



Te Hotonga Hapori
— connecting communities —

Project 2

Building Wellbeing in Your Community

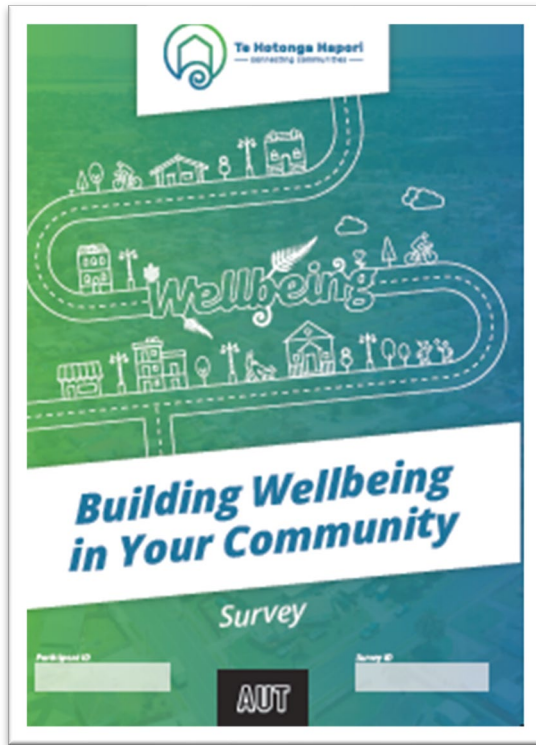
**Assoc Prof Tom Stewart, Dr Conal Smith, Dr Ananth
Narayanan, Prof Scott Duncan**

AUT

Place and wellbeing: using experienced wellbeing data to inform urban design



Data sources



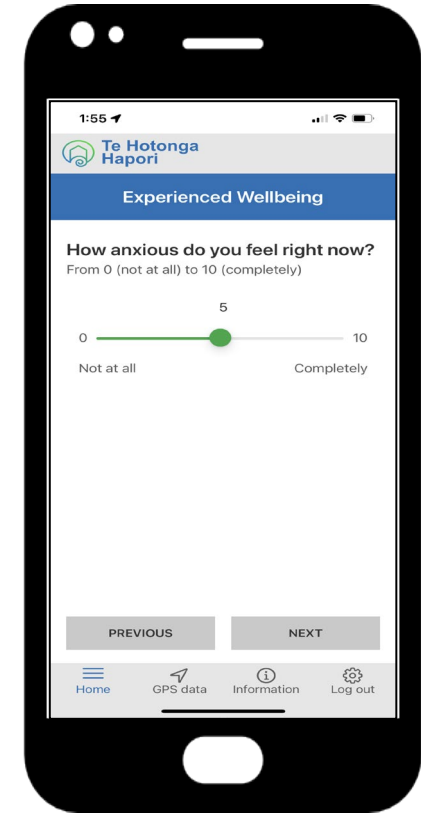
Wellbeing survey

1



Physical activity and location

2



Experienced wellbeing app

3

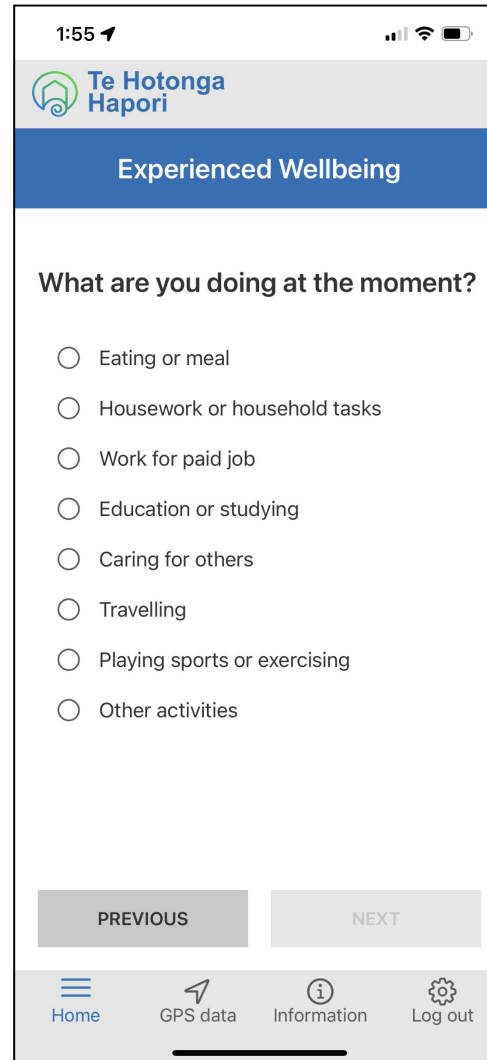
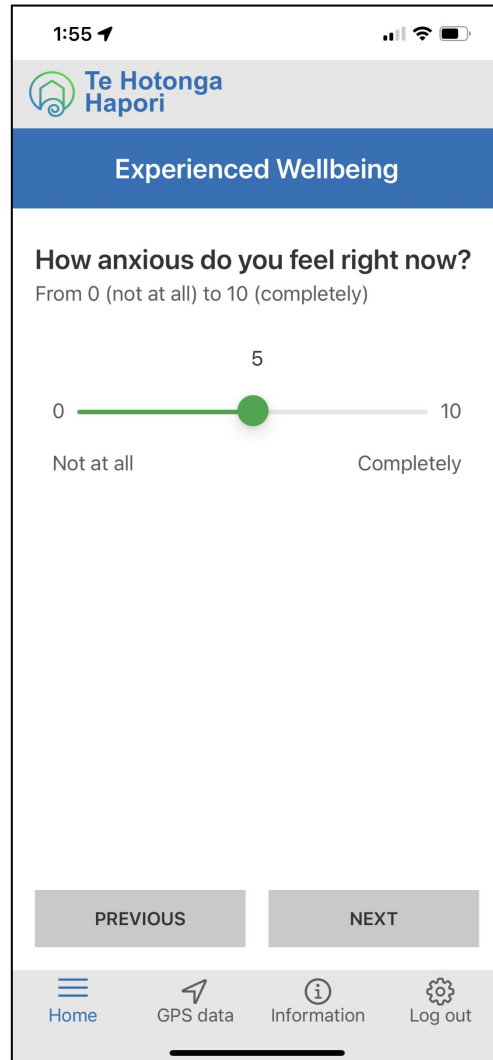


These data allow us to link together

where someone is,
what they are doing,
and **how they are feeling**



Experienced wellbeing (app)

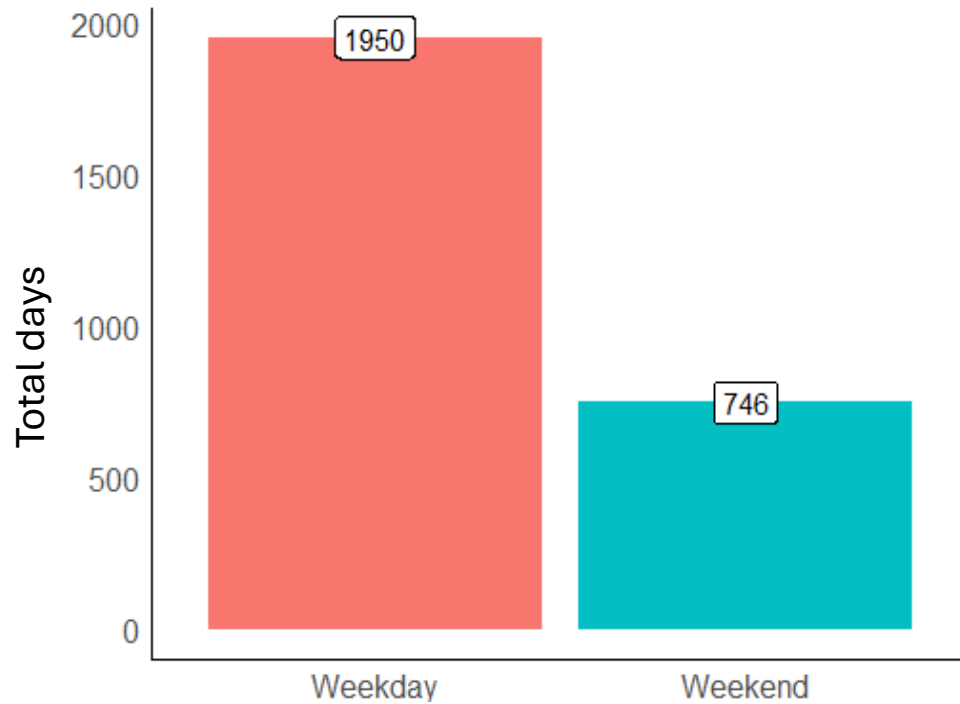


Physical activity (summary)

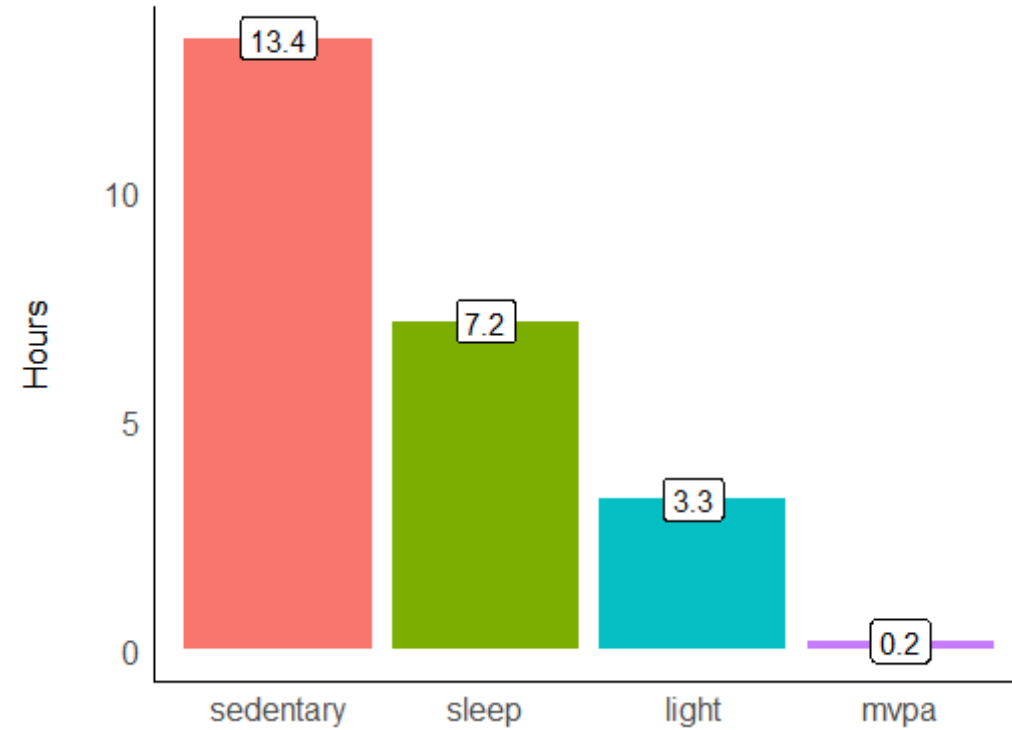


Average wear time

- 3.5 weekdays
- 1.5 weekend days

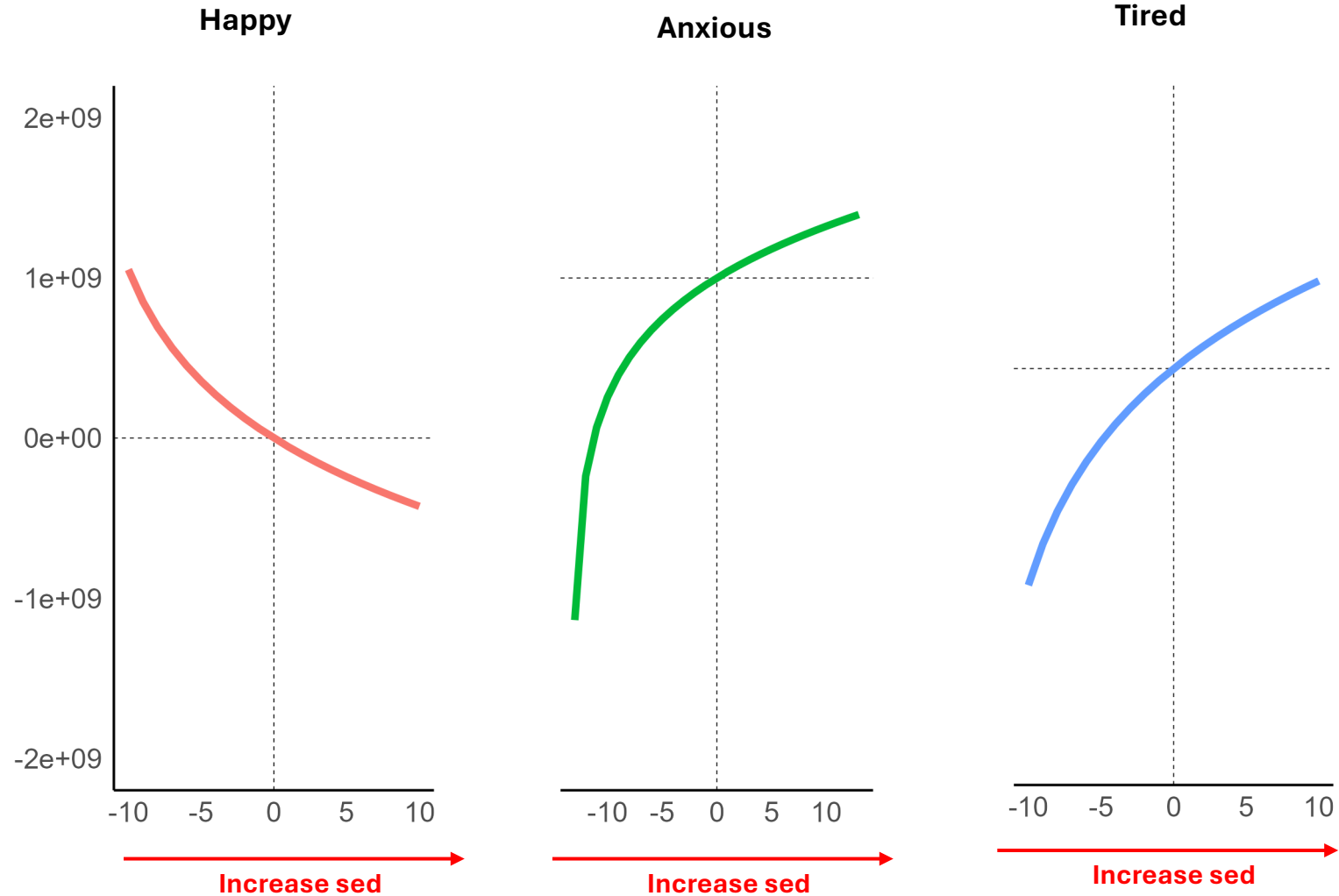


Average hours of each behaviour:



Physical activity and wellbeing

Replacing **sedentary** time
with moderate-intensity physical
activity
is associated with



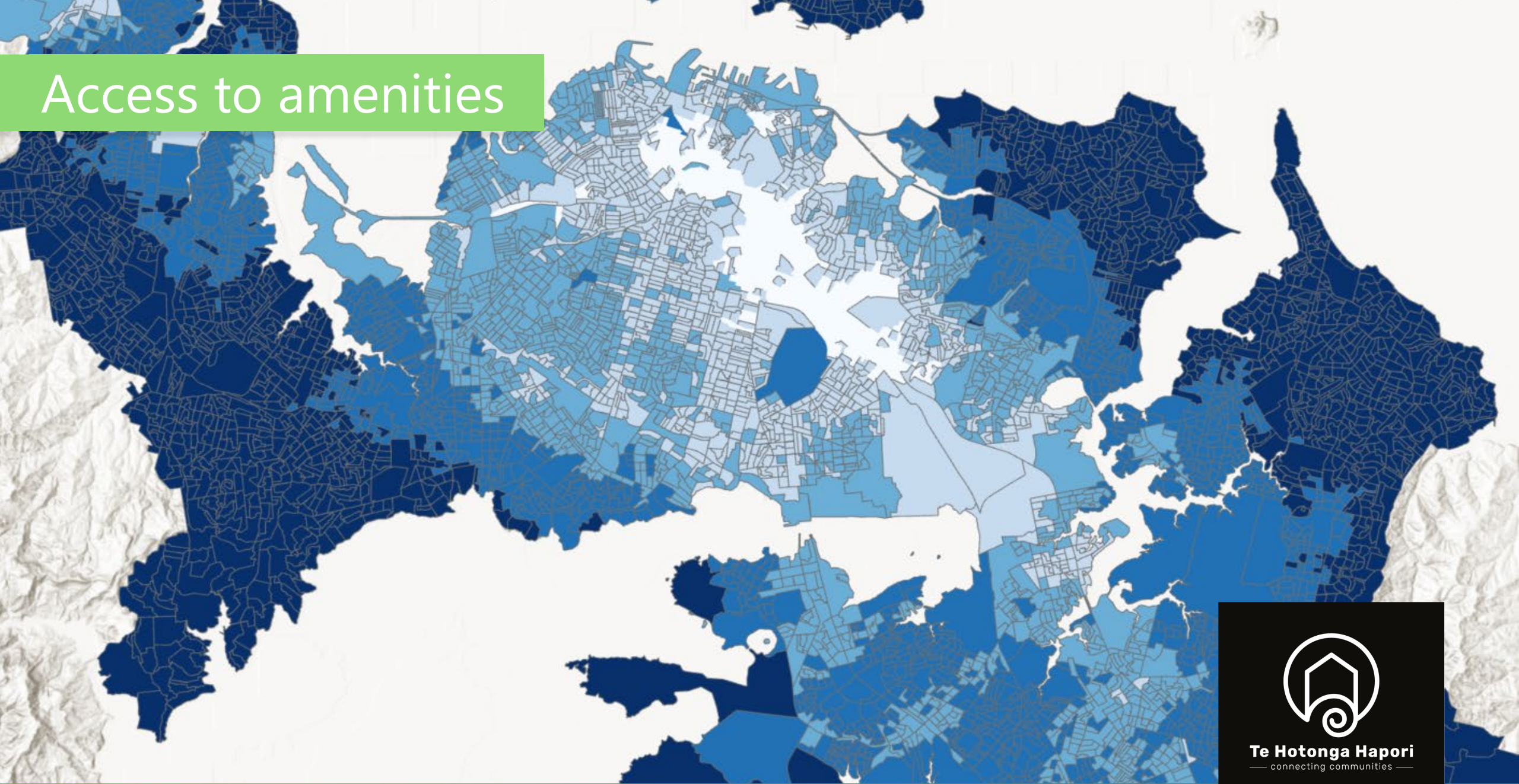
Location (summary)



- N = 380
- 7 million GPS data points (~36,000 hours) collected



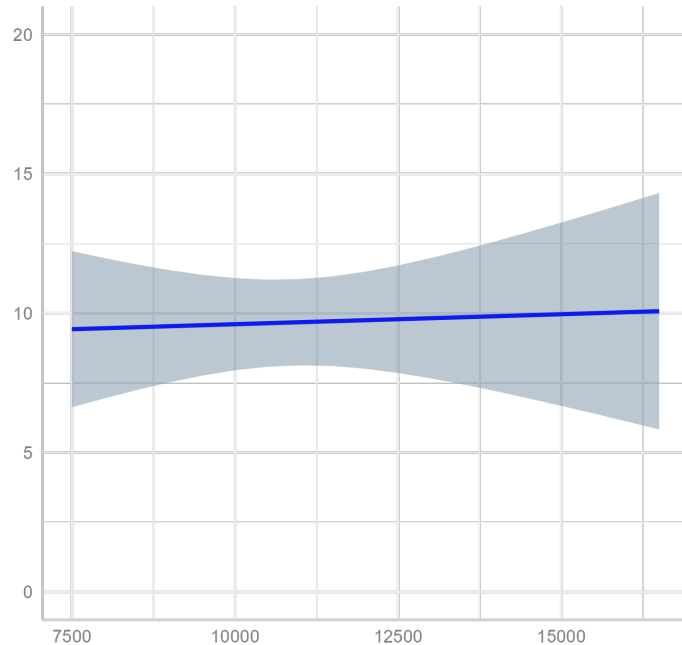
Access to amenities



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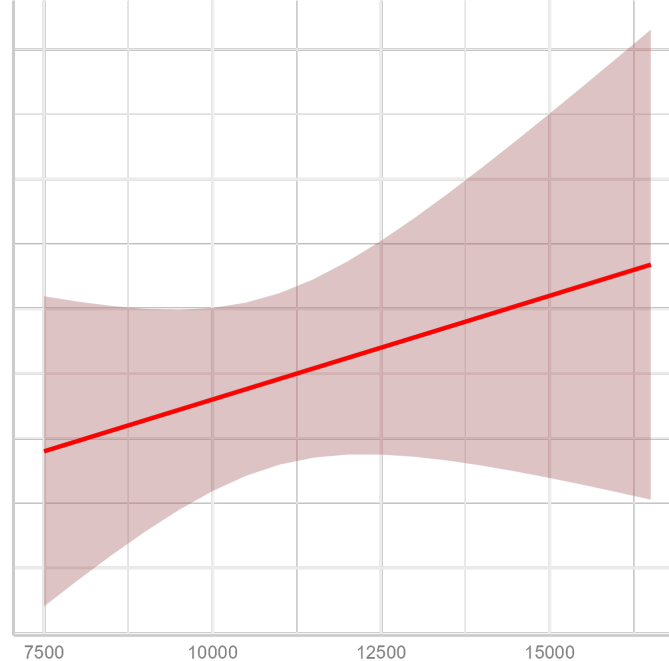
Travel and accessibility

Total walking trips



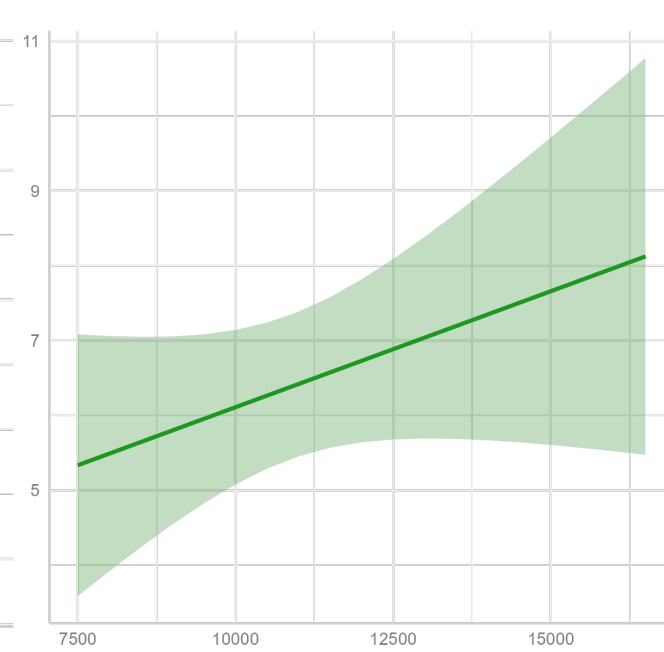
Higher access

Walking trips in neighbourhood



Higher access

Physical activity minutes



Higher access



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Experienced wellbeing



Experienced wellbeing

Overlaid EWB data with zones from Auckland Unitary Plan

Residential							
Zone	Zoning Maps Legend	Maximum Building Height	Height in Relation to Boundary	Maximum Building Coverage (Net Area)	Maximum Impervious Area	Minimum Net Site Area ²	Minor Dwellings Permitted
Residential - Large Lot Zone		8m	None	Lesser of 400m ² or 20%	Lesser of 1,400m ² or 35%	4,000m ²	Up to 65m ²
Residential - Rural and Coastal Settlement Zone		8m	2.5m: 45°	Lesser of 200m ² or 20%	Lesser of 1,400m ² or 35%	2,500m ²	Up to 65m ²
Residential - Single House Zone		8m	2.5m: 45°	35%	60%	600m ²	Up to 65m ²
Residential - Mixed Housing Suburban Zone		8m	2.5m: 45°	40%	60%	400m ²	No
Residential - Mixed Housing Urban Zone		11m	3m: 45°	45%	60%	300m ²	No
Residential - Terrace Housing and Apartment Buildings Zone		16m	3m: 45°	50%	70%	1,200m ²	No

Business Zones				
Zone	Planning Maps Legend	Maximum Building Height (unless Specified in Height Variation Control)	Height in Relation to Boundary	Minimum Net Site Size ³
Business - City Centre Zone		Subject to Height Variation Control	Varies depending on location in City Centre	200m ²
Business - Metropolitan Centre Zone		72.5m	Varies depending on zoning of adjacent site	200m ²
Business - Town Centre Zone		Subject to Height Variation Control	Varies depending on zoning of adjacent site	200m ²
Business - Local Centre Zone		18m	Varies depending on zoning of adjacent site	200m ²
Business - Neighbourhood Centre Zone		13m	Varies depending on zoning of adjacent site	200m ²
Business - Mixed Use Zone		18m	Varies depending on zoning of adjacent site	200m ²
Business - General Business Zone		16.5m	Varies depending on zoning of adjacent site	200m ²
Business - Business Park Zone		20.5m	Varies depending on zoning of adjacent site	1,000m ²
Business - Heavy Industry Zone		20m	6m: 35°	2,000m ² Minimum average site size: 5,000m ²
Business - Light Industry Zone		20m	6m: 35°	1,000m ² Minimum average site size: 2,000m ²

Open Space Zones						
Zone	Zoning Maps Legend	Gross Floor Area of Individual Buildings	Maximum Building Height	Maximum Building Coverage (Net Area)	Maximum Impervious Area	Minimum Net Site Size
Open Space - Conservation Zone		50m ²	4m	1%	Lesser of 10% or 5000m ²	Refer Unitary plan, Chapter 38 Subdivision – Urban, E38.10.
Open Space - Informal Recreation Zone		100m ²	8m	10%	Lesser of 10% or 5000m ²	Refer Unitary plan, Chapter 38 Subdivision – Urban, E38.10.
Open Space - Sport and Active Recreation Zone		150m ²	10m	30%	40%	Refer Unitary plan, Chapter 38 Subdivision – Urban, E38.10.
Open Space - Civic Spaces Zone		50m ²	4m	5%	None	Refer Unitary plan, Chapter 38 Subdivision – Urban, E38.10.
Open Space - Community Zone		300m ²	8m	50%	Varying	Refer Unitary plan, Chapter 38 Subdivision – Urban, E38.10.

Rural Zones			
Zone	Planning Maps Legend	Maximum Building Height	Minimum Net Site Size ⁴
Rural Production Zone		9m for dwellings, 15m for other buildings	80ha – Minimum average site size: 100ha
Mixed Rural Zone		9m for dwellings, 15m for other buildings	40ha – Minimum average site size: 50ha
Rural Coastal Zone		9m for dwellings, 15m for other buildings	40ha – Minimum average site size: 50ha
Rural Conservation Zone		9m for dwellings, 15m for other buildings	10ha – Minimum average site size: 20ha
Countryside Living Zone		9m for dwellings, 15m for other buildings	Refer Unitary plan, Chapter 39 Subdivision – Rural, E39.6.5.2.

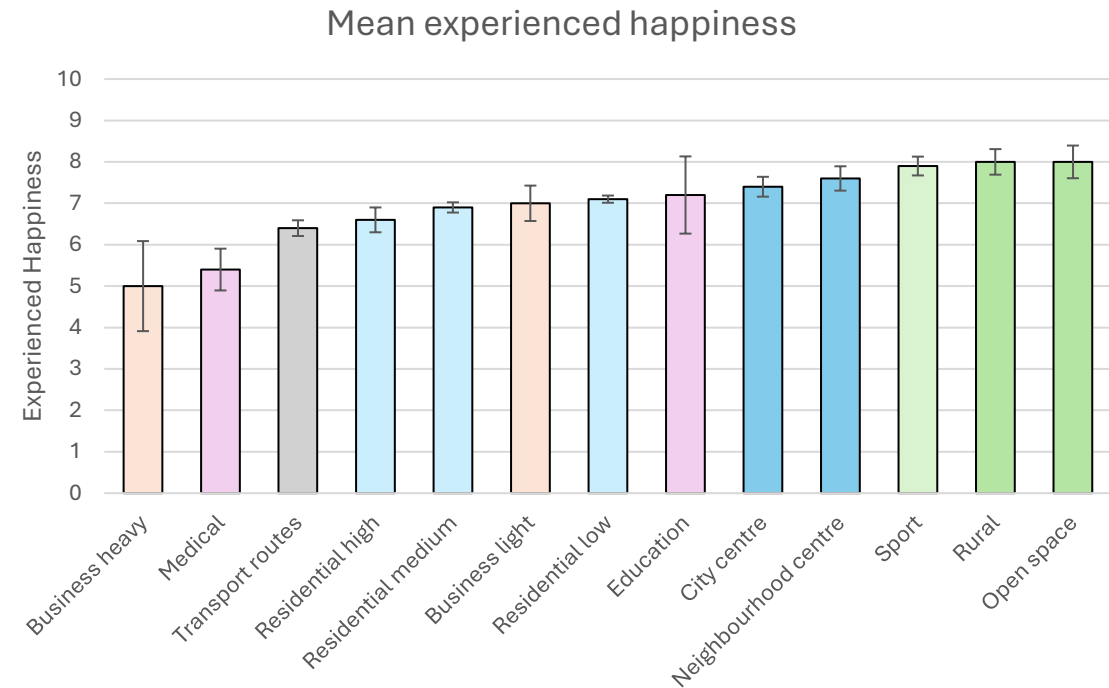
Future Urban Zones			
Zone	Planning Maps Legend	Maximum Building Height	Minimum Net Site Size
Rural Production Zone		9m for dwellings and buildings accessory to dwellings, 15m for other accessory buildings	Refer Unitary plan, Chapter 39 Subdivision – Rural, E39.4.3



Experienced wellbeing

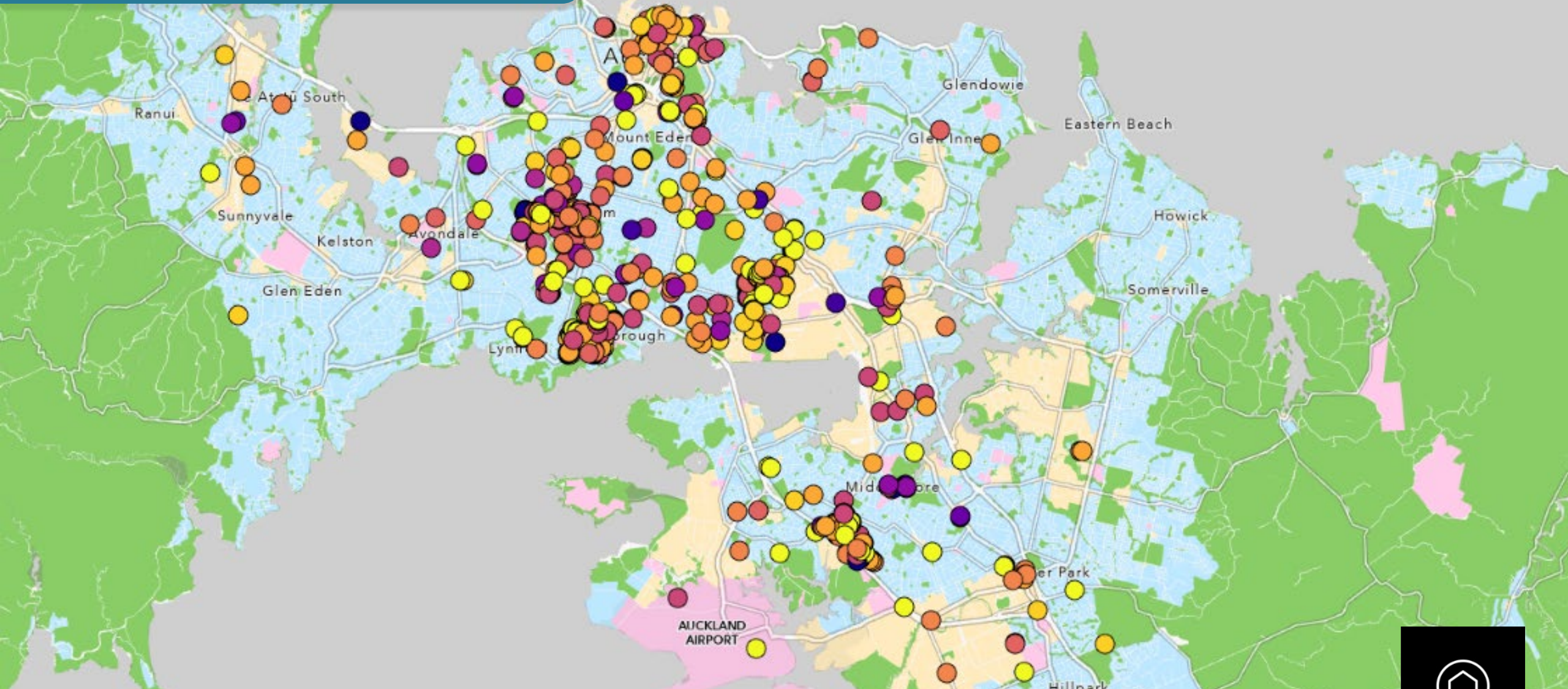
Grouped zones based on common environmental characteristics

Place	Unitary Plan categories	Characteristics	Obsv
Transport routes	Road, strategic transport corridor	Roading/rail	150
Residential high	Residential – Terrace Housing and Apartments	16m height limit	41
Residential medium	Residential – Mixed housing urban	11m height limit	323
Residential low	Residential – Mixed housing suburban, Residential single house	8m height limit	681
City centre	Business – metropolitan centre zone, business – city centre zone, business town centre zone	200m2 minimum site, High rise possible	54
Neighbourhood centre	Business – local centre zone, business - neighbourhood centre zone, Business – mixed use zone, Business – general business zone	13m – 18m height	51
Business heavy	Business – heavy industry zone, business – business park zone	20m high limit Lot size > 2000m2	11
Business light	Business – light industry zone	20m high limit Lot size > 1000m2	28
Medical	Special purpose – healthcare facility and hospital zone	Hospitals	27
Education	Special purpose – school zone, special purpose – tertiary education zone	Schools and universities	11
Rural	Rural – mixed rural zone, rural – rural production zone, coastal – general coastal marine zone, rural – rural coastal zone, future urban zone	Rural and marine areas	7
Open space	Open space – conservation zone, open space – informal recreation zone, open space – community zone	Open space	10
Sport	Open space – sport and active recreation zone, special purpose – major recreation facility zone	Sports facilities	59



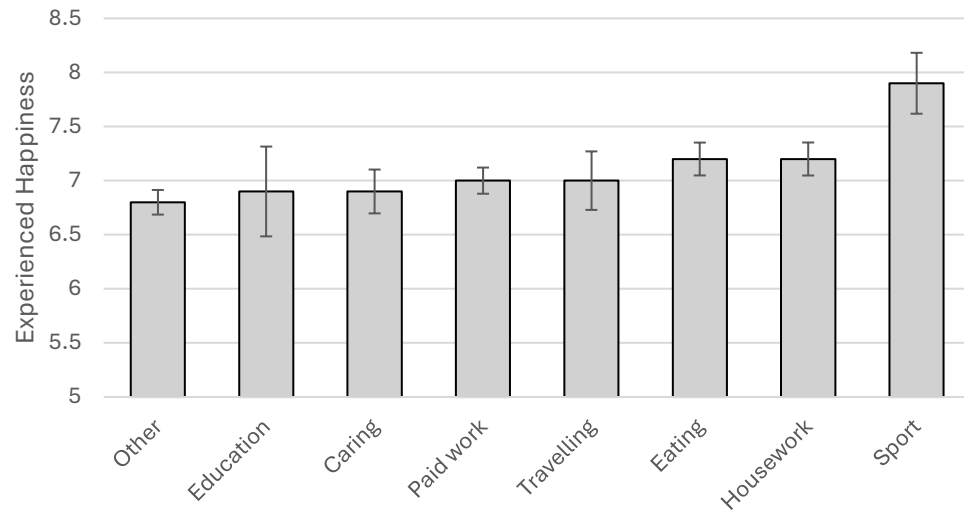
Experienced wellbeing

Happier

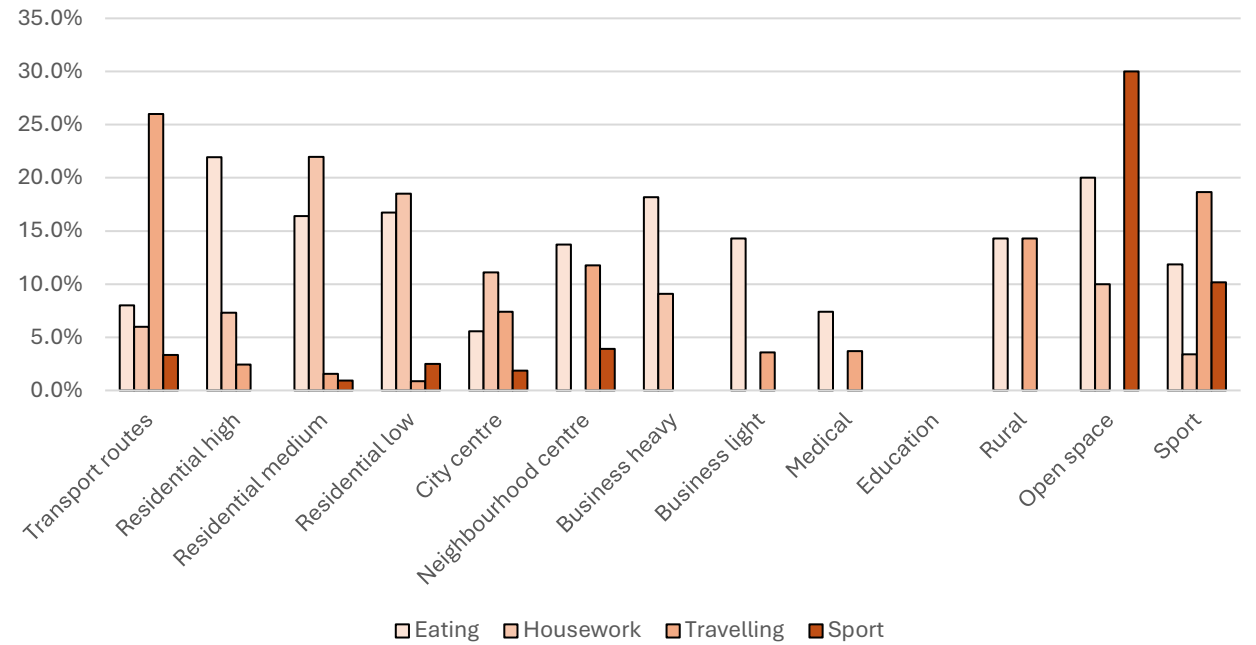


Experienced wellbeing, place, and activity

Mean experienced happiness



Proportion of time in selected activities by place



Experienced wellbeing, place, and activity

Variable	Coefficient
Hour of day	
8 am	0.05
9 am	0.09
10 am	0.29
11 am	0.15
12 pm	0.22
1 pm	-0.02
2 pm	-0.23
3 pm	0.35
4 pm	0.03
5 pm	0.3
6 pm	0.13
7 pm	0.19
8 pm	0.59
9 pm	-0.82
Activity (reference = paid work)	
Eating	0.5
Housework	0.41
Education	0.44
Caring	0.48
Travelling	0.41
Sport	0.78
Other	0.28
With who (reference = alone)	
children	-0.05
family	0.27
friends	0.32
strangers	0.1
Place (reference = heavy industrial)	
Transport routes	2.51
Residential high	2.52
Residential medium	2.26
Residential low	2.35
Citycentre	2.54
Neighbourhood centre	2.32
Business light	1.81
Medical	2.06
Education	2.03
Rural	2.87
Open space	1.68
Sport	2.68
Constant	4.08

We can use more sophisticated statistical techniques to identify the unique impact of activity, social context, and place on wellbeing.

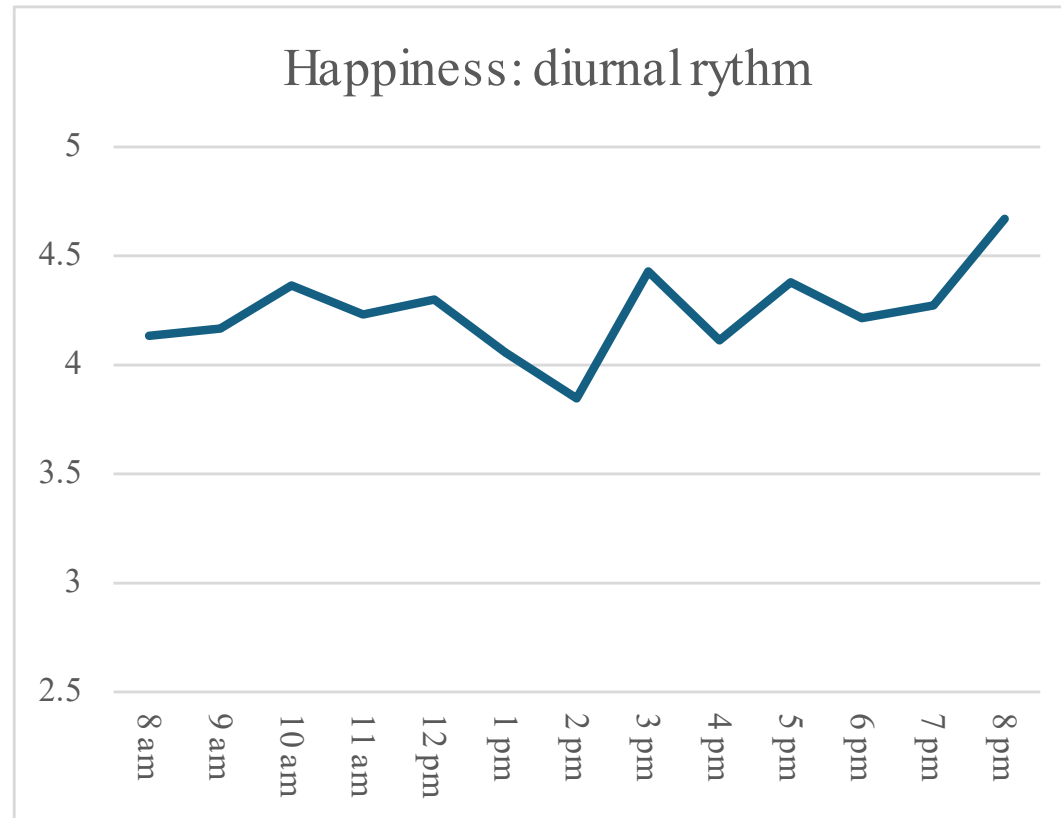
The table on the left gives the marginal impact of each of these factors after controlling for differences between individuals (i.e. an individual fixed effects model)



Experienced wellbeing, place, and activity

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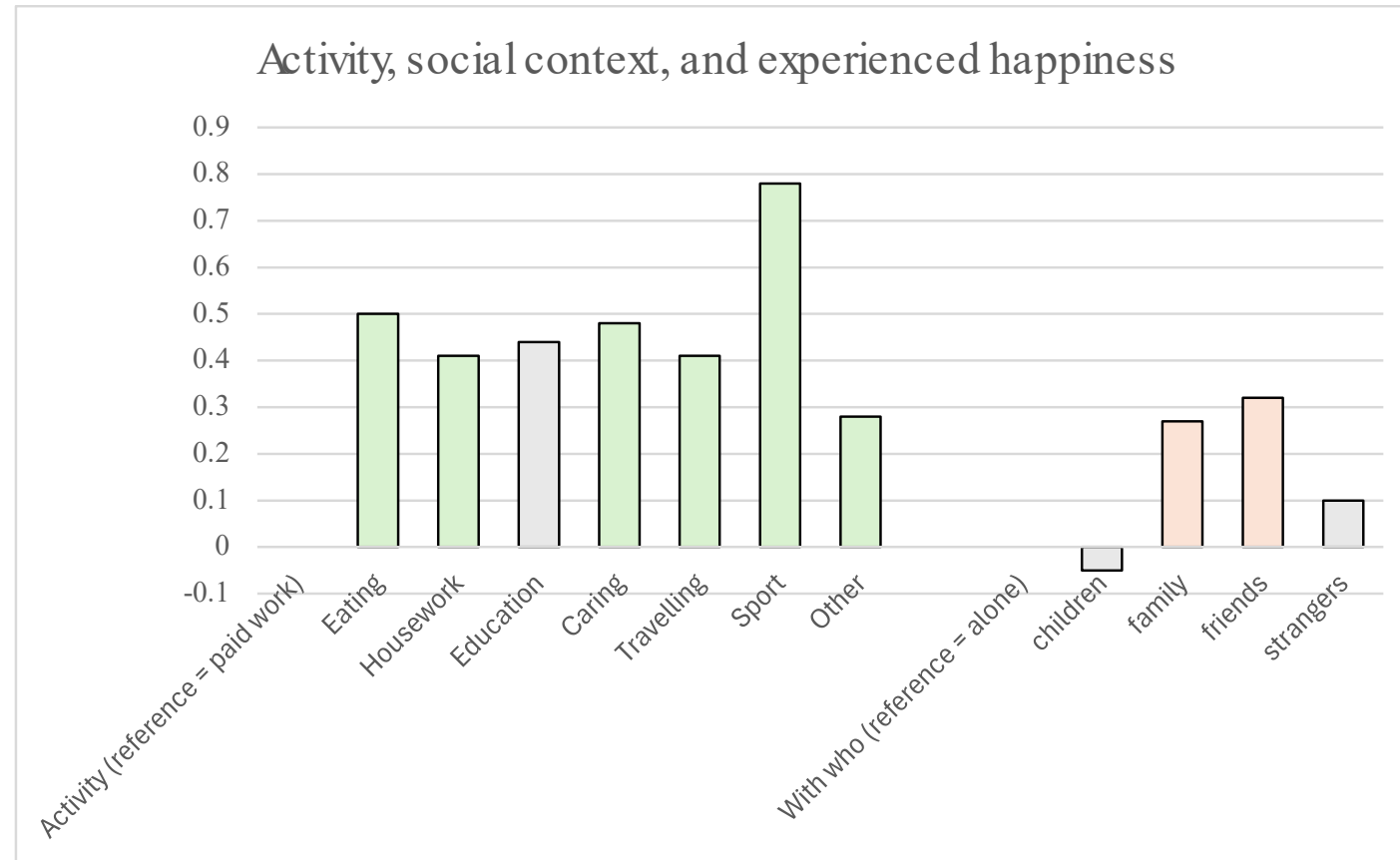
Our data replicates the diurnal rhythm associated with wellbeing



Experienced wellbeing, place, and activity

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Activity and social context matter for wellbeing



Experienced wellbeing, place, and activity

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There are also differences in experienced wellbeing associated with features of the urban environment



Valuing features of urban design

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How valuable is access to dedicated sports facilities?



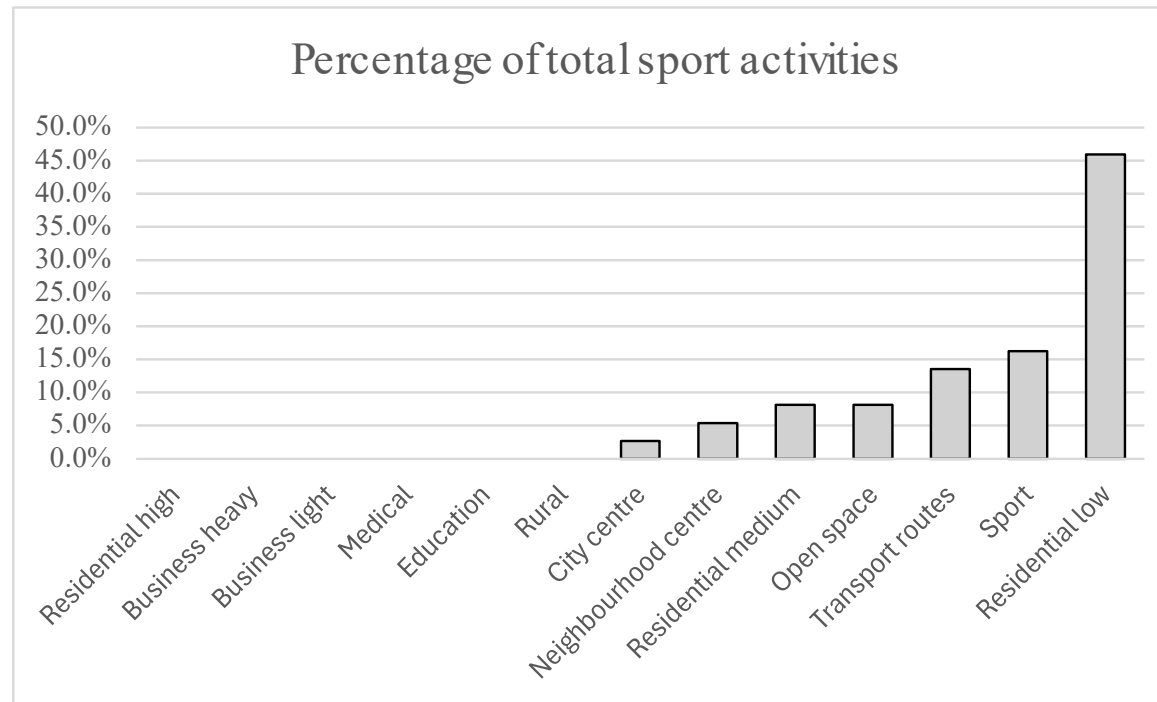
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How valuable is access to dedicated sports facilities?

37 out of 1453 responses (2.5%) in our sample are sporting activities

Most sporting activity in our sample takes place in low-rise residential zones



Valuing features of urban design

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How valuable is access to dedicated sports facilities?

We can compare the marginal impact of time spent in a sporting zone to time spent in a residential low zone.

Difference in experienced happiness: $2.68 - 2.35 = 0.33$

By comparing this value to the impact of a change in a person's income on wellbeing we can answer the question how much money could a person spend on access to the average sporting facility in our sample and remain happier than they were to begin with?

Economists call this value the compensating variation (CV)



Valuing features of urban design

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How valuable is access to dedicated sports facilities?

$$CV = \left(Y_0 - e^{\left[\ln(y_0) - \frac{\alpha\gamma}{\beta} \right]} \right) \times t_p \times t_r$$

Y_0 =reference income (\$26,200 – median income of benefit recipients)

α =impact of sports facilities on happiness (0.33 – from regression)

γ =impact of happiness on overall life satisfaction (.03 – from literature)

β =impact of doubling a person's income on life satisfaction (0.79 – from literature)

t_p =proportion of time spent in sporting activities (0.025 – from app data)

t_r =proportion of sporting activity in low rise residential areas (0.46 – from app data)

CV = \$35.90 per person per year



Limitations

- Sample

- We only have the first wave of experienced wellbeing data collection which limits sample size – we need to be careful about the estimates presented here and there are limits to how much detail we can meaningfully explore
- Our sample focuses on social housing tenants – their experience may differ from the rest of the population in important ways

- Data

- This is the first study of this type in Aotearoa – we are probably not getting all of the questions right (29% of activities are “other”)
- Zoning data from the Auckland Unitary plan is only one example of data on place that we can link to experienced wellbeing data – we are likely to be able to get more meaningful place-related outcomes than those presented here

