TRANSPORTATION CONFERENCE 2026 · WELLINGTON

Integration of Micromobility & Public Transport in NZ Urban Cities

Enhancing Urban Mobility Through Seamless Transport Connections in New Zealand Cities

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RESEARCH BACKGROUND

81.2%

of NZ travel time in private motor vehicles (2023/24) *

5.4%

NZ travel time by public transport — far below mode shift targets **

30%

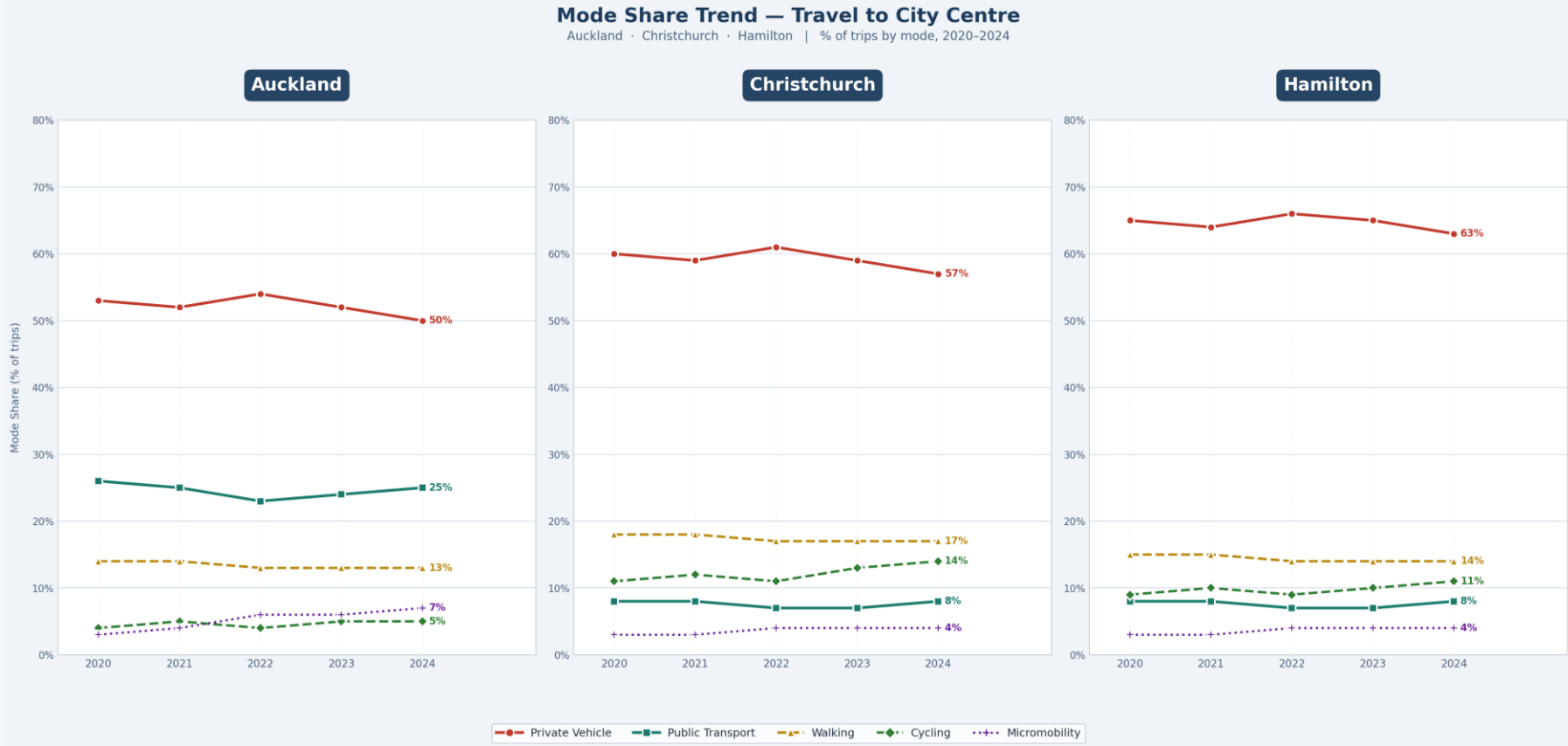
target for active modes in urban areas by 2040 (NZ Transport Strategy) ***

THE FIRST/LAST-MILE PROBLEM

Long walks to PT stops and irregular services make public transport inconvenient even when core services are efficient.

*Source: *NZ Household Travel Survey, MoT, **NZ Household Travel Survey, MoT 2023/24, ***Current active share ~12.4% | Source: NZTS 2008*

URBAN MODE SHARE TRENDS: NZ HOUSEHOLD TRAVEL SURVEY 2020–2024



Sources: Waka Kotahi Walking, Cycling & Micromobility Monitor (2020–2024) · NZ Household Travel Survey, Ministry of Transport · Stats NZ 2023 Census
Note: 2020 data affected by COVID-19 lockdowns. Shares are estimated proportions of all trips, all purposes, normalised to 100%.

RESEARCH QUESTIONS & OBJECTIVES

STUDY OBJECTIVES

1. Quantify impact of cost, time, proximity and availability on mode choice
2. Compare MNL vs MIXL model performance across three cities
3. Identify city-specific and demographic factors driving preference heterogeneity
4. Derive actionable policy priorities for PT-micromobility integration

RQ 1

What are the key determinants of choosing e-bike or e-scooter over walking for PT access?

RQ 2

How does preference heterogeneity vary across Auckland, Christchurch, and Hamilton?

RQ 3

Which socio-demographic segments show the strongest status-quo bias against adoption?

LITERATURE REVIEW & RESEARCH GAP

Micromobility + PT**

- First/last mile
- Catchment expansion
- Docked integration

Hosseinzadeh et al. (2021); Bieliński & Ważna (2021)

Rider Mode Choice**

- Mixed Logit
- Taste heterogeneity
- Cost / distance / safety

Train (2009); Hensher & Greene (2003)

Pricing and Availability

- Free trials ↑ ridership
- PT fare integration
- Fleet near stations

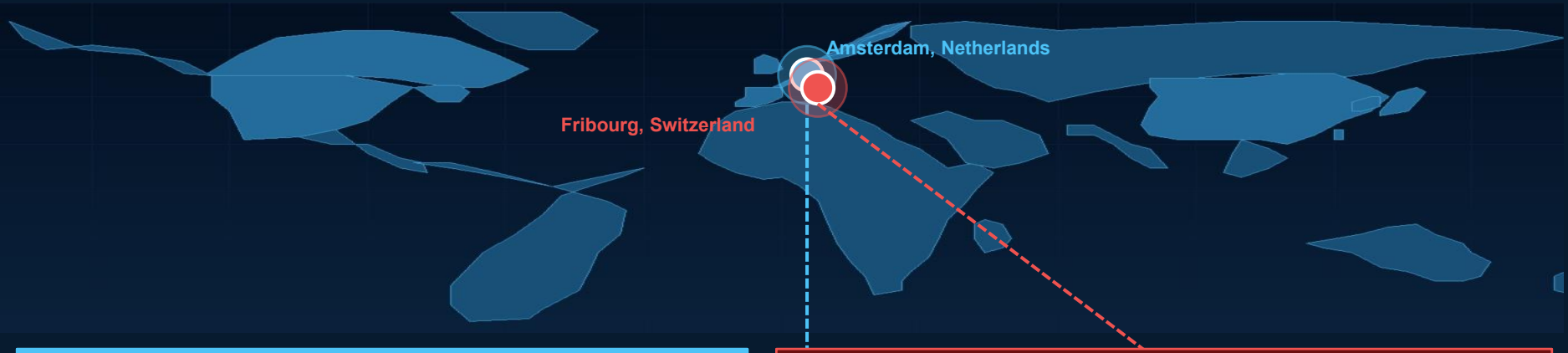
Fishman (2016); Shaheen et al. (2020)

RESEARCH GAP

What's missing in the NZ context?

- Limited evidence on how micromobility supports access to public transport
- Lack of city-specific research
- Key service factors have rarely been examined together
- Limited understanding of differences across user groups

WHAT NZ CAN LEARN?



NL Amsterdam - Netherlands

OV-fiets + OV-Chipkaart

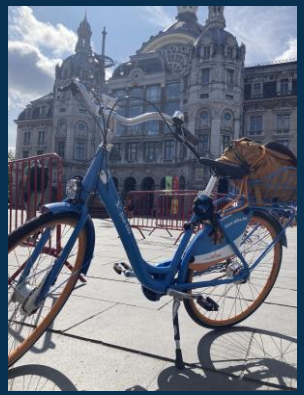
Seamless bike-rail integration. Millions of rentals expand station catchments dramatically.

CH Fribourg - Switzerland

Frimobil + PubliBike

Single annual pass covers PT and bike-sharing — reduces adoption friction for occasional users.

WHAT NZ CAN LEARN?



BE Brussels - Belgium

Blue-bike + MoBIB Card

Bike-share linked to PT smartcard — measurably more new train users and car-to-bike shift.

DE Berlin - Germany

BVG Jelbi (Berlin)

Unified PT+scooter booking app. Signals shared modes are part of the official transit system.

WHAT NZ CAN LEARN?

Integrated bus / light rail as the spine — micromobility as the first/final connection

US Pittsburgh - USA

Universal Basic Mobility

Free PT + unlimited scooters for low-income users — equity and first/last-mile addressed together.

TW Taipei - Taiwan

YouBike Free 30 min

Reinstating free first 30 minutes delivered a 50% daily ridership increase overnight.

SURVEY METHODOLOGY

1,597

Respondents across
Auckland · Christchurch · Hamilton | 2020–2023

12,776

Choice records · 8 tasks each
PT+Walk vs PT+E-bike vs PT+E-scooter

ATTRIBUTES TESTED

Service Cost

$2.50 – $3.45 per trip

Travel Time

5–7 min micromobility vs 15 min walk

Accessibility

<20m · <40m · <60m walk to device

Availability

50% – 80% chance of finding a device

MODELLING APPROACH: MNL VS MIXL

Multinomial Logit (MNL) *Baseline*

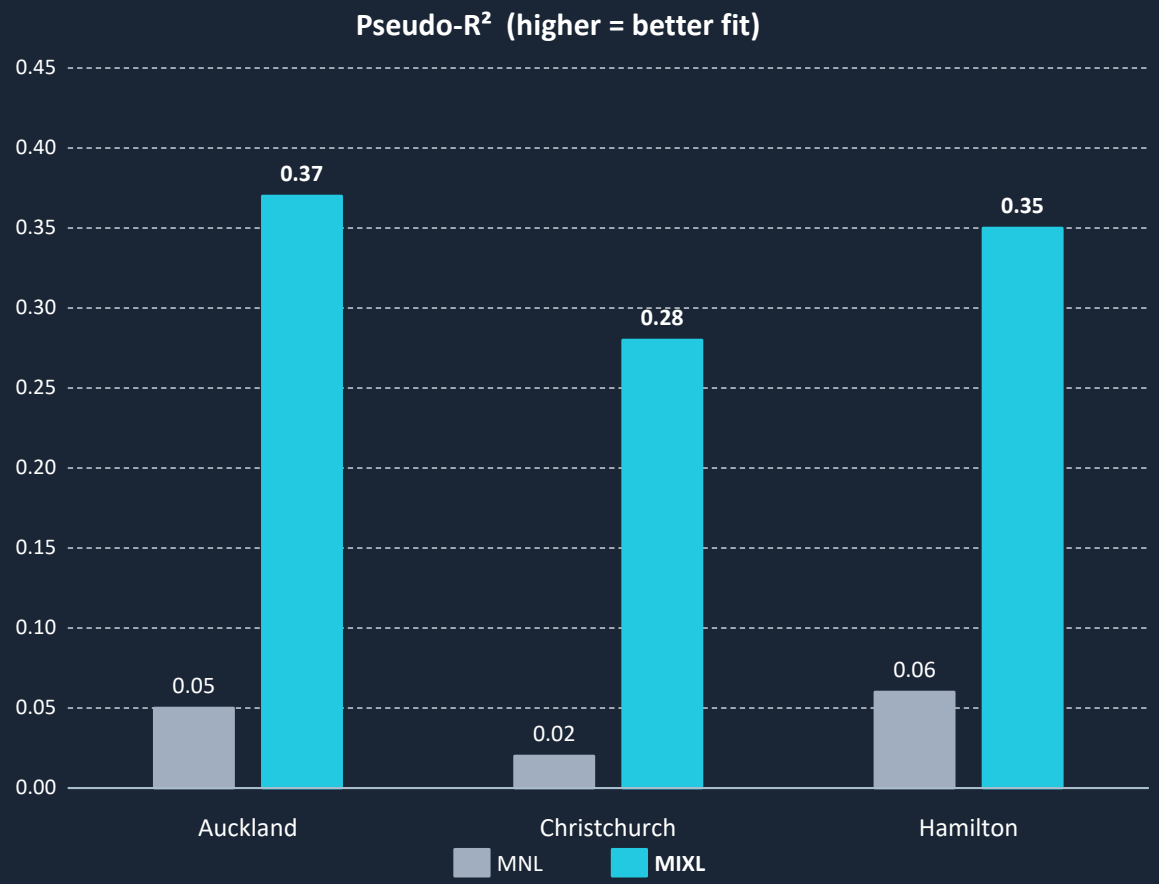
- Fixed preferences across all respondents
- IIA — Independence of Irrelevant Alternatives
- Transparent and computationally efficient
- Baseline / benchmark model
- ***Pseudo-R^2: 0.02–0.06 across cities***

Mixed Logit (MIXL) ★ *Preferred*

- Person-specific taste coefficients
- Relaxes IIA — allows correlated choices
- Simulated Maximum Likelihood (Halton)
- Captures unobserved heterogeneity in price sensitivity
- ***Pseudo-R^2: 0.28–0.37 (better fit)***

💡 *WHY MIXL? A large, significant SD in the cost coefficient across all 3 cities confirms strong preference heterogeneity, whereas fixed-taste MNL underestimates individual diversity.*

MODEL FIT: MNL vs MIXL — PSEUDO-R² & AIC/N



AIC/N Comparison (lower = better)

City	MNL	MIXL	Δ
Auckland	1.904	1.388	▼ 0.516
Christchurch	1.928	1.588	▼ 0.340
Hamilton	1.753	1.424	▼ 0.329

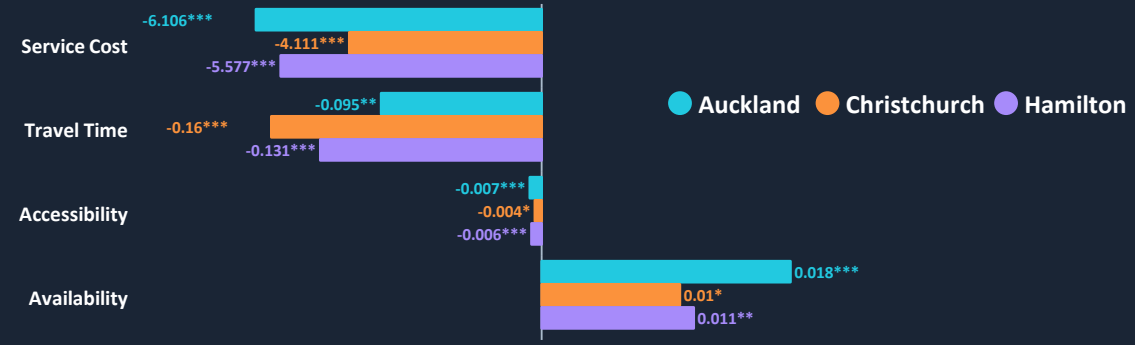
KEY INSIGHT

- ✓ **MIXL** is 5–14 times better than MNL across all cities.
- ✓ The **standard deviation** of cost is large and statistically significant, confirming strong unobserved **heterogeneity** in fare sensitivity.
- ✓ Fixed-taste MNL substantially underestimates the diversity of individual preferences in NZ urban travel.

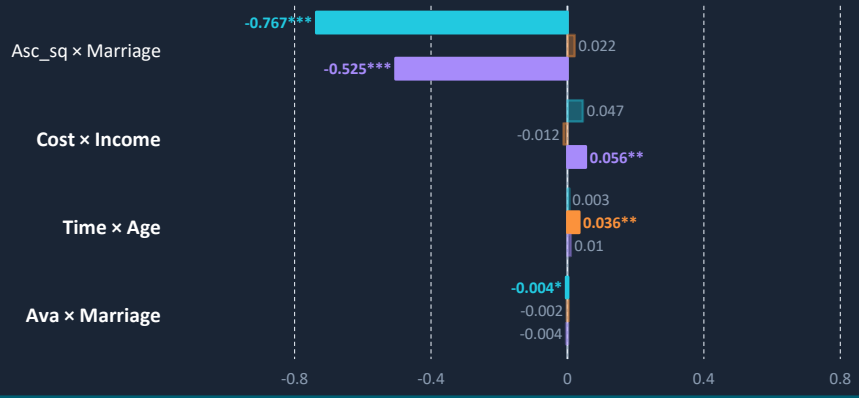
MNL = Multinomial Logit · MIXL = Mixed Logit · Pseudo-R² (McFadden) · AIC/N = Akaike Information Criterion per observation · Δ = improvement (MNL – MIXL)

MIXL MODELLING COEFFICIENTS: KEY PARAMETERS

Main Effect: Core Utility Coefficients



Interaction Effect: Socio-economic



E-Bike ASC

Auckland	Christchurch	Hamilton
-0.262	-0.258	-0.284
***	**	***

E-Scooter ASC

Auckland	Christchurch	Hamilton
-0.403	-0.360	-0.441
***	**	***

More negative = stronger resistance to switching from walking

**** p<0.01 ** p<0.05 * p<0.1 · MIXL = Mixed Logit Model · ASC = Alternative Specific Constant · SE = Standard Error*

CITY-BASED MODEL COMPARISON (MAIN EFFECT)

AUCKLAND

Walk distance & device availability are the primary levers

- Strongest Walk Sensitivity
- Highest Availability Coefficient

CHRISTCHURCH

Time-reliability is the primary lever

- Most Time-sensitive of All Cities
- Strong Cycling Culture Already

HAMILTON

Retail-driven, highest car dependency, most to overcome

- 62.7% Car Mode Share — Highest
- Strongest E-Scooter Resistance

SOCIO-ECONOMIC MODEL ANALYSIS

AUCKLAND

- Married Residents Most Resistant
- Higher Income = Less Price Sensitive

CHRISTCHURCH

- Education is a Major Trip Purpose
- Direct PT Connections Needed

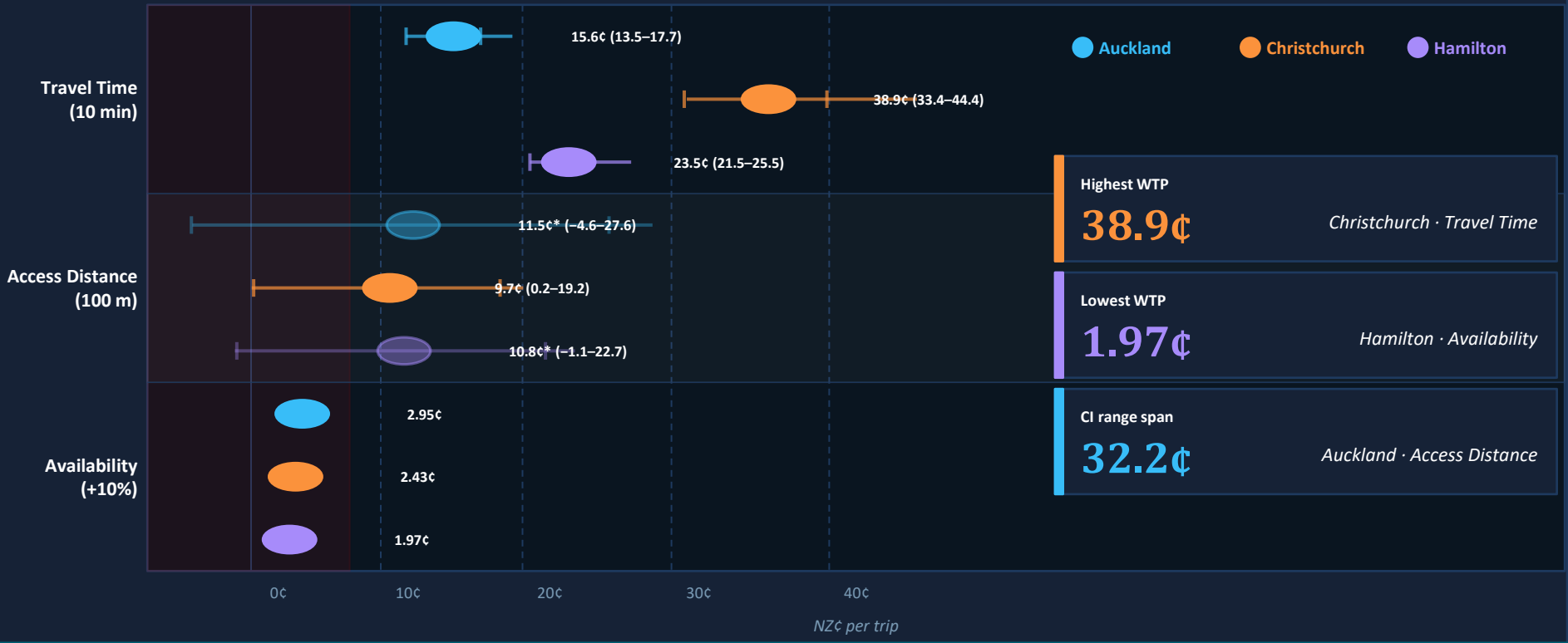
HAMILTON

- Shopping is #1 Trip Purpose (37.3%)
- Couples Most Resistant to Change

	Walk Sensitivity	Time Sensitivity	Car Dependency	Cycling Culture
Auckland	★★★	★★☆	★★☆	★★☆
Christchurch	★★☆	★★★	★☆☆	★★★
Hamilton	★★☆	★☆☆	★★★	★☆☆

WILLINGNESS-TO-PAY

WTP Point Estimates (95% CI using the Delta Method)



Highest WTP
38.9¢
Christchurch · Travel Time

Lowest WTP
1.97¢
Hamilton · Availability

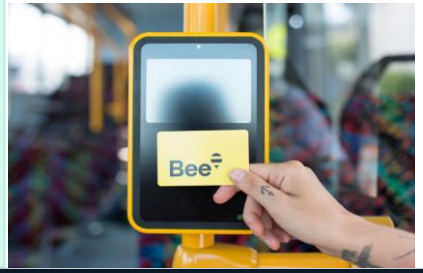
CI range span
32.2¢
Auckland · Access Distance

FOUR POLICY PRIORITIES

1 Micromobility Availability as a Service Commitment

Active rebalancing at transport nodes, treat reliability like a timetable.

2 Integrate Pricing with Transit Accounts



Fare-linked minutes or passholder credits.

3 Car-Free Zoning Around PT Stops

Concentrate devices within 20–40m of high-ridership stops.

4 Segment-Tailored Design

Use MIXL forecasting, not fixed-taste MNL.

LIMITATIONS & FUTURE DIRECTIONS

STUDY LIMITATIONS

CBD-Focused Data
SP surveys limited to CBD trips — non-CBD or longer-distance corridors may show different preference patterns

Safety Proxied
Safety perceptions approximated via walk distance; no direct infrastructure audit or incident data

SP vs Real Behaviour
Stated preference may overstate actual willingness to adopt in real-world conditions

FUTURE RESEARCH

- → Combine SP survey data with GPS trip data from operators
- → Longitudinal mode-shift tracking over 2–5 year horizon
- → Equity studies across lower-income segments

KEY TAKEAWAYS

- ✓ **Cost is the single strongest deterrent — pricing strategy is non-negotiable**
- ✓ **Micromobility availability must be treated as a service commitment, not an afterthought**
- ✓ **MIXL reveals strong heterogeneity — city-targeted policy outperforms one-size-fits-all**
- ✓ **E-scooters face inherent reluctance beyond e-bikes**

Shared micromobility can bridge NZ's first/last-mile gap — but only with reliable device availability, integrated pricing, and station-adjacent deployment targeted to each city's unique behavioural profile.

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