Relationships between travel behaviour and health: Results from the 2018 NovaTRAC Halifax Survey

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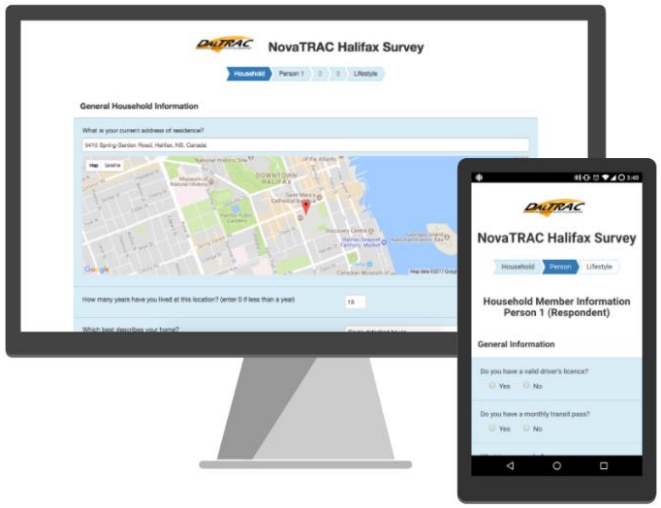
Presentation objectives

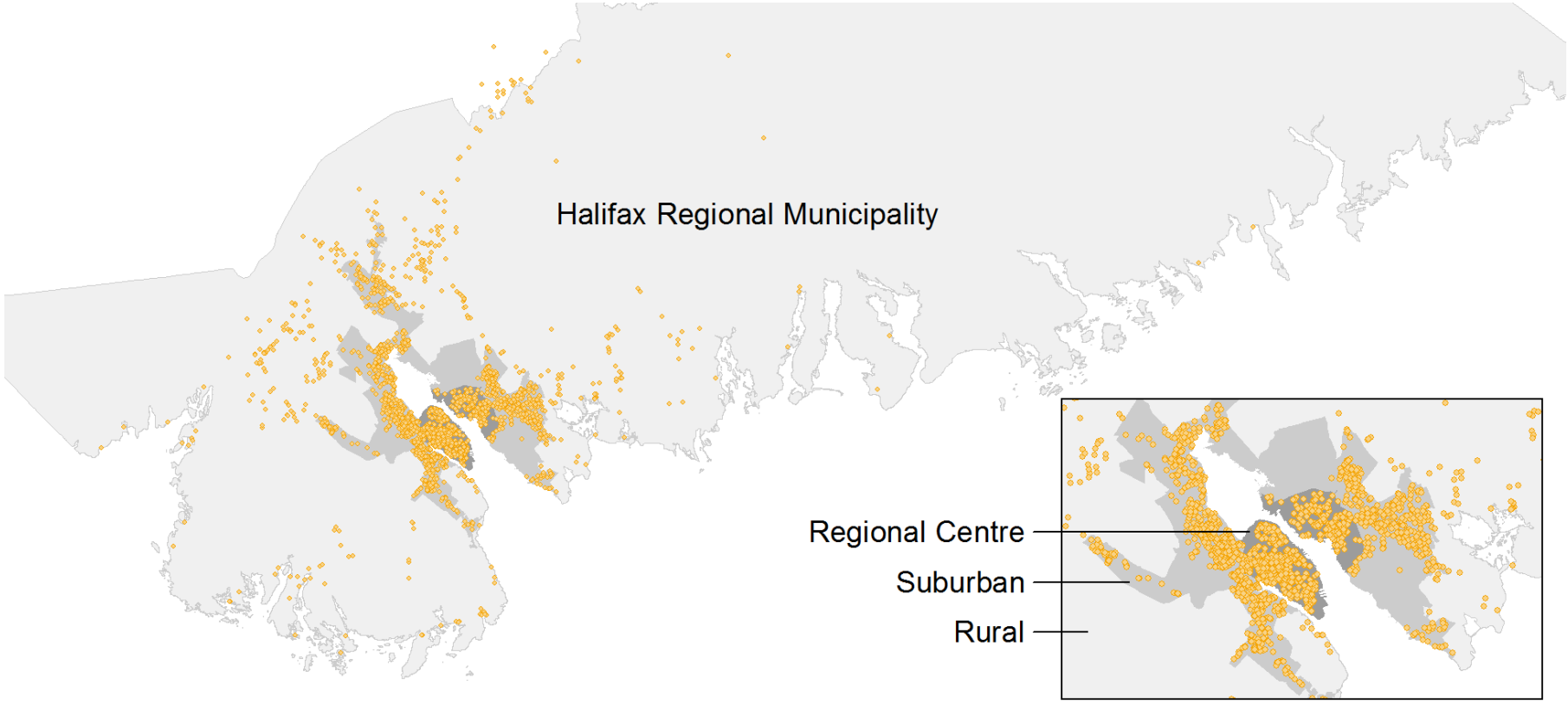
1. To describe the purpose, process and use of the 2018 NovaTRAC Halifax Survey.
2. To present our ongoing research on the relationships between travel behaviour and health emerging from analysis of the survey.

NovaTRAC Halifax survey 2018

- 24-hour travel diary survey
- Random sample through random-digit dialing and mail-out survey package
- Completed by 2,333 households (4,159 people)
- Total of 13,637 trips recorded

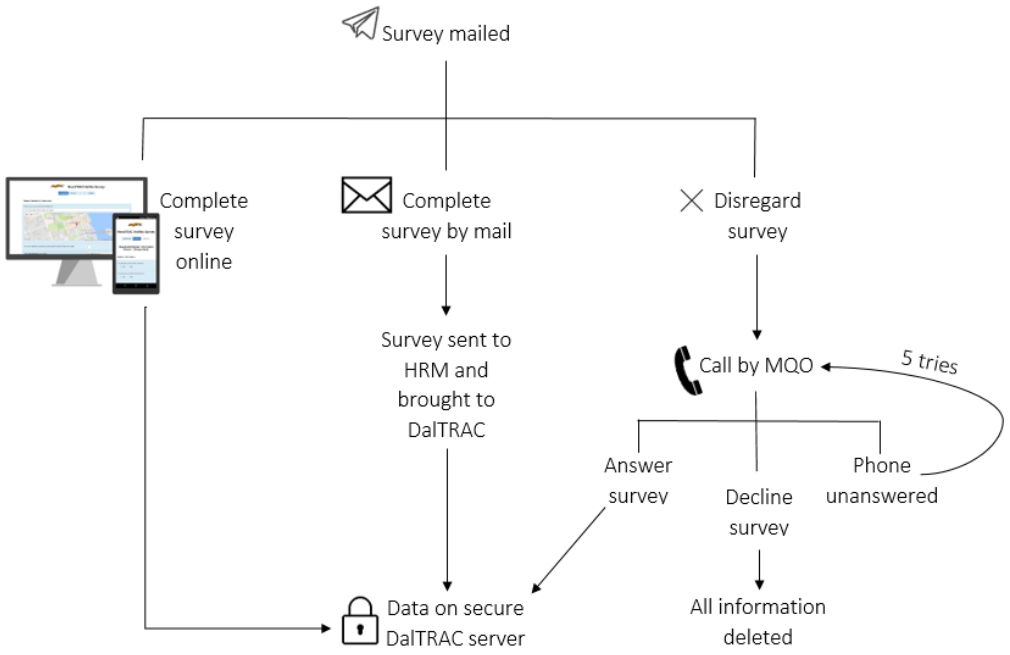


Respondent distribution

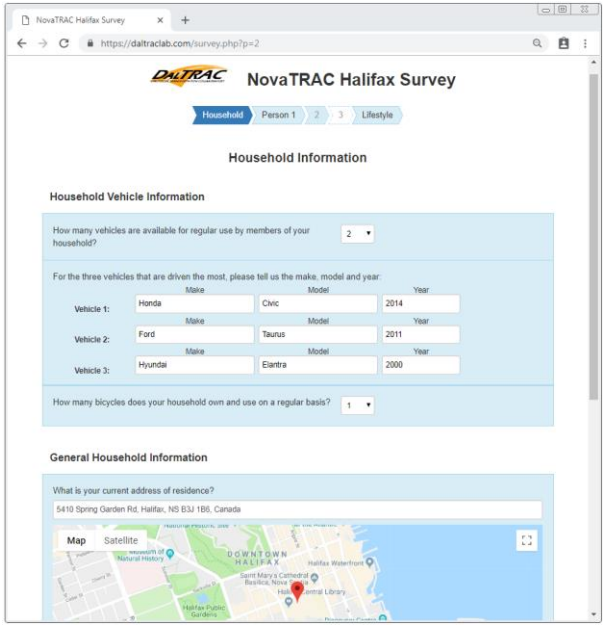


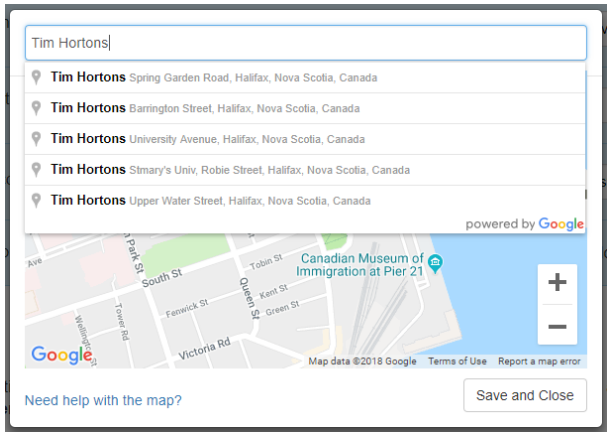
Survey process

- Invited households contacted by SMS or mail
- Option to complete survey online or mail back package
- If no response, called for a phone interview



Online survey tool



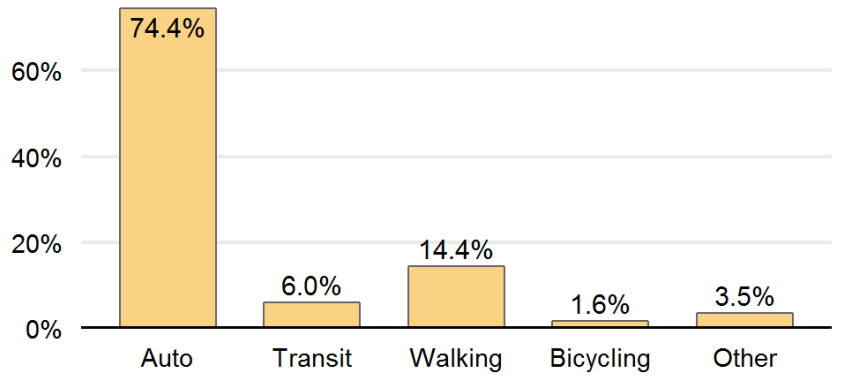


- Custom-designed web survey interface
- Integration with Google Maps and Places API for easy input
  - Search by address or place name
- Stored data directly in useable format
- Provided higher quality data compared to 2015-16 pilot surveys

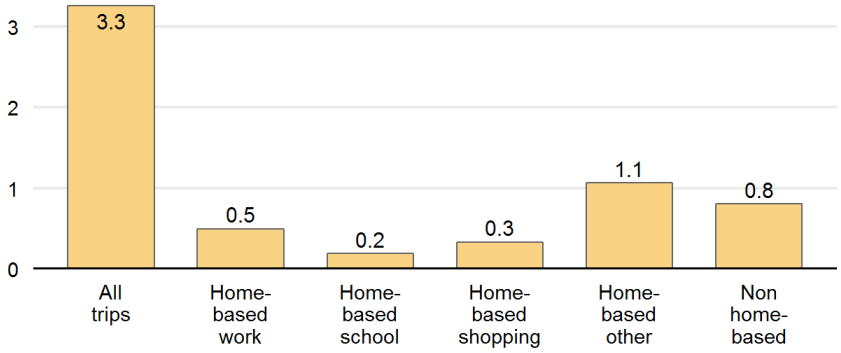
Some basic survey results

- Average household owns 1.6 vehicles and 0.9 bicycles
- Average resident takes 3.3 trips, covering 26 km in 54 min
- VKT per capita is 23 km
- 59% of all trips and 85% of work trips are made alone
- Average vehicle on the road is carrying 1.4 people

Mode share for all trips



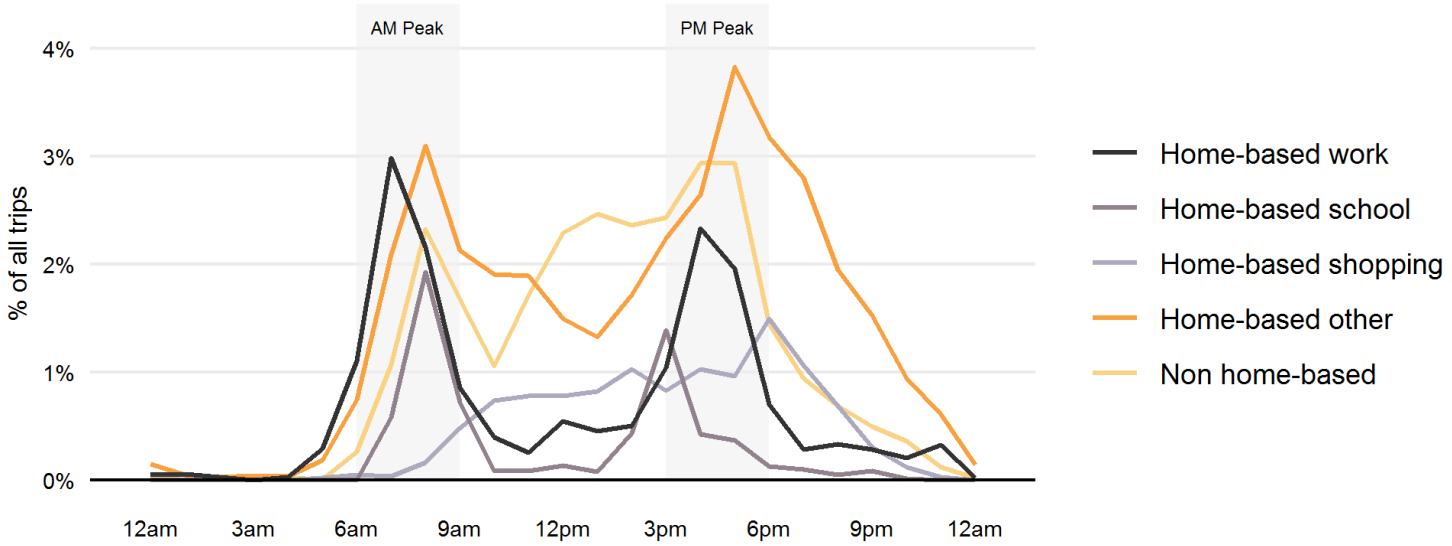
Average daily trip rates by purpose



Travel behaviour

- Time and activity-specific data allows for detailed analysis of travel behaviour at different times of day and for different populations
- Necessary for our research into how travel behaviours relate to health and well-being

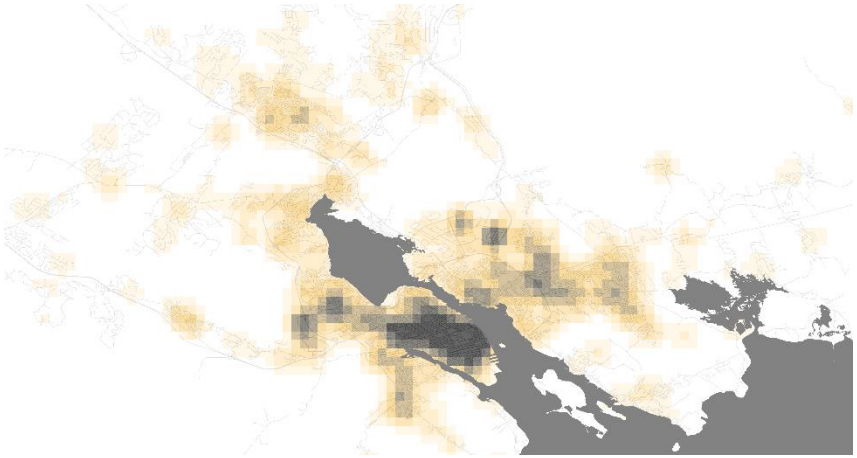
Trip frequency by type of trip and time of day



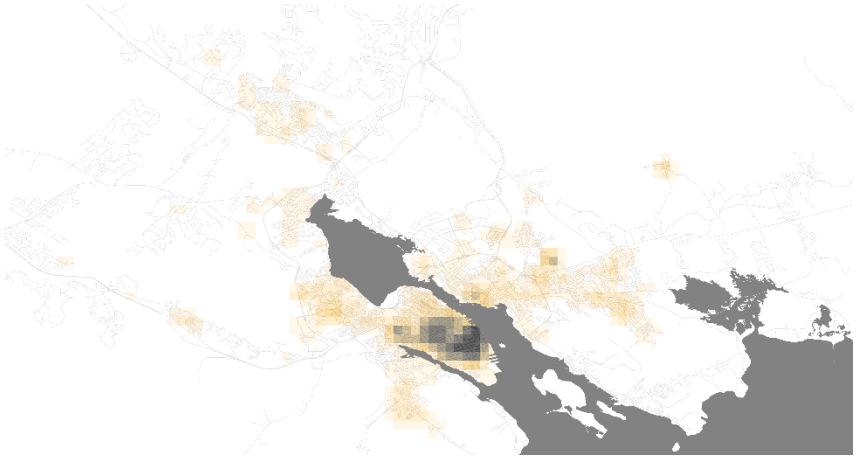
Geographical specificity of behaviour

- Location-based nature of trip data allows for analysis specific to geographies
- Possibility of future contributions to understanding geographical distributions of health outcomes

Density of trip origins, all modes



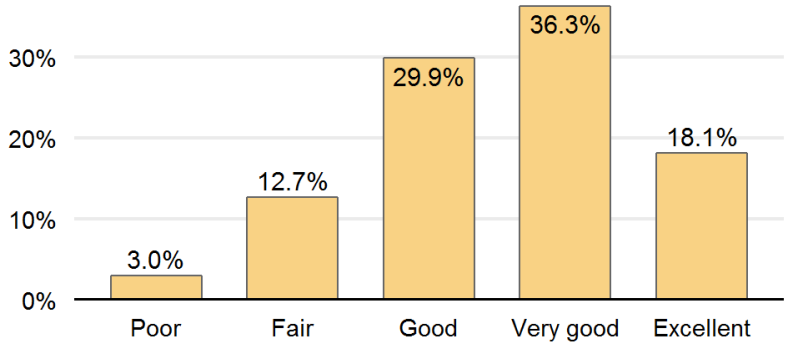
Density of trip origins, AT/transit



Health and well-being

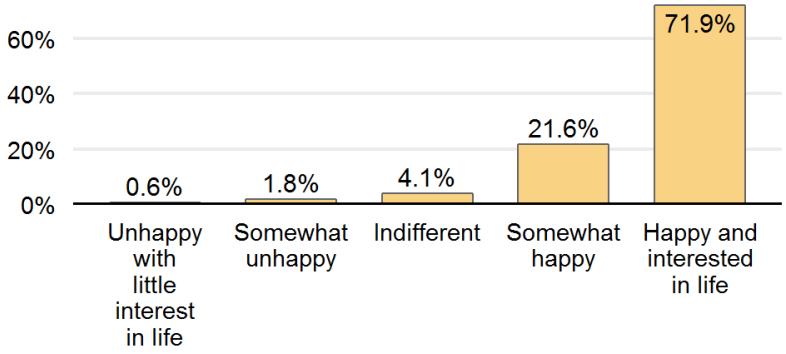
- We look at three health-related survey items
- Each shows different outcomes and relationships

Health status



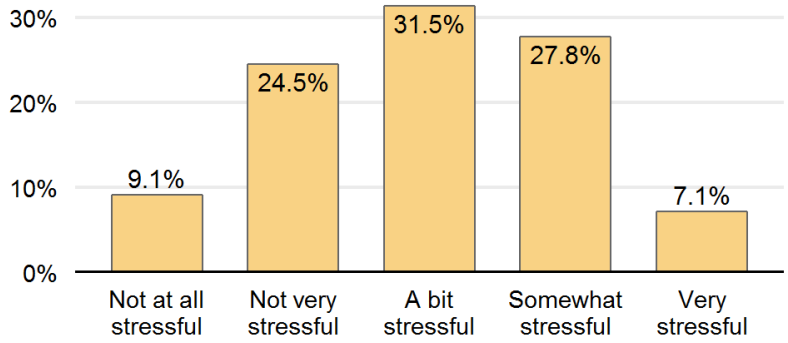
n = 2297 (36 non-responses)

Life satisfaction



n = 2258 (75 non-responses)

Stress level



n = 2267 (66 non-responses)

Completion rates for health questions

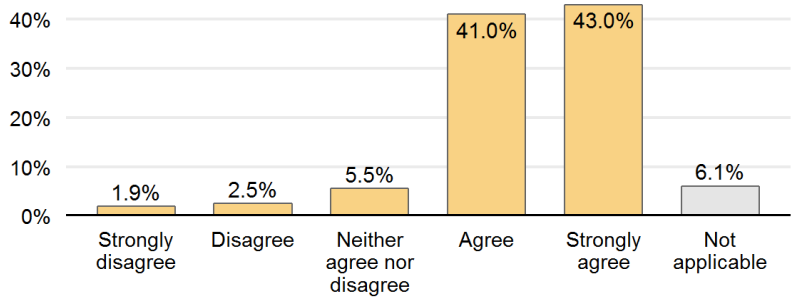
- Most questions were answered by > 97% of respondents
- Lowest completion rate was household income (82.0%)
- Vast majority of respondents answered the health-related questions:
  - Health status: 98.5%
  - Life satisfaction: 96.8%
  - Stress level: 97.2%

Modelling approach

- Ordered probit choice model
- Models explore relative contributions of independent variables to each health-related item
- Allows for relation of specific travel behaviours (e.g. visiting family and friends) with health/well-being
- Random parameters ordered choice models

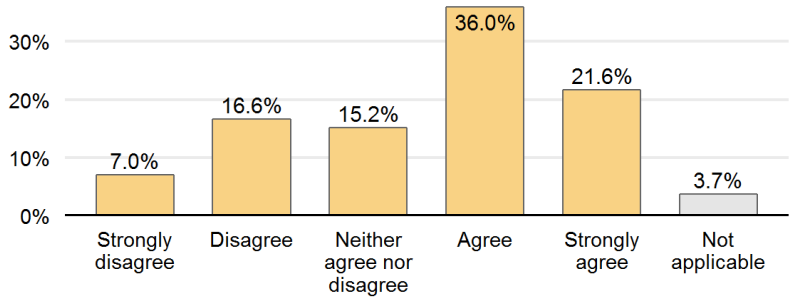
Attitudes

"Driving provides me freedom"



n = 2307 (26 non-responses)

"I prefer walking to driving when possible"



n = 2307 (26 non-responses)

- Survey asked 12 questions about attitudes toward several topics including mode preferences
- Our research investigates how these attitudes are linked to travel behaviour and health/well-being

Lifestyle preferences factors

Factor Analysis

	Primary Factor Loading			
Survey Question	**Satisfaction with commute**	**Satisfaction with AT**	**Satisfaction with driving**	**Community-mindedness**
Satisfied with commute	0.83			
Stressed by commute	-0.73			
Enjoys riding a bicycle		0.41		
Prefers walking to driving		0.61		
Thinks suburbs offer best lifestyle		-0.39		
Happier riding bus than driving			-0.48	
Takes pride in owning a car			0.59	
Gains freedom by driving			0.73	
Happy with place of residence				0.50
Invests time in community				0.58

Models Parameters 1/3

Random parameters ordered probit model

	Life satisfaction		Health status		Stress level	
Socioeconomic Attributes	*β*	*t*	*β*	*t*	*β*	*t*
Age 25-34	0.407	1.70*	0.294	1.49	-0.497	-2.64***
Age 35-44	0.298	1.10	0.263	1.22	-0.584	-2.77***
Age 45-54	0.219	0.79	0.304	1.34	-0.672	-3.10***
Age 55+	0.517	1.92*	0.274	1.24	-0.972	-4.66***
Household income $35k - $75k	0.587	1.88*	0.654	2.38**	0.797	3.28***
Household income $75k - $150k	0.656	2.11**	0.491	1.84*	1.215	4.21***
Household income $150k +	0.815	2.02**	0.873	2.72***	1.031	3.52***
Retirement status	1.350	2.30**	0.050	0.16	-1.629	-5.39***
Gender (female)	0.208	1.53	-0.004	-0.04	0.022	0.20
Household size	-0.011	-0.19	0.038	0.74	0.109	2.27**

Model Parameters 2/3

Random parameters ordered probit model

		Life satisfaction		Health status		Stress level	
Travel Behaviour		*β*	*t*	*β*	*t*	*β*	*t*
Weekly physical activeness	*Mean*	0.451	3.24***	1.226	10.16***	-0.151	-1.36
	SD	–		0.678	8.32***	–	
Number of vehicles owned	*Mean*	0.176	1.72*	0.160	2.15**	-0.062	-0.96
	SD	0.107	1.64	–		–	
In-vehicle travel time	*Mean*	0.069	0.44	-0.191	-1.64	0.129	1.28
	SD	0.325	1.90*	–		0.315	4.10***
Time on mandatory activities (income < $35k)	*Mean*	0.061	0.98	0.080	1.50	0.245	4.92***
	SD	–		–		0.162	4.92***
Time on mandatory activities ($75k < income < $150k)		–		–		-0.058	-1.58
Number of maintenance activities		0.120	1.38			–	
Number of recreational activities		–		0.211	1.63	–	
Number of visits to friends/family		–		0.461	2.32**	–	

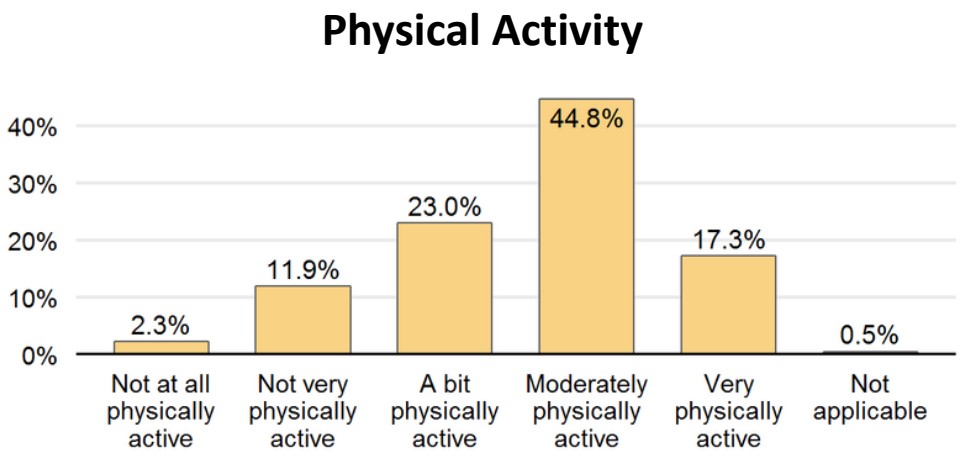
Model Parameters 3/3

Random parameters ordered probit model

		Life satisfaction		Health status		Stress level	
Built Environment & Lifestyle		*β*	*t*	*β*	*t*	*β*	*t*
Population density		-0.031	-1.63	–		–	
Apartment density		0.442	1.11	–		-0.565	-1.69*
Distance from home to nearest park		-0.085	-2.02**	-0.048	-1.21	-0.048	-1.58
Satisfaction with commute		–		–		-0.157	-2.51**
Satisfaction with AT		0.177	1.81*	0.086	1.06	-0.122	-1.60
Satisfaction with driving		0.176	1.88*	–		–	
Community-mindedness	*Mean*	0.379	4.04***	0.203	2.51**	–	
	SD	0.377	3.40***	0.377	3.64***	–	

Results: Travel behaviour

- Tension between:
  - Detrimental effects of in-vehicle travel time
  - Beneficial effects of vehicles owned (mobility options)
- Importance of regular physical activeness
  - More satisfied, healthier, less stress
- Varied effects of participation in different activity types
  - E.g. low income work: higher stress but also higher life satisfaction and health status



Results: Lifestyles

- Lifestyle satisfaction
  - Satisfaction with commute and mode of transport: less stress, higher life satisfaction

Photo by Premshree Pillai

- Community-mindedness
  - Positive but heterogenous association with health status and life satisfaction

Photo from rawpixel.com

Results: Built environment & lifestyles

- Density trade-off
  - Core urban and rural land use patterns may link to higher life satisfaction than suburbs

Photo by Citobun

- Proximity to parks
  - Negative effects of greater distance from parks

Photo by Dennis Jarvis

Policy implications

- Encouraging active transportation
- Discouraging vehicle use
  - Important to offset loss in mobility by facilitating alternatives
- Facilitating different types of trips
  - Make non-work activities easier to do
- Changing land-use patterns
  - Avoid suburban sprawl
  - Encourage local parks

Current research directions

- Investigating relationships of specific travel factors (e.g. travel accompaniment, mode choice) with health and well-being
- Specific interest in tour complexity and how it may affect health and well-being
  - Theorize that simple tours (e.g. Home→Work→Home) relate to different well-being outcomes than more complex ones (e.g. Home→Work→Shopping→Recreation→Home)
  - Could depend on spatial, temporal or purpose-based variation in tours

Thank you!

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