Barriers to Bicycle Use in Inner City East Christchurch, a low-income community.

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Contents:

Page:

2

Executive summary

- Transport in the Inner City East has been identified by community partner Te Whare Roimata as an issue which needs to be improved. Aspiring to increase active modes of transport, particularly cycling.

- The research question ⅍ꝲⱥⱥⱥⱡꝲꝲⱥⱥⱥ was developed to meet the desires of Te Whare Roimata.

- Methodological approaches of this research were intercept surveying and interviewing. These data collection processes have taken place within local community hubs within the Inner City East.

- Our research resulted in some key findings surrounding bicycle usage in the Inner City East. Safety and Economic factors act as the biggest barriers to cycling.

- The biggest limitation faced throughout the research process was time restraints, which resulted in minimal survey results. For any prospective future research that takes place, it will be crucial to remove time constraints in order to gather a maximum amount of data possible.

- Following research, we have recommendations for Te Whare Roimata; female skill based workshops to increase cycling confidence and ability amongst women, keep advertising/running ICEcycles, advocate for safer infrastructure.

1. Introduction

The Inner City East (ICE) in Christchurch, New Zealand stretches from Madras Street in the west to Linwood Avenue in the east, Avonside Drive to the north and Cashel Street to the south. The area is a relatively low income area with a disproportionate Māori, Asian and Pasifika population compared to the rest of Christchurch (Salmond et al., 2006., Population density and diversity in New Zealand, Census, 2020). The community group Te Whare Roimata Trust has asked our group to investigate barriers to cycling in this area. Te Whare Roimata runs ICEcycles, a grassroots community bicycling charity. They expect to gain an understanding of the barriers specific to this marginalised community when accessing and using a bicycle for transport and recreation so that ICEcycles can better meet their community's needs. Their goal is to help reduce the barriers and get more people cycling.

Our research question is, 'What are the barriers to cycling in the Inner City East of Christchurch, a low-income area?'

Figure 1: A map of ICE Christchurch. These are the boundaries of our survey area.
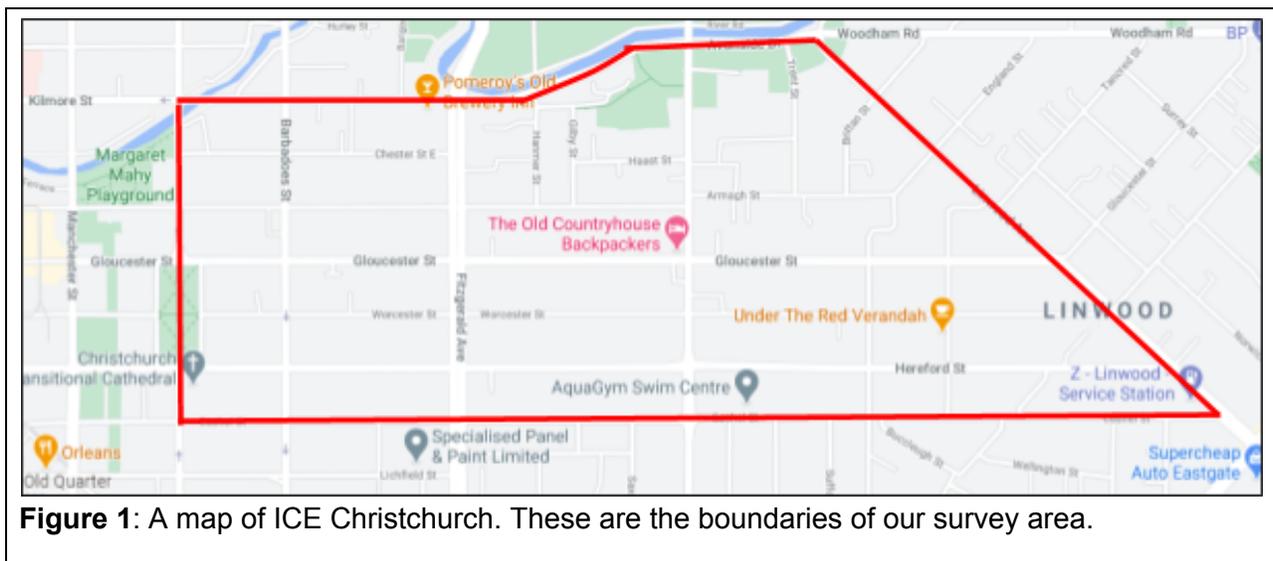
2. Review of Relevant Literature

The subthemes that we initially divided our research question into were: economic barriers, barriers for youth and adolescents, environmental barriers, health and gender barriers, and ethnic and cultural barriers.

2.1. Economic barriers

There was a lack of relevant literature on economic barriers to cycling for low income people. Prior to reviewing the literature, the group hypothesized that the expense of bikes, helmets or locks would be a significant barrier to low income households. However, we were unable to find

literature that supports this hypothesis. The majority of the existing literature is from a council or governmental perspective that analysed cycling infrastructure in low-income neighbourhoods compared to high-income neighbourhoods. The majority of existing literature also used census data and national travel survey data to base their analysis on (Pistoll and Goodman 2014; Taylor 2009; and Goodman 2013; Plaut 2005). When reviewing the literature on economic barriers to bicycle use at an individual or household level, it became clear that information about the economic barriers to cycling for low income communities was missing.

2.2. Barriers for youth and adolescents

Children represent a disadvantaged group in terms of accessibility. Ensuring that cycling is an accessible means even to children within areas of deprivation is crucial.

The review into barriers to cycling for young people found that as private vehicle use has increased, active modes of transport have decreased - which has reduced physical activity amongst adolescents (Thull and Lausterer, 2003). A study put together by Tranter and Pawson (2001) studied the effect of socio-economics on youth cycling. It looked at four different primary schools within Christchurch, all with varying deciles. The key finding from this was that students at low decile schools in Christchurch are a lot less likely to cycle to school due to fears of safety and theft, including at schools themselves. This was also reflected in the research of Christie et al., (2011), which highlighted theft as a significant barrier to youth cycling. Parental concerns for safety remained the largest deterrent to children cycling (Frater et al., 2017).

2.3 Environmental barriers

Separated cycleways are the most influential factor in increasing the numbers of people cycling (Wahlgren & Schantz, 2014., Handy, Xing, & Buehler, 2010., Fitch & Handy, 2020). There was also agreement that having separate cycle ways was more encouraging for beginner cyclists and that women were more likely to detour in order to use cycle ways (Fitch & Handy, 2020., Mertens et al., 2016). In cities where there was a high level of separate cycle paths, it was found that participants were willing to detour in order to have a higher proportion of their journey on the cycle paths rather than only taking the fastest route (Fitch & Handy, 2020).

Mertens et al (2016) looked at making changes to the micro-environments like putting barriers in such as hedges to separate motorised traffic from cyclists or having a well-lit street with low traffic volumes moving at a slower speed. Lighting was found to be of large concern in Mexico where participants were unwilling to walk or cycle in the street due to a feeling of uneasiness in unlit streets (Hermosillo-Gallardo, Sebire, & Jago, 2020). Changing these aspects on streets is a low-cost option that can be used as an intermediate until more cycle paths are implemented in the city (Mertens et al., 2016).

2.4 Health and Gender Barriers

Physical activity is a key determinant of disease prevention (Warburton et al., 2006.) Regular physical activity such as walking or cycling can improve wellbeing and reduce the risk of chronic health conditions ranging from cardiovascular disease to type two diabetes, depression, and obesity (Warburton et al., 2006). Picket and Pearl (2001) found a statistically significant association between socioeconomic status and negative health outcomes. Most existing research about barriers to active transport focussed on barriers to walking, rather than cycling.

Although there is a gap in the literature relevant to health barriers to cycling, engaging the community to identify barriers is a well supported method to increase cycling participation (Salvo et al., 2018, Shaw et al., 2020).

The literature showed that barriers to women cycling are different to the barriers men face to cycling (Shaw et al., 2020, Shirazi et al., 2019., Song et al, 2018). Shirazi et al., researchers in the United Kingdom, found highly statistically significant differences in terms of the type of cycling activity women preferred to undertake compared to men, and the purposes of their trips. Throughout the literature, women express concerns regarding safety.

2.5 Ethnic and Cultural Barriers

The ICE is a predominantly low-income area, made up of a mix of ethnicities. The population is made up of 55.9% European, 13.6% Maori, 5.2% Pacific Islander, 31.2% Asian, 2.8% Middle Eastern/Latin American/African, and 1.3% Other ethnicity (Statistics NZ, 2018). A large proportion of the suburb are therefore from a minority ethnicity.

Christie et al (2011) found that in the USA there were lower levels of engagement in cycling by people of a minority ethnicity. Clothing was seen as an issue amongst Asian women that wore jilbabs as they could get in the way when cycling (London, 2011; Steinbach et al., 2011). In Portland, people were deterred from cycling due to the publicly visible police violence against African Americans, along with racially targeted violence (Lubitow et al., 2019). Lubitow et al. also found that African Americans experience racial microaggressions in the form of being talked down to at bike shops, motorists and other cyclists riding dangerously close to them, and not being stopped for at pedestrian crossings.

2.6. How our literature review influenced our research approach:

We were more wary of barriers differing by sex, ethnicity and cultural factors. We wanted to ensure we surveyed a diverse range of the community. The reviews also reminded us to be conscious of our positionality to the community - our group is all Pakeha, and not local to the ICE. We are from a university, and universities typically reinforce certain cultural narratives about whose and what knowledge is valued (Fricker, 2007). We consulted with the Māori Advisory office and were given advice on how to best include tangata whenua in our research.

3. Methods

We chose to use a largely qualitative approach, collecting information on people's experiences through surveys and conversations. The surveys were intended to provide us with enough quantitative information to help us understand common opinions people in the area hold about barriers to cycling, and the conversations were intended to provide us with a chance to delve deeper into how and why those opinions are held (Kitzinger, 1995).

3.1 Intercept Surveying

Our main method of data collection was intercept surveying. Over a two week period group members went to the ICE to survey residents six times. The boundaries for our survey area are shown in Figure 1. Surveying consisted of approaching people on the street and talking them through our survey. We were careful not to influence the respondent's answers.

The most significant strength of this method was that more in-depth information could be collected by talking with the person during the survey process than from the survey alone. This gave us as researchers a deeper understanding of the extent to which the barriers hinder bicycle use for residents of ICE.

Unfortunately, there were also weaknesses to our method of data collection. The number of surveys that we were able to do and the people that we approached were dependent on each group member's individual tolerance for approaching people on the street. This meant that we were able to gather a sample size that was not as big as we would have liked. Our sample size was 39. Another weakness of our chosen method that we only had access to people who were mobile enough to be walking along the street at the time we were in the ICE. Therefore, barriers to bicycle use that are also barriers to general mobility such as very old age or physical impairment could be underrepresented in our data.

Despite this, accurate representation was achieved in other areas of our data, including our equal female and male representation and representative ethnic diversity.

In keeping with our health and safety plan, we always went to the ICE in pairs meaning that we were not approaching people alone.

3.2 Interviews

Our secondary method of data collection was conducting interviews with locals of ICE. Interviews were intended to last between ten and fifteen minutes. They were conducted over a one week period, close to ICE. The participants were found via a snowball sampling approach which was chosen to try and help us connect more with locals. Interviewers used a semi-structured interview protocol to guide the interview. Inductive coding was used for data

analysis as we did not wish to impose our views of what barriers to cycling were for the locals.

The most significant strength of this method was that by allowing interview subjects to bring up any barrier, they could discuss concerns outside of what we had preempted through our literature reviews. Their concerns also added depth and further context to the survey results.

A weakness of this approach was that we had very few participants, and that the interview process was time consuming, including transcribing and coding the interviews by themes.

4. Results

4.1 Survey Results

Ownership levels in the Inner-City-East:

**Figure 2:** Bicycle ownership in the ICE.
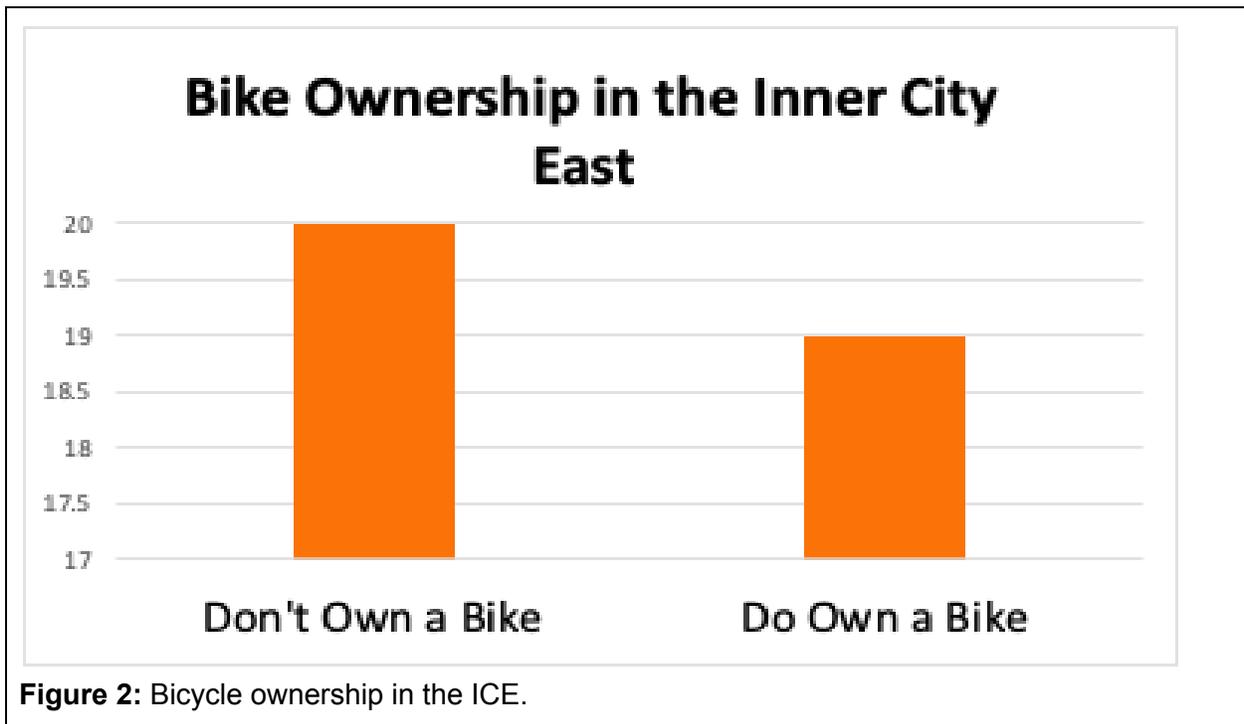
Results						
	Owns a bike	Does not own a bike				Row Totals
Male	10 (9.00) [0.11]	9 (10.00) [0.10]				19
Female	8 (9.00) [0.11]	11 (10.00) [0.10]				19
Column Totals	18	20				38 (Grand Total)

The chi-square statistic is 0.4222. The *p*-value is .51583. The result is *not* significant at *p* < .05.

Table 1: Chi-Squared statistical output for bicycle ownership in the ICE, separated by gender.
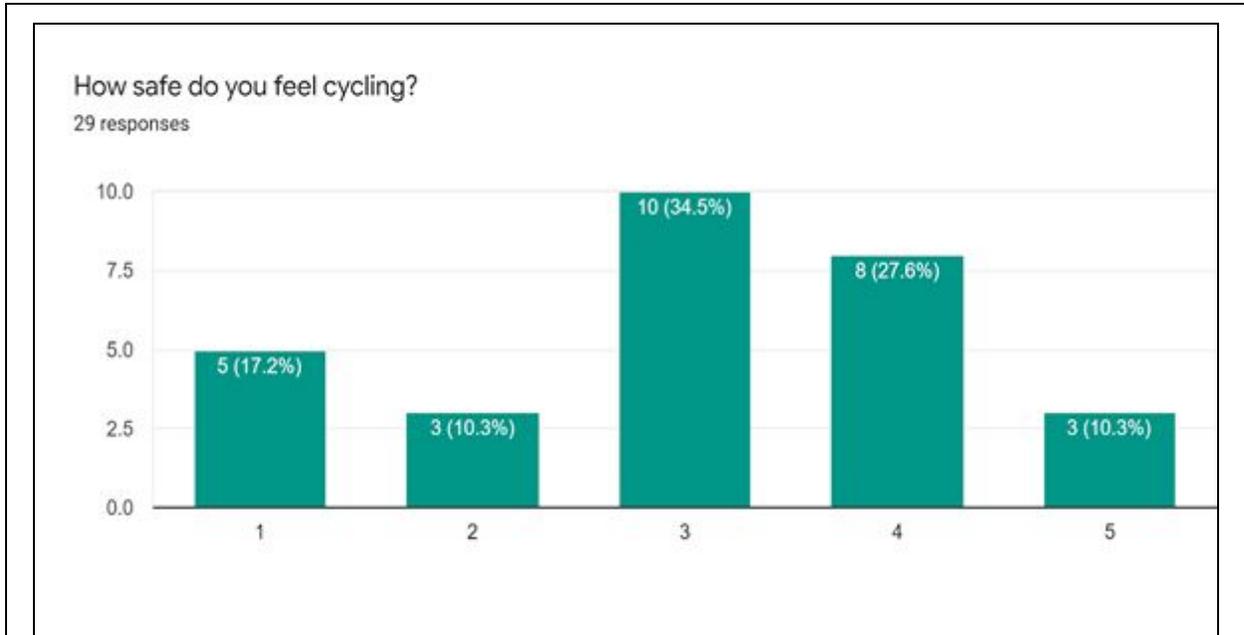
Attitude Towards Cycling in the Inner-City-East
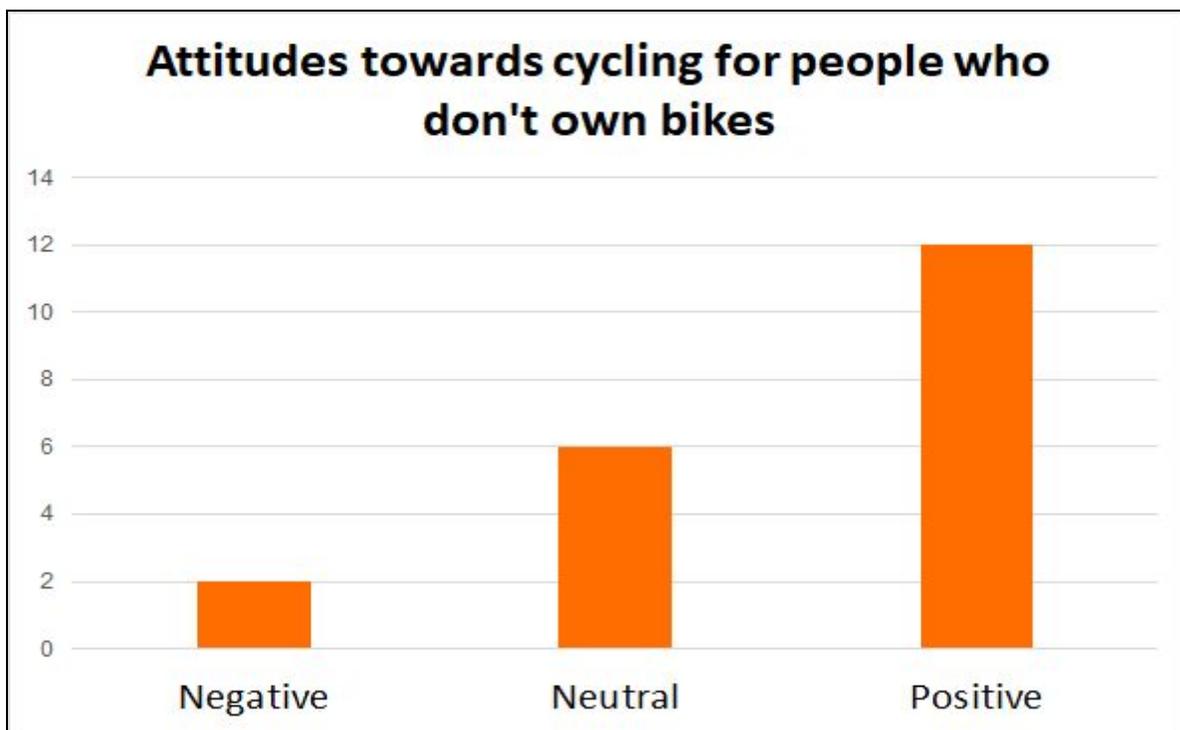
Figure 3: Attitudes towards cycling for people who do not own bikes. Respondents were shown a series of smiley faces (😁 😐 😠 😭) and asked which represented their feelings towards cycling.

Barriers to Cycling
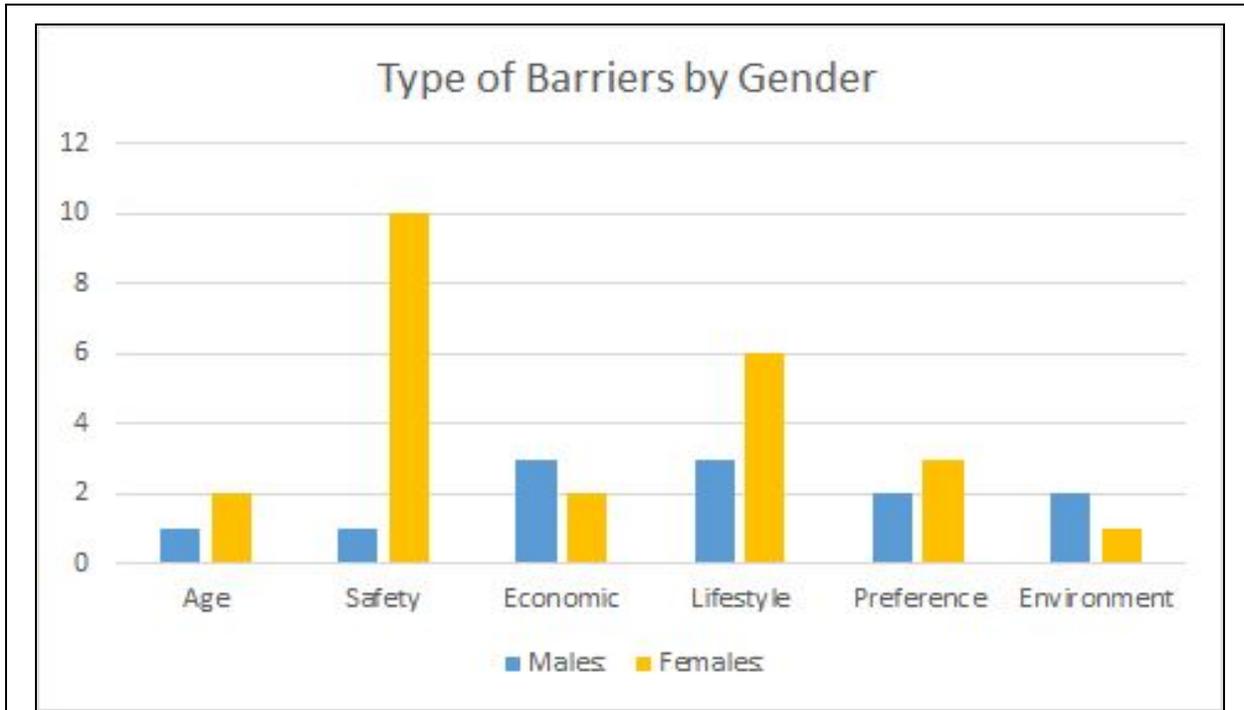
Figure 4: Barriers that residents of ICE face to cycling separated by gender.

Feelings of Safety

Figure 5: Feelings of safety when cycling (1 = Very Unsafe, 5 = Very Safe).

Results						
	1 - Not safe at all	2	3 - Neutral	4	5 - Very safe	**Row Totals**
Male	1 (2.07) [0.56]	1 (1.04) [0.00]	5 (5.19) [0.01]	6 (4.15) [0.83]	1 (1.56) [0.20]	14
Female	3 (1.93) [0.60]	1 (0.96) [0.00]	5 (4.81) [0.01]	2 (3.85) [0.89]	2 (1.44) [0.21]	13
Column Totals	4	2	10	8	3	27 (Grand Total)

The chi-square statistic is 3.3008. The *p*-value is .508802. The result is *not* significant at $p < .05$.

Table 2: Statistical Output of Chi-Squared test between Gender and Feelings of Safety when Cycling.

Aspects that Encourage Cycling
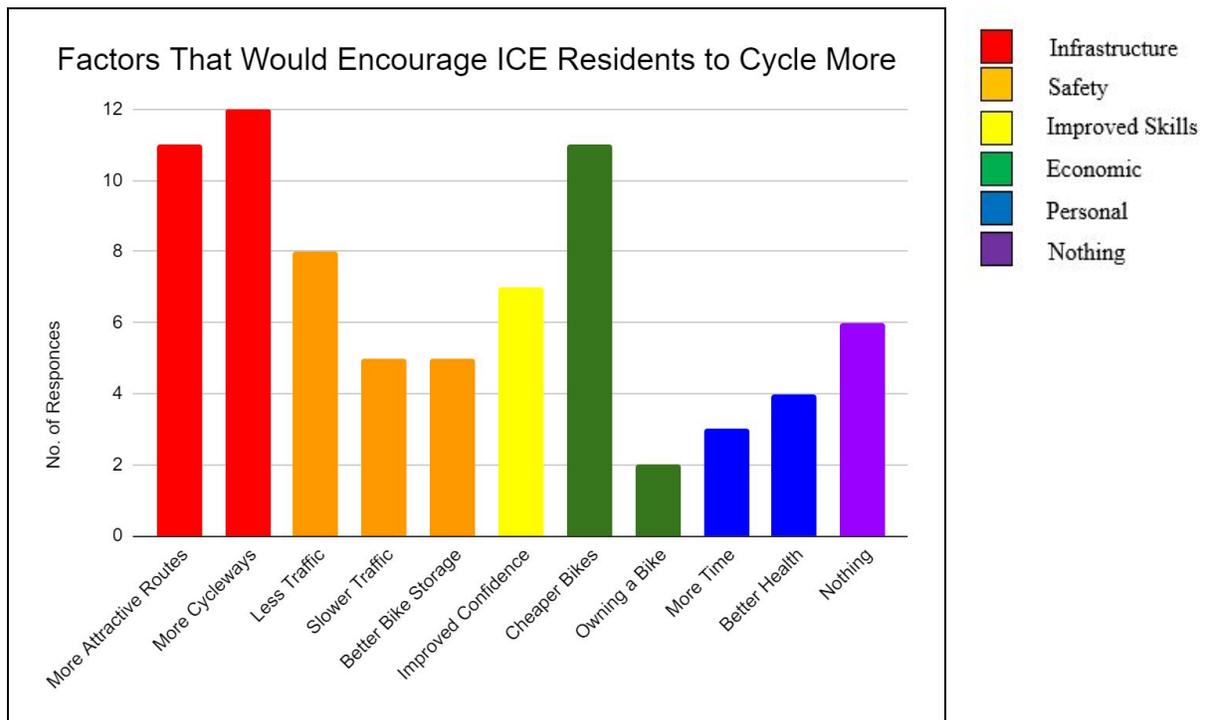
Figure 6: Factors that would encourage ICE residents to cycle more. Respondents were invited to choose more than one factor

11

4.2 Interview Results:

Three 10-15 minute interviews were conducted. Two out of three owned a bike, but all three rarely cycled. In these interviews, three themes emerged as key barriers or motivating factors to cycling. They were safety, security and fitness.

Safety

A female 23 year old interviewee said, "my shifts often end at 11pm, so I don't want to ride my bike in the dark just in case something happens." She brought up a spout of attacks to give context to her concern. Her concern about riding her bike at night time supported the idea that there are gender differences when it comes to feelings of safety. It also reflected the patterns we saw in our surveys.

Both male participants also raised concerns about safety. However, this was in relation to unsafe traffic rather than the possibility of assault, with a 29 year old male saying "... So long as the [expletive] cars don't kill me." and a 41 year old male saying "If the cycle paths were designed better so I didn't have cars trying to cross me and park to my left, that'd be great." These two comments show concern about inadequate infrastructure, and driving behaviour in the ICE.

Security

Two out of three interviewees expressed concern about crime rates in the neighbourhood, with the 29 year old male saying, "when I don't have a bike, there's no bike to steal!" and the 23 year old female retelling a story of her friend having her bike stolen in the area.

Health and fitness

All interviewees spoke about health and fitness as potential motivational factors that may make them want to bike more. One participant said he was time-poor due to work, but recognises the value of cycling: "I think it'd be a real good family activity, you know? Keep us healthy!" Another said he would like to cycle more because cycling is "…. cheaper than the gym and less [people] watching you, it's good for my heart.". Finally, the female participant said that cycling more could help her actions align more with her principles and therefore have a positive mental payoff as well as physical benefits, "It would be good for me and I'd feel like a better greenie … maybe this summer I can try it with earlier shifts."

As with the surveys, participants largely expressed positive views about cycling. All three recognised that riding bikes can be fun and can contribute to good wellbeing.

5. Discussion

5.1 Bike Ownership

Cycling needs to be understood in relation to the societies which it exists in (Cox et al., 2016). This study found that residents within the ICE struggle with bike ownership and accessibility. As shown in Figure 2, 60% of survey residents did not own a bike. Handy et al., (2008) found that bike ownership is a natural precursor to bicycle use, highlighting that ownership and availability are key factors in determining an individual's preferred mode of transport. On the basis of this study, there is no strong correlation between bike ownership and gender. Table 1 indicates that 8 women in our survey owned a bike, compared to 10 male survey respondents. Although this shows a difference, the correlation is not strong enough for us to make the claim based on our research that gender influences bike ownership.

This was rather surprising as when collating literature at the beginning of the research process, gender was continually highlighted as a component which greatly influenced cycling experiences (Shaw et al., 2020, Shirazi et al., 2019., Song et al, 2018). Handy et al., (2008), stated that women and men experience different barriers to cycling as a result of their societal stance. Women generally experience greater fears of their safety and well being while partaking in cycling. Handy et al., (2008), argues that women are more risk averse than men and tend to perceive more negative consequences of sharing the roads with vehicle traffic than men do. Drawing on past researchers and projects, it is clear that there is a relationship between gender and cycling experiences. It is reasonable to assume that the negative connotations women may have with cycling could influence bike ownership.

Our survey results show that regardless of gender, lack of bike ownership is an issue in the ICE. This study recommends Te Whare Roimata keep engaging with the community through their ICEcycles workshops to keep costs of bike maintenance to a minimum. As well as looking into developing a bike sharing network within the community similar to the 'Next Bike' initiative which runs within Christchurch CBD.

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5.2 Attitudes
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A person's attitude towards cycling is a major factor to whether they cycle or not and how often (Unwin, N.C. 1995). It can encompass many things such as feelings of safety, environmental awareness, awareness of the health benefits and whether they enjoy cycling. Our results show a generally positive trend of attitudes towards cycling (Figure 3) even if the participant did not cycle. As Unwin, N.C. (1995) says, non-cyclists identify unpleasantness towards cycling whereas cyclists identify cheapness, health and enjoyment with cycling. So it is positive to see that the residents of the ICE have a generally positive attitude towards cycling. For Te Whare Roimata, this general positivity towards cycling is beneficial as it means that levels of engagement may be quite high if people are enabled to cycle.

5.3 Barriers to Cycling

We asked respondents to identify what hindered them from cycling. As displayed in Figure 4, safety is the greatest deterrent to cycling amongst those in the ICE. When investigating this in more depth, 'safety' can be broken down to: lack of skills/confidence, misconduct/theft and fears of road traffic.

Common perceptions of cycling suggest the mode of transport with unsafe outcomes. Ironically, an abundance of literature indicates that riding a bicycle is significantly safer than motorised forms of transport such as cars and motorcycles (ITF, 2008). Demographic factors, like age, contribute greatly to the safety of cycling as risk of serious injury increases immensely with age, a phenomenon apparent across all modes of transport. This is greatly relevant to our research project, as a large proportion of the community's population would be considered as elderly (Statistics NZ, 2018).

Although concerns of safety are felt on an individual level, these are greatly influenced by both social and physical environments (Handy et al., 2008). Many factors contribute to how safe one feels whilst cycling. When talking with residents while we were completing our data collection, we were able to gain a deeper understanding of what specifically made people feel unsafe. One male respondent stated he, "once had a bike but it was stolen". In comparison, most discussions with female respondents were centred around fears of traffic or doubts in their own personal ability and skills. This indicates that once again, gender plays a major role in the experiences of safety whilst cycling. In Figure 4, 10 female respondents indicated safety as a barrier to cycling, compared to 1 male respondent. Research shows that women feel significantly safer when cycling in specific infrastructure away from mainstream vehicle traffic. Aldred et al., (2019) further discusses, that the development of female skills and confidence is crucial to closing the gap which gender imposes in regard to cycling participation.

5.4 Increasing Cycling Prevalence
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One of the questions in the survey we distributed was 'what would encourage you to cycle more?' This question was relevant whether the respondent already cycled or not.

As seen in Figure 6, three aspects stand out more than the others. Cheaper bikes, more attractive cycle routes and more cycleways have the most responses with 11, 11, and 12 response counts respectively. 'More attractive cycle routes' and 'more cycleways' can be grouped under the merged category of improved cycling infrastructure, while 'cheaper bikes' falls under the economic category.

Overall, improved infrastructure has been identified as the most significant aspect that would encourage residents to cycle more. This aligns with existing literature on the cycling environment (Mertens et al., 2016). As suggested previously, the desire for improved cycling infrastructure is likely to be directly related to cyclist safety. According to McCarthy (2016)

creating safe cycleways to enhance cyclist safety is the 'highest ranked concern' when designing cycling infrastructure.

As initially hypothesized, economic factors act as a barrier to cycling in the ICE. This is clear as many of the respondents indicated that cheaper bikes would encourage them to cycle more. Clearly identifying through the voices and experiences of respondents that cheaper, more affordable bikes would encourage people to cycle more, indicates that this would be a worthwhile area for further research in future projects.

6. Limitations

Throughout our research project we encountered many limitations that affected our results.

It was difficult to find respondents for our intercept surveying. We were surveying in a small area, with very little pedestrian traffic and no community hubs, greatly influencing our response numbers. To overcome this, we would have needed more time, a larger area to survey, or carry out different methods of data collection.

People were wary of us getting close to them, likely due to COVID-19 concerns. After hearing news reports of a shooting and someone with a knife, we were worried about our safety.

Data collection was labour intensive, which meant it was not possible to gather a large data sample. This meant that when we ran chi-squared tests they did not return any significant results, which acted as a limitation in our analysis stage.

A number of people who we talked to appeared to be in quite difficult circumstances, and a few were impaired in some way, so answering our questions or verbally agreeing to consent to the survey was not practical. Additionally, English was not always the respondents' first language, so some people struggled to communicate their answers. If we had the resources to translate our survey, we likely would have seen an uptake in responses and increase in the quality of the responses (Moradi et al., 2010., Harkness et al., 2004).

Interviewing cyclists was not plausible, as they were preoccupied and would bike straight past us. This would have given us great insight to the barriers that cyclists may have overcome, or what they were struggling with at the time.

The most significant limitation we faced was time constraints. We limited data collection for the sake of time, which limited our sample size, in turn affecting the statistical strength of our findings.

7. Future Research

This research has created a benchmark on bicycle use for residents of the Inner-City East. For future research it is essential to collect more data to establish a more accurate representation of the area. In terms of data collection, implementing focus groups would be beneficial. Focus groups could be held to get more qualitative data, as they allow for more in-depth conversations. This is important as it might unearth barriers that were not obvious to us as researchers. Another useful method would be to place surveys in prepaid envelopes in mailboxes, along with an incentive for completing the survey.

The surveys could have gone into more detail in each of the different themes we analysed in our literature reviews, for example, financial barriers or attitudes towards cycling. This may give a clearer and more detailed image of what is really stopping people living in the Inner-City East from cycling. There could also be youth and adolescent specific surveys and focus groups, as people who cycle when they are younger typically carry it through to their adult years.

8. Conclusion

This study has explored the barriers to cycling for residents in the Inner City East. We found that bike ownership was around 50%, so accessing a bike was a major barrier. The majority of people surveyed had a positive attitude towards cycling. A main finding was that women do not feel safe when cycling.

We have put forward recommendations to Te Whare Roimata in order to help increase cycling prevalence in the Inner City East. We recommend some short-term actions; running female specific bike workshops, continuing advertising ICEcycles workshops, and considering establishing a bike sharing network. In the longer term we recommend approaching the City Council and advocating for safer cycling infrastructure in the ICE.

With the pressing issue of climate change and cycling playing such a key role in reducing our emissions, we think future research that seeks to understand what is holding people back from cycling is extremely important.

9. Acknowledgements

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11. Appendices:

Appendix I - Copy of the Consent Form and Survey

Barriers to Cycling in the Inner City East for residents

Kia ora,

We are inviting you to take part in this project by completing a survey. Before deciding whether you want to take part, please read the following info and ask any questions if there is anything you are unsure about.

This survey is being conducted as a requirement of a University of Canterbury course under the supervision of Dr Lindsey Conrow, who can be contacted at (lindsey.conrow@canterbury.ac.nz), if you would like to discuss any concerns about your participation in the survey. We are working with Te Whare Roimata to look into barriers to cycling for residents of the Inner City East. That is to say, what keeps people who live in this area from cycling? We are asking you to take part as you are a resident of the Inner City East neighbourhood and you are 18 years or older.

Taking part in the survey is voluntary and you have the right to withdraw at any time. If you decide to participate, we would like you to complete a survey about your experiences with cycling which should take you less than 10 minutes to complete. Some people enjoy participating in this kind of research and welcome the opportunity to give their views.

The results of the project may be published and presented, and are open to the public. If you want to stay updated or review the results, we will be making a report available and can give out our contact details after this survey has been completed.

If you choose to take part in this study, all data will be kept confidential and **your involvement in this project will be anonymous**. Returning the survey implies your consent to participate in this research and you may keep this form to keep for your records.

Thank you for your participation
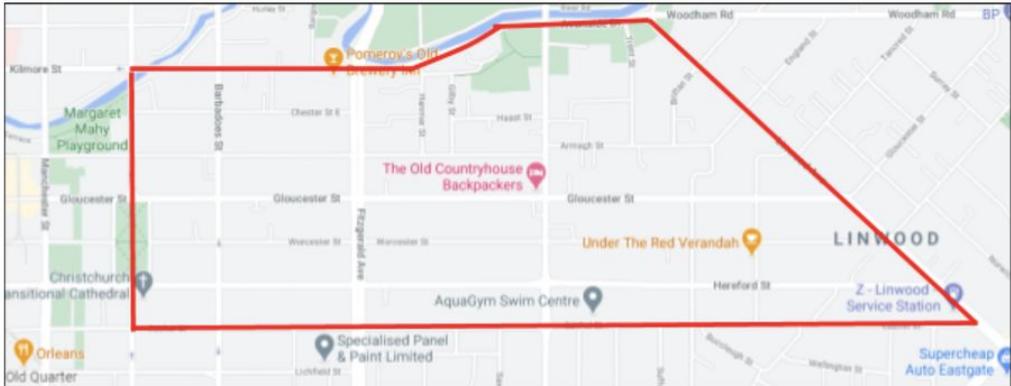
My return of this survey implies my consent to participate in this research and I have been given a second copy of this survey to keep for my records.

_____

1. Do you currently own a bike? (Please circle)   Yes / No

2. How regularly do you cycle?   (Please circle)

Never	Once a week	2-3 times a week	Four times a week	More than five times a week

3. If you cycle, do you use the cycle path? (Please circle) Yes / No / Sometimes

4. How safe do you feel cycling? (Please circle)

1 = Not safe at all	2	3 = Neutral	4	5 = Very safe

5. If you do not cycle, what stops you from cycling?   Circle which apply:

☐ Financial reasons   ☐ Work
☐ Family responsibility   ☐ Health
☐ Safety reasons   ☐ Disability
☐ Cultural reasons   ☐ Clothing
☐ Commuter distance   ☐ Religion
☐ Time restraints
☐ Age
☐ Other: _____

6. What would make you want to cycle more?

☐ More cycleways   ☐ Less vehicle traffic
☐ Cheaper bikes   ☐ Slower traffic
☐ Better bike storage   ☐ Improved cycling skills/confidence

☐ More attractive cycle routes
☐ Nothing would make me want to cycle more
☐ Other: _____

7. What is your attitude towards cycling? (Please circle)

😁 😐 😠 😭

8. What is your ethnicity?

☐ Prefer not to say
☐ Māori
☐ Pacific Peoples
☐ European / Pākehā
☐ Asian
☐ MELAA (Middle Eastern/Latin American/African)

☐ Other ethnicity: _____

9. What is your gender?
☐ Female
☐ Male
☐ Gender Diverse
☐ Prefer not to say

10. What suburb do you live in? _____

11. Are there any other things you would like to mention?