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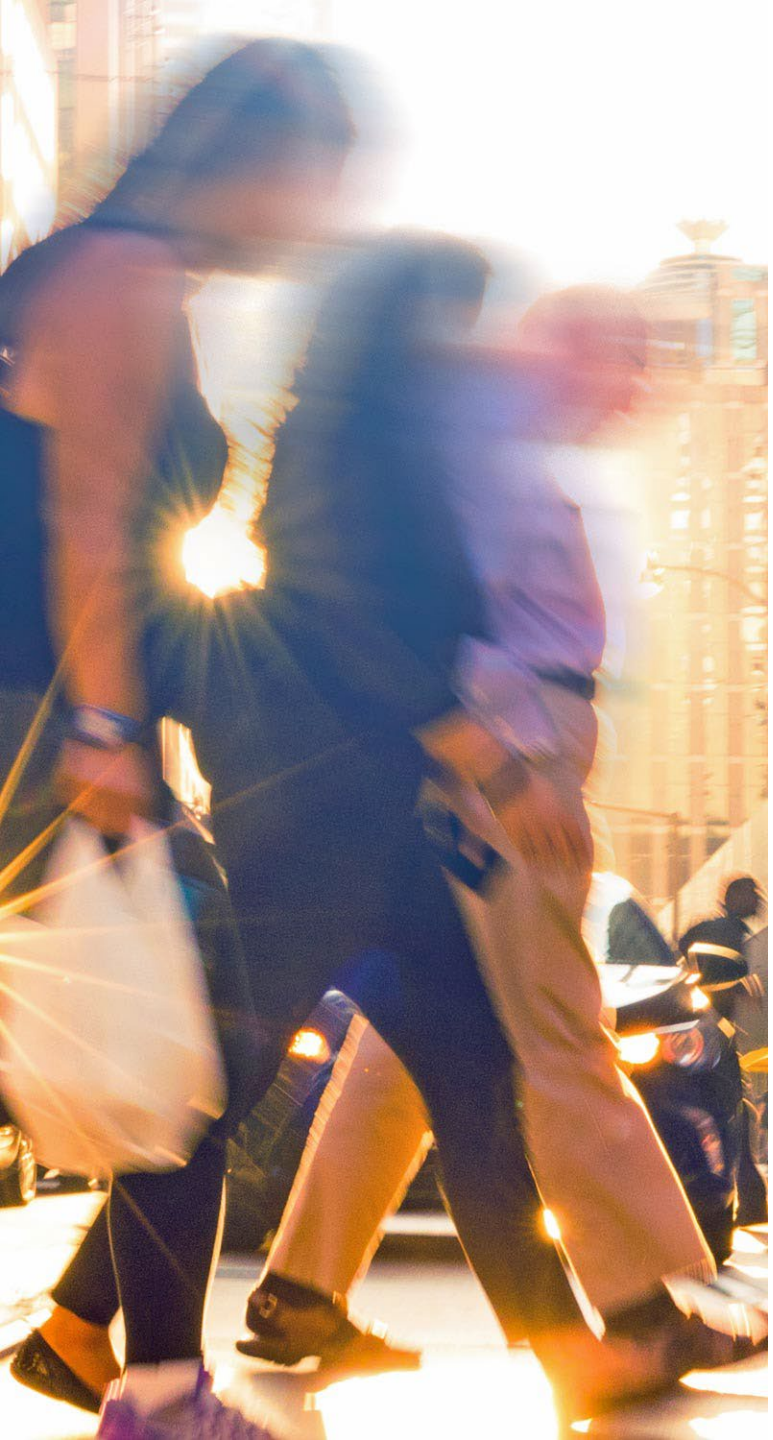

How Built and Social Environments Influence Commuters' Travel Choices

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Institute for Work & Health | Research Excellence Safe Work Healthy Workers

Public Health Agency of Canada | Agence de la santé publique du Canada

Disclosures

- Dr. Biswas is a scientist employed by the Institute for Work & Health (IWH). IWH receives its core funding from the Ontario Ministry of Labour, Immigration, Training and Skills Development
- Dr. Biswas currently receives research funding from CIHR and SSHRC
- Dr. Prince Ware does not have any conflicts of interest to disclose

Learning Objectives

By the end of this event, participants will be able to:

- Understand the importance of built and social environments around homes and workplaces for active commuting and physical activity
- Describe the distribution of built and social environments across urban neighbourhoods in Canada
- Discuss ways to promote physical activity and active commuting in adult populations based on the research evidence

Land acknowledgement

Research Team

- **Dr. Avi Biswas**, Scientist, Institute for Work & Health; Assistant Professor, Epidemiology, Dalla Lana School of Public Health, University of Toronto
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- **Cynthia Chen**, Biostatistician, Institute for Work & Health
- **Dr. Justin Lang**, Research Scientist, Centre for Surveillance and Applied Research, Public Health Agency of Canada; Adjunct Professor, School of Epidemiology and Public Health, University of Ottawa
- **Dr. Peter Smith**, President and Senior Scientist, Institute for Work & Health; Professor, Dalla Lana School of Public Health, University of Toronto
- **Dr. Paul Villeneuve**, Professor, Carleton University; Biostatistician/Epidemiologist, Epistream Consulting

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CANUE

Statistics Canada
Statistique Canada

Project Advisors

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The Centre for Active Transportation / Clean Air Partnership

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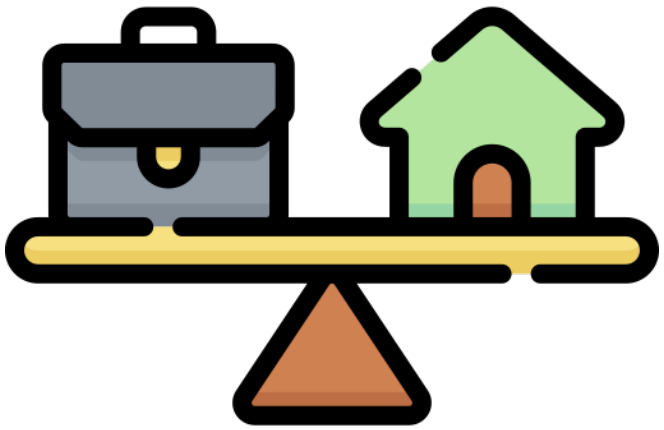
Takeaway Messages

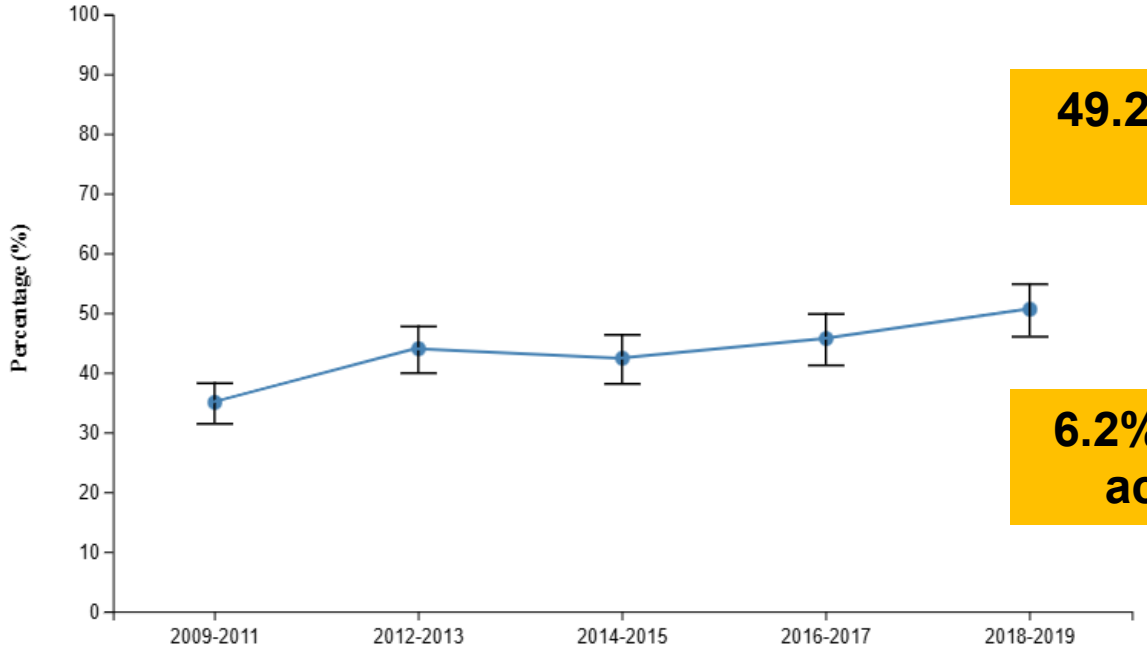


- Supportive built environments (including good air quality, greater walkability, cycling infrastructure, and greenness) may promote active commuting, particularly in areas with higher residential instability and material deprivation

- **Both** home and work neighbourhood environments contribute to support active commuting

Physical Inactivity Prevalent Among Canadian Adults

[a]Percentage (%) of adults who meet physical activity recommendations by accumulating at least 150 minutes of moderate to vigorous physical activity each week, aged 18-79 years, by year (ASR), Canada, 2009-2011 to 2018-2019



Trend (unbouted), total population - age-standardized rates

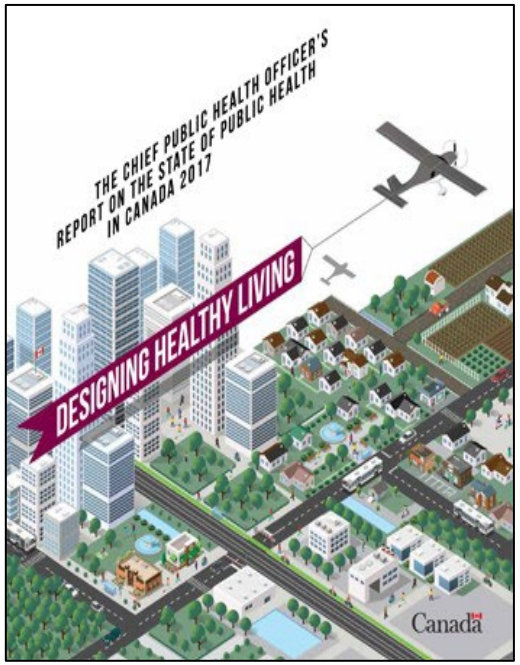
49.2% of adults 18-79 years are physically active

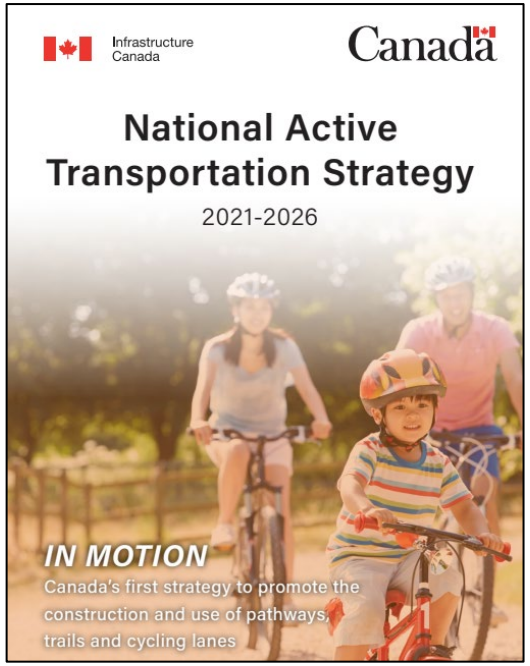
6.2% of working Canadians use active forms of commuting

Sources: Center for Surveillance and Applied Research, Public Health Agency of Canada. Physical Activity, Sedentary Behaviour and Sleep (PASS) Indicators, 2023 Edition. Public Health Infobase. Ottawa (ON): Public Health Agency of Canada, 2023.
2021 Census of the Population

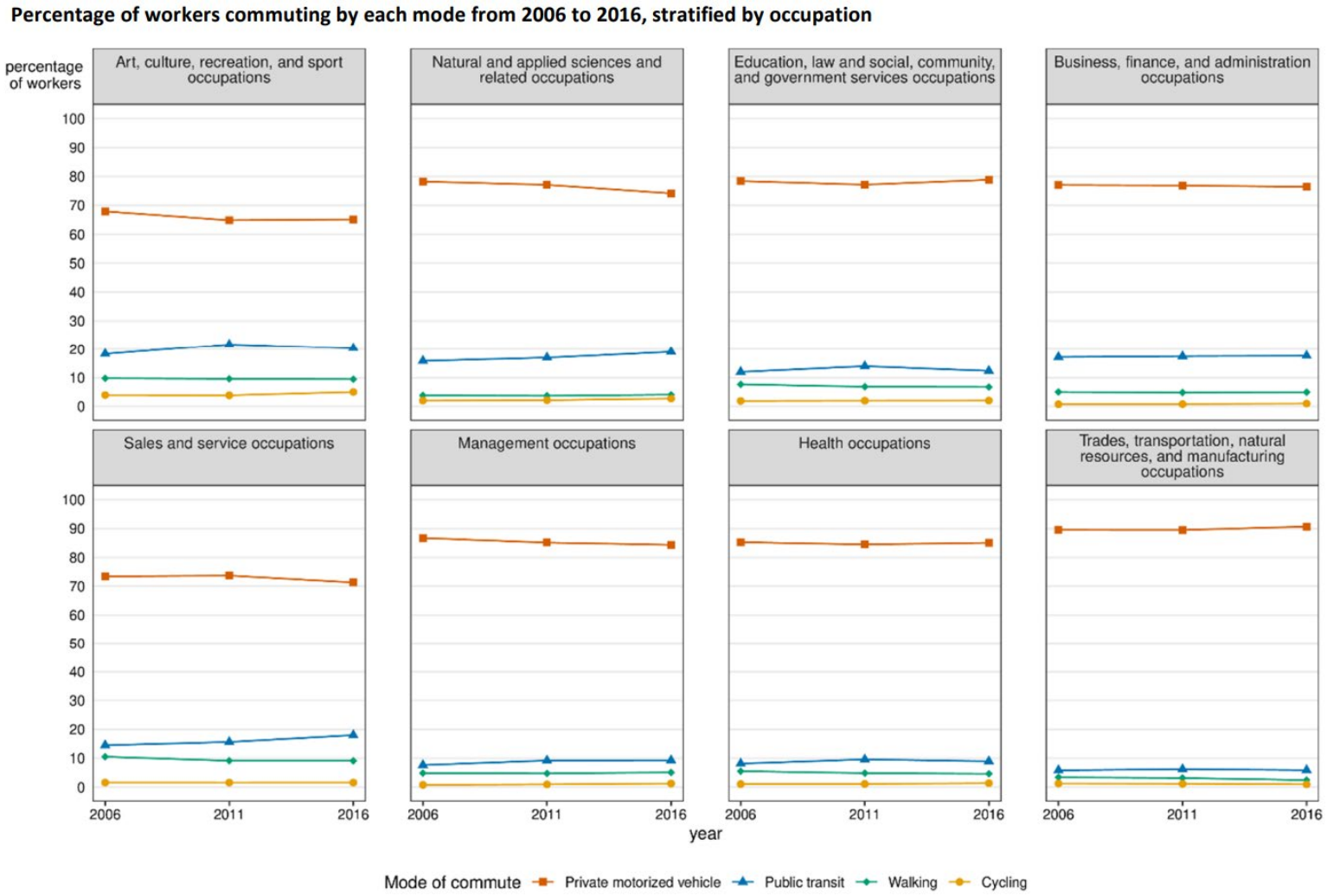
Why Promote Active Commuting?

- A practical way for workers to increase their daily physical activity
- Environmental and health benefits



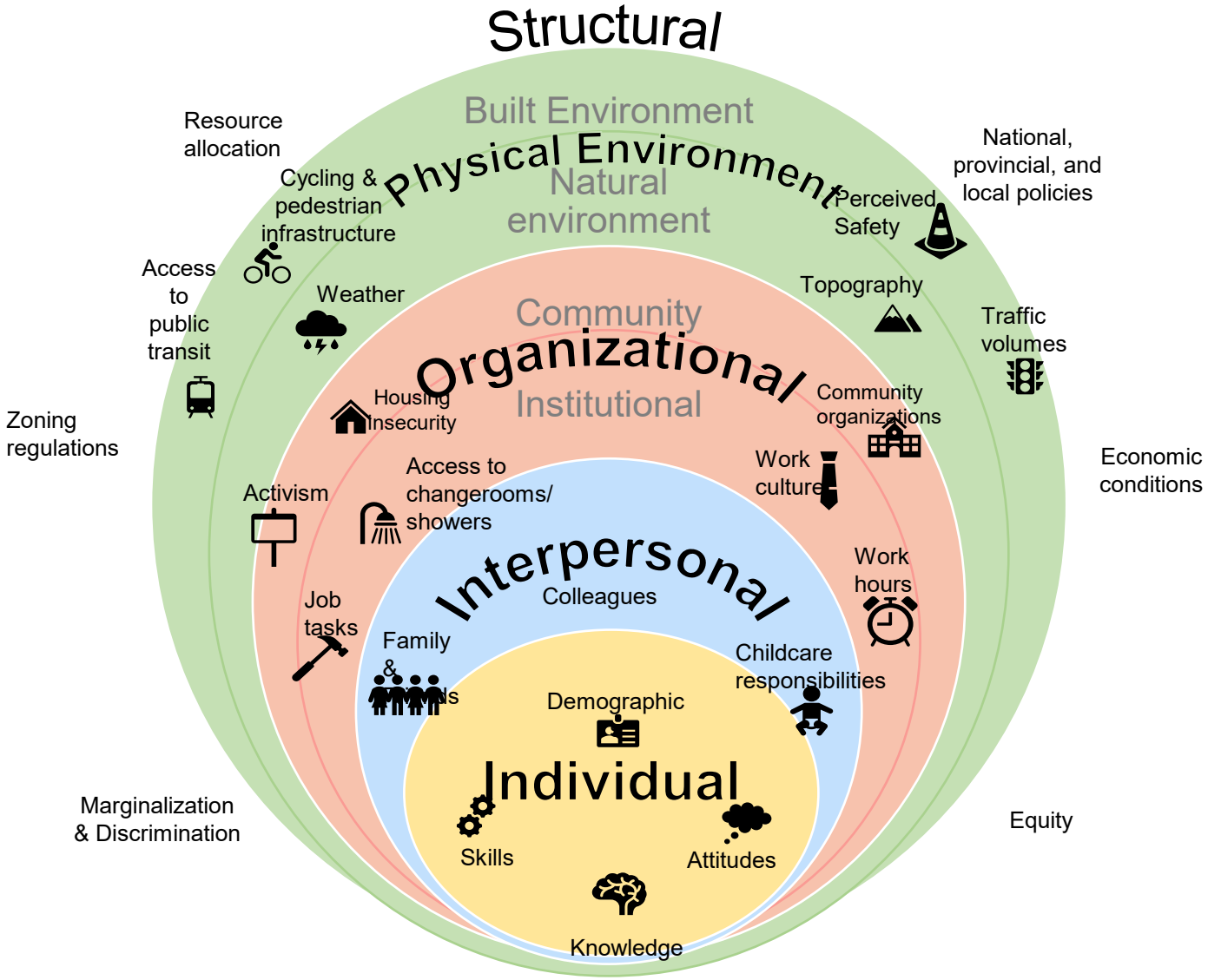


Occupational Trends by Main Mode of Commute

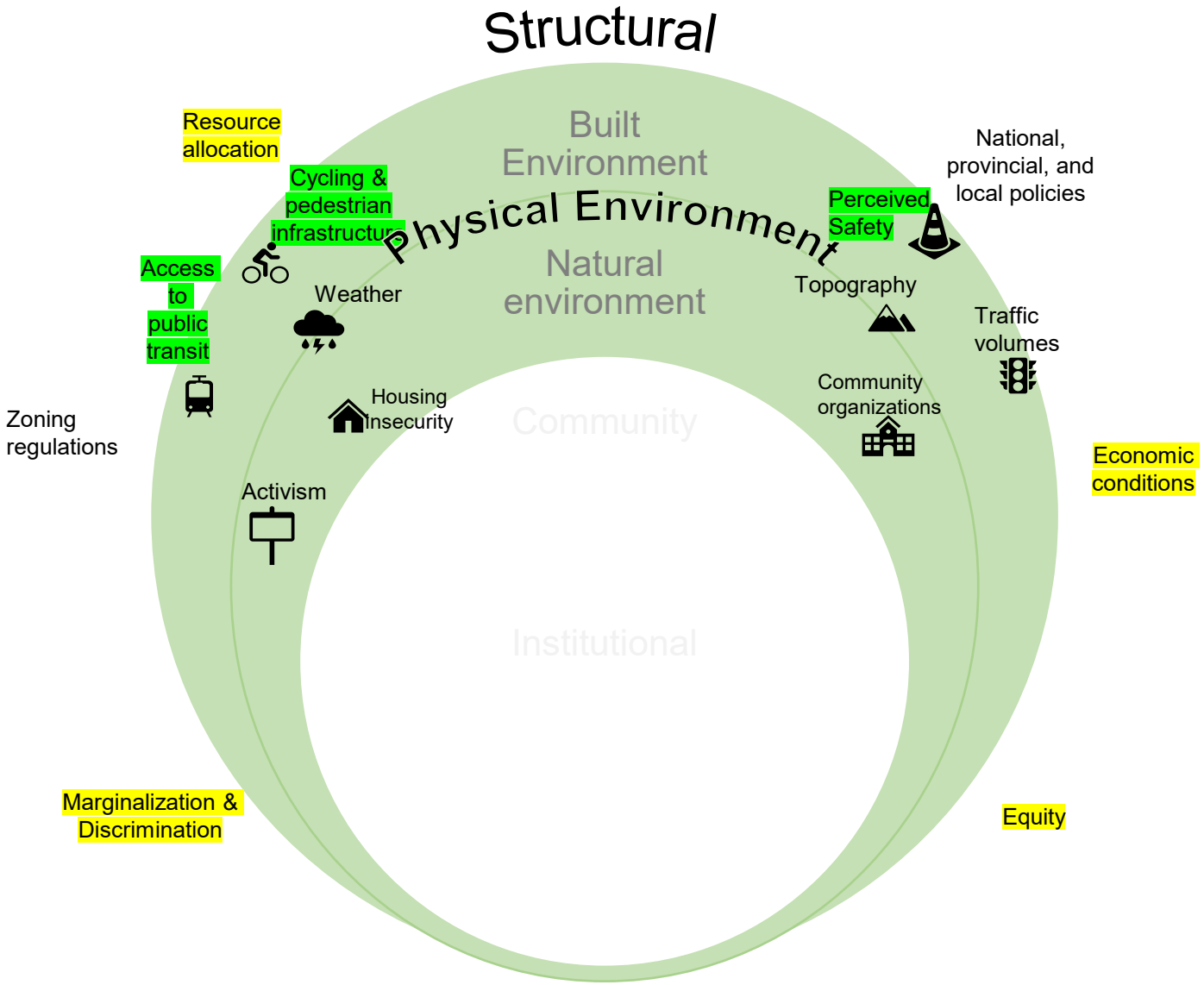


Source: Christopher G, Biswas A, Lang JJ, Prince SA. Occupational and sex differences in active commuting among Canadian workers from 2006 to 2016. Health Reports, Vol. 35, no. 9, September 2024

Built and Social Environments and Active Transportation



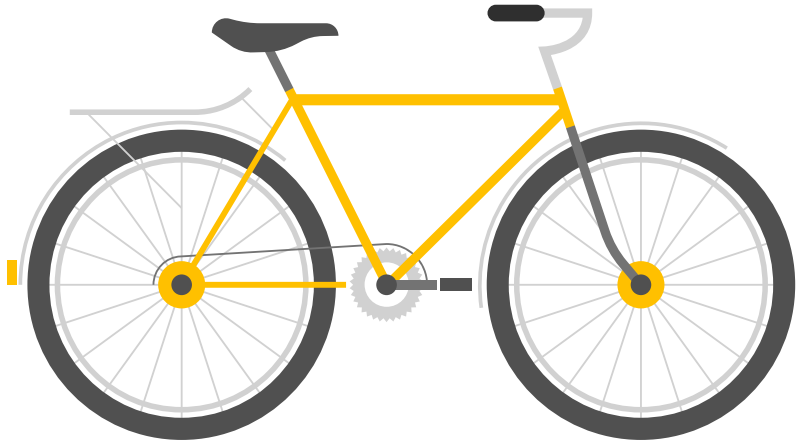
Built and Social Environments and Active Transportation



Built environment:
Human-made or human-modified elements of the physical environment

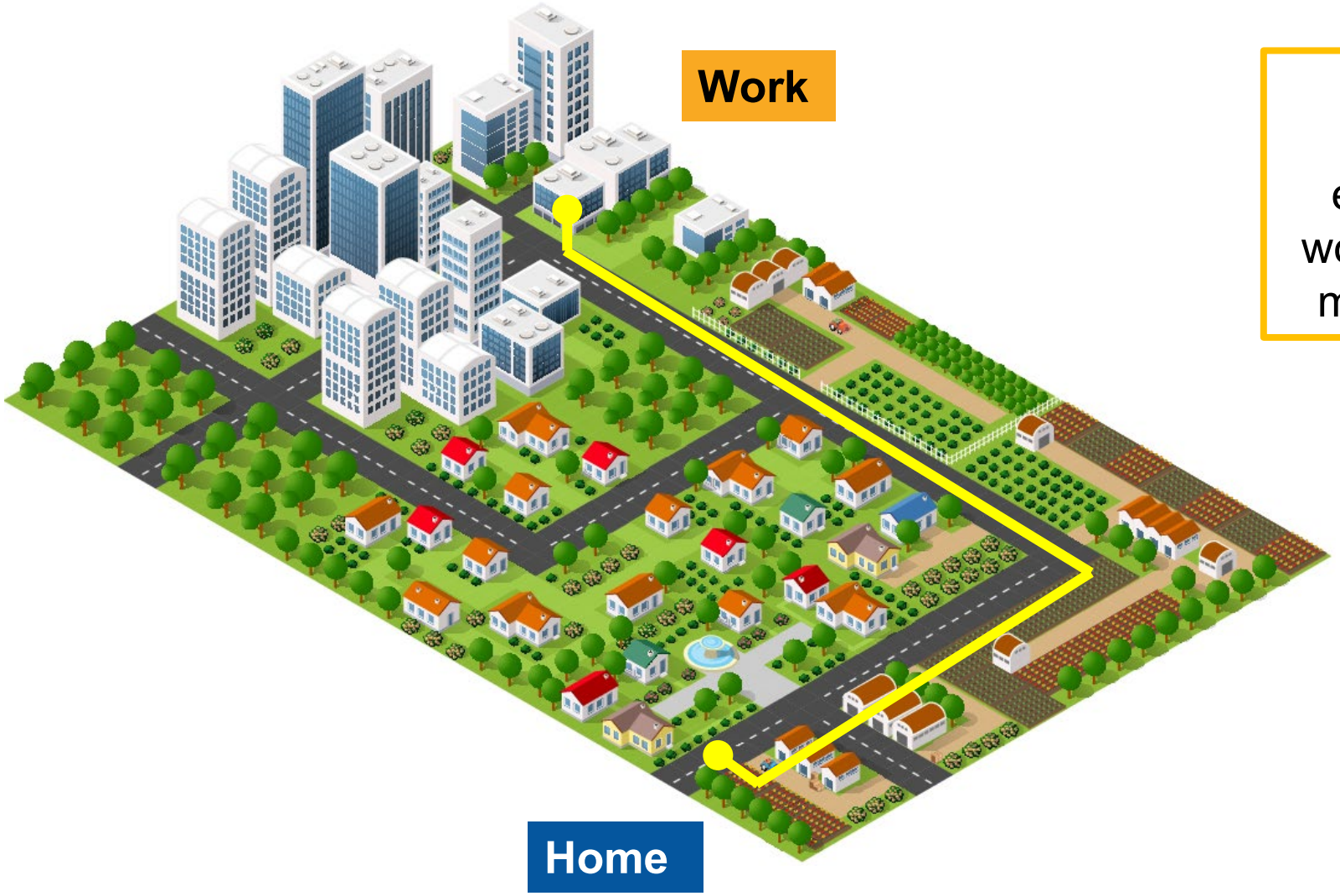
Social environment:
Sociodemographic makeup of areas, community relationships, and social dynamics within them

Environments Supportive of Active Commuting



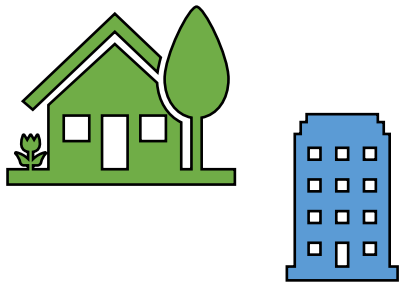
- Shorter distance to work
- Higher density of street intersections
- Pedestrian and cyclist-friendly infrastructure
- Access to points of interest (facilities, shops, schools) close to work
- Car parking costs at work
- Worksite supports/facilities (bike racks, showers)

Existing Knowledge Gaps

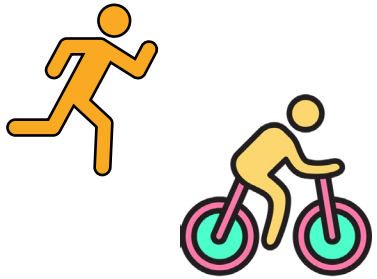


Need to explore connections between social and built environments on the home to workplace journey and how they may support active commuting

Objectives



1. Identify interrelated built and social environmental features around homes and workplaces of urban Canadian workers



2. Examine how the different types of built and social environments are associated with active commuting (walking and cycling to work)

Methods

Data Sources

Dissemination area:
small geographic unit corresponding to ~several city blocks with 400 to 700 people

2016 Canadian Long-Form Census

Canadian Urban Environmental Health Research Consortium (CANUE)

Census responses on:
- location of home
- location of workplace
- main mode of commute to work

Area-level environmental data

Sample

- 2,077,405 respondents of the 2016 Canadian Long-Form Census

Eligible sample:

- Ages between 18 to 90 years
- Residing in urban areas
- Reported a fixed work address outside the home within 15 km
- Had no long-term daily activity limitations

Built Environment Data

- Active living environments
- Cycling infrastructure
- Bus stops
- Green roads
- Greenness
- Annual average Nitrogen Dioxide (NO_2) concentration
- Annual average fine particulate matter concentration ($PM_{2.5}$)
- Annual average Ozone (O_3) concentration

Social Environment Data

Canadian Marginalization Index (CAN-Marg; area-level social inequities)

- Residential instability
- Material deprivation
- Dependency
- Ethnic composition

Source: Matheson FI., Dunn JR., Smith KL, Moineddin R. & Glazier RH. (2012). Development of the Canadian Marginalization Index: a new tool for the study of inequality. Canadian Journal of Public Health, S12-S16.

Analysis

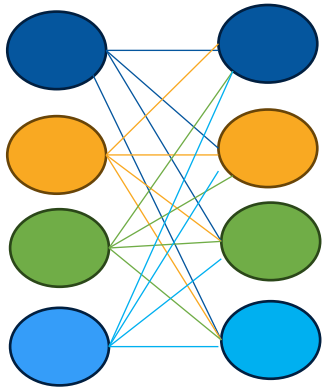
- Cluster analysis to identify patterns of built environment and social environment features in urban neighbourhoods
- Clusters (patterns of similar environments) assigned to Census respondents' home location and workplace location

Home neighbourhood

Workplace neighbourhood

Analysis

Home Work



Combinations of clusters (similar environments) around home and workplace

Multivariate multinomial logistic regression

Mode of commute to work




Explored differences in associations:

- Different age groups
- Sex: Males vs. females
- Sex & having a young child at home
- Distances from home to work

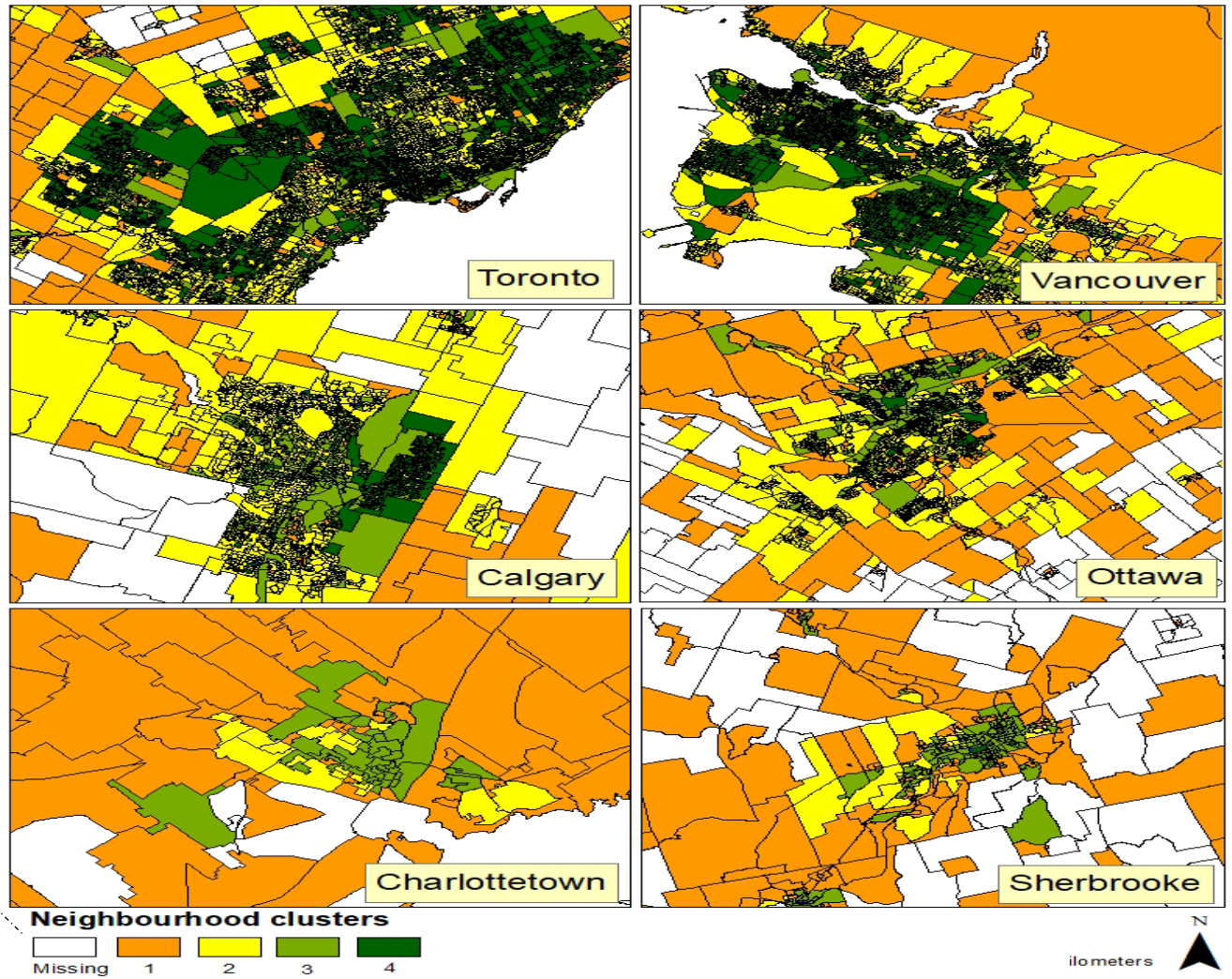
Results

4 Clusters of Built and Social Environments

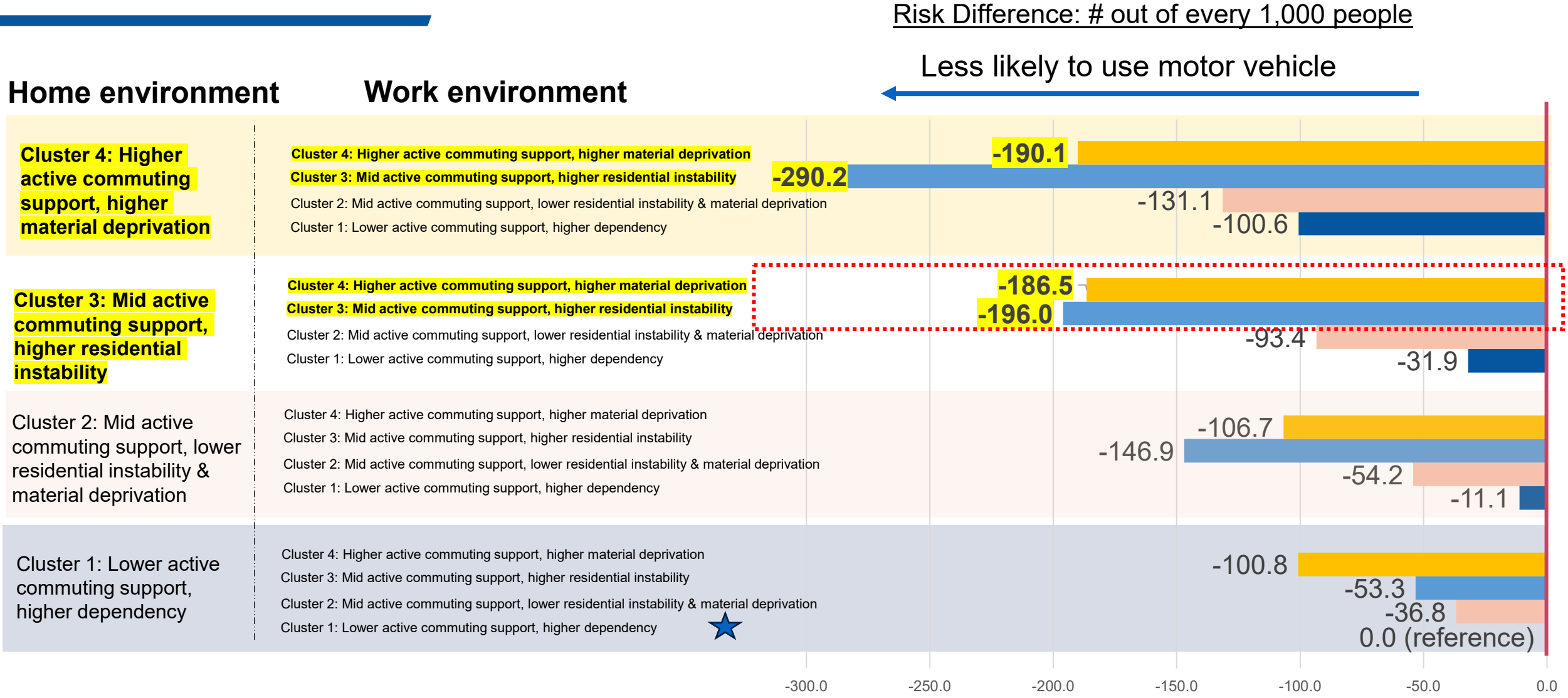
Worker Characteristics Across Four Clusters

‘Lower active commuting support, higher dependency’ (12% of sample)	‘Mid active commuting support, lower residential instability and material deprivation’ (24% of sample)	‘Mid active commuting support, higher residential instability’ (43% of sample)	‘Higher active commuting support, higher material deprivation’ (21% of sample)
55% Males	54% Males	53% Males	53% Males
41% High school diploma	**39% Bachelors of above**	**34% High school diploma**	**36% High school diploma**
39% Married with child	46% Married with child	26% Married no child	37% Married with child
87% White	76% White	77% White	**44% White**
12% Immigrants	26% Immigrants	24% Immigrants	**53% Immigrants**
23% Q4 income	34% Q5 income	31% Q1 income	29% Q1 income
87% House	**90% House**	**56% Apartment**	**51% Apartment**
28% Sales & Services jobs	24% Sales & Services jobs	29% Sales & Services jobs	32% Sales & Services jobs

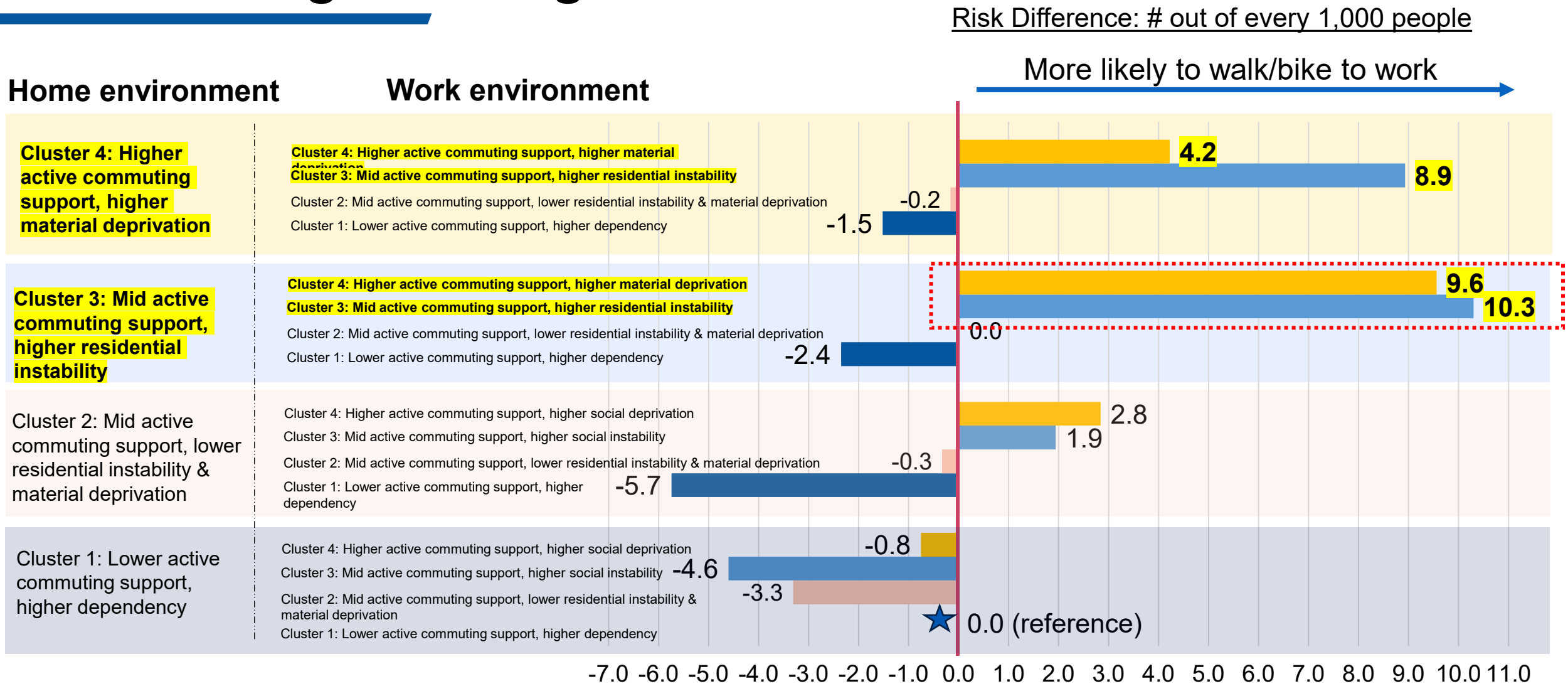
Locations of Built and Social Environments



Motor Vehicle to Work

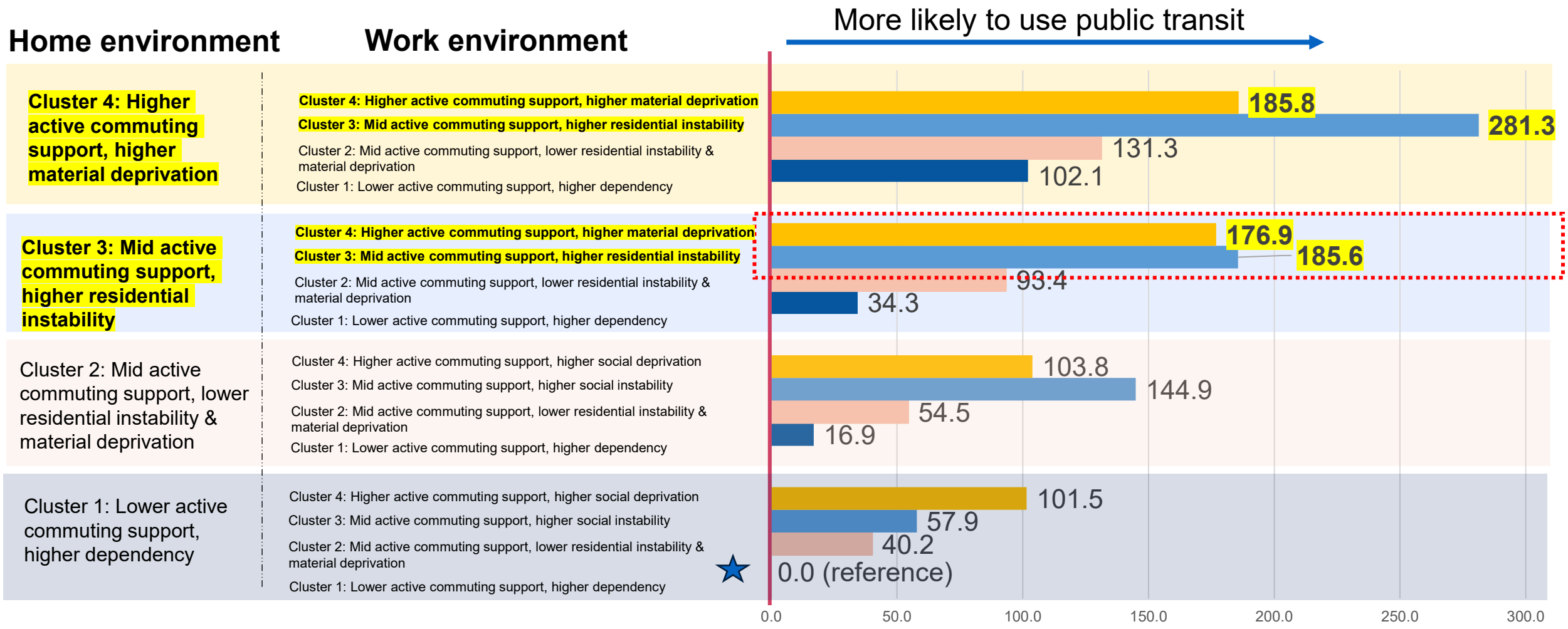


Walking or Biking to Work



Public Transit to Work

Risk Difference: # out of every 1,000 people



Consistent for Different Groups, with Notable Highlights

- Males walked, biked, and used motor vehicles more than females
- Younger (18-34 years) and middle-aged workers (35-49 years) were more likely to use public transit than older workers
- Those with longer commutes were more likely to use public transit

Discussion

Example Contexts

Cluster 1: ‘Lower active commuting support, higher dependence’

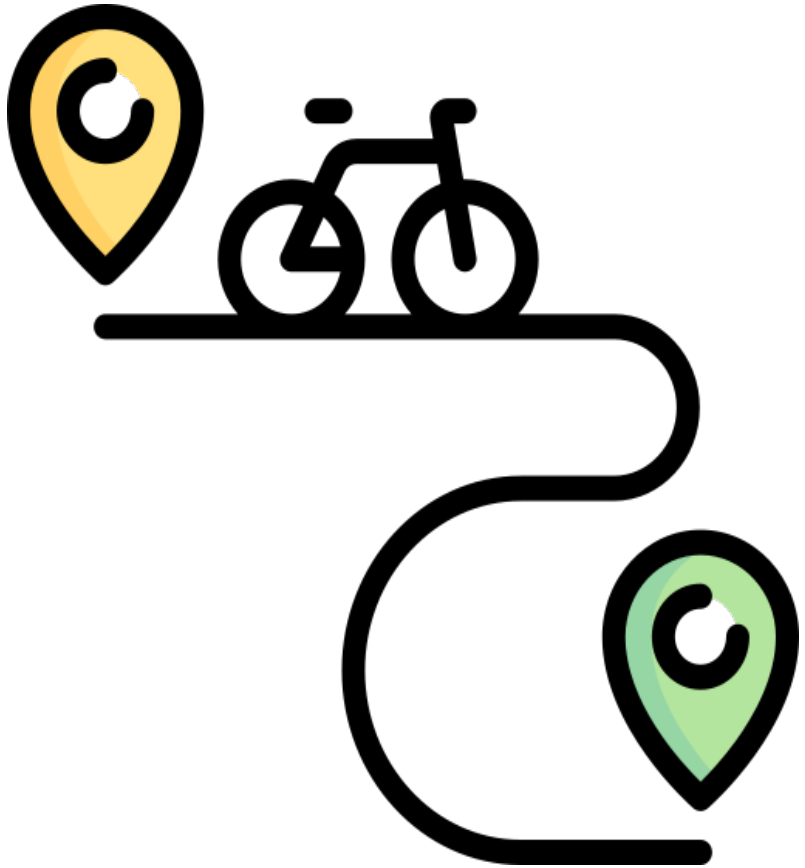
Cluster 4: ‘Higher active commuting support, higher material deprivation’

Key Messages

- Supportive walking/biking infrastructure, air quality, and greenness can promote active commuting, particularly for areas experiencing higher material deprivation

- Supportive environments around **both** homes and workplaces are important for promoting active commuting

Future Directions



- 2021 Canadian Census (post-COVID-19 reality)
- Multi-modal travel
- Natural experiments
- Health outcomes

Thank you

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