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# Impediments to Walking as a Mode choice



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Foundation for Research  
Science and Technology

# Outline of Presentation

## Background

- a. Declines in walking rates
- b. Definitions of walking
- c. Poor methodological and evidential support for policy development

## Research Design

- a. Three research Questions

## Results & Implications

## Recommendations



## General and purpose-specific analysis of walking trips in New Zealand

|  | Year                        |                              |                             |
|--|-----------------------------|------------------------------|-----------------------------|
|  | 1989/1990                   | 1997/1998                    | 2003/2004                   |
| Walking trips  |                             |                              |                             |
| Percentage trips walked <sup>a</sup>                     | <b>21.2%</b>                | <b>18.4%</b>                 | <b>15.0%</b>                |
| Percentage of trips walked less than 1km <sup>b</sup>    | <b>63.6%</b>                | <b>63.7%</b>                 | <b>72.9 %</b>               |
| Percentage of trips walked less than 2km <sup>b</sup>    | <b>85.6%</b>                | <b>85.2%</b>                 | <b>79.8%</b>                |
| Average trip distance <sup>c</sup>                       | <b>0.89 km</b>              | <b>0.93 km</b>               | <b>0.91 km</b>              |
| Mean distance to change mode <sup>b</sup>                | <b>0.64 km</b>              | <b>0.65 km</b>               | <b>0.59 km</b>              |
| Mean duration to change mode                             | <b>7.69 min<br/>(14.67)</b> | <b>7.84 min<br/>(15.36)</b>  | <b>7.08 min<br/>(11.62)</b> |
| Mean distance for social/recreational trips <sup>b</sup> | <b>1.08 km</b>              | <b>1.1 km</b>                | <b>1.1 km</b>               |
| Mean duration for social / recreational trips            | <b>13.0 min<br/>(20.83)</b> | <b>13.25 min<br/>(18.17)</b> | <b>13.2 min<br/>(17.94)</b> |
| Mean distance for shopping trips <sup>b</sup>            | <b>0.79 km</b>              | <b>0.76 km</b>               | <b>0.71 km</b>              |
| Mean duration for shopping trips                         | <b>9.53 min<br/>(12.88)</b> | <b>9.11 min<br/>(13.45)</b>  | <b>8.54 min<br/>(14.85)</b> |

# Definitions of Walking

Four walking types defined by Tolley (1993)

1. Access Mode
2. Access sub-mode
3. Recreational/leisure
4. Circulation/Exchange.



# Overseas findings on Impediments to Walking

| USDOT (1993)<br>Review of Walking<br>studies | Reasons for not walking |         |        | % Believing Following changes<br>would increase walking |     |
|--|-------------------------|---------|--------|---|-----|
|  | Seattle                 | Toronto | Ottawa |   |     |
| Distance                                     | 33%                     | 47%     | 56%    | Reduce crime/Safer Streets                              | 19% |
| Too slow; Takes too long                     | 14%                     | 12%     | 14%    | Education; awareness of health benefits                 | 15% |
| Weather                                      | 8.7%                    |         |        | More sidewalks  | 14% |
| Dislike walking/Lazy                         | 6.4%                    |         |        | Improved street crossings                               | 8%  |
| Difficult to carry things                    | 5.7%                    | 50%     | 48%    | More trails , paths and places to walk                  | 5%  |
| Inconvenient                                 | 5.7%                    |         |        | Better Street Lighting                                  | 4%  |
| Fear of Crime                                | 3.3%                    |         |        | Enforcing Pedestrian laws                               | 3%  |
| No Time                                      | 2.0%                    |         |        | Nothing more should be done                             | 29% |
| Darkness                                     | 1.7%                    |         |        |   |     |
| No Sidewalks                                 | 1.3%                    |         |        |   |     |

# Research Design

**Park and Riders (N= 110)**



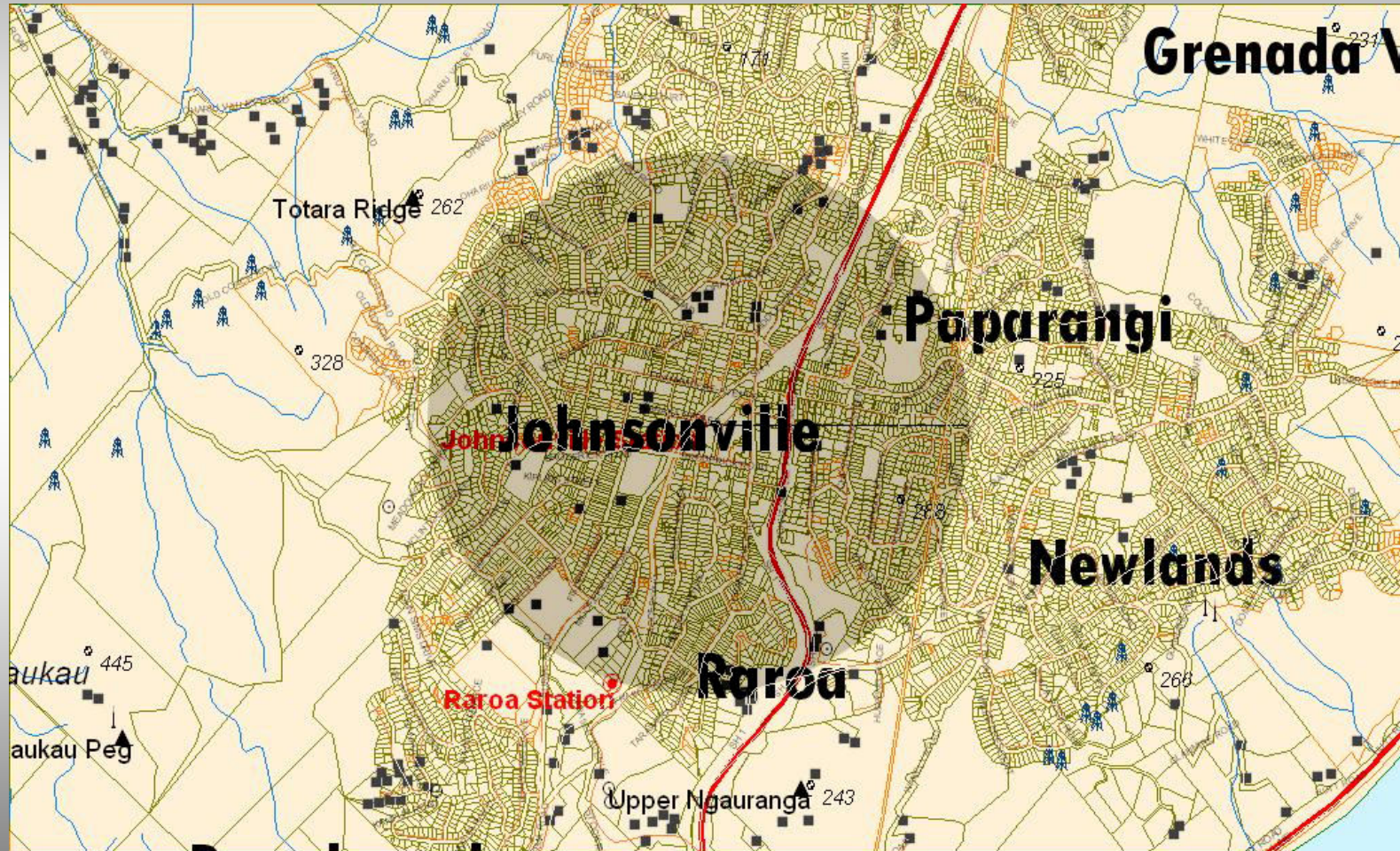
**Walkers (N=138)**



**Samples collected in Wellington and Auckland to compare groups to assess location effects**



# Case-Participant Selection Criterion



# Characteristics of samples

1. Equal mix of genders
2. Self-reported experience of walking to the station
  - a. Auckland drivers 26%
  - b. Wellington drivers 41%
  - c. Auckland Walkers 72%
  - d. Wellington Walkers 85%
3. Thus no group walks or drives exclusively
4. Income effects are observed for Aucklanders, but not between driver groups.

Thus all analyses conducted to account for location differences





# The survey

**OPUS**  
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Research into V  
Contact: Dr D  
Opus Internat  
PH 04 587 068

**Dear Participant**

We are undertaking research that will help us to make journeys by walking. The research is focused on how to improve services, and to consult on how to improve services, and to consult on how to improve services. We need your walking and public transport use. We need you to return it in the Freepost Envelope provided with your outgoing mail.

This research is funded by Land Transport NZ

Many thanks

Darren Walton, PhD

1. We value your opinion, whether it is right or wrong.  
2. There are no right or wrong answers.  
3. If a question doesn't make sense, please skip it.  
4. We will not ask you to identify yourself.  
5. You may withdraw your participation at any time.  
6. You are entitled to a brief summary of the results using the details above.

**Why Me?**

- We have either chosen you at random from a database of ours and we want your opinion.

**I get asked to do all sorts of surveys**

- Surveys are often used by many organisations but we aim at making them as simple as possible.

**Isn't it too simple?**

- We deliberately make our surveys as simple as possible, and we are measuring from just your own findings.

**Can surveys really help?**

- Yes they can! A survey is a much easier than having to talk to many people. It might also be challenging.

For a list of how our surveys have helped our broader programme...

14. Estimate how far it is between the train and your regular destination? (i.e. work, school or whatever) (Place an X on the line)

0 0.2 0.4 0.6 0.8 1km 1.2 1.4 1.6 1.8 <2Km

15. How long might it take to walk the distance between the train station and your regular destination?  
.....minutes

Please answer the following by placing a mark to indicate the most appropriate answer for you

|  | Strongly disagree        | Disagree                 | Not sure                 | Agree                    | Strongly agree           |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 16. It is uncomfortable to walk in a strong wind   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. I can't afford to pay for parking in town  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. I might need to walk through an unpleasant alleyway  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. A walk to the station in the morning is much better than a walk home at the end of the day | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. I get more chance to think about my day when I drive the car                               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. I probably should walk to the station more often   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 22. Walking to the station has benefits for my health  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

23. Estimate how far you'd need to walk from an available car park to your regular destination if you took a car? (Place an X on the line)

0 .2 .4 .6 .8 1km 1.2 1.4 1.6 1.8 <2Km

Please answer the following by placing a mark to indicate the most appropriate answer for you

|  | Strongly disagree        | Disagree                 | Not sure                 | Agree                    | Strongly agree           |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 24. Walking times are too variable to reliably meet the train or bus                     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 25. I like to walk to the train station when the weather is fine                         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 26. The shoes I wear are inappropriate for walking any real distance                     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 27. Sometimes it's just more convenient to take the car to the station                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 28. I arrive at work fresher if I drive rather than walk to the station                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 29. I do not enjoy walking   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 30. I have a weekday morning routine that stays pretty much the same throughout the year | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 31. I would prefer to walk with someone that I know                                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 32. Walking takes too long   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

33. How far would the average New Zealander who takes a train normally walk to the station? (Place an X on the line)

0 .2 .4 .6 .8 1km 1.2 1.4 1.6 1.8 <2Km

Please answer the following by placing a mark to indicate the most appropriate answer for you

|   | Strongly disagree        | Disagree                 | Not sure                 | Agree                    | Strongly agree           |
|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 34. If there's a chance of rain I will take the car             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 35. It is nearly impossible for me to walk to the train station | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 36. I have more chance of a traffic accident when walking       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 37. I won't walk to the station when it's raining heavily       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 38. I like the company of others on the train                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 39. It's sometimes too cold to walk                             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 40. I often have too much to carry for walking to the station   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

41. Please indicate what day of the week you travel to work, school, etc.

Mon  Tues  Wed  Thurs  Fri  Sat  Sun

Please estimate the likelihood of the following events if you were to walk home from the train station tomorrow evening? (Place an X on the each of the lines)

42. What is the likelihood of witnessing an act of vandalism occurring, such as graffiti?

43. What is the likelihood of someone choosing to follow you from the train?

44. What is the likelihood of you feeling intimidated by a group of teenagers?

45. What is the likelihood of you being verbally harassed by a stranger?

46. What is the likelihood of you being physically threatened by a stranger?

47. What is the likelihood of you being approached for money (other than for charitable donations)?

Not sure Agree Strongly agree

threshold income

3  More than 3

35-74  75+

the survey?

Very hard



# Research Design (continued)

- a. Weather
- b. The walking environment
- c. Parking prices



- d. Social norms and influences
- e. Fitness/fatigue
- f. Variability in travel times
- g. Inconvenience of walking

# Research Design (continued)

- h. Car dependency for trip chains
- i. Enjoyment of walking
- j. Fear of crime
- k. Concern for time



## Summary

- Weather
- The walking environment
- Parking prices
- Social norms and influences
- Fitness/fatigue
- Variability in travel times
- Inconvenience of walking
- Car dependency for trip chains
- Enjoyment of walking
- Fear of crime
- Concern for time
- Geography

## Research Questions

1. When controlling for distance what factors distinguish between drivers and walkers in the walking for the access sub-mode?
2. What is determined to be a reasonable distance to walk to the train station and does the individual's perception of this distance influence their mode choice?
3. Are the factors that impede mode choice location specific?

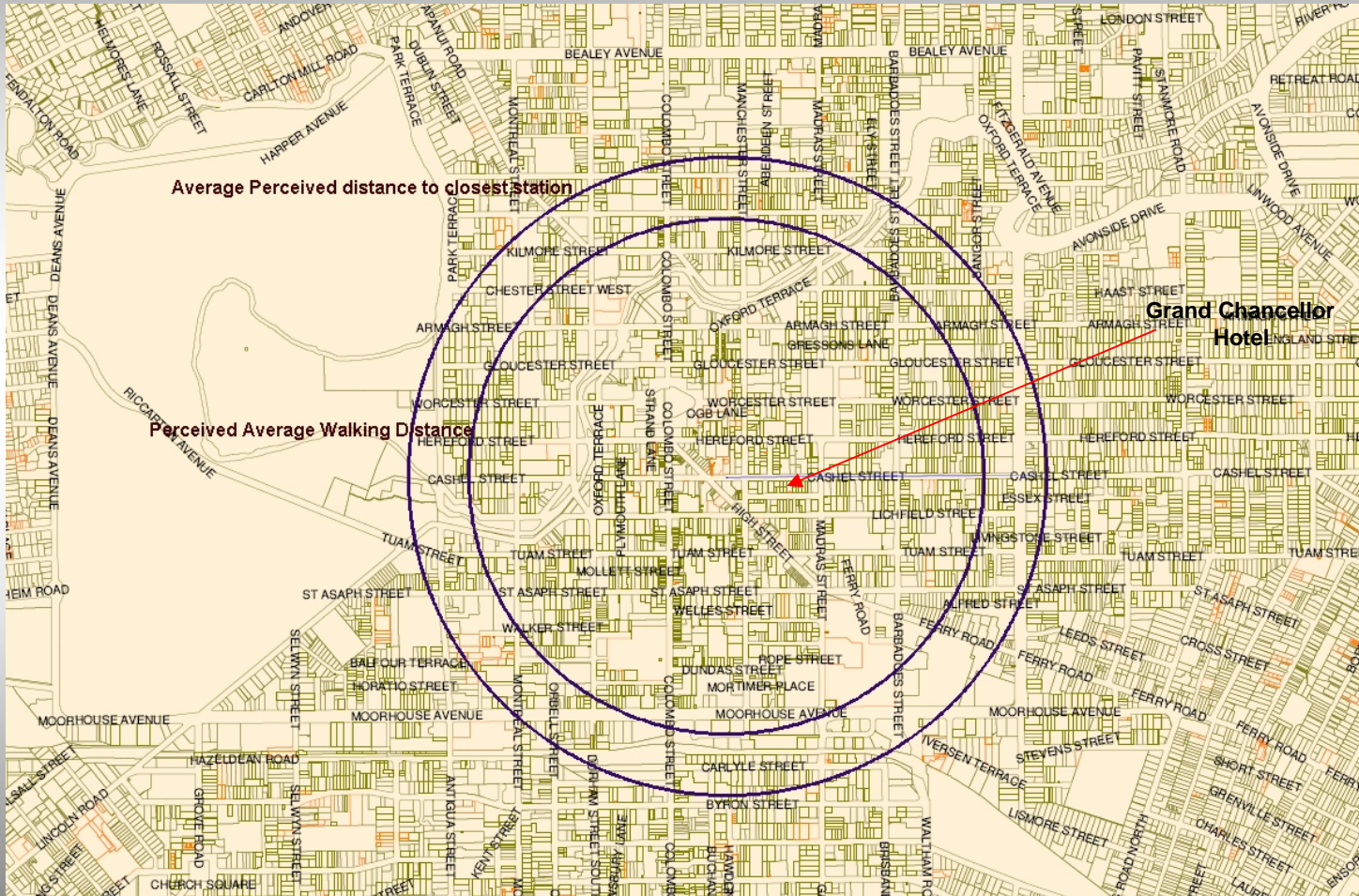
# Perceptions of Walking Distances

Table 3. Drivers and Walkers Perceptions of the Walking Times and Distances the Average New Zealander might take to the Train or Bus station.

| Location<br>N   | Drivers        |                  | Walkers         |                   | Total        |
|---|----------------|------------------|-----------------|-------------------|--------------|
|   | Auckland<br>30 | Wellington<br>80 | Auckland<br>112 | Wellington<br>126 | Total<br>348 |
| Perceived average New Zealander's walking distance of (metres)        | 865 (376)      | 809 (385)        | 808(383)        | 829(346)          | 820.1(368.4) |
| Perceived average New Zealander's Walking Time (minutes)              | 13.91 (6.04)   | 11.67 (4.56)     | 15.11(8.56)     | 12.43(5.01)       | 13.24(6.50)  |
| Perceived average New Zealander's walking speeds (metres per minute)  | 62.16m/m       | 69.28m/m         | 53.39m/m        | 66.67m/m          | 61.94m/m     |
| Estimated walking Distance to closest station                         | 1103 (475)     | 878 (455)        | 1120 (617)      | 893(510)          | 980 (542)    |
| Estimated walking time to closest station (minutes)                   | 20.24 (22.5)   | 11.46 (5.45)     | 18.75(11.91)    | 11.75(8.14)       | 14.62(11.34) |
| Perceived walking speeds (metres per minute)                          | 54.49m/m       | 76.61m/m         | 59.73m/m        | 76.00m/m          |              |
| Calculated Distance of closest intersection to train station (metres) | 1334(n = 26)   | 643(n = 68)      | 973(n = 30)     | 624(n = 27)       | 824(n = 151) |

|                                       |  |  |  |  |
|---------------------------------------|--|--|--|--|
| Summary compared to perceived average | Walking is further and longer but at a slower pace | Walking is the same distance and same time but at a quicker pace | Walking is further and longer but at a slower pace | Walking is further, less time, but at a quicker pace |
|---------------------------------------|--|--|--|--|

# Difference between individual and Perceived Average Walking Distances



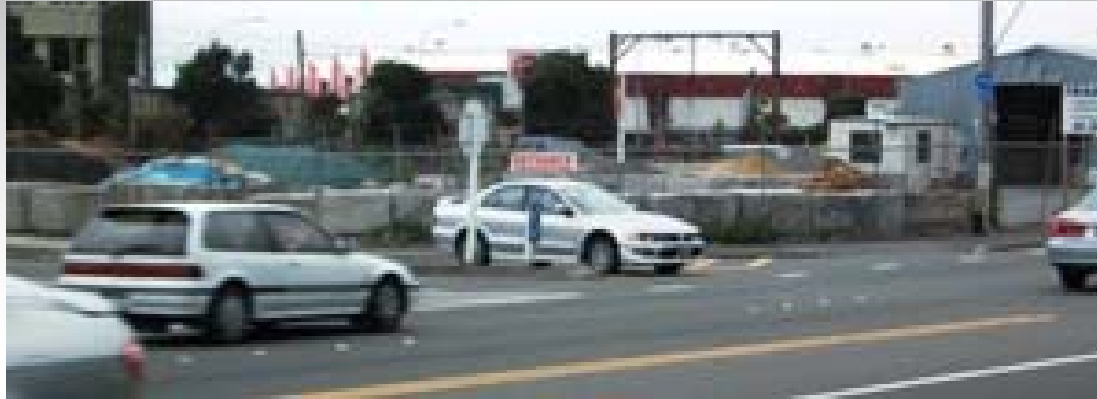
# Backward Wald Stepwise logistic regression

- Living on the Hills is counter-intuitive. Living on a hill increases the likelihood of walking 4.5 times.
- Each additional car in the household reduces the likelihood of walking to the station by about 50%
- The belief that park and rides are for people who live a long way away is a significant factor and therefore important if interventions are to be developed to encourage walking

| Variable    | Explanation   | B      | Odds ratio | CI Lower | CI Upper |
|-------------|---|--------|------------|----------|----------|
| NCARS (0-4) | Number of cars owned  | -0.435 | 1.55       | 1.04     | 2.30     |
| Q51 (1-5)   | P&R's are only for people who travel a long way to use the bus or train | 0.562  | 1.75       | 1.28     | 2.4      |
| Q27 (1-5)   | Normally walk to the station when the weather is fine                   | 0.455  | 1.58       | 1.21     | 2.06     |
| Q29 (1-5)   | Sometimes more convenient to take the car                               | -0.611 | 1.84       | 1.32     | 2.57     |
| Q37 (1-5)   | Chance of rain will take the car  | -0.588 | 1.80       | 1.32     | 2.44     |
| Hills (0-1) | Live on a hill  | -1.548 | 4.69       | 1.84     | 12.05    |

$$\hat{g}(W) = 6.735 - 2.771 (\text{Auckland\_Wellington}) - .435 (\text{NCars}) + .562 (\text{Q51}) + .455 (\text{Q27}) - .611 (\text{Q29}) - .588 (\text{Q37}) - 1.548 (\text{Hills})$$

# Why walk uphill?





# Conclusions

1. A reasonable walking distance is perceived to be about 820m
2. 'Rain' has an influence on the choice to drive vis-a-vis fine weather that aids the decision to walk.
3. The opportunity to park it for free in a monitored facility induces the reasonable walking trip to be replaced by a car trip.
4. Factors thought to influence the uptake of walking such as time, distance, fatigue, the carriage of goods, concern for crime are not found to be real impediments to the walking journey considered as an access sub mode.



# Recommendations

1. Improve the infrastructure concerning rain by providing better shelters, covered walkways and so on to prevent reliance on the car.
2. Establish a ticketing system that prevents use of park-n-rides on a regular basis by those who live within 850metres of the station.
3. Move park and ride facilities away from the train station (200m) to force a walking distance that competes with the convenience of getting in the car.
4. Charge a fee for park-n-ride facilities to prevent their use by people who might otherwise walk.

