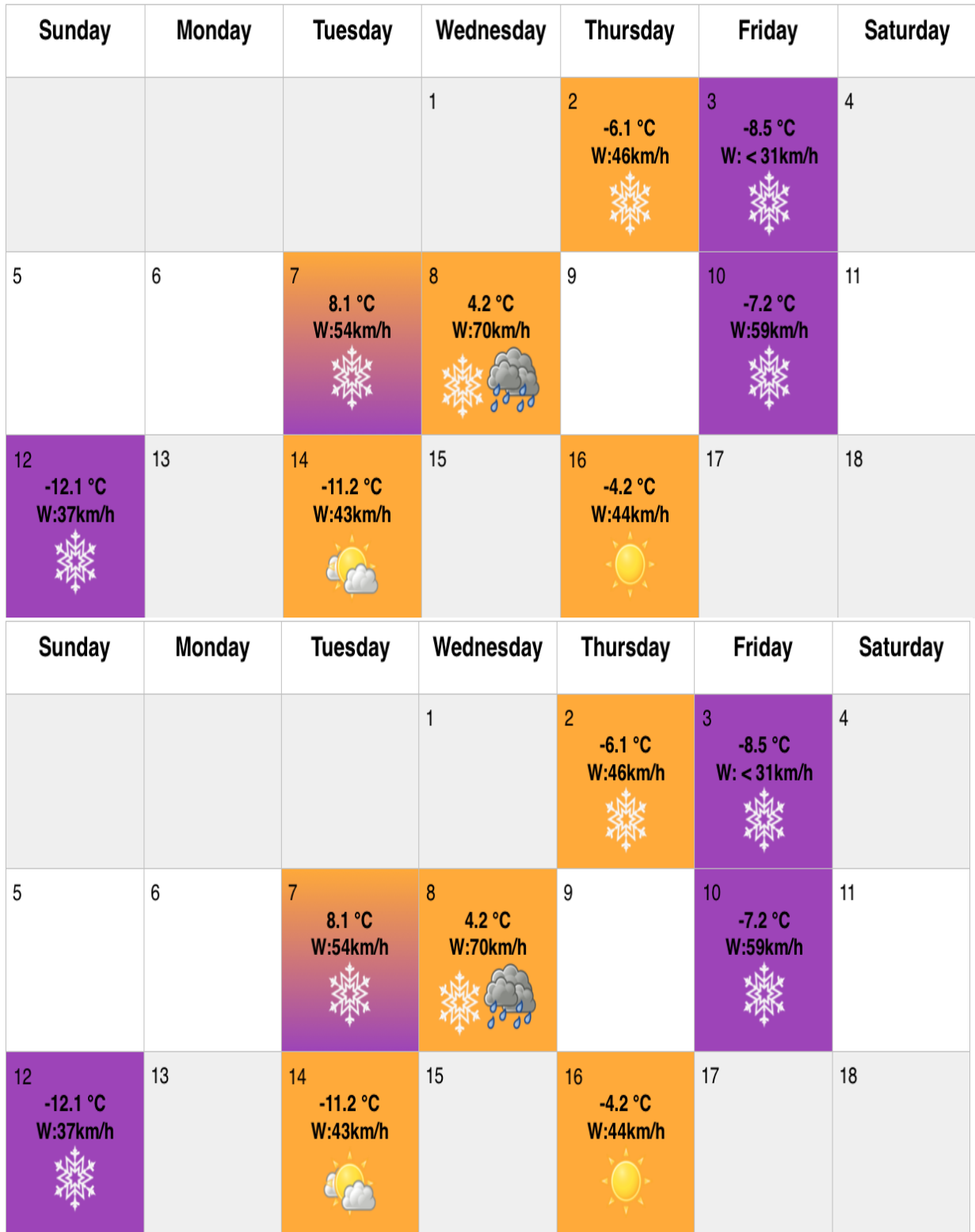
- a. Knowledge of where the trails are
- b. Maintenance of the trail
- c. Connectivity to major areas
- e. Leisure
- f. Other (please specify below)

[
]

7a) If you have used trails before what is your most preferred maintenance method for these trails?

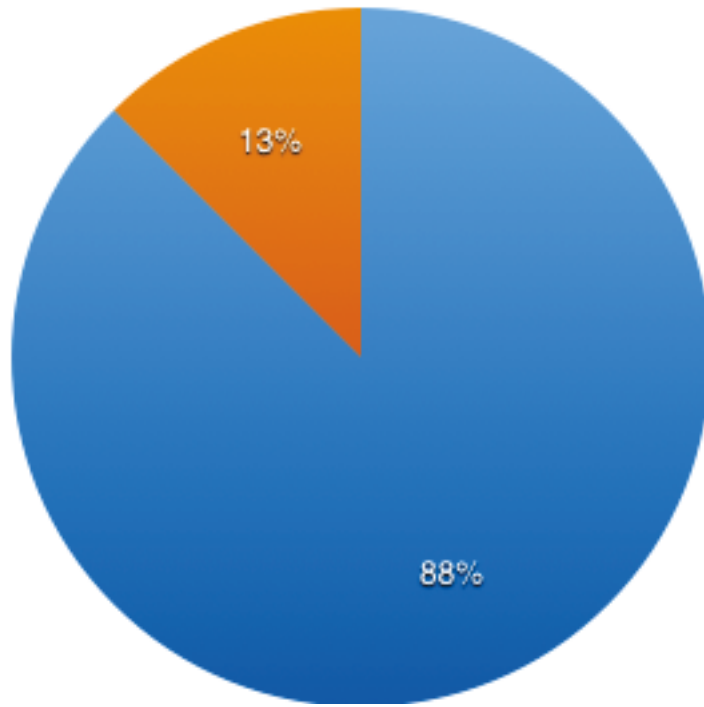
- a. No treatment
- b. Snow plowed & Salt
- c. Snow plowed and sand
- d. Snow packed down
- e. I don't have a preference
- f. Other (please specify below)

[
]

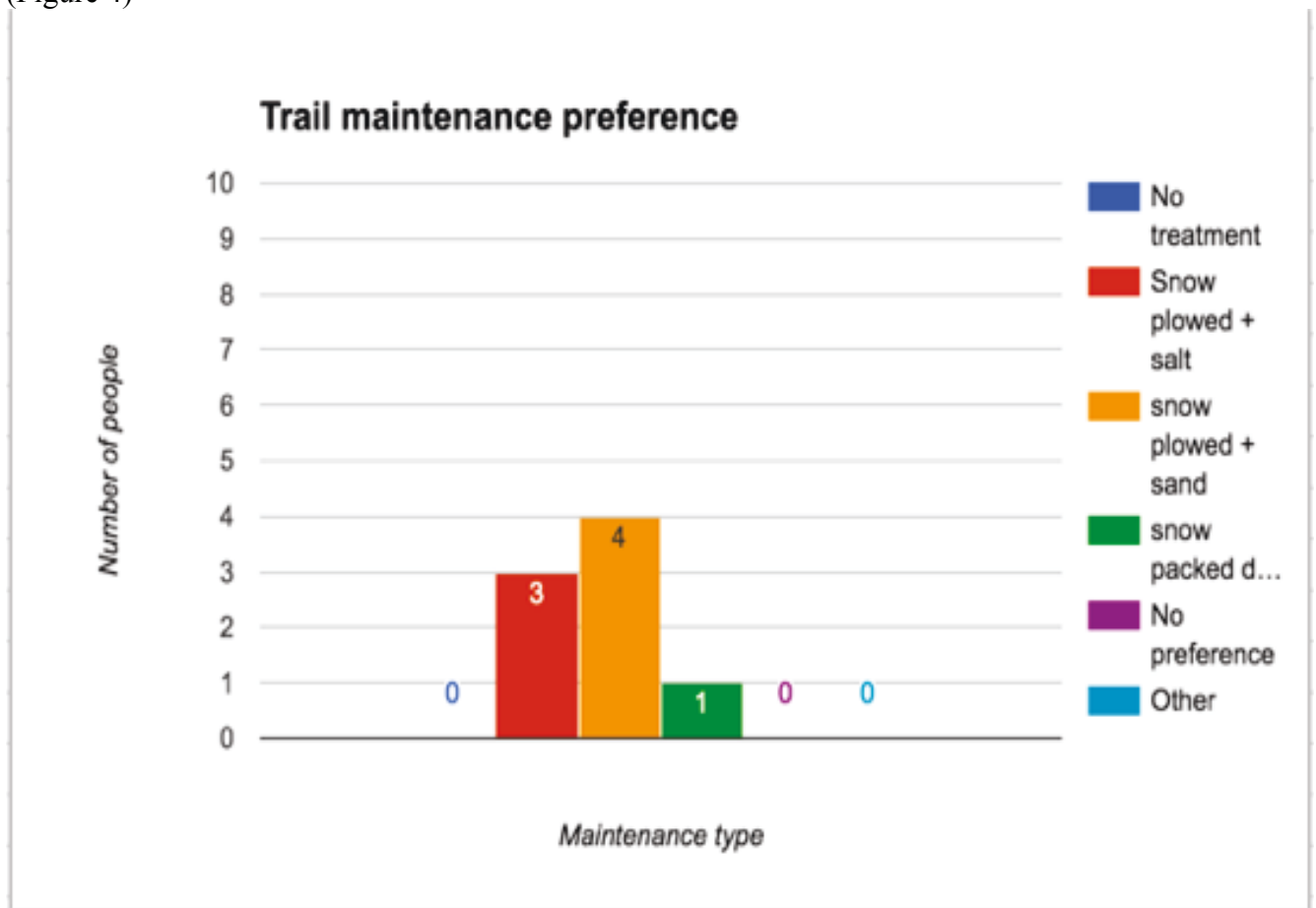


(Figure 3)

● Walking ● Cycling ● Wheels ● Other



(Figure 4)



(Figure 5)

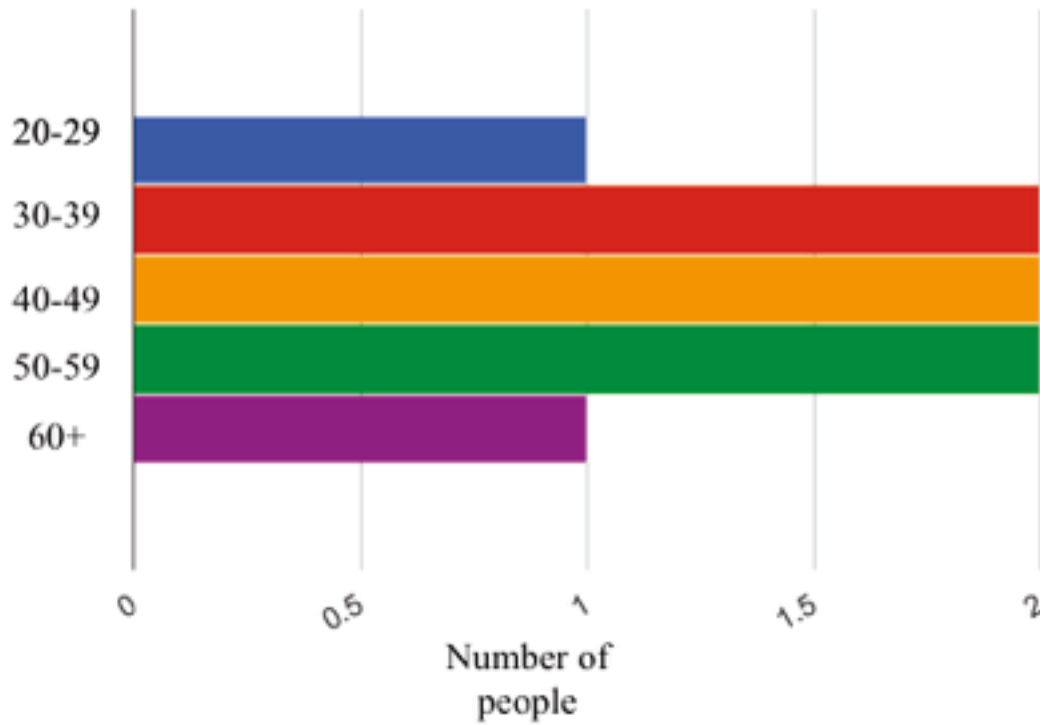
Female Participant number	Response to treatment preference	Male Participant	Response to treatment preference
P121	Plow+ sand	P123	plow + salt
P118	Plow+ sand	P119	Plow+ sand
p122	plow + salt	P120	Packed down
p117	plow + salt		
p124	Plow+ sand		

(Figure 6)

Retired	treatment
P118	plowed+sand
P123	plowed+salt

(Figure 7)

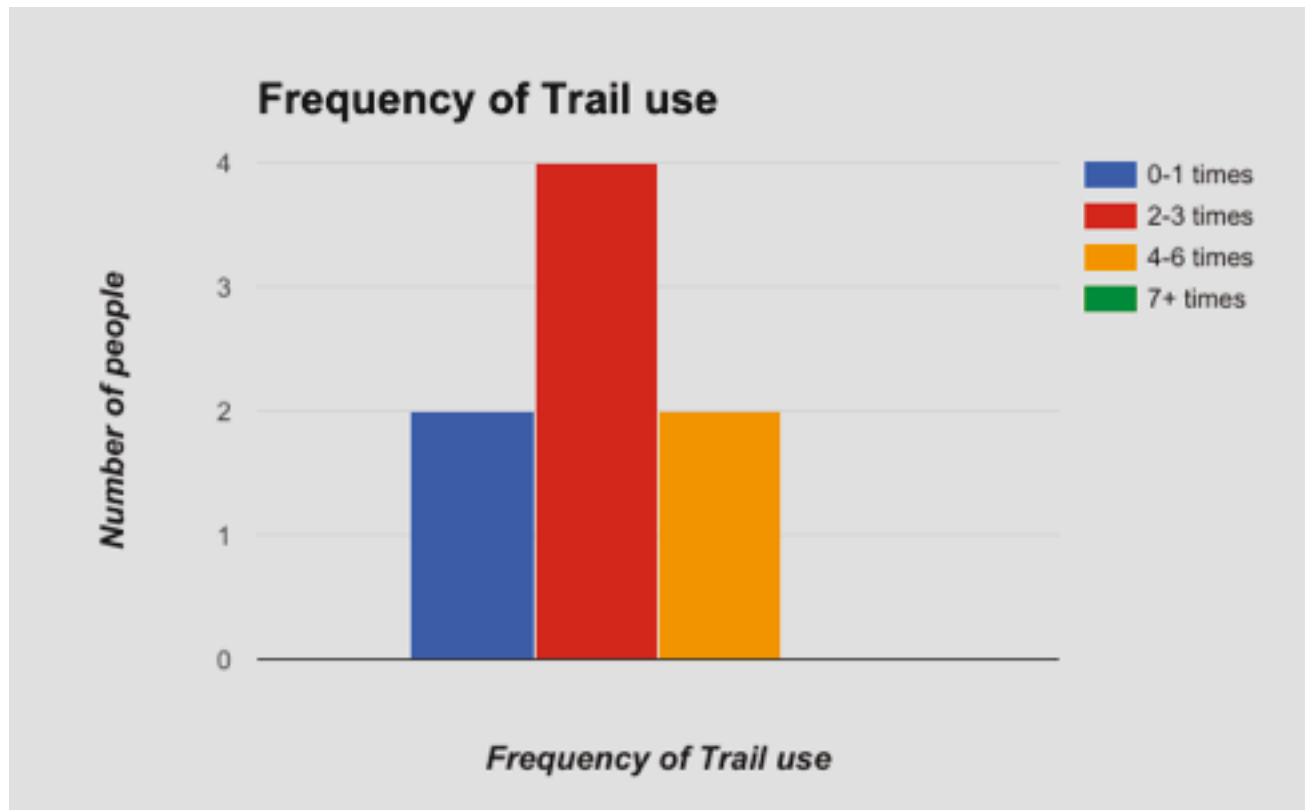
Age Distribution on the Trails



(Figure 8)

20-29	treatment preference	30-39	treatment preference	40-49	treatment preference	50-59	treatment preference	60+	treatment preference
P117	plowed+salt	P120	snow packed down	P122	plowed+salt	P124	plowed+ sand	p118	Plow+ sand
		P121	Plow+ sand	P123	plowed+salt	P119	plowed+ sand		

(Figure 9)



(Figure 10)

Female Participant number	frequency	Male Participant number	frequency
P121	4-6	P123	0-1
P118	2-3	P119	2-3
p122	2-3	P120	4-6
p117	0-1		
p124	2-3		

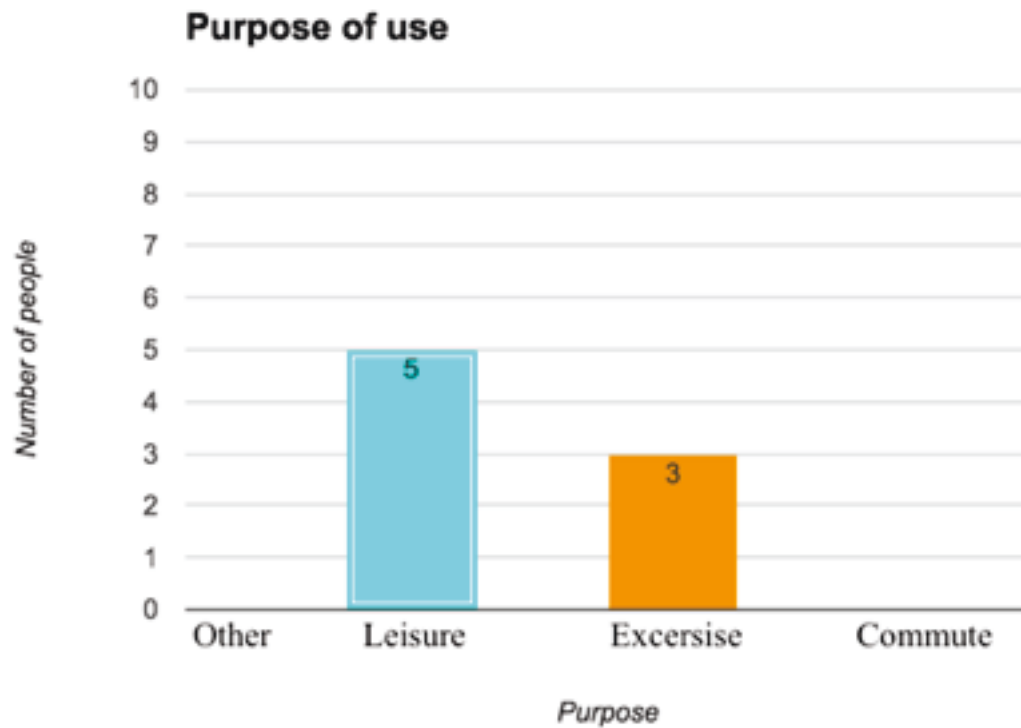
(Figure 11)

retired	frequency
P118	2-3 times
P123	0-1 times

(Figure 12)

20-29	frequency	30-39	frequency	40-49	frequency	50-59	frequency	60+	frequency
P117	0-1 times	P120	4-6 times	P122	2-3 times	P124	2-3 times	p118	2-3 times
		P121	4-6 times	P123	0-1 times	P119	2-3 times		

(Figure 13)



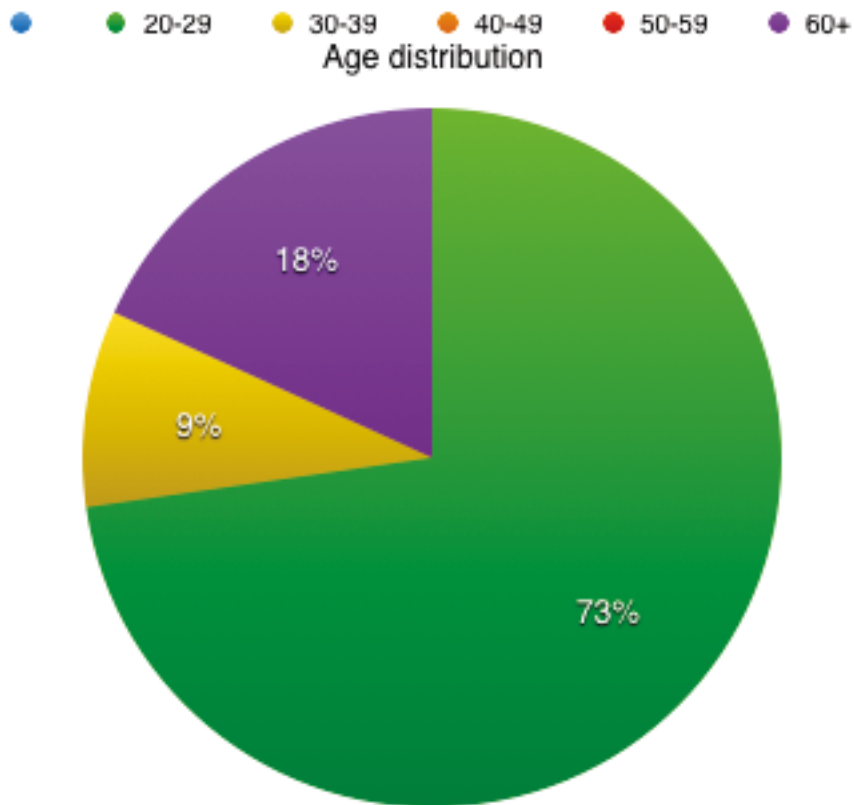
(Figure 14)

Female Participant number	motivation	Male Participant number	motivation
P121	Exercise	P123	leisure
P118	Exercise	P119	leisure
p122	Exercise	P120	Leisure
p117	leisure		
p124	leisure		

(Figure 15)

20-29	motivation	30-39	motivation	40-49	motivation	50-59	motivation	60+	motivation
P117	leisure	P120	exercise	P122	exercise	P124	leisure	p118	exercise
		P121	exercise	P123	leisure	P119	leisure		

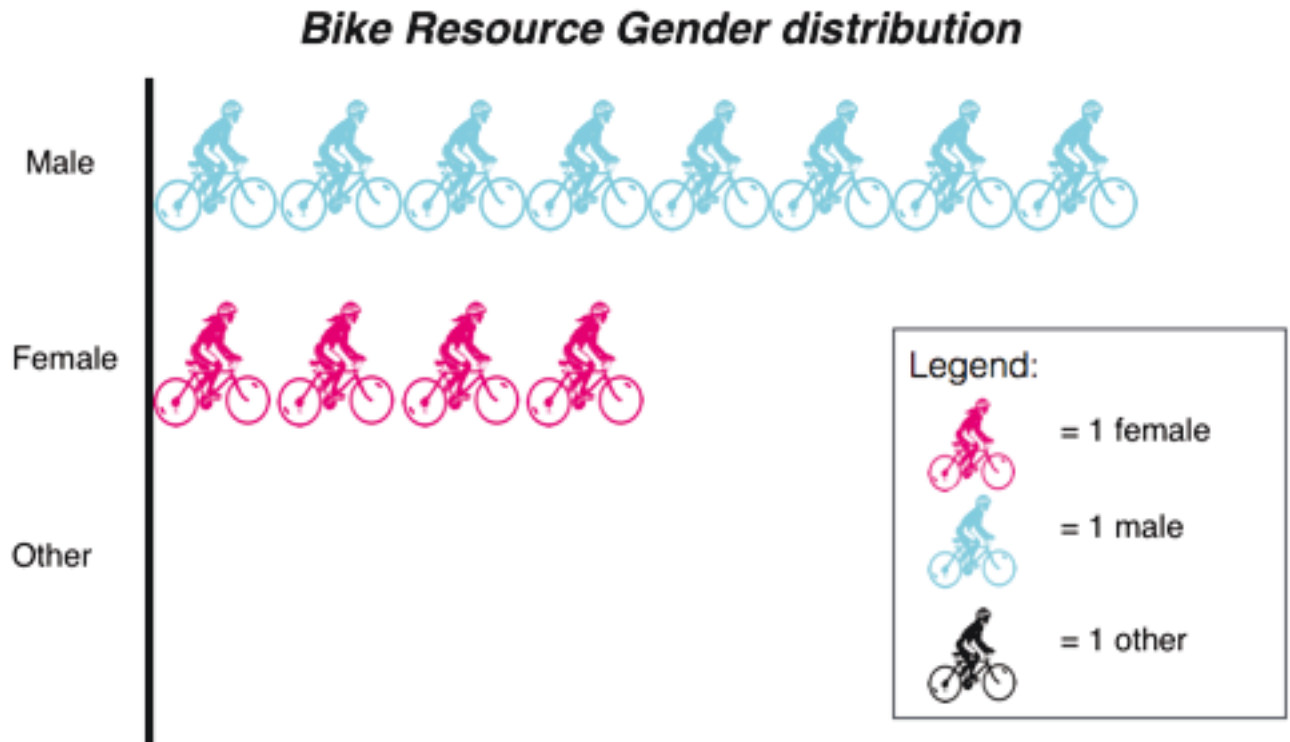
(Figure 16)



(Figure 17)



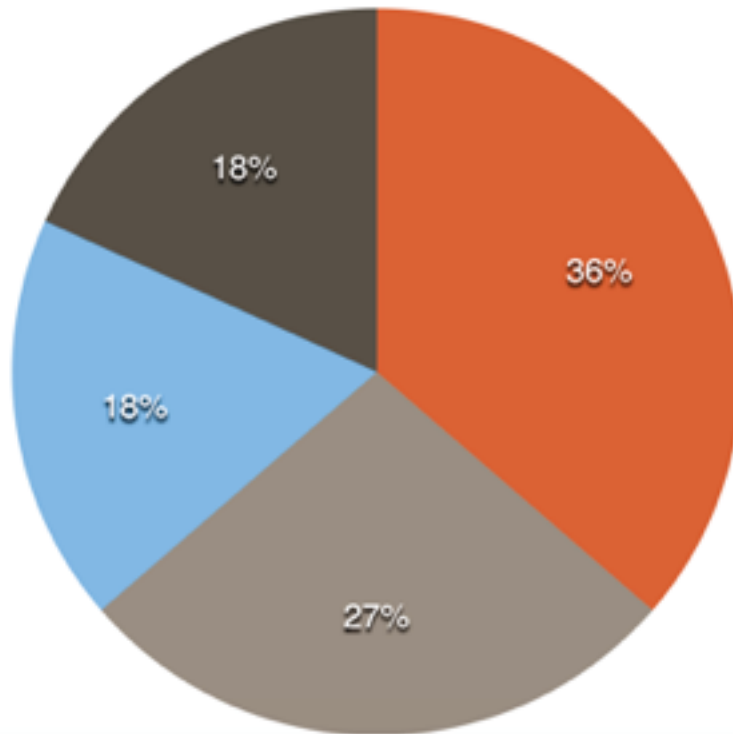
(Figure 18)



(Figure 19)

Bike Resource Preference

- No treatment
- Plowed + salt
- Plowed+ sand
- Packed down
- No preference
- Other(packaged+plowed+ sand)



(Figure 20)

female	preference	male	preference
P4D1	plowed + sanded+packed	P1D1	plowed + salted
P1D2	snow packed down	P2D1	plowed + sanded
P1D3	plowed + salted +packed	P3D1	plowed + sanded
P3D3	snow packed down	P5D1	plowed + sanded
		P6D1	packed sanded and packed
		P2D3	plowed + salted
		P4D3	plowed + salted
		P1D5	plowed + salted

(Figure 21)

Student/Education	preference	Environmental	preference	Retail	preference	Religious	preference
P1D1	plowed + salted	P6D1	packed sanded and packed	P1D5	plowed + salted	P2D1	plowed + sanded
P3D1	plowed + sanded	P1D2	packed down				
P4D1	plowed + sanded+packed	P3D3	snow packed down				
P5D1	plowed + sanded						
P1D3	plowed + salted +packed						
P2D3	plowed + salted						
P4D3							

(Figure 22)

Age 20-29	preference	Age 30-39	preference	Age 40-49	preference	Age 50-59	preference	Age 60+	preference
P1D1	plowed + salted	P2D3	plowed + salted					P2D1	plowed + sanded
P3D1	plowed + sanded							P5D1	plowed +sanded
P4D1	plowed + sanded+packed								
P6D1	snow packed + sanded								
P1D2	snow packed down								
P1D3	plowed + salted +packed								
P3D3	snow packed down								
P4D3	plowed + salted								
P1D5	plowed + salted								

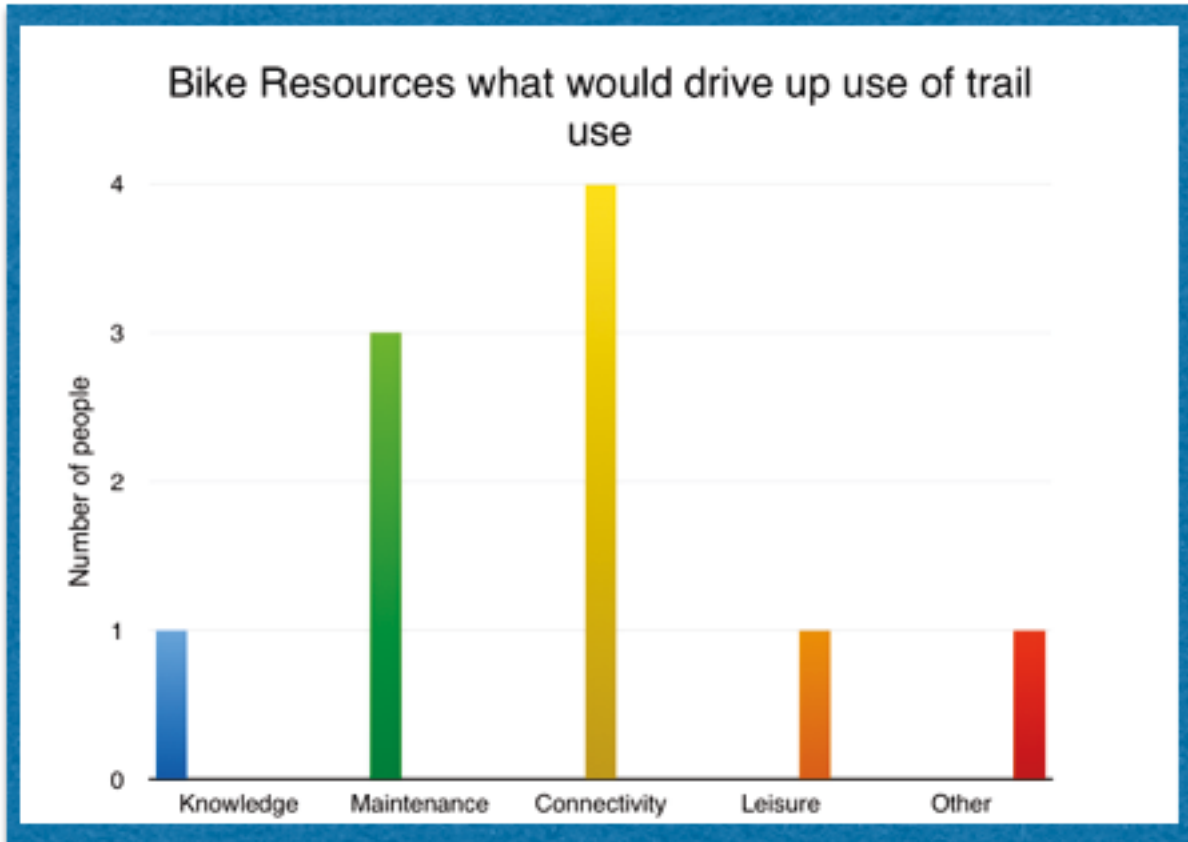
(Figure 23)

P1D1	2-3 times	P6D1	2-3 times	P1D5	7+ times	P2D1	4-6 times
P3D1	2-3 times	P1D2	4-6 times				
P4D1	0-1 times	P3D3	0-1 times				
P5D1	4-6 times						
P1D3	0-1 times						
P2D3	2-3 times						
P4D3	2-3 times						

(Figure 26)

Age 20-29	frequency	Age 30-39	frequency	Age 40-49	frequency	Age 50-59	frequency	Age 60+	frequency
P1D1	2-3 times	P2D3	2-3 times					P2D1	4-6 times
P3D1	2-3 times							P5D1	4-6 times
P4D1	0-1 times								
P6D1	2-3 times								
P1D2	4-6 times								
P1D3	0-1 times								
P3D3	0-1 times								
P4D3	2-3 times								
P1D5	7+ times								

(Figure 27)



(Figure 28)

female	motivation	male	motivation
P4D1	recreaton/exercise	P1D1	exercise
P1D2	a(fastest route)	P2D1	fastest route/recreation
P1D3	d(commuting)	P3D1	fastest route
P3D3	fastest route/ recreation	P5D1	fastest route
		P6D1	other
		P2D3	fastest route
		P4D3	fastest route/recreation
		P1D5	fastest route/recreation/exercise

(Figure 29)

Student/Education	motivation	Environmental	motivation	Retail	motivation	Religious	motivation
P1D1	exercise	P6D1	other	P1D	fastest route/recreation/exercise	P2D1	(fastest

