Relevant literature was critically reviewed for this report, to provide background information and explore existing results on cycle commuting. The review was split into 5 sub-themes.

The relationship between green spaces and cycling rates is influenced by various factors.formation

In countries with low cycling rates, the intersection of gender and ethnicity poses significant barriers to cycling. Cycling is primarily favoured by affluent white men (Steinbach et al., 2011). Women face a "triple burden" concerning traffic danger, personal safety concerns, and additional responsibilities (Russell et al., 2021). For Māori women, these barriers are even

residents on various topics, including transport. The Life in Christchurch Transport survey was

One of the primary quantitative sources for data was the 2018 New Zealand census, with data available online from Stats NZ. This included data for Beckenham and other suburbs in Christchurch City. Data from the 2018 census was used to create maps in ArcGIS Pro and run statistical analysis.

Maps were created in ArcGIS Pro using data from Stats NZ. A shapefile of the Christchurch area was downloaded and sorted by suburb before data was joined to the shapefile. Data used to create maps came in the form of cycle commuting rates for one map, median household income for another, and median house sales price for another.

Statistical data analysis was undertaken using summary statistics and multiple regression. Census data was subject to multiple regression to estimate the effect of various independent variables on the dependent variable of cycling rates for all suburbs in Christchurch City. These variables included median income, ethnicity, age, education, elevation above sea level, and distance to CBD.

The data shows that residents of Beckenham cycle more than the general population of Christchurch. This sheds light on the cycling culture in Beckenham and the prevalence of cycling in the suburb.

Figure B1

proximity, personal values were shown to be an important factor. Many residents expressed their commitment to environmental consciousness, recognising cycling as an eco-friendly alternative to conventional transportation methods.

The presence of cycling infrastructure outside the suburb was identified as another crucial aspect contributing to Beckenham's high rates of cycling. The provision of dedicated cycling lanes, bike parking facilities, and other supportive infrastructure in the central city fosters a sense of safety among cyclists, encouraging more individuals to take to the roads on their bikes.

The topography of the neighbourhood itself was acknowledged as a contributing factor. Beckenham's relatively flat terrain makes cycling a practical and enjoyable option for residents, without the challenges posed by steep inclines.

A key factor regarding high cycle commuting rates in Beckenham is its proximity to the central business district (CBD). Beckenham is around four kilometres away from the centre of

Throughout the investigation, Beckenham's level of cycle-friendly infrastructure was a key feature, indicating how the area is hospitable to cyclists. Although there are not any separated cycleways and shared paths within Beckenham, there are many cycleways in close vicinity, which links residents to essential facilities. Despite this, the lack of infrastructure for cyclists down Colombo St towards the CBD has been criticised (McDonald, 2023).

Other than cycle infrastructure, the wideness of Beckenham's roads and the decreased speed limits compared to other suburbs are also factors that make cycling more inclusive. As mentioned by one focus group participant:

"It feels quite safe as a place to cycle. The roads are quite wide, the speeds are low, and there are lots of kids and families around" - (Focus Group 3, 2023)

These features contrast with other suburbs, which have narrow streets and speed limits of 50km/h. As seen in Figure B3, when asked in the community survey whether they would go out of their way to use a separate cycleway when travelling by bike, most respondents answered yes. This is because separated cycleways make people feel safer when cycling, as they do not have to spend as much time worrying about other road users as they would while using a painted cycle lane.

Figure 3: Stacked bar graph comparing Beckenham and Christchurch responses to the question: ά h Ø Ŝ ℕ ı · f f Σ K 2 ø Ŝ ı · ă è ƛ ă ƛ ű Ŧ 2 ℕ è 2 ʤ ű 2 ű ℕ ı · Ø Ŝ f ō è ō ƛ ʅ Ŝ ƛ y ′ / K ℕ ℵ ă ǔ Ǒ K ʤ ℕ Ǒ K K ε Σ ʤ ă ƛ y ∃ Ř ı · ű ı · Ŧ ℕ 2 Y ′ ǔ K Ŝ Ǒ 2 Y Y ′ ʤ y ƛ ú è survey (Beckenham data), and the Life in Christchurch Transport survey (Christchurch data).

The effect of Beckenham's nearby cycle infrastructure can also be seen in how easy residents believe cycling is in the area, as shown in Figure 3

How safe people perceive themselves to be is a key factor in cycling rates in Beckenham.

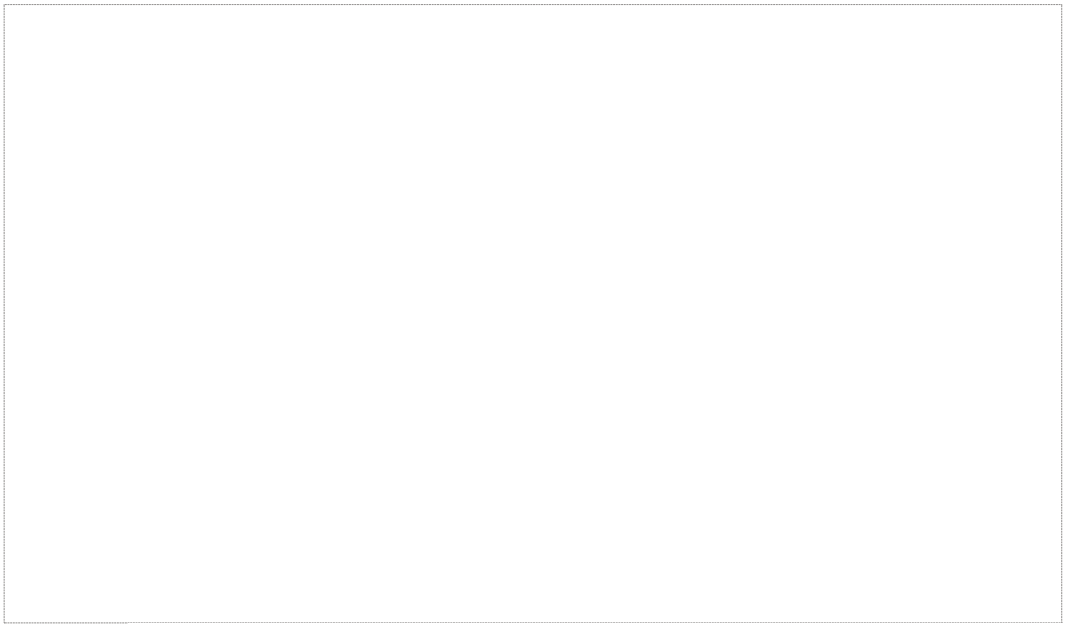

Figure 4: Stacked bar chart of the percentage of Beckenham residents living both outside and inside the loop who felt varying levels of safety cycling in Christchurch, using data from our community survey.

As shown in green in Figure 4, the percentage of people living inside the loop felt safer than

Figure 5: Map of Beckenham from openstreetmaps with dots representing places with vehicle access (in blue) and places with cycle and pedestrian access.

Figure 5 shows that there are multiple places where cars and cyclists can enter and exit the Beckenham loop from other suburbs. The blue dots on this map represent vehicles' access points, with the majority being at the far end of the river loop near Tennyson Street. The yellow dots on this map represent the access points only cyclists and pedestrians have, all within the river loop's closed end. Cyclists can also use the blue vehicle access points. Therefore, cyclists have more access to get in or out of the Beckenham loop than cars, especially when crossing the river. Therefore, the traffic is influenced by filtered permeability, with a more connected grid for cyclists and less access to cars. This can cause less traffic congestion within the loop and more people choosing to cycle due to convenience. A statement by a male participant during the second focus group supported this concept that the river loop was causing filtered permeability:

The community survey asked whether respondents were likely to go out of their way to cycle near or through green and blue spaces. Two-thirds of respondents answered yes, while the remainder said no. It could be assumed that Beckenham's relatively high level of green and blue space contributes to the area's higher cycling rates than neighbouring suburbs.

Beckenham also lies at the foot of the Port Hills, which provides many recreational cycling opportunities for residents. The proximity of the Port Hills and its effect on cycling uptake was

As seen in Figure 6, the cycle commuting habits of men and women differ. Women are more likely to cycle sometimes, while men are more likely to cycle daily to work. Most women who answered our survey cycle to work two to four times a week, while men were split between those who cycle two to four times per week and those who cycle five times or more. This was consistent with some of the focus group discussions we had around this topic.

In Focus Group 1, it was discussed how women are held to a higher standard of dress and presentation, that women's(m)7(e)-Qq0(f)-6(o)6g(T/F1 12 Tf1 0 0 1 72.025 526.9 Tm0.0549 0.0627 0.102 rg

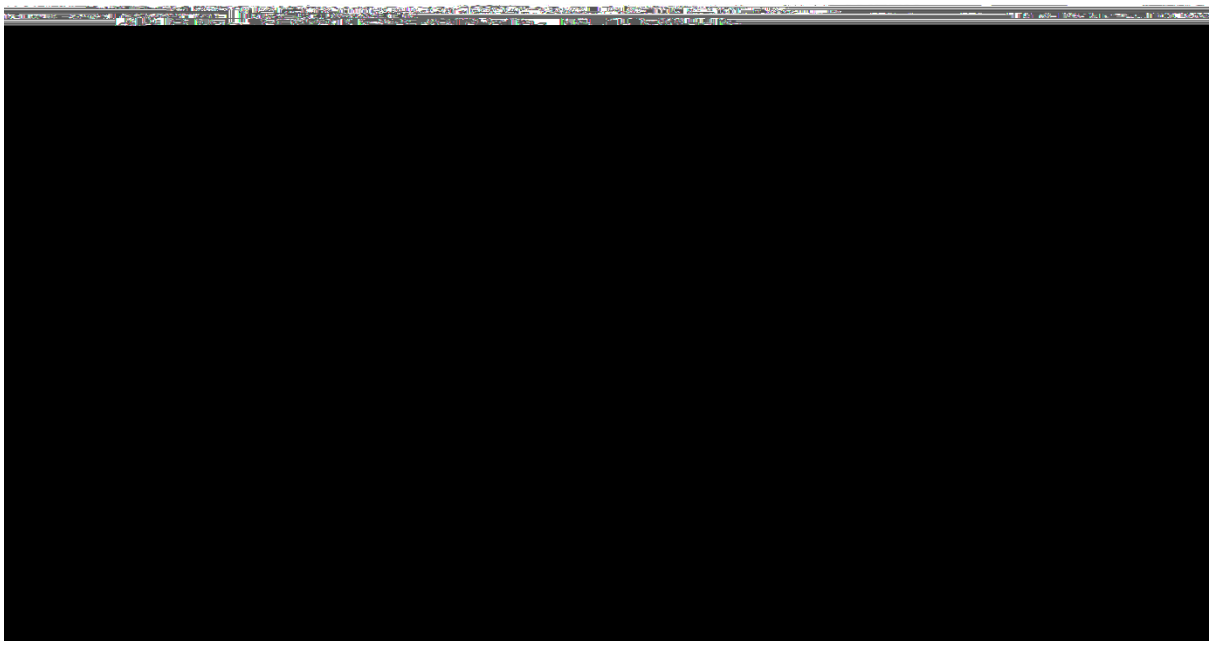

Figure 7: Box and whisker plot that shows the distance cycled against the number of days cycled.

Figure 7 shows the distance cycled against the number of days cycled. There is a much smaller spread for those who cycled five times or more per week, and they are limited to around five kilometres or less, with a few exceptional outliers. This suggests that for people to be consistent daily cyclists, they likely need to live within five kilometres of their workplace. People who cycled two to four days per week had the most significant spread, suggesting that people are happy to cycle further but that this may not always be practical or desirable for every day.

Something that came through from the focus groups and the survey when we asked people why they thought so many people in Beckenham cycled was that the suburb is wealthy. As one focus group participant said:

"There is a threshold of money, Beckenham is a homogeneous suburb, educated, similar income." - (Focus Group 2, 2023)

Another anomaly was the discussion around affluence. Literature suggests lower-income individuals cycle more as motor vehicles are less accessible to them (Marques et al., 2016). However, the situation in Beckenham bucks this trend. In fact, Beckenham's relative affluence seems to have a positive effect on cycling rates, as they can afford more expensive and utile vehicles such as cargo bikes.

The relatively high affluence in Beckenham is majorly due to the suburb being a character area, meaning the demographic of people that can live there is severely limited. This was also notable from both census data and the focus groups, which showed Beckenham is made up of mostly families with professional jobs. This may contribute to building a well-connected community – centred around children and similar lifestyles. As discussed before, cargo bikes came up alongside affluence throughout the focus groups, with many attributing their high levels of cycling to their cargo bike – while also noting the cost of these bikes.

This would have been good to research more at the beginning. It was not until we had conducted a focus group that we realised how important cargo bikes were. This is definitely an area for future research and may help explain the degree of affluence that leads to higher cycling levels amongst more high-income individuals.

Another factor that cannot be overlooked is the importance of the river loop and the filtered permeability it creates. This in combination with slower speeds creates an instantly quiet and safe area, and negates the need for cycling-specific infrastructure inside Beckenham. Another area for further research would be the retrofitting of filtered permeability to other areas via the use of planter boxes and street furniture, or planting green belts. This could potentially be an unpopular addition to many car-centric areas, and as Beckenham has the river it is a

permanent non-negotiable barrier, however, with enough community buy-in, this could be implemented anywhere.

Some limitations of this project were the timeframe, we had to narrow the scope to make the research achievable. As a part of this, we did not engage much with mana whenua, or do much research into Māori in Beckenham and ethnicity in the suburb.

Additionally, future research in this area could take climate into account as many participants claimed they only cycled in good weather, and comparing the weather of Christchurch with the country could explain the cycling rates somewhat. Along these lines, Beckenham could have been compared with similar neighbourhoods in other cities across Aotearoa or even internationally, rather than just neighbouring suburbs to see if factors such as income and distance from the CBD are consistent factors in cycling outside of Christchurch.

In conclusion, our research identified several factors contributing to Beckenham's high cycling rates. These factors include the suburb's proximity to the city centre, the wide roading infrastructure and low speed limits, filtered permeability, sense of community and socio-economic status. Together, these factors create a cycling culture in the area. Not all these contributing factors are transferable to other communities, however implementing cycling infrastructure and creating filtered permeability can be achieved with strong community buy-in. However, it is important to recognise the limitations of this study in applying the findings. Future research should address these limitations to gain an understanding of cycling behaviours and influences in the rest of Aotearoa.

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summary of the research to you at the end of the study, if you request this. If you provide an email address for this purpose, it will be linked with your survey responses.

If you have any concerns about the research, please contact: Simon Kingham: simon.kingham@canterbury.ac.nz If you have any questions about the research, please contact: Lily lro93@uclive.ac.nz If you have a complaint about this research, please contact the Chair of the HREC at human-ethics@canterbury.ac.nz.

Please read the following statement of consent and start the survey below.

Q4 Do you travel by Ebike in Christchurch more often than once a month?

- O Yes (1)
- O No (2)

Display This Question:

If In the past 12 months, have you travelled by bike in Christchurch more often than once a month (i... = No

Q8 Even though you don't cycle regularly we are interested in your opinions towards cycling

Display This Question:

If In the past 12 months, have you travelled by bike in Christchurch more often than once a month (i... = No

Q9 Describe any barriers you face towards cycling

_____

Display This Question:

If In the past 12 months, have you travelled by bike in Christchurch more often than once a month (i... = No

Q10 What could influence you to begin cycling?

_____

Q11 Which of the following best describes your current employment status? (Optional)

- O I am in full time paid employment (1)
- O I am in part time paid employment (2)
- O I am not in paid employment (3)
- O I am a full time tertiary student (4)
- O Other (Please Specify) (9)

_____

Display This Question:

If In the past 12 months, have you travelled by bike in Christchurch more often than once a month (i... = Yes

Display This

Q20

Q23 Which of the following do you best identify with?

O

Display This Question:

If In the past 12 months, have you travelled by bike in Christchurch more often than once a month (i... = Yes

Or In the past 12 months, have you travelled by bike in Christchurch more often than once a month (i... = No

Q26 Why do you think Beckenham has high rates of cycling?

_____

Q

Q33 Would like a copy of our report?

O Yes (1)

O No (2)

Display This Question:

If Would like a copy of our report? = Yes

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