

Commuting Matters: Subjective Impacts on Work Performance, Health, and Well-Being in Canadian Cities

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McGill

Commuting Impacts on Work Performance, Health, and Well-Being

Background

Commuting is a routine part of life for millions of Canadians. To investigate potential spillover effects of commuting on worker quality of life, the Canadian Mobility Survey asked respondents across 12 metropolitan regions to rate the impact of their commute mode on their energy and productivity at work, punctuality to work, physical and mental health, and life in general (N= 6,671).

Findings

- Active commuters generally have the highest odds for both positive work outcomes and health and well-being outcomes
- Drivers are generally better off for punctuality
- Transit users, particularly bus commuters, generally have the lowest odds of expressing positive impacts on their work performance and their life in general
- Those who used rapid transit modes (subway, LRT/BRT) were more likely to feel positive physical health benefits than drivers
- Longer commutes are negatively associated with all measures of work performance and health and well-being

Summary of outcomes by commute mode, relative to drivers

	Bicycle 	Walk 	Bus 	Subway 	LRT/BRT 
Energy at work	Consistently higher	Sometimes higher	Sometimes lower	Consistently lower	No difference
Productivity at work	Consistently higher	Sometimes higher	Sometimes lower	Consistently lower	No difference
Punctuality to work	No difference	Consistently higher	Sometimes lower	No difference	Consistently higher
Physical health	Consistently higher	Sometimes higher	No difference	Consistently higher	Consistently higher
Mental health	Consistently higher	Sometimes higher	No difference	No difference	No difference
Life in general	Consistently higher	Sometimes higher	Sometimes lower	No difference	No difference

Odds for positive outcomes relative to drivers*

Consistently higher	Sometimes higher	Sometimes lower	Consistently lower	No difference
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*Based on weighted logistic regression models

Policy Implications

- Transportation planners should focus on **quality of in-commute time** over a singular focus on speed
- Investment in **active transport infrastructure** as well as **workplace amenities**, such as showers or changing rooms, can **encourage active commuting** to promote **positive work performance** and **employee health and well-being**
- Planning for **better accessibility by public transit** can **reduce travel times** and associated negative **spillover effects** of commuting

Impacts des déplacements domicile-travail sur le rendement au travail, la santé et le bien-être

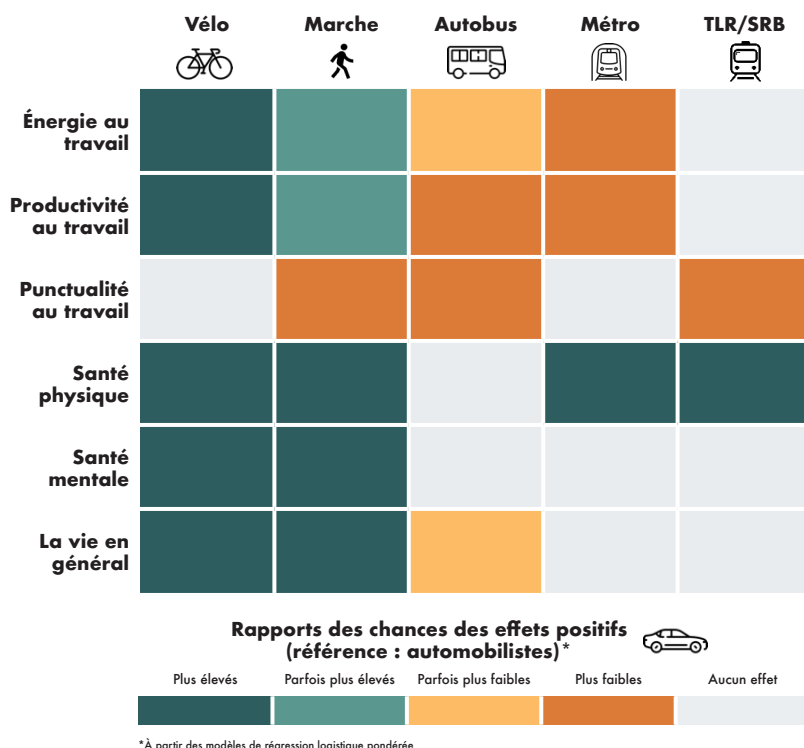
Contexte

Les déplacements domicile-travail font partie du quotidien de millions de Canadiens. Afin d'examiner leurs effets potentiels sur la qualité de vie des travailleurs, l'Enquête sur la mobilité canadienne a demandé aux répondants de 12 régions métropolitaines d'évaluer l'impact de leur mode de déplacement sur leur énergie, productivité et ponctualité au travail, leur santé physique et mentale, ainsi que leur vie en général (N= 6 671).

Résultats

- Les navetteurs actifs ont généralement les meilleures chances d'obtenir des résultats positifs sur le rendement au travail, la santé et le bien-être
- Les automobilistes s'en tirent mieux pour la ponctualité en général
- Les usagers du transport en commun, surtout ceux qui prennent l'autobus, ont les plus faibles chances de connaître des effets positifs sur le rendement au travail et sur leur vie en général
- Les usagers du transport rapide (métro, TLR/SRB) ressentent davantage de bienfaits sur la santé physique que les automobilistes
- Les trajets plus longs sont associés négativement à toutes les mesures de rendement au travail, de santé et de bien-être

Résumé des résultats par mode de déplacement domicile-travail, par rapport aux automobilistes



Implications pour les politiques publiques

- Les planificateurs des transports devraient privilégier la **qualité du temps de déplacement** plutôt que de se concentrer uniquement sur la vitesse
- Investir dans les **infrastructures de transport actif** et dans les **aménagements en milieu de travail**, tels que les douches ou les vestiaires, peut encourager des déplacements actifs favorisant un **meilleur rendement au travail ainsi que la santé et le bien-être des employés**
- L'amélioration de l'**accessibilité par les transports en commun** peut **réduire les temps de déplacement** et les **effets négatifs** des déplacements domicile-travail sur la qualité de vie

Acknowledgment

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Finally, to my cohort at the School of Urban Planning: thank you for filling these last two years with friendship, support, and laughter. I will forever look back on this chapter of my life with fondness.

I could not have done this without you all.

— Andie

Contribution of Authors

Chapter 1 of this Supervised Research Project is based on a paper titled “Post-commute Self-assessed Work Performance” that was published in the *Journal of Travel Behaviour and Society* in 2026. Secondary authors to this publication include Hisham Negm, Prof. Nancy A. Ross (Queen’s University), and Prof. Ahmed El-Geneidy.

Chapter 2 is based on a manuscript titled “Commuting matters: Perceived impacts of work travel on health and well-being in Canada” that was submitted to *Transportation Research Part D* in March 2026. Contributing authors include Hisham Negm, Prof. Jonas De Vos (University College London), and Prof. Ahmed El-Geneidy.



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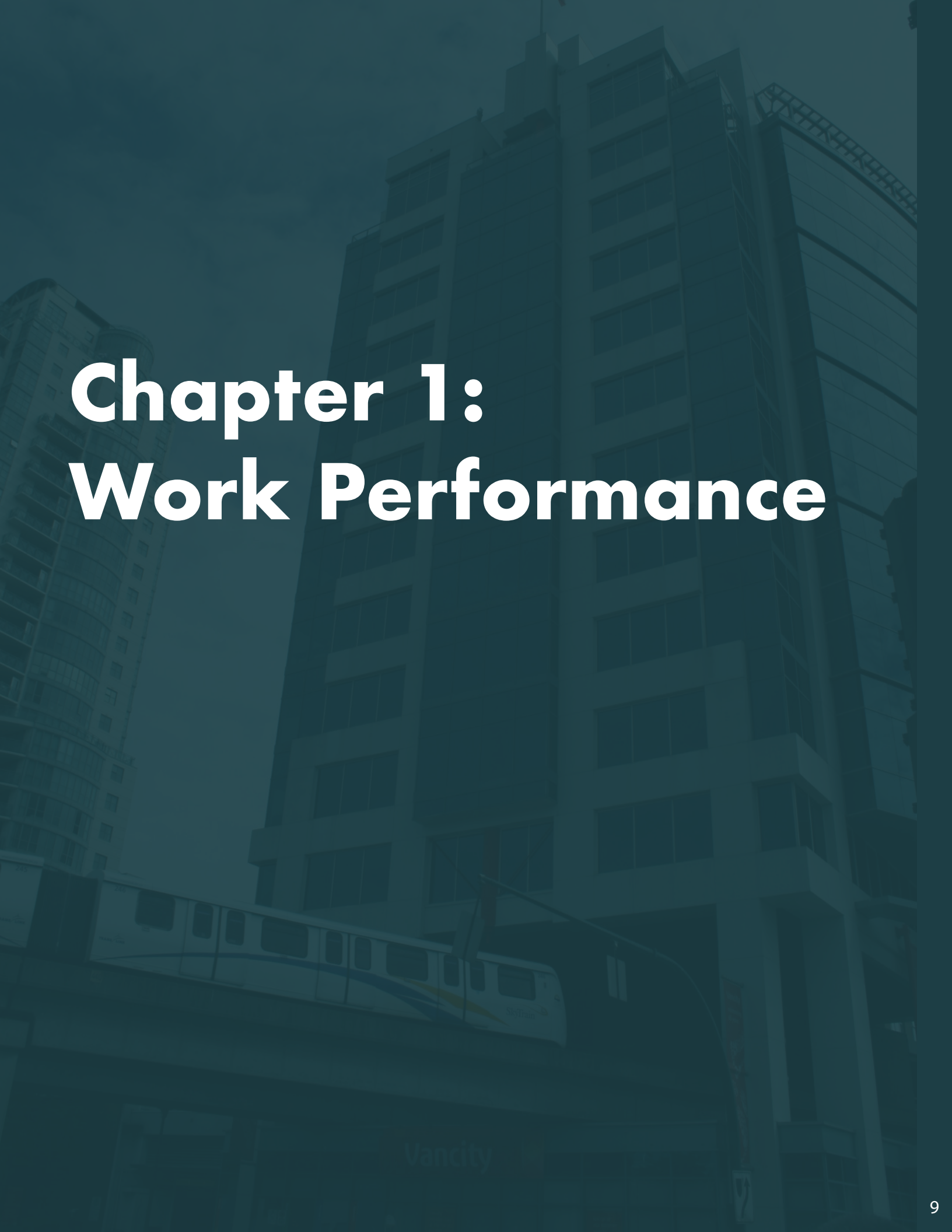
Introduction

Commuting is a defining feature of daily life for millions of Canadians. Although hybrid and remote work arrangements have become more common since the pandemic, the journey to work continues to structure everyday routines in meaningful ways. While the notion of quality of life is has become increasingly important to policymakers in recent decades, the potential subjective impacts of commuting on quality of life—including subdomains of health and work—remain underexplored. This gap in understanding makes broad ambitions to improve urban quality of life difficult to translate into concrete policy actions.

Transportation planners have traditionally focused on efficiency of mobility and time-saving objectives, often with less regard for the experience of travel itself. However, the subjective impact of travel has the potential to influence one's state of well-being both upon arriving at work in terms of performance and through its influence on overall health and life satisfaction. These impacts of commuting can carry significant implications for employee productivity with downstream economic consequences, as well as public health expenditure.

This research employs large-scale survey data across 12 Canadian metropolitan regions to explore the impact of commuting by different modes on various self-assessed aspects of performance at work, health, and well-being using a series of regionally subset weighted logistic regression models. Chapter 1 analyzes the relationship between commute characteristics and the reported impact of commute mode on energy at work, productivity at work, and punctuality to work. Chapter 2 extends the analysis to physical health, mental health, and satisfaction with life in general.

Together, these chapters contribute to a more comprehensive understanding of how commuting can shape performance at work and the health and well-being of Canadian workers. The findings offer actionable evidence to guide the planning and design of transportation systems that better support worker well-being and, in turn, healthier and more productive cities.

The background of the slide is a dark, teal-tinted photograph of a modern city skyline. Several tall, multi-story buildings with many windows are visible. In the lower portion of the image, a white and blue train is traveling on an elevated track. The overall atmosphere is professional and urban.

Chapter 1: Work Performance

Introduction

Despite the rising prominence of teleworking and hybrid work (Kellermann et al., 2022), commuting remains a key part of daily life that shapes how people structure and experience their routines. As of 2024, there are 16.5 million commuters in Canada (Statistics Canada, 2024). Commuting has been theorized as a trade-off between two variables: labour and housing, with individuals optimizing their commute by balancing wages and housing costs to maximize their utility (Alonso, 1965). This theory suggests that longer commute times could be entirely compensated for by lower housing prices. Recently, it has been recognized that the full costs (or benefits) of commuting can extend much further, affecting individuals' perceptions of general well-being (Stutzer & Frey, 2008) and performance at work (Li et al., 2024; Loong et al., 2017; Ma & Ye, 2019).

Long commutes can strain work-life balance and are associated with lower organizational commitment (Emre & De Spiegeleare, 2021). Heavy commute burdens can lead employees to reduce their work effort and have higher rates of absenteeism (Ma & Ye, 2019; Wang et al., 2021), carrying significant economic consequences. Absenteeism was estimated to have a direct cost of \$16.6 billion to the Canadian economy in 2012 (Stewart, 2013). Acknowledging the importance of the commute trip on the overall economy and on daily lives, many studies have explored commute satisfaction (Chatterjee et al., 2020; Liu et al., 2022) and stress (Legrain et al., 2015). Lim et al. (2024) proposed a model understanding the determinants and impacts of commuting and its relationship with several aspects of life through the Pre-commute/In-commute/Post-commute (PIP) model. The model hypothesizes that commuting has immediate and long-term



impacts that can affect work and personal outcomes like family life and health. Our study contributes to the literature by expanding on the work-related post-commute impacts beyond the notions of satisfaction and stress.

This study examines the self-assessed impact of commute mode choice on work performance using large-scale data from the Canadian Mobility Survey, a nationwide survey conducted in 2024 across 12 Canadian regions. The survey collects data on participants' commuting behaviour and perceived impacts on work performance, reasoning behind mode choice, travel attitudes, and socioeconomic characteristics. We categorize the 12 regions into three large (N=2,109), three mid-size (N=1,923), and six small regions (N=2,639). For each group, we run three logistic regression models to explore the factors that are associated with positive impacts on energy at work, productivity at work, and punctuality in getting to work. Understanding the influence of commuting on work performance can underpin strategies targeted at improving employee performance and well-being, which has cascading effects on organizational efficiency and broader economic outcomes.

Literature Review

Commute satisfaction

Commuting is typically considered to be unpleasant. Mood tends to be lower during the commute compared to other daily activities (Chatterjee et al., 2020). Experiences with congestion, crowding, and unpredictability can induce stress during travel (Legrain et al., 2015). Impedances or unsatisfactory travel experiences during the commute can deplete time, energy, and emotional resources, reducing individuals' capacity to manage responsibilities at work or at home (Lim et al., 2024).

Commute duration is an important determinant of commute satisfaction (Liu et al., 2022). Longer commute times have been associated with higher stress (Gimenez-Nadal & Molina, 2019; Legrain et al., 2015; Sposato et al., 2012) and increased worker strain (Clark et al., 2020). Yet, Redmond and Mokhtarian (2001) found that most people have a non-zero optimum commute time, suggesting that people can derive some positive benefits from their commute, such as a buffer between home and work or the ability to use the time productively. The relationship between duration and satisfaction may be mode-specific. Heinen et al. (2011) found that longer commuting distances by cycling were associated with more positive attitudes towards the mode, contesting the blanket notion that longer travel durations are detrimental to satisfaction. However, De Vos et al. (2022) suggest that differences in commute satisfaction between active commuters and public transit commuters can be explained by shorter versus longer commutes, implying that travel duration may be a more important determinant of commute satisfaction than travel mode.

Nonetheless, the experiential qualities of different modes are relevant to cognitive and affective evaluations of commute trips that contribute to overall satisfaction (Ettema et al., 2011). Research consistently shows that active commuters are more satisfied with their commutes than car or transit users (Handy & Thigpen, 2019; Smith, 2017; St-Louis et al., 2014; Ye & Titheridge, 2017) and are able to derive positive well-being benefits such as physical health benefits (Heinen et al., 2011; Humphreys et al., 2013) and greater life satisfaction (Fordham et al., 2018). However, car users can also derive benefits from their travel such as feelings of freedom and control or possessing a status-symbol (Ory & Mokhtarian, 2005).

The ability to derive utility from the travel experience itself may be a result of subjective attitudes, as preferences driven by personal motivations towards a mode can play a dominant role in mode choice, and therefore travel satisfaction, with those with positive attitude towards mode used and travel in general being more satisfied (St-Louis et al., 2014; Ye & Titheridge, 2017). Manaugh and El-Geneidy (2013) found drastic differences in travel patterns and satisfaction levels among commuters who walk based on their motivations for their mode choice. Those who reported valuing exercise and environmental awareness tended to walk farther and were more satisfied, while satisfaction for those who valued convenience, proximity, and cost was negatively associated with distance. Limitations in travel options—for example, due to limited public transit routes or schedules or not having a drivers' license or car—might result in people engaging in a certain mode by necessity rather than choice, and these dissonant travelers tend to have lower satisfaction levels (De Vos, 2018).

Spillover effects of commuting

Evidence increasingly suggests that the experience of commuting can “spill over” into different domains of subjective well-being including health and work (Chatterjee et al., 2020; Deng et al., 2024). Lim et al. (2024) propose the Pre-commute/In-commute/Post-commute (PIP) model for understanding how the commute can be resource depleting or replenishing within the Conservation of Resources (COR) framework. In the pre-commute stage, underlying personal variables can affect how individuals experience their commutes, while different in-commute characteristics like predictability, crowding or congestion, and physical or mental demands can affect whether one experiences their commute as energizing, relaxing, or restorative versus stressful and resource-depleting. The experience of the commute can have lingering impacts on work performance and personal outcomes like family life and health—which subsequently affect the pre-commute state—creating potential for a negative feedback loop.

Loong et al. (2017) investigated how the daily commutes of university students, staff, and faculty affected their punctuality and feelings of being energized at work or school. They found that cyclists had the highest odds of feeling energized while drivers and public transit users had similarly low odds. Cyclists also had the highest punctuality whereas drivers and bus users were least likely to be punctual. While the sample was relatively limited in its scope of students and employees at a downtown campus in a dense metropolis, the positive benefits of active commuting on work performance have been corroborated in both transport and occupational health research. A study of employees at an organization in the United Kingdom found that employees who participated in a behaviour change intervention to switch to e-bikes for commuting reported higher positive affect and more productive organizational behaviour compared to employees who continued with their regular

passive commuting behaviour (Page & Nilsson, 2017).

Commute distance has been shown to have a direct impact on worker performance. Ma and Ye (2019) examined the effects of commute mode choice and distance in three Australian regions on employee productivity which was measured by absenteeism and a work performance measure adapted from the World Health Organization (WHO) Health and Work Performance Questionnaire (HPQ). Using structural equation modelling, they found that mode choice and distance influenced absenteeism and work performance through their effects on commute satisfaction and personal health, though, after controlling for the indirect effects, longer commute distance retained a direct effect on higher absenteeism.

Our study addresses a gap in the literature by examining post-commute impacts on self-assessed work performance through commute-specific questions, rather than relying on universal measures such as the WHO performance questionnaire, which do not directly capture the direct impact of commute mode. Our study also uses self-reported ratings of the impact of commute mode on work performance, contributing to the understanding of how subjective appraisals of energy, productivity, and punctuality are shaped by commute characteristics.



Data

This research uses data from the Canadian Mobility Survey (CMS), a bilingual online transport survey conducted in Fall 2024 in 12 Census Metropolitan Regions (CMA): Toronto, Montréal, Vancouver, Ottawa-Gatineau, Calgary, Edmonton, Québec, Winnipeg, Hamilton, Halifax, Victoria, and Saskatoon (Figure 1). The CMS collects data on commuting behaviour and impacts on work performance, reasoning behind mode choice, travel attitudes,

participants' IP and e-mail addresses, location pins of home, work and/or school, the time it took to complete the survey, age above 90 years old, commute mode, and frequency of weekly travel (Negm et al., 2025). Only participants who reported a work commute trip (full- and part-time workers that did not exclusively telework) were retained. Respondents reported the modes used in their most recent commute trip. In the case of multiple modes,



Figure 1: Regions surveyed in the CMS

and socioeconomic characteristics. Recruitment was performed using a variety of strategies as recommended by Dillman et al. (2014) including online social media advertisement, the distribution of flyers, radio interviews, and a public opinion company.¹

A thorough multi-step data-cleaning procedure was applied to the survey data. The cleaning process used exclusion criteria based on

they identified their main mode as the one they traveled farthest in. Participants identified the factors that were important in choosing their main commute mode (e.g., shorter travel time, more comfortable, physical/mental health). Using the home and work locations and the main mode of travel, we retrieve travel times using a Google Maps API. Reported commute travel times were retrieved through questions about departure time from home and arrival

1 Consent was obtained from the McGill Research and Ethics Board prior to conducting the survey (certificate # 99-0719).

time at work at 5-minute intervals. We use reported travel times as a better representation of the real-world experience (Koslowsky, 1997; Valero et al., 2025). However, calculated travel times were important to set an exclusion criteria where the discrepancy between the reported and calculated travel time was 30 minutes or more, or if their reported travel time was greater than 105 minutes.

To ensure statistical rigor, respondents were excluded for a given mode if fewer than 30 reported using it in their region (e.g., Saskatoon had 18 cyclists, who were excluded). Light rail transit (LRT) and bus rapid transit (BRT) were combined into a single mode category, and the bus category includes streetcar users. This resulted in a final sample of 6,671 commuters across 12 metropolitan regions.

Due to heterogeneity of transit services offered across these regions, we chose to split the sample according to region size and transit modes offered. The three subsamples are for large regions with a sufficient number (more than 30 in each region) of subway² users (Toronto, Montréal, and Vancouver), mid-size regions with a sufficient number of LRT or BRT users (Calgary, Ottawa-Gatineau, Edmonton), and smaller regions where transit users are exclusively bus users (Québec, Winnipeg, Halifax, Victoria, Hamilton, and Saskatoon). The final subsample sizes used in analysis are 2,109 respondents in large regions, 1,923 respondents in mid-sized regions, and 2,639 respondents in small regions (Figure 3).

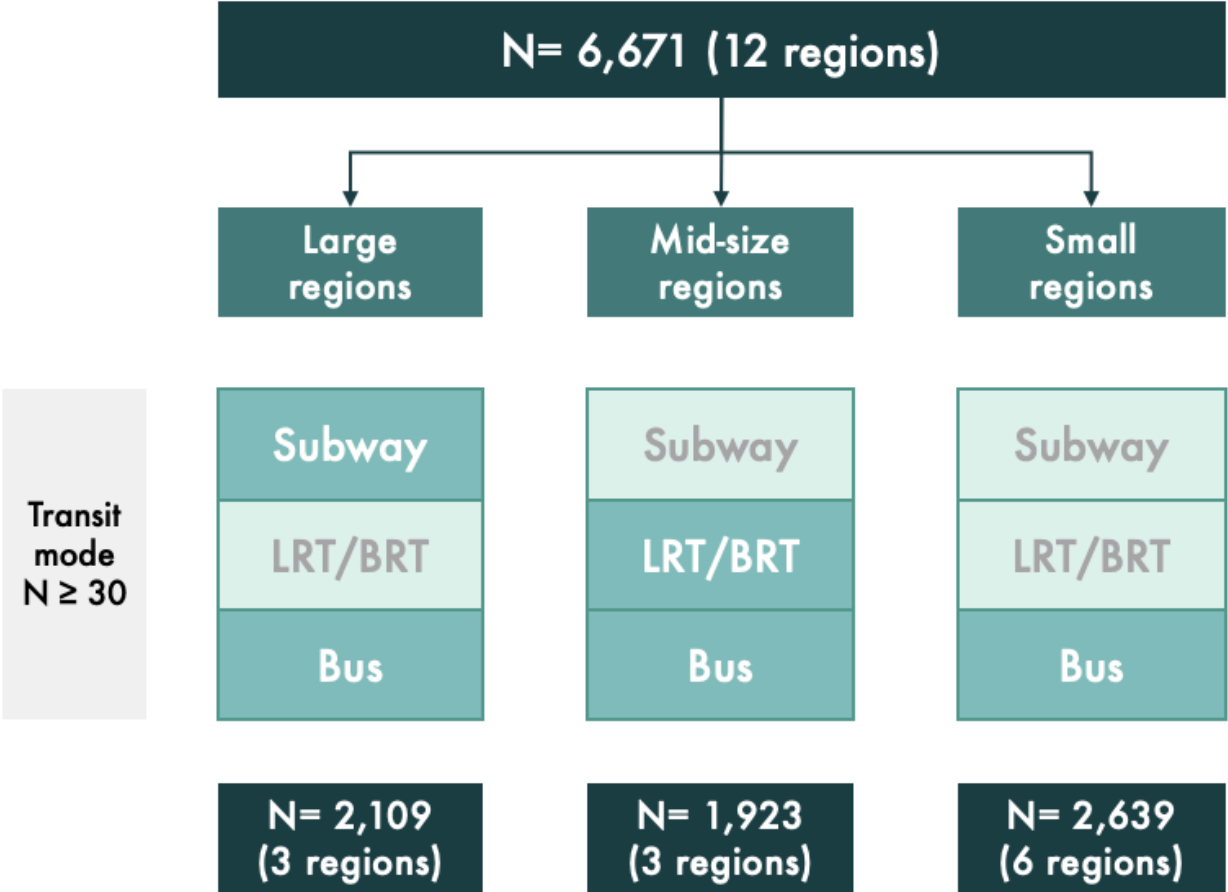
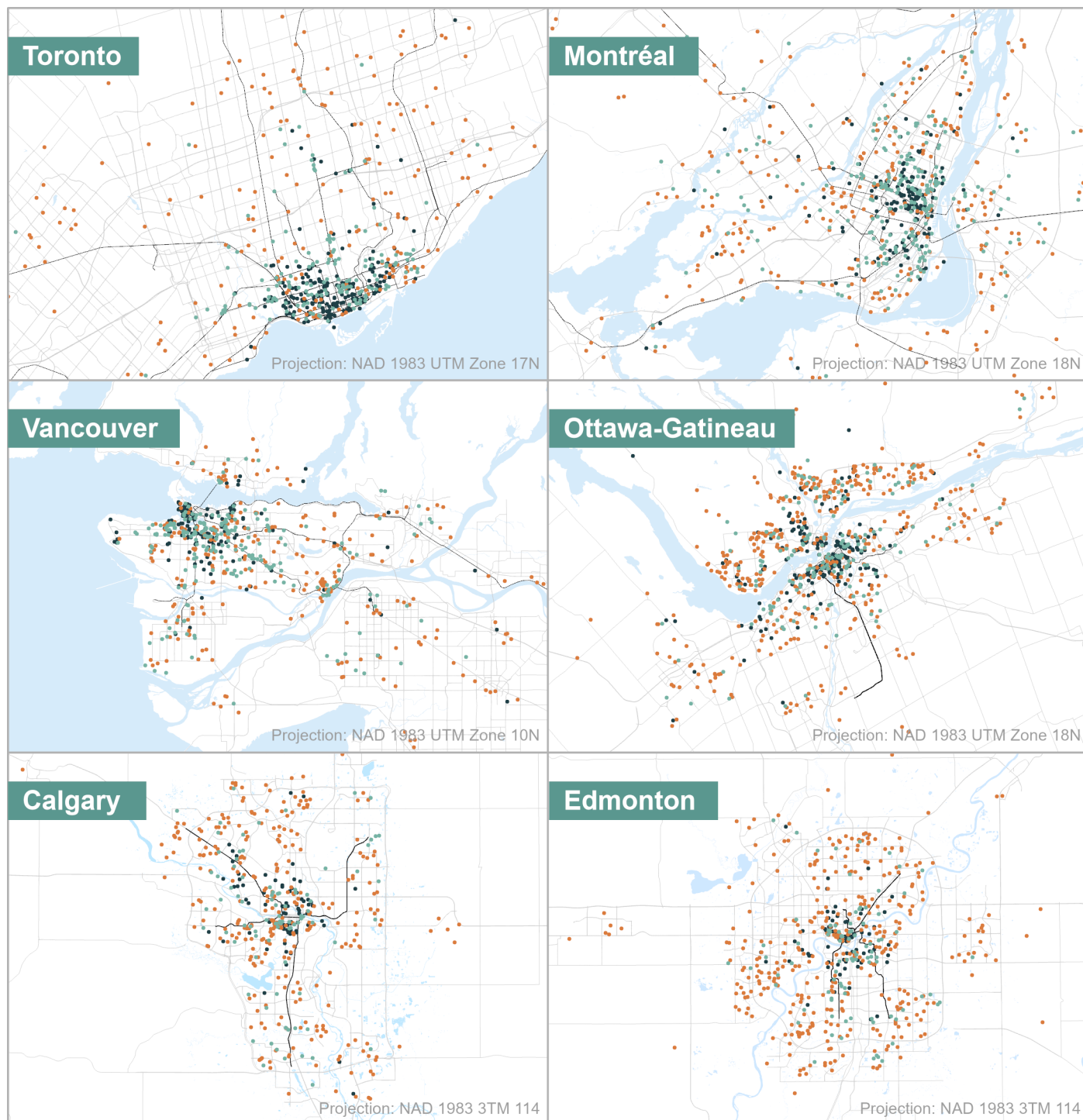


Figure 2: Data subsamples

2 In this study, subway includes the SkyTrain that serves Metro Vancouver.



Respondents' home location
Main commute mode

- Active
- Transit
- Car

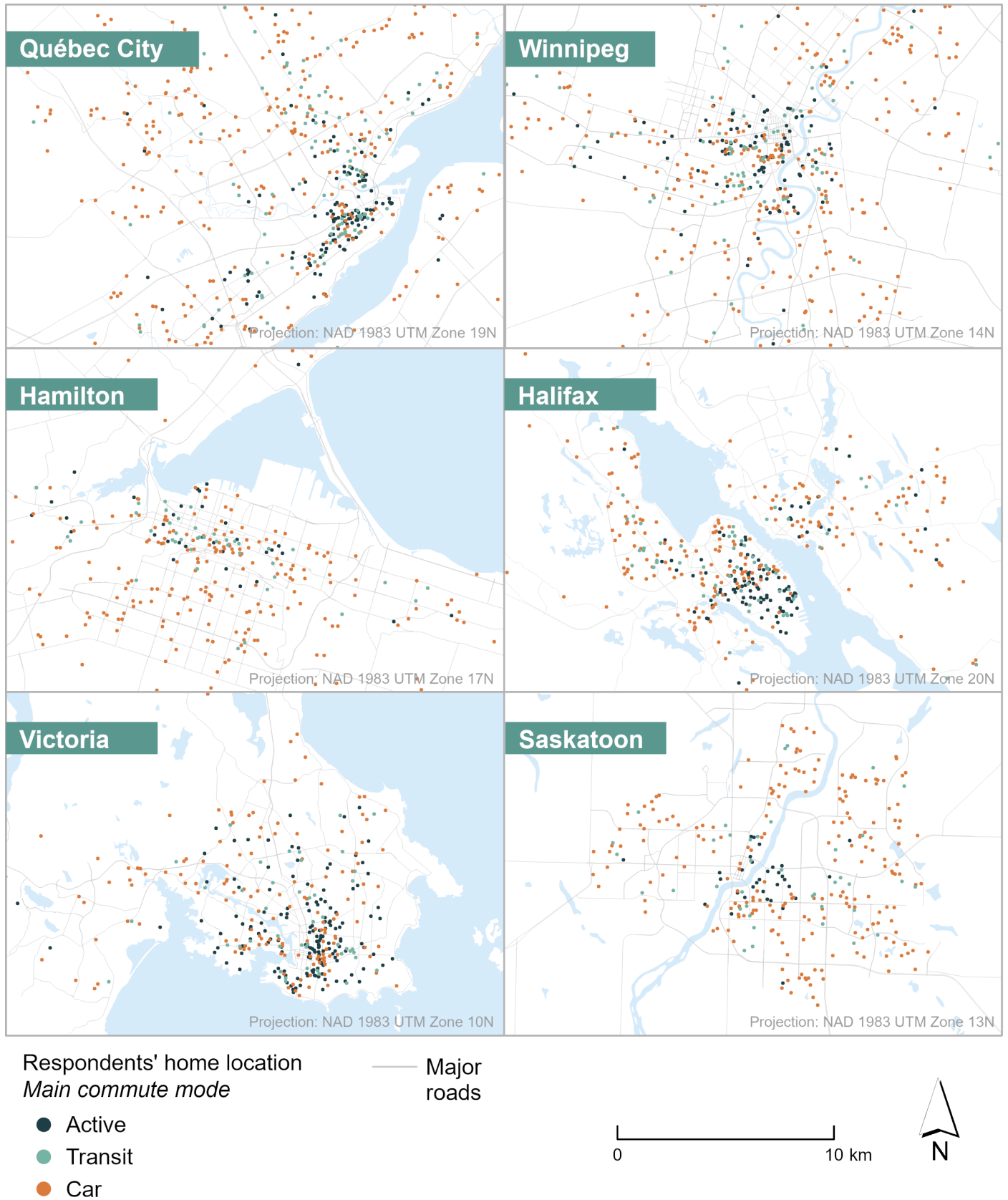
- Rapid transit network
- Major roads

0 10 20 km



Data Sources: Open Street Maps, TTC and Metrolinx (Toronto), ARTM and STM (Montreal), City of Calgary Transit (Calgary), OC Transpo (Ottawa), ETS (Edmonton), Translink (Vancouver), Statistics Canada, Survey data

Figure 3: Home location and main commute mode of respondents in large and mid-size regions



Data Sources: Open Street Maps, Statistics Canada, Government of Canada, Survey data

Figure 3 (continued): Home location and main commute mode of respondents in small regions

Methods

We examined work performance using self-rated questions about energy and productivity at work and punctuality to work on a five-point Likert scale from “very negatively” to “very positively”. Respondents were asked: “How does travelling to work using the selected mode(s) impact the following aspects?” For each outcome variable, we ran three logistic regressions, stratified by metropolitan region size, resulting in a total of nine models. Although ordered logit and probit models are often used to examine well-being and satisfaction questions when data is ordinal in nature (Fielbaum & Tirachini, 2021; Mattson et al., 2021), several issues led us to adopt a binary approach instead: the small sample size within the most negative category, a lack of statistical difference between “negatively” and “no impact” thresholds in initial estimations, and violations of the parallel slopes assumption for key predictor variables. In turn, we categorized the outcome variables as binary by grouping “very negatively,” “negatively,” and “no impact” as 0, and “positively” and “very positively” as 1.

Due to the regional variation of respondents, we tested a multi-level modeling approach which is commonly used when geographic difference adds important context that would be otherwise lost (Jones, 1991). The random intercept allows for baseline outcomes to vary across groups, i.e. regions. However, in all nine models, intraclass correlation coefficient (ICC) and intercept variance (τ_{00}) were either nonexistent or negligible, as grouping the sample by region size and transit services offered likely already accounted for the most relevant regional differences. We proceeded with weighted logistic regression models which accounted for any sampling bias in the clean survey data. The weighting is calculated for all

valid responses using the *anesrake* R package (Pasek, 2018), which follows an iterative ranking process (DeBell & Krosnick, 2009). The weights were calculated to match the census-tract information of age, income, gender, and commute mode obtained from Statistics Canada 2021 census (Statistics Canada, 2023), which was retrieved through the *cancensus* R package (von Bergmann et al., 2021), in addition to the latest commute mode share data retrieved from Statistics Canada (2024). The weights did range from 0.1 to 5 and were incorporated in all statistical analysis.

We examined the associations of main commute mode and travel time with each dependent variable, controlling for sociodemographic characteristics, travel mode attitudes, and region dummy variables. The sociodemographic variables included age, income, gender, and number of teleworking days per week. Disability and household size were discarded due to lack of statistical significance in the initial models. Travel mode attitudes are captured with binary indicators for factors respondents selected as important when deciding to use their main mode which can be framed as both attitudinal preferences (“My physical and/or mental health”, “It is better for the environment than other modes”, “I am more comfortable using this mode to travel than when using other modes,” “I am able to be productive on my journey”, “I have a shorter travel time than with other modes”) and practical constraints (“It is cheaper for me than other modes,” and “Other modes don’t go where I need to go”). Finally, while separate models are estimated for regions of similar size, we include a region variable to account for potential inter-regional differences.

Results

Descriptive Statistics

About half or more of the respondents found that their commute mode positively impacts their energy and productivity at work and punctuality in getting to work (Table 1 Subsample descriptive statistics (unweighted)). The car was used for commuting by over half of the respondents in mid-size and small regions (60.1% and 62.8%, respectively) while less than half of the respondents in large regions commuted by car (42.3%). Active modes were more popular than transit in all subsamples. Large regions had the highest share of active commuters with 17.0% cycling and 10.5% walking to work, in addition to the highest share of transit use with 19.3% of respondents commuting via subway and 10.9% via bus or streetcar.

Average commute duration was shortest for respondents in small regions (26.0 minutes) compared to mid-size regions (30.5 minutes), and large regions (35.2 minutes). The most commonly stated reason for mode choice was a shorter travel time, with more than two-thirds of respondents in regions of all sizes agreeing. Comfort was commonly selected by respondents in small (43.2%), mid-sized (43.9%), and large regions (40.0%) as a rationale behind the mode selection. Many respondents were motivated in their mode choice by their physical/mental health (40.7% in large regions, 37.8% in mid-size regions, and 39.4% in small regions). Cost (40.6%) and environmental reasons (30.2%) were common reasons for mode choice and were more frequently cited in large regions than in mid-size and smaller regions.

For energy and productivity at work across all region sizes, more respondents rated cycling and walking as positive followed by car users then transit users (Figure 4). For punctuality in getting to work, more bicycle users rated a positive impact than car users in large regions, however, in mid-size and small regions, ratings of car users were either on par with or greater than active mode users. Transit users were distantly behind active and car commuters for perceptions of punctuality in all three subsamples.

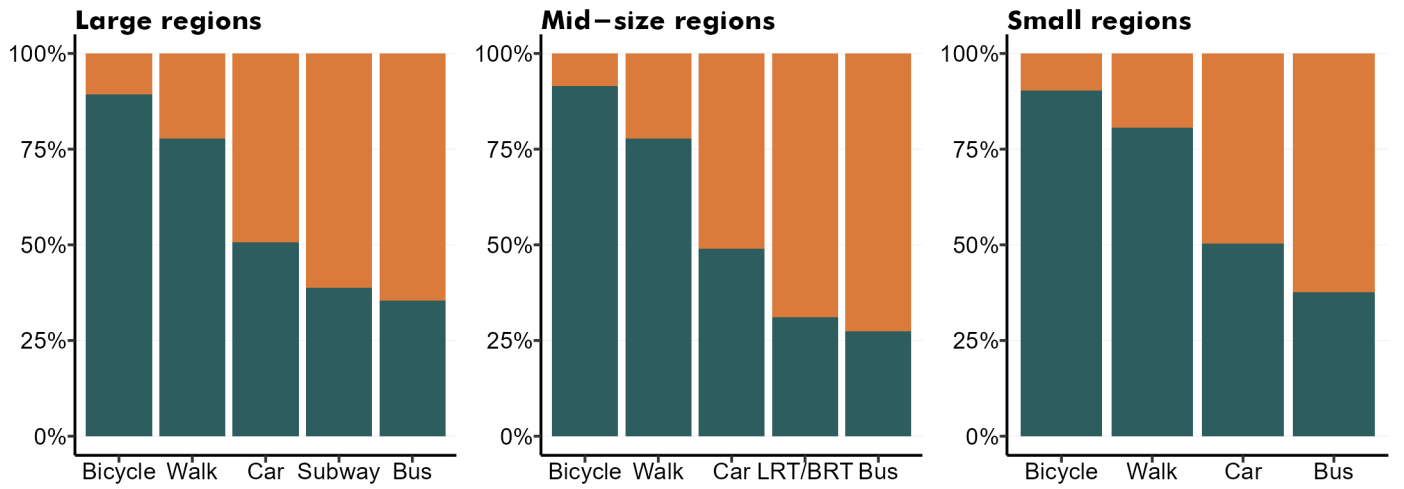


Table 1: Sample descriptive statistics (unweighted)

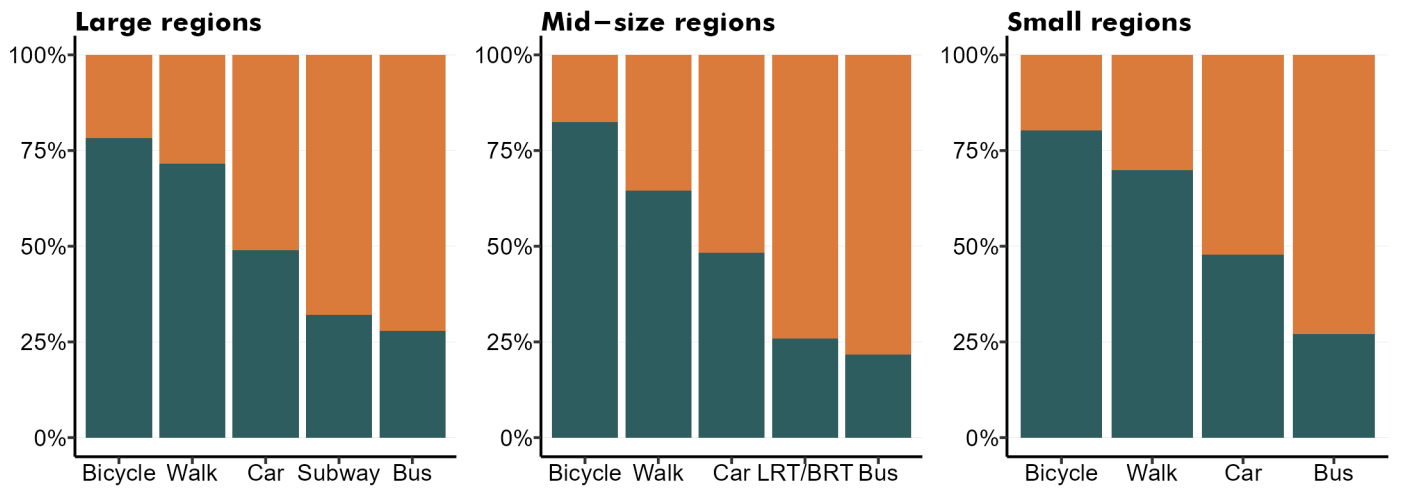
	Large (N= 2,109)		Mid-size (N= 1,923)		Small (N= 2,639)	
Energy at work (positive)	1,183	56.1%	1,021	53.1%	1,493	56.6%
Productivity at work (positive)	1,070	50.7%	950	49.4%	1,348	51.1%
Punctuality in getting to work (positive)	1,390	65.9%	1,320	68.6%	1,843	69.8%
Independent variables						
Age	40.9	12.5	41.1	12.1	41.9	12.8
Gender (women)	1,127	53.4%	1,181	61.4%	1,592	60.3%
Income						
Less than \$60k	315	14.9%	268	13.9%	528	20.0%
\$60k to \$120k	761	36.1%	703	36.6%	1,036	39.3%
More than \$120k	1,033	49.0%	952	49.5%	1,075	40.7%
Days teleworking	1.3	1.5	1.1	1.4	1	1.4
Main commute mode						
Car	893	42.3%	1,155	60.1%	1,657	62.8%
Bicycle	358	17.0%	245	12.7%	310	11.7%
Walk	221	10.5%	166	8.6%	295	11.2%
Bus or streetcar	229	10.9%	222	11.5%	377	14.3%
Subway	408	19.3%				
LRT or BRT			135	7.0%		
Commute duration (mins)	35.2	18.9	30.5	15.8	26	14.2
Reasons for mode choice						
Shorter travel time	1,419	67.3%	1,264	65.7%	1,773	67.2%
More comfortable	844	40.0%	844	43.9%	1,141	43.2%
Physical/mental health	859	40.7%	727	37.8%	1,039	39.4%
Cheaper	857	40.6%	679	35.3%	851	32.2%
Better for environment	636	30.2%	454	23.6%	636	24.1%
Other modes don't go where I need to go	338	16.0%	323	16.8%	485	18.4%
Able to be productive	250	11.9%	210	10.9%	288	10.9%
Region						
Montréal	746	35.4%				
Toronto	684	32.4%				
Vancouver	679	32.2%				
Ottawa-Gatineau			870	45.2%		
Edmonton			569	29.6%		
Calgary			484	25.2%		
Québec					652	24.7%
Winnipeg					538	20.4%
Halifax					460	17.4%
Victoria					372	14.1%
Hamilton					314	11.9%
Saskatoon					303	11.5%

n (%); mean (SD)

Energy at work



Productivity at work



Punctuality to work

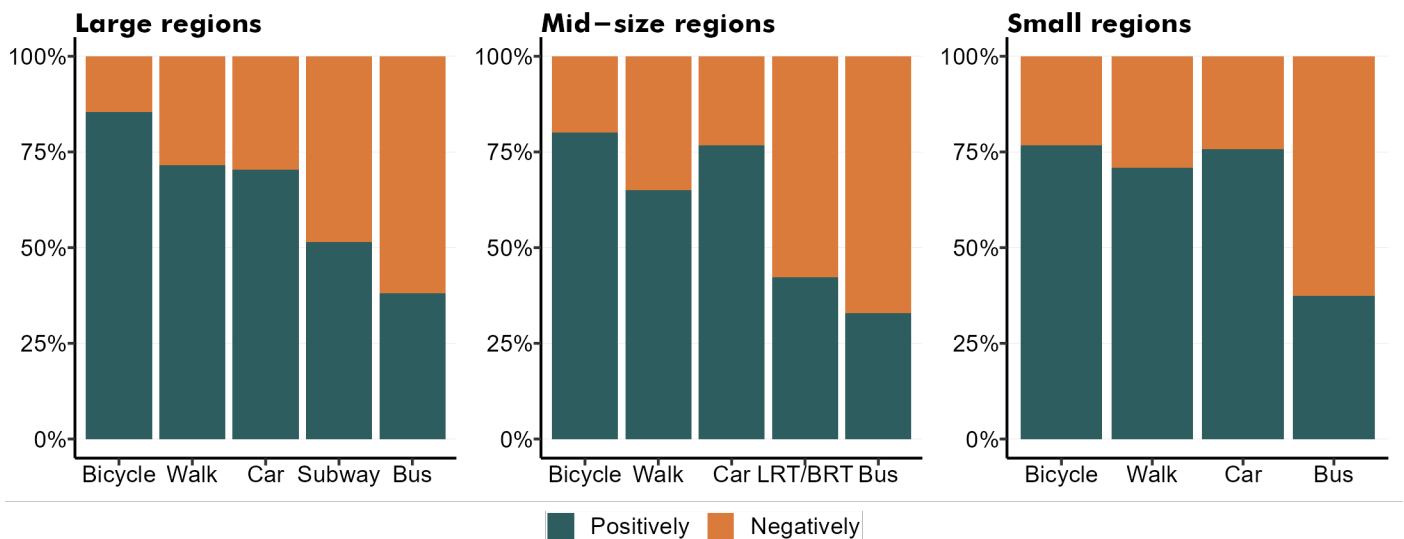


Figure 4: Respondents' self-assessment for the impact of commute mode on energy, productivity, and punctuality by region size

Statistical Model Results

This section presents the results of the weighted logistic regression models with the three work performance measures as outcome variables: energy at work (Table 2), productivity at work (Table 3), and punctuality in getting to work (Table 4). Of the three work performance measures, the models for energy at work explain most of the variation with R^2 values ranging from 0.211 to 0.215. Punctuality in getting to work models show similar explanatory power (R^2 between 0.188 and 0.202), while self-assessed productivity's model fits slightly lower (R^2 between 0.178 and 0.186).

Active mode use, especially cycling, was associated with higher odds of greater self-assessed energy and productivity at work. Workers who cycle to work had 5.60 times higher odds of reporting more energy at work in mid-size regions, 3.47 times higher in large regions, and 3.28 times higher in small regions, compared to car users, all else equal. The strong positive association of cycling with self-assessed productivity was most pronounced in mid-size regions (OR= 3.25) followed by small and large regions (OR= 2.19 and 2.18, respectively), *ceteris paribus*. In small regions, walking was associated with 2.43 greater odds of energy at work compared to car users while keeping all other variables at their mean. Walking to work in mid-size regions was associated with 2.12 greater odds of energy at work and 1.70 greater odds of productivity. Unlike energy and productivity at work, walking was associated with significantly lower odds for punctuality than car commuting in all region sizes. The odds for punctuality were reduced the most in large regions (OR= 0.34) followed by mid-size regions (OR= 0.40) and small regions (OR= 0.52). Cycling was not statistically associated with punctuality.

Compared to drivers, transit users tended to have lower odds of self-assessed energy, productivity, and punctuality across the board, though the magnitude of the association varied by region type and transit mode. Subway



use was associated with reduced odds of energy at work by 34% and productivity by 48% relative to car use. LRT/BRT use was not associated with energy or productivity but was associated with reduced odds of punctuality by 65%, *ceteris paribus*. Bus users generally fared the worst compared with other transit modes, and the outcomes tended to be worse in smaller regions. Bus use was associated with lower odds of energy at work by 40% in large regions and 55% in small regions relative to commuting by car, all else equal. Similarly, odds of productivity at work for bus users were 51% lower in large regions, 58% lower in mid-size regions, and 70% lower in small regions. Self-assessed punctuality for bus users was 47% lower than car commuters in large regions, 77% in mid-size regions, and 68% in small regions.

Commute duration was negatively associated with outcomes across all models. An additional

five minutes of commute times reduced the odds of energy at work by 11 to 13%, with the association being slightly stronger in small regions, all else equal. Similarly, there was an 11% reduction in odds of productivity at work in large and mid-size regions and 12% in small regions for every 5 additional minutes of commute time. Commute duration was strongly associated with lower odds of punctuality (18% to 19% reduced odds across the three region sizes).

There was a small association with age in the models for productivity in all three region sizes and women were more likely to report a positive influence of their commute mode on their productivity in large and mid-size regions. The influence of working from home was statistically significant and negative in large regions on self-assessed productivity at work, with each additional day per week spent working from home lowering the odds of post-commute productivity at work by 9% *ceteris paribus*.

Certain attitudes and preferences regarding chosen mode played a role in determining self-assessed impacts of commute mode on work performance. In all nine models, preference for

comfort consistently emerged as a predictor of positive work performance outcomes. Choosing a commute mode for physical/mental health reasons was associated with higher odds of perceiving a positive impact on energy at work and productivity at work across all region sizes. Environmental consciousness also played a role in positive outcomes, but the influence varied more by region and performance domain. The ability to be productive during the commute increased the odds of productivity at work in all region sizes, especially in mid-size regions. Conversely, cost sensitivity lowered odds of positive work performance in some contexts. Valuing low cost reduced odds in large regions by 24% for energy at work and by 38% for punctuality in small regions.

Region dummies were included in all models; only Montréal (in large regions) and Québec City (in small regions) were statistically significant and positive in the energy and productivity models. This indicates that workers in Montréal were more likely than those in Toronto, and workers in Québec City more likely than those in Hamilton, to report a positive impact of their commute on their energy and productivity at work.



Table 2: Energy at work weighted logistic regression model

Energy at work	Large regions (N= 2,109)		Mid-size regions (N= 1,923)		Small regions (N= 2,639)	
Predictors	OR	CI (95%)	OR	CI (95%)	OR	CI (95%)
(Intercept)	1.04	(0.64–1.68)	0.69	(0.41–1.17)	0.67	(0.42–1.08)
Age	1.00	(1.00–1.01)	1.00	(1.00–1.01)	1.00	(1.00–1.01)
Gender (Women)	1.14	(0.95–1.38)	1.25 *	(1.03–1.53)	0.95	(0.81–1.12)
Income (ref. Above \$120k)						
\$60k to \$120k	1.05	(0.84–1.31)	1.12	(0.90–1.40)	1.26*	(1.04–1.52)
Less than \$60k	1.28	(1.00–1.65)	0.94	(0.71–1.25)	1.12	(0.90–1.39)
Days teleworking	0.97	(0.90–1.04)	0.98	(0.91–1.06)	1.02	(0.96–1.08)
Main mode (ref. Car)						
Bicycle	3.47***	(2.00–6.27)	5.60***	(3.01–11.10)	3.28***	(1.89–5.94)
Walk	1.15	(0.72–1.87)	2.12**	(1.23–3.77)	2.43***	(1.52–3.98)
Bus or streetcar	0.60*	(0.38–0.96)	0.65	(0.39–1.08)	0.45***	(0.30–0.69)
Subway	0.66*	(0.46–0.94)				
LRT or BRT			0.81	(0.46–1.42)		
Commute duration (5 mins)	0.89***	(0.86–0.91)	0.88***	(0.84–0.91)	0.87***	(0.84–0.90)
Reasons for mode choice						
Physical/mental health	1.88***	(1.50–2.35)	1.87***	(1.49–2.36)	1.75***	(1.45–2.12)
Better for environment	1.92***	(1.32–2.80)	1.43	(0.96–2.14)	2.73***	(1.89–3.98)
More comfortable	1.63***	(1.33–1.99)	1.63***	(1.33–2.01)	1.81***	(1.52–2.16)
Able to be productive	1.01	(0.73–1.39)	2.33***	(1.64–3.34)	1.16	(0.88–1.52)
Cheaper	0.76 *	(0.58–0.99)	0.90	(0.68–1.20)	0.96	(0.73–1.25)
Shorter travel time	1.20	(0.96–1.49)	1.27*	(1.00–1.61)	1.06	(0.87–1.29)
Other modes don't go where I need to go	0.67***	(0.53–0.85)	0.68**	(0.53–0.87)	1.27*	(1.04–1.56)
Region						
Toronto (ref.)						
Montréal	1.38**	(1.09–1.75)				
Vancouver	1.22	(0.97–1.53)				
Edmonton (ref.)						
Calgary			1.02	(0.79–1.32)		
Ottawa			1.18	(0.93–1.50)		
Hamilton (ref.)						
Victoria					1.08	(0.78–1.49)
Halifax					1.23	(0.91–1.66)
Québec					2.29***	(1.70–3.10)
Winnipeg					1.16	(0.86–1.56)
Saskatoon					1.21	(0.88–1.68)
R ² Tjur	0.215		0.218		0.211	

* p<0.05 ** p<0.01 *** p<0.001

Table 3: Productivity at work weighted logistic regression model

Productivity at work	Large regions (N= 2,109)		Mid-size regions (N= 1,923)		Small regions (N= 2,639)	
Predictors	OR	CI (95%)	OR	CI (95%)	OR	CI (95%)
(Intercept)	0.91	(0.57–1.48)	0.51*	(0.30–0.87)	0.50**	(0.31–0.80)
Age	1.01*	(1.00–1.02)	1.01***	(1.01–1.02)	1.01***	(1.01–1.02)
Gender (Women)	1.31**	(1.09–1.59)	1.23*	(1.01–1.50)	0.92	(0.78–1.08)
Income (ref. Above \$120k)						
\$60k to \$120k	1.10	(0.89–1.37)	1.05	(0.84–1.30)	1.22*	(1.02–1.48)
Less than \$60k	1.11	(0.87–1.42)	0.77	(0.58–1.02)	1.00	(0.81–1.24)
Days teleworking	0.91**	(0.85–0.98)	0.95	(0.88–1.03)	0.99	(0.93–1.05)
Main mode (ref. Car)						
Bicycle	2.18**	(1.35–3.58)	3.25***	(1.88–5.78)	2.19**	(1.34–3.65)
Walk	1.07	(0.67–1.70)	1.70*	(1.01–2.89)	1.11	(0.72–1.70)
Bus or streetcar	0.49**	(0.30–0.79)	0.42**	(0.24–0.71)	0.30***	(0.19–0.47)
Subway	0.52***	(0.36–0.76)				
LRT or BRT			0.61	(0.34–1.08)		
Commute duration (5 mins)	0.89***	(0.86–0.91)	0.89***	(0.86–0.93)	0.88***	(0.85–0.91)
Reasons for mode choice						
Physical/mental health	1.71***	(1.37–2.14)	1.43**	(1.13–1.79)	1.58***	(1.31–1.91)
Better for environment	1.42	(0.99–2.06)	1.50*	(1.02–2.23)	2.54***	(1.79–3.62)
More comfortable	1.46***	(1.19–1.78)	1.55***	(1.26–1.90)	1.56***	(1.31–1.85)
Able to be productive	1.66**	(1.20–2.30)	2.28***	(1.62–3.24)	1.34*	(1.02–1.75)
Cheaper	0.77	(0.60–1.01)	0.94	(0.71–1.25)	1.02	(0.79–1.33)
Shorter travel time	1.22	(0.98–1.51)	1.23	(0.97–1.55)	0.97	(0.80–1.18)
Other modes don't go where I need to go	0.71**	(0.56–0.90)	0.68**	(0.53–0.87)	1.27*	(1.05–1.55)
Region						
Toronto (ref.)						
Montréal	1.30*	(1.02–1.64)				
Vancouver	0.94	(0.75–1.18)				
Edmonton (ref.)						
Calgary			1.07	(0.83–1.38)		
Ottawa			1.15	(0.91–1.46)		
Hamilton (ref.)						
Victoria					1.03	(0.75–1.42)
Halifax					1.31	(0.97–1.77)
Québec					2.12***	(1.58–2.86)
Winnipeg					1.32	(0.99–1.77)
Saskatoon					1.22	(0.88–1.69)
R ² Tjur	0.186		0.182		0.178	

* p<0.05 ** p<0.01 *** p<0.001

Table 4: Punctuality to work weighted logistic regression model

Punctuality to work	Large regions (N= 2,109)		Mid-size regions (N= 1,923)		Small regions (N= 2,639)	
Predictors	OR	CI (95%)	OR	CI (95%)	OR	CI (95%)
(Intercept)	2.99***	(1.75–5.13)	4.04***	(2.23–7.34)	3.89***	(2.30–6.59)
Age	1.01***	(1.01–1.02)	1.01	(1.00–1.02)	1.00	(1.00–1.01)
Gender (Women)	1.20	(0.97–1.48)	1.18	(0.94–1.48)	0.93	(0.77–1.12)
Income (ref. Above \$120k)						
\$60k to \$120k	1.00	(0.79–1.27)	0.94	(0.73–1.21)	1.10	(0.89–1.36)
Less than \$60k	1.72***	(1.28–2.32)	0.98	(0.71–1.35)	0.89	(0.69–1.13)
Days teleworking	0.96	(0.89–1.04)	1.01	(0.92–1.10)	0.96	(0.90–1.03)
Main mode (ref. Car)						
Bicycle	1.29	(0.75–2.26)	0.66	(0.38–1.16)	0.72	(0.44–1.20)
Walk	0.34***	(0.21–0.56)	0.40**	(0.23–0.70)	0.52**	(0.34–0.83)
Bus or streetcar	0.53**	(0.33–0.86)	0.23***	(0.14–0.38)	0.32***	(0.21–0.48)
Subway	0.89	(0.62–1.29)				
LRT or BRT			0.35***	(0.20–0.60)		
Commute duration (5 mins)	0.81***	(0.78–0.83)	0.82***	(0.79–0.86)	0.81***	(0.78–0.84)
Reasons for mode choice						
Physical/mental health	1.21	(0.94–1.57)	0.88	(0.67–1.15)	1.25	(1.00–1.56)
Better for environment	1.27	(0.87–1.88)	1.48	(0.99–2.23)	1.92***	(1.33–2.79)
More comfortable	1.73***	(1.37–2.17)	1.67***	(1.32–2.13)	1.58***	(1.29–1.93)
Able to be productive	1.01	(0.71–1.45)	1.20	(0.82–1.80)	1.25	(0.91–1.74)
Cheaper	0.90	(0.68–1.20)	1.21	(0.88–1.68)	0.62***	(0.47–0.83)
Shorter travel time	1.74***	(1.38–2.20)	1.85***	(1.44–2.37)	1.65***	(1.34–2.03)
Other modes don't go where I need to go	0.81	(0.63–1.05)	0.94	(0.71–1.25)	1.00	(0.79–1.25)
Region						
Toronto (ref.)						
Montréal	1.16	(0.89–1.52)				
Vancouver	0.92	(0.72–1.18)				
Edmonton (ref.)						
Calgary			0.95	(0.71–1.28)		
Ottawa			0.89	(0.68–1.17)		
Hamilton (ref.)						
Victoria					1.05	(0.74–1.49)
Halifax					0.93	(0.67–1.28)
Québec					1.46*	(1.05–2.03)
Winnipeg					1.35	(0.97–1.87)
Saskatoon					1.25	(0.86–1.81)
R ² Tjur	0.202		0.206		0.188	

* p<0.05 ** p<0.01 *** p<0.001

Sensitivity Analysis

Since commute time was one of the important variables in the above models, we conducted a sensitivity analysis using the outputs of the weighted logistic regression models to examine how commute duration influenced the three work performance measures (energy, productivity, and punctuality) for each commute mode across various durations (Figure 5). These probabilities were calculated for the reference regions in each model (Toronto for large regions, Edmonton for mid-size regions, and Hamilton for small regions), using a standard profile: a 40-year-old man with household income above \$120k who did not report reasons for choosing his commute mode.

Across all modes, region sizes, and performance indicators, the probability of positive work performance declined with longer commute times, though at varying rates. Cyclists consistently reported the highest probability of positive impacts on energy at work across regions and commute durations. Although this probability decreased with longer commutes, even at 45 minutes it remained similar to or higher than the maximum probability observed for drivers and transit users at a 5-minute commute time.

Transit users, especially bus riders, had the lowest probability of positive outcomes for energy and productivity at work across all region sizes. At 45 minutes of travel time, bus users in small regions had negligible probabilities (0–5%) compared to 10–20% in large and mid-size regions. Out of the three performance measures, punctuality declined the most as commutes got longer, with probabilities almost cut in half around 50 minutes. For example, cyclists in large regions had around 80% probability of punctuality at a 5-minute commute, which fell to nearly 40% at 50 minutes of commute duration.



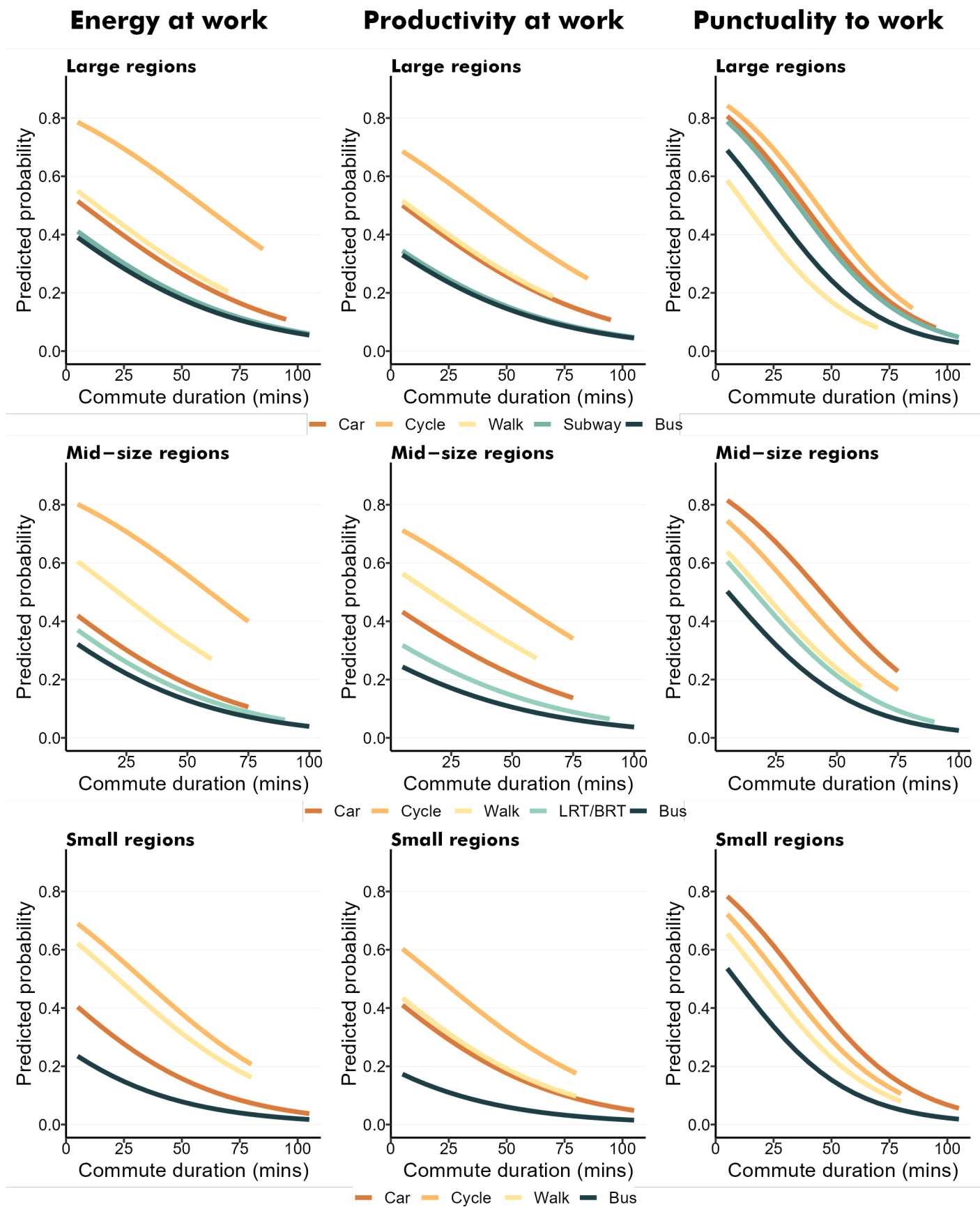


Figure 5: Sensitivity curves by commute mode and commute duration for energy, productivity, and punctuality

Discussion

The higher likelihood of reporting positive impact of commute on energy and productivity among active commuters, particularly cyclists, aligns with previous literature on active travel and work performance (Loong et al., 2017; Ma & Ye, 2019; Page & Nilsson, 2017). The positive effects of cycling to work on work performance were consistent across all region types. This can be due to the well-established positive impacts of cycling on mental and physical health (Garrard et al., 2021; Mueller et al., 2015), especially right after the commute (Brutus et al., 2017; Kalliolahti et al., 2024). It is worth noting that the positive associations with cycling to work were more pronounced in mid-size regions compared to others. One possible explanation is that commuting by bicycle in mid-size regions may attract a more self-selective group of highly enthusiastic cyclists, while a greater prevalence of cycling infrastructure in large regions may encourage a broader spectrum of utilitarian

users. The distinction between enthusiastic cyclists and cyclists motivated by convenience has been noted in previous research (Willis et al., 2013) and may be relevant to the commute spillover effect, though the observed pattern here warrants further investigation. A second hypothesis can be related to the reduced stress from traffic in these mid-size regions compared to larger ones. This finding can be used to encourage employers to adopt cycling friendly strategies at workplaces, such as providing secured bicycle parking areas, changing rooms, and showers (Buehler, 2012), as, if causal, those strategies would support cycling and, in turn, higher productivity at work.

Transit users reported the most negative outcomes in all regions. Buses and streetcars often operate in mixed-traffic conditions, which may make them more vulnerable to congestion and delays, potentially having



negative implications on workers' energy and punctuality. Additionally, crowdedness in popular routes can cause stress and exhaustion (Gimenez-Nadal & Molina, 2019; Legrain et al., 2015), which may influence productivity at work (Loo & Tsoi, 2024). In mid-size and large regions where LRT/BRT and subway exist, these modes still underperformed compared to the car for all three outcomes. These results could also be attributed to crowding and delays along these modes. Transit infrastructure investments should consider not just capacity or coverage but speed, comfort, and opportunities to use travel time productively as these factors were associated with better self-assessed work performance. The findings regarding the length of the commute aligns with previous findings of longer commutes being both more stressful and fatiguing (Gimenez-Nadal & Molina, 2019; Legrain et al., 2015) and associated with higher absenteeism (Ma & Ye, 2019). Accordingly, planning for better accessibility via public transit with land use and/or transport planning interventions will lead to a reduction in travel times and can be an effective way to reduce the negative spillover effect of the post commute (Deboosere & El-Geneidy, 2018; Levinson, 1998).

The more frequently people work from home in large regions the less likely they are to report positive outcomes from their commute on productivity. This finding may signify that frequent telecommuters find it harder to adapt with the commute days when they travel to a workplace as they feel less productive at work compared to frequent commuters. We find alignment here with previous findings where those who commute more frequently are more positive about their commute (Ettema et al., 2012). This finding raises some questions that require further investigation on the effectiveness of hybrid working models when it comes to self-assessed productivity, especially in larger regions.

As travel-related attitudes have been shown to both directly and indirectly affect commute satisfaction (Ye & Titheridge, 2017), accounting for underlying mode preferences shaped by values and beliefs is crucial to



avoid overestimating the associations between travel mode and workplace outcomes. Placing importance on environmental consciousness and physical/mental health were associated with higher odds of perceiving a positive impact of commute mode on workplace outcomes. This may reflect greater subjective well-being stemming from value alignment, which has been linked to higher productivity (Diener, 2012). Valuing comfort and perceived productivity during the commute were also associated with positive outcomes at work, similar to previous studies (Smith, 2017; St-Louis et al., 2014). The relationships observed in this study support the idea that subjective attitudes towards mode used not only mediate the relationship between mode choice and commute satisfaction (St-Louis et al., 2014; Ye & Titheridge, 2017), but are relevant to the commute spillover effect. Educational awareness campaigns at workplaces on the impacts of commute on work performance might be one way to increase the positive spillover effect of the commute and create mindfulness regarding mode selection.

Conclusion

This study examined the self-assessed impact of commute mode on three aspects of post-commute work performance, namely energy and productivity at work and punctuality in getting to work using a large sample of Canadian commuters in large, mid-size, and small metropolitan regions. The findings confirm that commuting is not a neutral activity; it can shape how workers feel and perform at work, validating the hypothesized relations suggested by Lim et al. (2024). Travel modes, travel duration, sociodemographic characteristics, and preferences and constraints around mode choice shape how individuals perceive the impact of their commute on work performance. Active commuters, especially cyclists, reported the highest positive impacts of their commute mode on energy and productivity at work across all region types, followed by car drivers then transit users. Longer commute times consistently undermined all three work performance self-assessed outcomes.

While this study provides insight into the self-assessed impacts of commuting by a variety of modes, there are many additional factors that can shape the commute experience and spillovers into the workplace that were unaccounted for. Detailed itinerary of travel, rather than relying on the main mode of travel, could provide deeper insights into the variation in the work outcomes, especially among public transit users. While the generated models used weights to correct for biases in the sampling, a larger sample across each region could help in reducing biases related to receiving more responses from active transport users. The finding from the number of work-from-home days is interesting and invites further investigations in this area, especially in larger regions.

Future surveys might include detailed questions regarding the direct impacts of working from home on self-assessed work outcomes. Several work-related and lifestyle factors that were not accounted for in this study may influence the relationships between commuting and work performance. Contextual factors such as job satisfaction or work-family life interference can shape commuting experiences, and, in turn, affect performance at work, creating a feedback loop (Lim et al., 2024). This study did not directly examine the potentially moderating role of in-commute activities including the increasingly common use of information and communication technologies (Lim et al., 2024). Investigating whether engaging in productive tasks during the commute can facilitate the transition between home and work or exacerbate work-life balance may provide useful insights into post-commute effects on work performance. Future research might take advantage of a mixed methods approach, where interviews and open-ended questions are analyzed to add more nuance to survey approaches.



Chapter 2: Health and Well-Being

Introduction

Travel has traditionally been thought of as a derived demand with no intrinsic utility—valued only insofar as it allows access to opportunities (Becker, 1965). However, recent research is beginning to uncover the ways in which daily travel experiences can accumulate over time and shape perceptions of health and well-being (Lim et al., 2024; Liu et al., 2022). Roughly two out of five Canadians are regular commuters, spending an average of just under 27 minutes on their journeys to work (Statistics Canada, 2024). Given the scale and regularity of commuting, it is crucial to understand its implications on population health and well-being. As more than half (54%) of Canadian adults fail to meet the recommended level of 150 minutes of moderate-to-vigorous physical activity (MVPA) per week (Statistics Canada, 2025), the commute offers a viable way to incorporate physical activity in daily routines. The widespread adoption of active transport can have population-level and personal-level benefits. At the aggregate level, it could result in healthcare expenditure savings, reduced traffic crash fatalities, and better urban air quality (Jarrett et al., 2012; Rojas-Rueda et al., 2016). At the disaggregate level, the experience of commuting can spillover into personal outcomes, with implications for performance at work, health, and family life, as posited by Lim et al. (2024) in their theoretical Pre-commute, In-commute, Post-commute (PIP) model. Our study contributes to the literature by exploring the direct impact of commuting on perceptions of health and well-being.

This study examines the impact of commute mode choice on perceived physical health (PH) and mental health (MH) and life in general (LiG) using a subset of the Canadian Mobility Survey (CMS). The CMS is a nationwide survey conducted in 2024 across 12



Canadian metropolitan regions (N=15,962). The survey collects data on participants' commuting behaviour and impacts on health and LiG, travel attitudes and preferences, and sociodemographic characteristics. We categorize the 12 regions into three large (N= 2,109), three mid-size (N= 1,923), and six small regions (N= 2,639). For each group, we run three logistic regression models to explore the factors associated with perceived PH, MH, and LiG. By focusing on commute mode-specific perceived impacts, this study contributes to a more nuanced understanding of how everyday commuting shapes health and well-being with implications for transport planning and policy. Understanding the influence of commuting on workers' health and well-being can guide strategies targeted at improving daily travel experiences that enhance these outcomes.

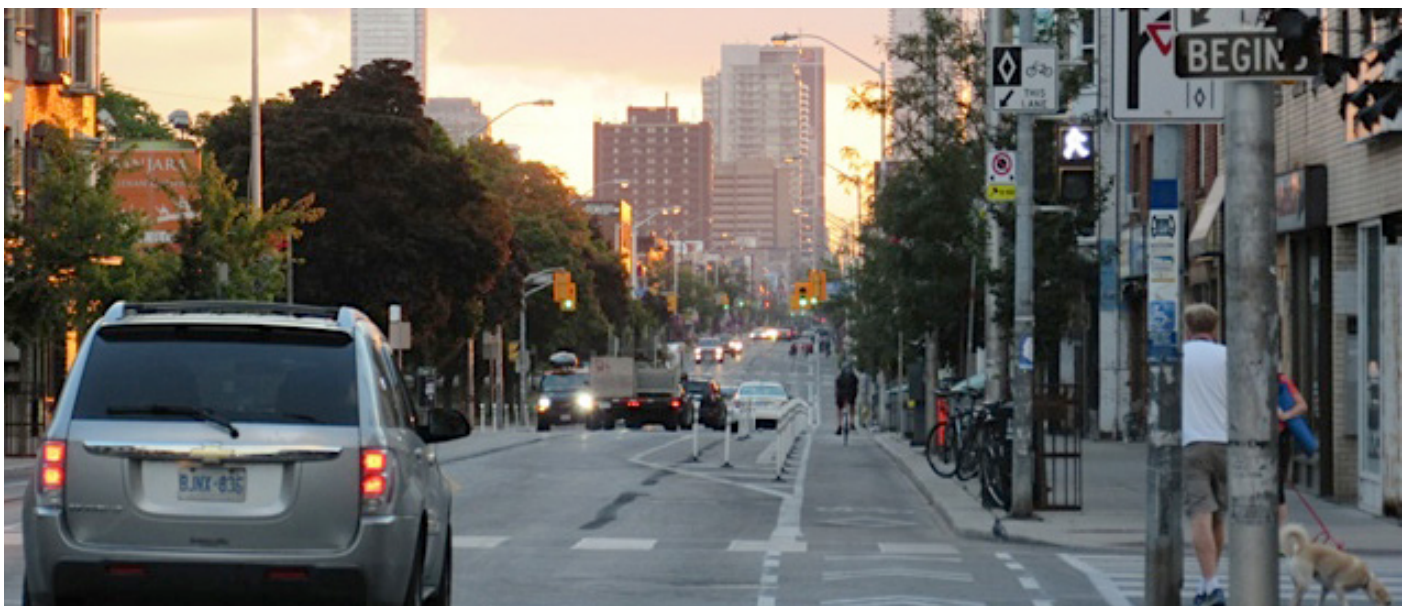
Literature Review

While early notions of quality of life relied on objective economic and social indicators, subjective measures that seek to understand people's perceptions of their life have become increasingly important to policymakers (Bognar, 2005; Diener & Suh, 1997; Pacione, 1982). Subjective well-being (SWB) encompasses both cognitive and affective reactions to one's life as a whole or within specific domains (Diener & Suh, 1997), and research in psychology has demonstrated that satisfaction with specific domains can play a significant role in overall life satisfaction (Lent et al., 2005). Emerging research in transport suggests that travel is one such domain, with satisfaction with daily travel exerting influence over general well-being (Ettema et al., 2011; Fordham et al., 2018; Friman et al., 2017; Lim et al., 2024).

The impact of travel on one's SWB has been thought to exist primarily indirectly by means of the access to opportunities related to employment or education, relationships, social services, or leisure activities that travel

provides (Bergstad et al., 2012; Delbosc, 2012). However, travel may also exert a direct influence on well-being, particularly through the daily commute, which is a regular and largely unavoidable activity whose cumulative experience can shape SWB over time (Liu et al., 2022). In the theoretical Pre-commute, In-commute, Post-commute model proposed by Lim et al. (2024), the experience of commuting can spillover into SWB subdomains of work, health, or family life and can create a feedback loop that shapes future commute experiences, either positively or negatively.

Commuting can constrain time available for other desired activities (Chatterjee et al., 2020; Clark et al., 2020), and longer commutes are associated with greater psychological distress as a result of work-family conflict (Barreck & Marchand, 2025) and lower satisfaction with leisure time (Clark et al., 2020). Those with longer commutes exhibit lower levels of happiness, increased strain, and poorer MH (Clark et al., 2020; Olsson et al., 2013).



Resultingly, overall life satisfaction seems to decline with increasingly long commutes (Liu et al., 2022). However, Redmond and Mokhtarian (2001) found that most people have a non-zero optimum commute time, suggesting that the journey to work can provide positive utility such as a transitional buffer between home and work, an opportunity to use time productively, exposure to environment and scenery, and/or physical exercise.

The potential benefits that can be derived from the journey to work can vary by the intrinsic properties of different modes, including the varying degrees of physical activity they offer (Chatterjee et al., 2020; Clark et al., 2020; Liu et al., 2022). The physical activity provided by active travel can impact health by reducing cardiovascular disease and all-cause mortality (Celis-Morales et al., 2017; Kelly et al., 2014), and the commute can provide an opportunity to build routine exercise into the day. Humphreys et al. (2013) found that more time spent commuting by cycling and walking was associated with better physical well-being, even after controlling for other physical activity. While public transit is not always considered to be an active mode, walking to stations is the most common means to access transit, and active trip segments for transit access and egress can help individuals meet daily physical activity targets (Freeland et al., 2013; Le & Dannenberg, 2020).

The physical activity provided by active travel can promote positive affect (Ekkekakis et al., 2008). While stress is commonly associated with the experience of commuting as a whole, Legrain et al. (2015) found that commute stress varies by mode, and pedestrians and cyclists experience lower levels of stress than drivers and transit users during their commute. Commuting by active modes has been associated with lower risk of both depression and anxiety (Fan et al., 2025) and less frequent workplace absenteeism (Ma & Ye, 2019). In a study of McGill University commuters, Fordham et al. (2018) found that pedestrians and cyclists not only had the highest trip satisfaction and highest overall life satisfaction, but they also reported the strongest impact of their commute

on their life satisfaction.

Evidence regarding motorized modes of driving and transit paints a less clear picture. Several studies suggest that commuting by car is more satisfactory and beneficial to well-being than by transit (Eriksson et al., 2013; Friman et al., 2017; Olsson et al., 2013), while others report opposing findings. A longitudinal study of commuters in Great Britain by Martin et al. (2014) demonstrated that public transit modes were associated with higher emotional well-being than driving, and a study across 11 Latin American cities found that using public transit was associated with lower risk of depression than commuting by private automobile (Wang et al., 2019). However, most of these studies treat public transit as a single category, overlooking how different types of transit compare to driving in terms of their relationships to well-being.

In addition to characteristics inherent to the commute, sociodemographic characteristics and travel-related attitudes can influence travel satisfaction and therefore mediate the relationship between travel and general well-being (Liu et al., 2022; Manaugh & El-Geneidy, 2013; Singleton, 2019; Ye & Titheridge, 2017). A plausibly bi-directional relationship may exist, whereby travel experiences shape well-being, but also individuals with higher well-being may be more likely to report satisfaction with their travel (Mokhtarian, 2019; Olsson et al., 2013).

While most studies rely on measures of life satisfaction or general indicators of MH or PH as dependent variables, this study instead focuses on the self-assessed impacts of commuting, while controlling for baseline satisfaction with life and health as well as attitudes towards mode choice. Additionally, although many studies aim to assess the relationship between commute mode and well-being, they often do not distinguish between types of public transit modes. This study fills the gap in the literature by examining the direct impact of commute mode on PH, MH, and LiG using commute-specific health and well-being questions. We distinguish between different types of transit modes in regions of different sizes and rely on data obtained from the general population.

Data

This study draws on the CMS, a bilingual online transport survey conducted in Fall 2024. The survey was administered in 12 Census Metropolitan Areas (CMA): Toronto, Montréal, Vancouver, Ottawa-Gatineau, Calgary, Edmonton, Québec, Winnipeg, Hamilton, Halifax, Victoria, and Saskatoon (Figure 6). The CMS collected data about commuting behaviour, commute impacts on well-being, reasons for travel mode choice, overall life and health satisfaction, and sociodemographic characteristics. Participant recruitment followed the mixed-methods approach outlined by Dillman et al. (2014) including online social

location pins of home, work and/or school, survey completion time, and other quality checks. Full details of the cleaning and validation procedure are outlined in Negm et al. (2025). To reduce some of the biases associated with the sampling weight were calculated for each respondent using demographic information obtained from the Census.

As this study focuses on the work commute, only participants who reported a recent commute trip (full- and part-time workers that did not exclusively telework) were retained. These respondents reported the modes used during



Figure 6: Regions surveyed in the CMS

media advertisement, the distribution of flyers, radio interviews, and a public opinion company.

The collected data underwent a thorough multi-step data-cleaning and validation procedure. The cleaning process used exclusion criteria based on participants' IP and e-mail addresses,

their most recent commute trip, and in the case of multiple modes, identified their main mode as the one covering the greatest distance. Participants rated their agreement with the reasons that influenced their mode choice (e.g., shorter travel time, more comfortable, able to be productive). Respondents provided their departure and arrival times within

5-minute intervals; from which we estimate their reported travel time. While we calculated travel times using a Google Maps API based on respondents' home and work location and their main mode of travel, we opted for using the reported travel time as it better represents the travel experience (Koslowsky, 1997; Valero et al., 2025). We excluded respondents if the discrepancy between their reported travel time and calculated travel time was 30 minutes or more, or if their reported travel time was greater than 105 minutes.

Regarding the main commute mode, light rail transit (LRT) and bus rapid transit (BRT) were combined into a single mode category, and streetcar (in Toronto) was combined with the bus category. Respondents were excluded for a given mode if fewer than 30 individuals reported using it in their region to ensure statistical rigor (e.g., we excluded the 18 participants with cycling as main mode in Saskatoon). This resulted in a final sample of 6,671 commuters

across 12 metropolitan regions. We subdivided our sample according to similar region population size and transit modes offered in each region. The survey covers three large regions with populations over two million: Toronto, Montréal, and Vancouver; three mid-size regions with populations over one million: Ottawa–Gatineau, Calgary, and Edmonton; and six smaller regions with populations under one million: Québec, Winnipeg, Hamilton, Halifax, Victoria, and Saskatoon. Based on mode availability and sufficient sample sizes, subway users are included only in large regions and LRT/BRT users only in mid-size regions, while cyclists, pedestrians, drivers, and bus users are included in all three regional subsets. The final subsample sizes used in analysis are 2,109 respondents in large regions, 1,923 respondents in mid-sized regions, and 2,639 respondents in small regions. Figure 8 shows the distribution of the sample in each region based on the home location and commute mode of the participants.

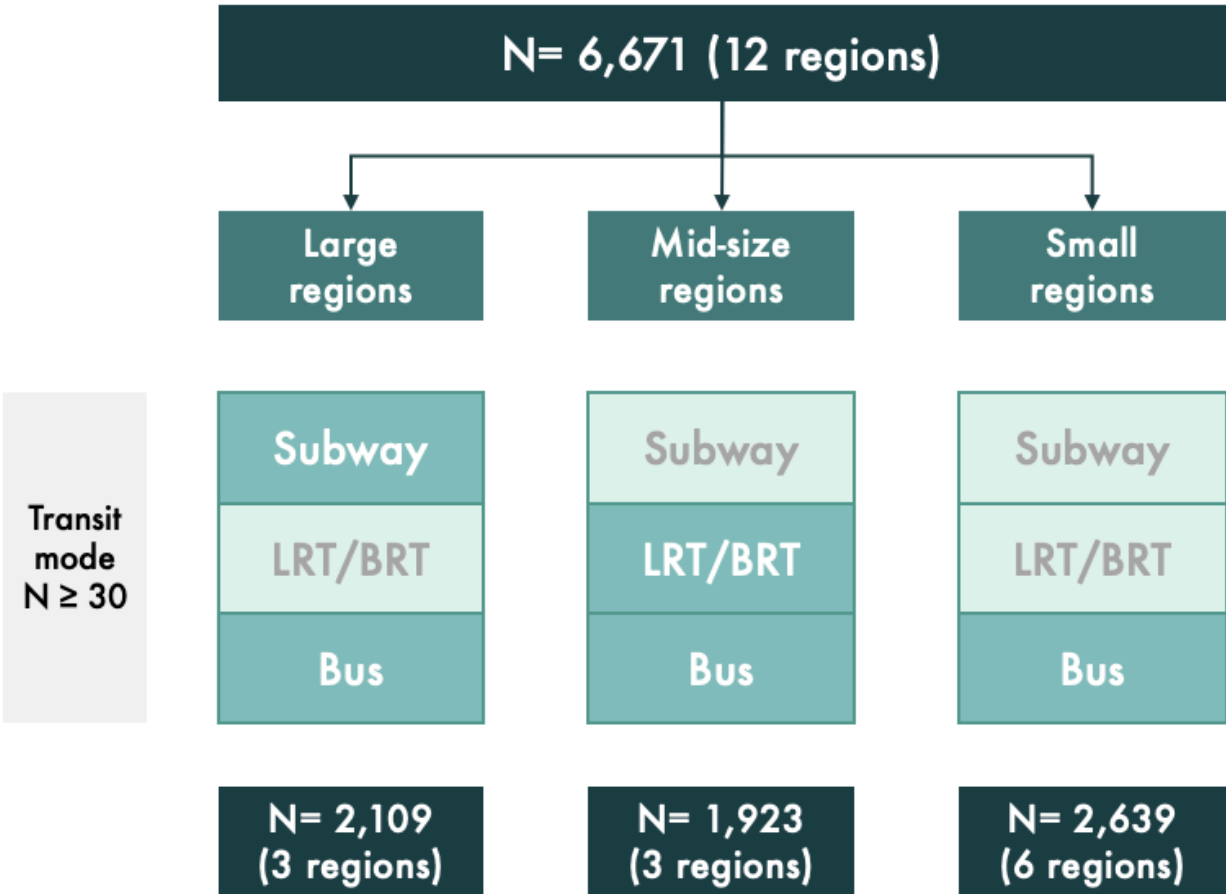
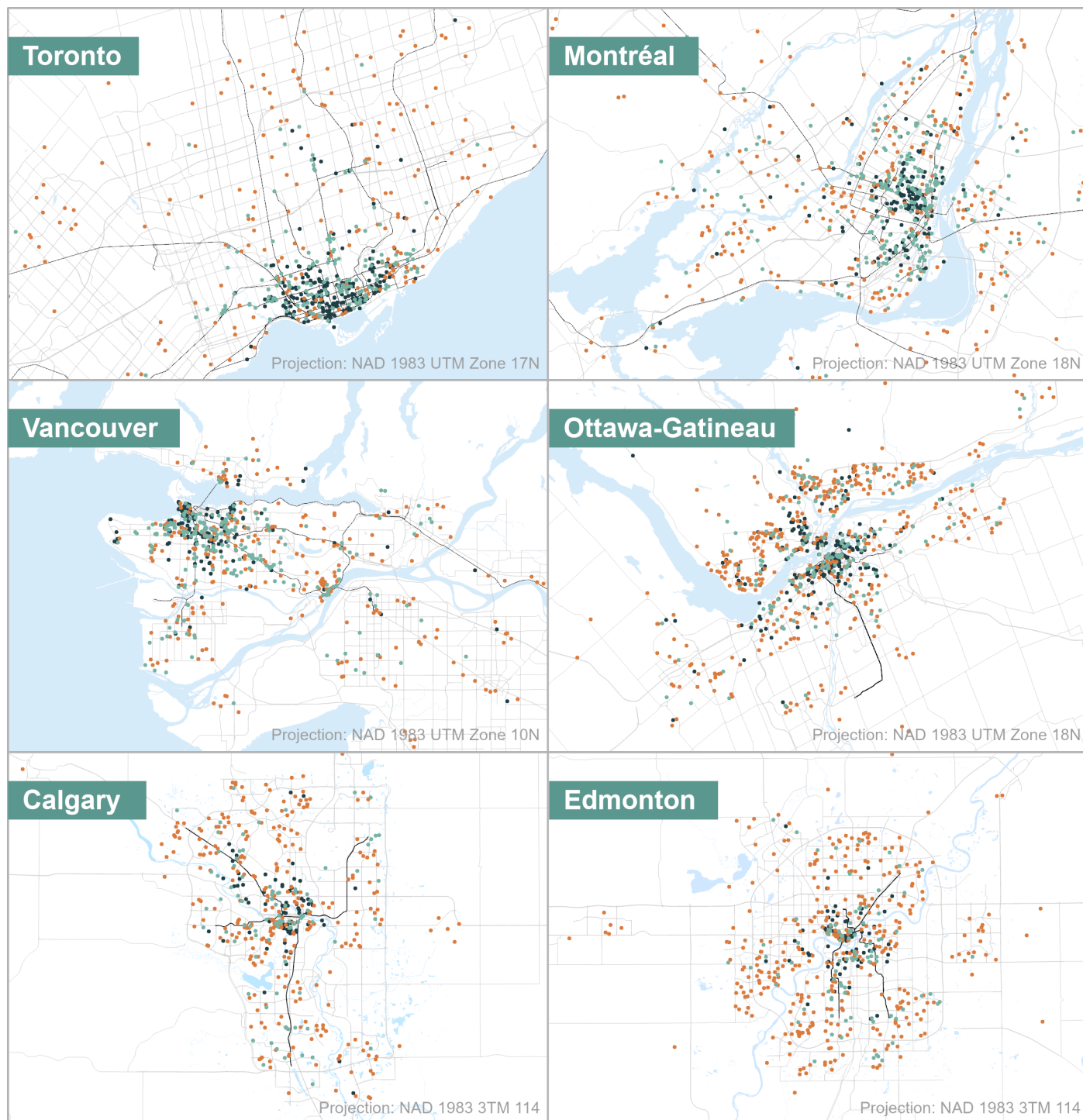


Figure 7: Data subsamples



Respondents' home location
Main commute mode

- Active
- Transit
- Car

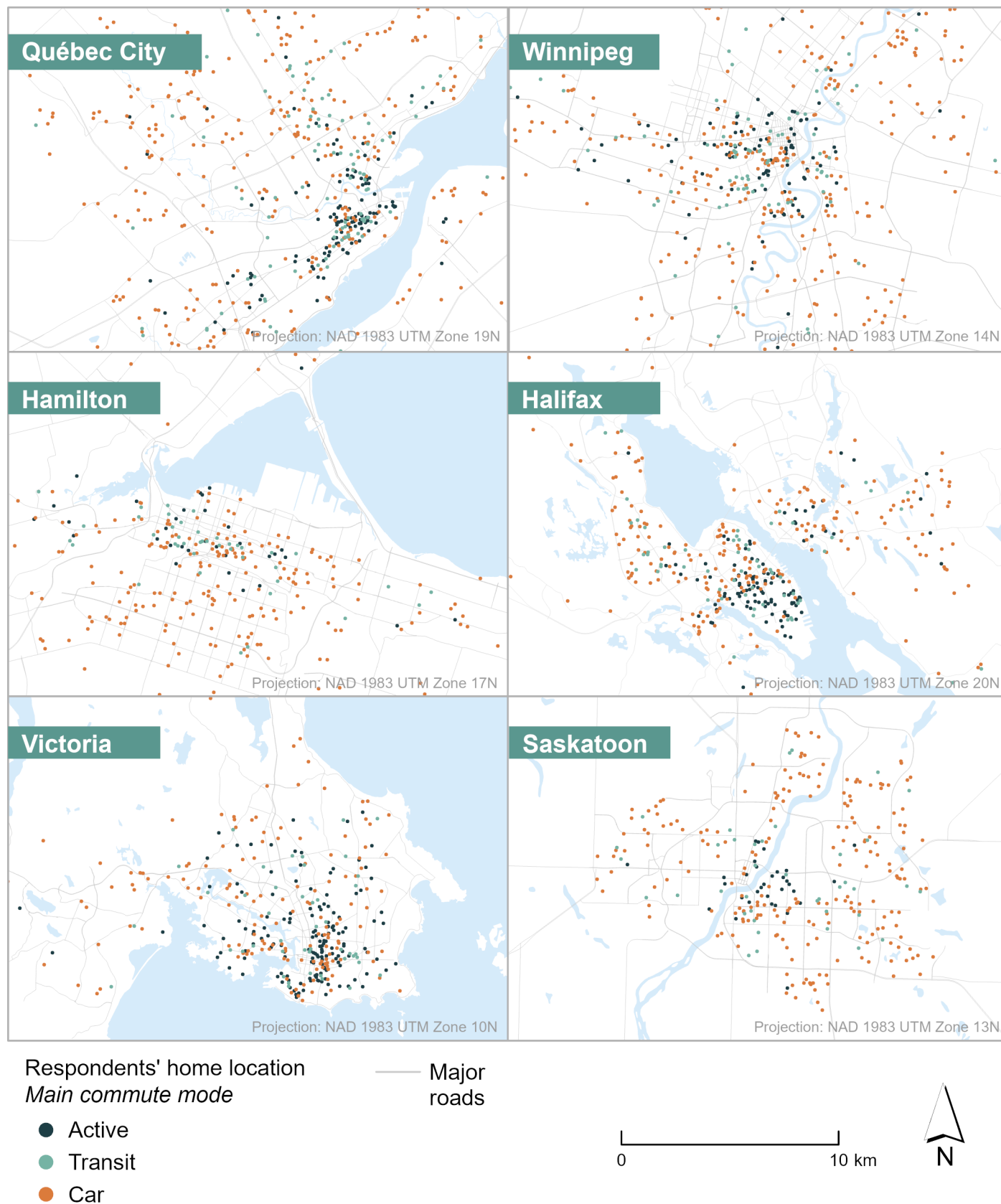
— Rapid transit network
— Major roads

0 10 20 km



Data Sources: Open Street Maps, TTC and Metrolinx (Toronto), ARTM and STM (Montreal), City of Calgary Transit (Calgary), OC Transpo (Ottawa), ETS (Edmonton), Translink (Vancouver), Statistics Canada, Survey data

Figure 8: Home location and main commute mode of respondents in large and mid-size regions



Data Sources: Open Street Maps, Statistics Canada, Government of Canada, Survey data

Figure 8 (continued): Home location and main commute mode of respondents in small regions

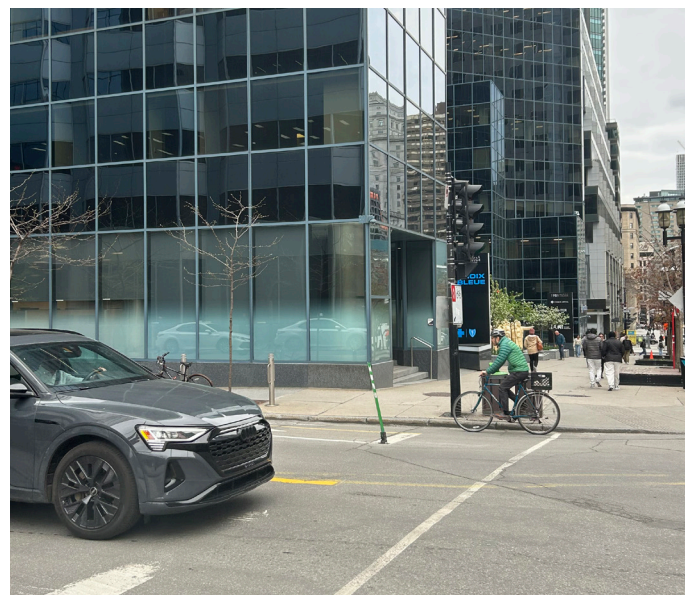
Methods

We examined health and well-being using self-rated questions about PH and MH and LiG on a five-point Likert scale from “very negatively” to “very positively”. Respondents were asked: “How does travelling to work using the selected mode(s) impact the following aspects?” and were prompted to rate the impact for their physical health” (PH), “mental health” (MH), and “life in general” (LiG). For each of the three variables, we ran three weighted logistic regressions, stratified by metropolitan region size, resulting in a total of nine models.

Ordered logit and probit models have been used in past travel satisfaction studies where survey responses provide ordinal data (Fielbaum & Tirachini, 2021; Mattson et al., 2021). However, we opted to adopt a binary approach due to small sample sizes within the most negative categories. We attempted to collapse these categories into variables with three or four levels rather than five; however, the ordered models continued to violate the parallel slopes assumption for key predictor variables or showed a lack of statistical difference between thresholds. As a result, we transformed our outcome variables into binary ones where “very negatively,” “negatively,” and “no impact” are coded as 0 and “positively” and “very positively” are coded as 1. We applied weights to the logistic regression models to account for potential sampling bias in the cleaned survey data. The weighting is calculated for all valid responses using the *anesrake* R package (Pasek, 2018), which follows an iterative ranking process (DeBell & Krosnick, 2009). The weights were calculated to match the census-tract information of age, income, gender, and commute mode obtained from Statistics Canada 2021 census (Statistics Canada, 2023) in addition to the latest commute mode share data retrieved from

Statistics Canada (2024).

Each statistical model examined the impact of main commute mode and travel duration while controlling for overall life satisfaction (for the LiG models) and overall health satisfaction (for the PH and MH models), reasons for mode choice, sociodemographic characteristics, and region of respondent. Reasons for mode choice, which are captured with binary indicators, included “It is better for the environment than other modes”, “I am more comfortable using this mode to travel than when using other modes”, “I am able to be productive on my journey”, “I have a shorter travel time than with other modes”, “It is cheaper than other modes”, and “Other modes don’t go where I need to go.” Mode choice reasons were removed from the models when they were insignificant across all subsample models. Sociodemographic characteristics included in all models were age, gender, income, number of days teleworking per week. Disability was included only in the models for PH, as it did not show statistical significance in any models for MH or LiG.



Results

Descriptive Statistics

Roughly two thirds of respondents across the three subsamples reported that their commute mode positively impacted their LiG (Table 5). Over half (56-59%) reported that their commute mode positively affected their MH, while for PH, fewer (46-55%) reported a positive impact. The average commute duration ranged from 26.0 minutes in small regions to 35.2 minutes in large regions.

More respondents drove to work in small regions (63%) and mid-size regions (60%) compared to large regions (42%). The share of transit users and active mode users was the highest in large regions with 19% taking the subway and 11% taking the bus or streetcar (30% total transit) and 17% cycling and 11% walking (28% total active). In small and mid-size regions, commuting by active modes made up a similar proportion (23% and 21%, respectively). Transit share was lowest overall in small regions with 14% commuting by bus. The most cited reason for mode choice across all regions was shorter travel time, followed by comfort and cost. Environmental concerns, other modes not going where one needs to go, and the ability to be productive were generally cited less.

Figure 9 presents descriptive plots of the relationship between commute mode and the three outcome variables across the three regional subsamples. Across regions of all sizes, more bicycle and walking commuters felt that their PH was positively impacted by their commute mode than transit and car commuters. Transit users more frequently rated

a positive impact on their PH than drivers across all subsamples, and agreement from subway and LRT/BRT users was more common than bus users in large and mid-size regions. For MH, more cyclists and pedestrians felt that their commute mode positively impacted their MH followed by drivers and transit users in all region types. The rated impact on LiG follows a similar pattern as MH, though slightly more subway users responded positively than car users in large regions. To further examine these relationships, we conducted multivariate statistical analyses, presented in the following section.



Table 5: Sample descriptive statistics (unweighted)

	Large (N= 2,109)		Mid-size (N= 1,923)		Small (N= 2,639)	
Physical health (positive)	1,167	55.3%	887	46.1%	1,246	47.2%
Mental health (positive)	1,227	58.2%	1080	56.2%	1,545	58.5%
Life in general (positive)	1,411	66.9%	1225	63.7%	1,735	65.7%
Independent variables						
Age	40.9	12.5	41.1	12.1	41.9	12.8
Gender (women)	1,127	53.4%	1,181	61.4%	1,592	60.3%
Disability	218	10.3%	235	12.2%	350	13.3%
Income						
Less than \$60k	315	14.9%	268	13.9%	528	20.0%
\$60k to \$120k	761	36.1%	703	36.6%	1,036	39.3%
More than \$120k	1,033	49.0%	952	49.5%	1,075	40.7%
Days teleworking	1.3	1.5	1.1	1.4	1.0	1.4
Satisfaction with life (0-10)	7.3	1.6	7.3	1.7	7.4	1.6
Satisfaction with health (0-10)	7.2	1.9	7.1	1.8	7.1	1.8
Main commute mode						
Car	893	42.3%	1,155	60.1%	1,657	62.8%
Bicycle	358	17.0%	245	12.7%	310	11.7%
Walk	221	10.5%	166	8.6%	295	11.2%
Bus or streetcar	229	10.9%	222	11.5%	377	14.3%
Subway	408	19.3%				
LRT or BRT			135	7.0%		
Commute duration (mins)	35.2	18.9	30.5	15.8	26	14.2
Reasons for mode choice						
Shorter travel time	1,419	67.3%	1,264	65.7%	1,773	67.2%
More comfortable	844	40.0%	844	43.9%	1,141	43.2%
Cheaper	857	40.6%	679	35.3%	851	32.2%
Better for environment	636	30.2%	454	23.6%	636	24.1%
Other modes don't go where I need to go	338	16.0%	323	16.8%	485	18.4%
Able to be productive	250	11.9%	210	10.9%	288	10.9%
Region						
Montréal	746	35.4%				
Toronto	684	32.4%				
Vancouver	679	32.2%				
Ottawa-Gatineau			870	45.2%		
Edmonton			569	29.6%		
Calgary			484	25.2%		
Québec					652	24.7%
Winnipeg					538	20.4%
Halifax					460	17.4%
Victoria					372	14.1%
Hamilton					314	11.9%
Saskatoon					303	11.5%

n (%); mean (SD)

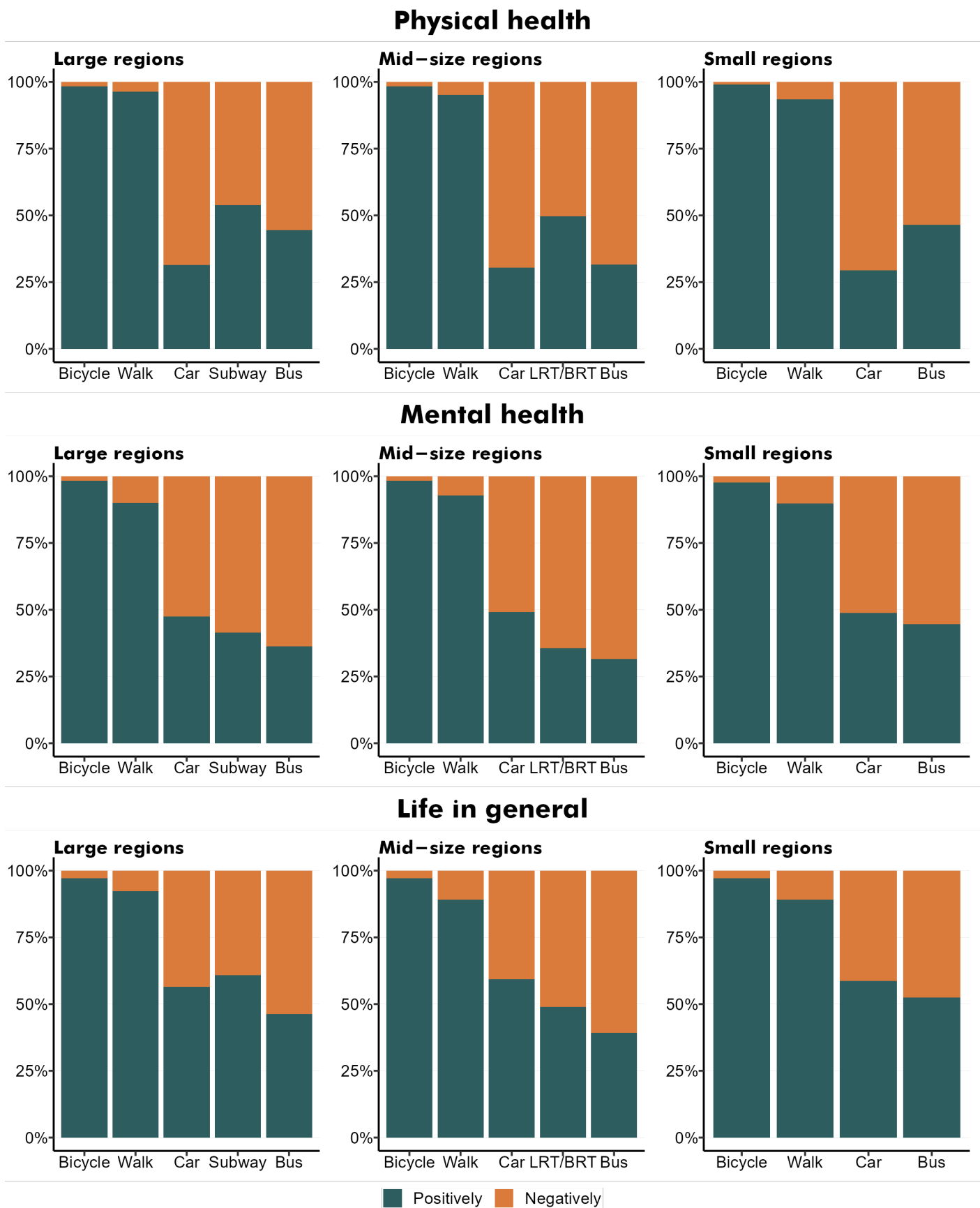


Figure 9: Respondents' self-assessment for the impact of commute mode on physical health, mental health, and life in general by region size

Statistical Model Results

This section presents the results of the weighted logistic regression models with commute mode impact on PH (Table 6), MH (Table 7), and LiG (Table 8). The R-squared values are the highest in the PH models with values between 0.376 and 0.343. For MH and LiG, the R-squared values are slightly lower, ranging from 0.246 to 0.313 and 0.220 to 0.279, respectively.

Across all regional models, commuting by active transport, especially cycling, is associated with significantly higher odds of reporting a positive impact of commute mode on PH compared to all other modes. Relative to drivers, cyclists in large, mid-size, and small regions have 55.3, 88.2, and 78.4 times higher odds, respectively, of reporting a positive impact on their PH, *ceteris paribus*. Walking to work was associated with high odds of deriving a positive impact from commuting on PH. Walking was associated with positive odds of perceiving PH ranging from 25.7 to 17.3 compared to driving across models, while holding all other variables at their mean values. Compared to driving, LRT/BRT use was associated with 2.1 times higher odds of positive PH in mid-size regions and subway use was associated with 1.9 times higher odds of positive PH in large regions, all else kept constant. Commuting by bus or streetcar was not significantly associated with PH in any of the models.

Active mode use was similarly associated with positive impacts on MH and LiG. In large, mid-size, and small regions, cyclists had 61.5, 27.6, and 9.4 times greater odds, respectively, for positive MH impacts than drivers, *ceteris paribus*. There was a positive relationship between cycling to work and LiG with an OR of 21.9 in large regions, 7.5 in mid-size regions, and 8.9 in small regions, compared to commuting by car, holding all other variables at their mean value. Walking to work was also associated with positive impacts on MH and LiG, though the magnitude of effect was smaller than cycling. For MH, odds increase by 5.3 times compared to those who drive in



large regions, 8.8 times mid-size regions, and 4.4 times in small regions, *ceteris paribus*. A similar pattern can be observed for LiG across all region sizes for those who walk to work (with the OR being 3.9 in large regions, 3.9 in mid-size regions, and 3.2 in small regions). While commuting by LRT/BRT and subway was associated with a positive perceived impact on PH compared to car use, all else equal, the associations with MH and LiG were not statistically significant. However, commuting by bus or streetcar was associated with a 48% reduction in odds for a positive impact on LiG compared to commuting by car in mid-size regions, with all other variables kept at their mean value.

Holding all other variables at their mean value, commute duration was associated with reduced odds for perceiving a positive impact on PH, MH and LiG in various regional sizes. Each additional 5 minutes of time spent commuting was associated with between 9% and 5% reduced odds for PH. For MH, the reduction in odds was between 10% and 11%, and for LiG, every 5 minutes was associated with between 15% and 12% lower odds. All else equal, each additional day spent working from home was associated with an 8% reduction in odds for PH in small regions, and in large regions, an 8% reduction in odds for MH and 13% reduction in odds for LiG.

The PH and MH models controlled for overall satisfaction with health. Higher satisfaction ratings with overall health were associated in all regions with greater odds for deriving a positive impact of commute mode on PH (OR around 1.2) and MH (OR around 1.1), *ceteris paribus*. Similarly, the models for LiG included a control variable for overall satisfaction with life which was positively associated with greater odds of positive impacts of commuting on LiG (OR between 1.2 and 1.3).

Holding other variables constant, in terms of reasons for mode choice, agreeing that environmental reasons and comfort were important factors in mode choice were associated with positive impacts of commute mode on PH, MH, and LiG. The ability to be productive was associated with greater odds for PH and, in some cases, MH and LiG. Valuing shorter travel time was associated with greater odds of positive impact on LiG in large and mid-size regions and MH in large regions but was associated with reduced odds of PH in small regions. Lower cost was in some cases associated with higher odds for PH and LiG, while agreement that other modes don't go where one needs was sometimes associated with lower odds for MH and LiG, *ceteris paribus*.

Older age was associated with positive PH and MH effects from commuting with between 1% to 2% increased odds for each additional year across the region subsamples, holding all other variables at their mean. Women tended to feel more positively about their commute mode impacting their LiG (ORs between 1.5 and 1.2) and MH (ORs ranging from 1.4 to 1.5), *ceteris paribus*, but gender was not statistically significant for perceived PH impacts. Disability was associated with greater odds for positive impacts on PH with all other variables constant with ORs between 1.8 and 2.1, but disability was not included in MH and LiG models due to lack of statistical significance.

Region dummies were included in all models and were in some cases statistically significant. For MH, a positive relationship was observed in Québec City, indicating commuters in Québec City have higher odds of reporting positive MH

impacts relative to commuters in Hamilton, all else equal. Positive and statistically significant effects were found for Montréal, Québec City, and Victoria regarding LiG, suggesting higher odds than commuters in Hamilton. Commuters in Montréal exhibited higher odds of positive impacts on LiG compared to commuters in Toronto.



Table 6: Physical health weighted logistic regression model

Physical health	Large regions (N= 2,109)		Mid-size regions (N= 1,923)		Small regions (N= 2,639)	
Predictors	OR	CI (95%)	OR	CI (95%)	OR	CI (95%)
(Intercept)	0.07***	(0.04–0.14)	0.04***	(0.02–0.09)	0.06***	(0.03–0.11)
Age	1.01*	(1.00–1.02)	1.02***	(1.01–1.02)	1.02***	(1.01–1.03)
Gender (Women)	1.15	(0.94–1.41)	1.16	(0.94–1.45)	0.97	(0.80–1.16)
Disability	1.98***	(1.44–2.72)	1.76***	(1.27–2.45)	2.11***	(1.61–2.76)
Income (ref. Above \$120k)						
\$60k to \$120k	1.50***	(1.19–1.91)	1.43**	(1.12–1.82)	1.36**	(1.10–1.68)
Less than \$60k	2.28***	(1.75–2.99)	1.89***	(1.39–2.57)	1.57***	(1.23–2.00)
Days teleworking	0.98	(0.91–1.05)	0.97	(0.89–1.06)	0.92*	(0.85–0.98)
Satisfaction with health (0-10)	1.16***	(1.10–1.22)	1.20***	(1.13–1.28)	1.16***	(1.10–1.22)
Main mode (ref. Car)						
Bicycle	55.33***	(21.70–192.03)	88.22***	(28.64–458.05)	78.40***	(27.09–355.58)
Walk	25.65***	(12.20–63.22)	20.31***	(9.68–48.74)	17.28***	(9.35–34.60)
Bus or streetcar	1.52	(0.96–2.39)	0.97	(0.58 – 1.59)	1.31	(0.85–1.99)
Subway	1.90***	(1.33–2.71)				
LRT or BRT			2.10**	(1.22–3.60)		
Commute duration (5 mins)	0.94***	(0.91–0.97)	0.95*	(0.91–1.00)	0.91***	(0.88–0.95)
Reasons for mode choice						
Better for environment	2.37***	(1.58–3.56)	1.85**	(1.21–2.83)	4.73***	(3.22–7.05)
More comfortable	1.85***	(1.49–2.29)	1.64***	(1.31–2.07)	1.74***	(1.43–2.12)
Able to be productive	1.47*	(1.06–2.03)	2.06***	(1.46–2.92)	1.53**	(1.16–2.03)
Cheaper	1.13	(0.86–1.49)	1.29	(0.96–1.73)	1.38*	(1.03–1.83)
Shorter travel time	1.09	(0.86–1.38)	0.86	(0.66–1.10)	0.74**	(0.59–0.92)
Region						
Toronto (ref.)						
Montréal	1.08	(0.84–1.38)				
Vancouver	0.95	(0.74–1.21)				
Edmonton (ref.)						
Calgary			0.91	(0.70 – 1.20)		
Ottawa			0.87	(0.68 – 1.13)		
Hamilton (ref.)						
Halifax					1.11	(0.79–1.56)
Victoria					1.33	(0.96–1.86)
Québec					0.7	(0.48–1.03)
Winnipeg					1.15	(0.82–1.60)
Saskatoon					1.34	(0.93–1.92)
R ² Tjur	0.343		0.344		0.376	

* p<0.05 ** p<0.01 *** p<0.001

Table 7: Mental health weighted logistic regression model

Mental health	Large regions (N= 2,109)		Mid-size regions (N= 1,923)		Small regions (N= 2,639)	
Predictors	OR	CI (95%)	OR	CI (95%)	OR	CI (95%)
(Intercept)	0.20***	(0.11–0.38)	0.12***	(0.06–0.24)	0.22***	(0.12–0.39)
Age	1.01***	(1.01–1.02)	1.02***	(1.01–1.03)	1.01***	(1.00–1.02)
Gender (Women)	1.37**	(1.12–1.67)	1.51***	(1.23–1.86)	1.13	(0.96–1.34)
Income (ref. Above \$120k)						
\$60k to \$120k	1.23	(0.98–1.55)	1.30*	(1.04–1.64)	1.16	(0.95–1.40)
Less than \$60k	1.30	(1.00–1.70)	1.14	(0.85–1.52)	1.34**	(1.08–1.68)
Days teleworking	0.92*	(0.85–0.99)	0.98	(0.91–1.06)	0.98	(0.93–1.05)
Satisfaction with health (0-10)	1.12***	(1.07–1.18)	1.12***	(1.06–1.19)	1.08***	(1.03–1.13)
Main mode (ref. Car)						
Bicycle	61.54***	(19.04–364.61)	27.57***	(10.77–95.95)	9.39***	(4.77–20.84)
Walk	5.33***	(3.03–9.97)	8.78***	(4.35–19.88)	4.38***	(2.66–7.50)
Bus or streetcar	0.70	(0.43–1.11)	0.69	(0.42–1.11)	0.76	(0.51–1.12)
Subway	0.74	(0.52–1.06)				
LRT or BRT			0.84	(0.48–1.45)		
Commute duration (5 mins)	0.89***	(0.87–0.92)	0.90***	(0.86–0.93)	0.89***	(0.86–0.92)
Reasons for mode choice						
Better for environment	2.14***	(1.44–3.20)	1.78**	(1.17–2.72)	4.55***	(3.11–6.78)
More comfortable	2.46***	(2.01–3.03)	1.91***	(1.54–2.36)	2.37***	(1.99–2.83)
Able to be productive	1.86***	(1.33–2.61)	2.38***	(1.66–3.46)	1.30	(0.99–1.71)
Shorter travel time	1.26*	(1.00–1.58)	1.22	(0.96–1.56)	1.09	(0.89–1.33)
Other modes don't go where I need to go	0.74*	(0.58–0.94)	0.82	(0.63–1.05)	1.14	(0.94–1.40)
Region						
Toronto (ref.)						
Montréal	1.26	(0.98–1.61)				
Vancouver	1.13	(0.89–1.43)				
Edmonton (ref.)						
Calgary			1.01	(0.78–1.30)		
Ottawa			1.11	(0.87–1.42)		
Hamilton (ref.)						
Halifax					1.13	(0.83 – 1.54)
Victoria					1.98***	(1.47 – 2.68)
Québec					1.30	(0.94 – 1.81)
Winnipeg					1.22	(0.91 – 1.65)
Saskatoon					1.27	(0.92 – 1.77)
R ² Tjur	0.313		0.266		0.246	

* p<0.05 ** p<0.01 *** p<0.001

Table 8: Life in general weighted logistic regression model

Life in general	Large regions (N= 2,109)		Mid-size regions (N= 1,923)		Small regions (N= 2,639)	
Predictors	OR	CI (95%)	OR	CI (95%)	OR	CI (95%)
(Intercept)	0.26***	(0.13–0.50)	0.11***	(0.05–0.23)	0.27***	(0.15–0.49)
Age	1.00	(0.99–1.01)	1.02***	(1.01–1.03)	1.00	(1.00–1.01)
Gender (Women)	1.46***	(1.19–1.79)	1.75***	(1.43–2.16)	1.19*	(1.00–1.41)
Income (ref. Above \$120k)						
\$60k to \$120k	1.27 *	(1.00–1.61)	1.46**	(1.16–1.84)	1.33**	(1.09–1.62)
Less than \$60k	1.71 ***	(1.29–2.28)	1.3	(0.96–1.75)	1.29*	(1.03–1.62)
Days teleworking	0.87***	(0.81–0.94)	1.00	(0.92–1.08)	0.98	(0.92–1.05)
Satisfaction with life (0-10)	1.26***	(1.19–1.33)	1.20***	(1.13–1.28)	1.17***	(1.11–1.23)
Main mode (ref. Car)						
Bicycle	21.91***	(8.36–77.90)	7.47***	(3.50–18.28)	8.90***	(4.21–21.92)
Walk	3.91***	(2.09–7.92)	3.90***	(1.96–8.55)	3.24***	(1.92–5.65)
Bus or streetcar	0.86	(0.53–1.37)	0.52**	(0.31–0.84)	0.82	(0.54–1.22)
Subway	1.28	(0.89–1.84)				
LRT or BRT			0.78	(0.45–1.35)		
Commute duration (5 mins)	0.85***	(0.82–0.88)	0.88***	(0.85–0.92)	0.86***	(0.83–0.89)
Reasons for mode choice						
Better for environment	1.92**	(1.26–2.94)	1.82**	(1.19–2.82)	3.07***	(2.07–4.62)
More comfortable	2.17***	(1.75–2.69)	1.64***	(1.32–2.04)	2.33***	(1.94–2.79)
Able to be productive	1.16	(0.82–1.64)	2.21***	(1.51–3.28)	1.50**	(1.12–2.02)
Cheaper	1.23	(0.93–1.64)	1.37*	(1.01–1.85)	0.95	(0.72–1.26)
Shorter travel time	1.47**	(1.16–1.85)	1.42**	(1.12–1.81)	1.15	(0.94–1.41)
Other modes don't go where I need to go	0.78*	(0.61–0.99)	0.70**	(0.54–0.90)	1.10	(0.90–1.36)
Region						
Toronto (ref.)						
Montréal	1.39*	(1.08–1.80)				
Vancouver	1.26	(0.99–1.61)				
Edmonton (ref.)						
Calgary			1.06	(0.81–1.37)		
Ottawa			1.14	(0.89–1.46)		
Hamilton (ref.)						
Halifax					1.22	(0.90–1.66)
Victoria					2.06***	(1.51–2.80)
Québec					1.49*	(1.07–2.08)
Winnipeg					1.15	(0.85–1.54)
Saskatoon					1.14	(0.82–1.59)
R ² Tjur	0.279		0.229		0.220	

* p<0.05 ** p<0.01 *** p<0.001

Discussion

The positive association observed between active commuting, particularly cycling, and PH, MH, and LiG is corroborated by previous literature (Fan et al., 2025; Fordham et al., 2018; Humphreys et al., 2013; Wild & Woodward, 2019). The strongest positive impacts of cycling and walking were observed for the self-assessed impact on PH, consistent with previous literature showing positive associations between active commuting and both subjective and objective health outcomes (Celis-Morales et al., 2017; Humphreys et al., 2013). While consistently positive, the effect of walking to work was weaker than cycling across all three outcome variables in all region sizes. This may be due to a lower level of intensity of physical activity from walking compared to cycling (Celis-Morales et al., 2017). Taken together, these findings suggest that policies that encourage active commuting may help integrate physical activity into daily routines, with potential perceived health benefits for workers. Commuters frequently cite lack of safe pedestrian and cycling routes as a barrier to adopting active modes (Oja et al., 1998; Shannon et al., 2006), suggesting the need for investment into reconfiguring transport systems to be favourable to active travel which can encourage shifts in commuting behaviour (Panter et al., 2016).

Subway and LRT/BRT as main commute modes were associated with greater odds for positive PH impacts compared to driving. This aligns with previous research that has shown that walking to transit can contribute to meeting daily physical activity recommendations (Freeland et al., 2013; Wasfi et al., 2013). Taking the bus or streetcar to work, however, did not provide a statistically significant difference from driving in terms of perceived PH benefits. This is likely due to generally higher proximity of bus stops



that requires less walking compared to subway trips (El-Geneidy et al., 2014; Morency et al., 2011). Commuting by bus was associated with negative feelings about its impact on one's LiG in mid-size regions. This finding aligns with previous research showing that bus users have low commute satisfaction in general (Eriksson et al., 2013) and suggests the presence of a negative spillover effect from the experience of commuting by bus to overall well-being. Improving bus services through increased reliability and comfort may reduce or eliminate these adverse effects experienced by users. Alternatively, rapid transit options such as subway, LRT, or BRT can provide better service that people are willing to walk farther to use (Sarker et al., 2019), offering built-in physical activity accessing and egressing stations and providing better self-assessed impact of the commute on quality of life.

Commute duration was consistently associated with reduced odds of positive impacts on PH, MH, and LiG. The relationship was more pronounced with LiG and MH, which is in line with previous literature suggesting that long commute times can interfere with time available for leisure or family, reducing overall

SWB (Barreck & Marchand, 2025; Clark et al., 2020). The negative association of commute duration with perceived PH aligns with previous findings from Rüger et al. (2017) who found that the adverse effects of longer commutes on health-related quality of life could be attributed to stress responses. Another possible explanation is that commuting can account for a significant proportion of daily exposure for all types of mode users to air pollution caused by motor vehicle combustion engines (Knibbs et al., 2011), and these risks may be perceived by commuters and may influence travel behaviour (Fan et al., 2021). Despite the observed negative influence of commute time across well-being outcomes, slower modes (i.e. walking and cycling) were associated with the greatest positive impacts, suggesting the importance of improving the quality of in-commute time over a singular focus on speed of commute. Planning for better accessibility by cycling and walking as well as public transit can reduce the travel time burden of commuters and support more satisfactory travel.

Telecommuting was, in some cases, associated with negative outcomes. The impact of commuting on MH and LiG suffered with more days worked from home in large regions. This may suggest that those who prefer not

to commute may self-select more frequently into hybrid working arrangements, which cause them to find days where they must commute unpleasant, though this hypothesis remains largely unexplored. Teleworking more frequently was associated with perceiving a negative impact of one's commute on PH for workers in small regions. These findings warrant further investigation into the effects of the hybrid working model on commuters self-assessed impacts of the commute on health and well-being.

Satisfaction with commute can be affected by travel-related attitudes (Manaugh & El-Geneidy, 2013; Ye & Titheridge, 2017); therefore, accounting for these preferences avoids overestimating the impact of travel mode on perceived health and well-being outcomes. Generally, placing value on environmental sustainability of one's commute mode was associated with better odds for PH, MH, and LiG. This relationship may be driven by psychological benefits associated with engaging in a commute that aligns with one's values. Preferences towards experiential qualities of modes such as comfort and the ability to be productive tended to be significant and positive, consistent with previous findings (Smith, 2017; St-Louis et al., 2014)

Previous studies indicate mixed results regarding the effect of gender with several studies indicating lower commute satisfaction and higher sensitivity to commute stressors among women (Clark et al., 2020; Singleton, 2019). In contrast, our models show that in nearly all cases, women had higher odds of reporting positive impacts of their commute mode on their MH and LiG. Further research is needed to unpack the mechanisms that underpin these gendered differences. The slight positive associations with age for PH and MH aligns with previous literature that shows slightly higher travel satisfaction with age (St-Louis et al., 2014). Interestingly, individuals with disabilities had higher odds of deriving a positive impact of their commute mode on their PH, but greater understanding is needed to explain transport-related health impacts for these individuals.



Conclusion

This study examined the self-assessed impact of commute mode on physical health (PH), mental health (MH), and life in general (LiG) using a large sample of commuters in small, mid-size, and large metropolitan regions across Canada. The findings show that the journey to work can have significant implications for commuters' self-assessed health and well-being. Commute mode and duration emerged as important factors that can influence PH, MH, and LiG. Despite the negative influence of longer commutes, active modes of walking and cycling which are typically slower in speed were linked to the most positive outcomes. Cyclists in particular benefited most from their commute mode across all health and well-being outcomes. Subway and LRT/BRT commuters saw PH benefits, while bus commuters in mid-size regions were prone to reduced odds of a positive impact from their commute on LiG compared to drivers. These findings suggest that planning for improved accessibility via active modes, including connections with

transit, can enhance the quality of commutes which supports the health and well-being of workers.

While this study provided insights into the self-assessed impacts on health and well-being of commuting by various modes, several limitations exist. Our analysis was conducted based on the main mode of commuters; however disaggregated trip diaries with detailed questions pertaining to each mode would provide a more accurate assessment, particularly regarding the findings related to different transit modes and PH outcomes. Future studies may seek to employ objective measures of health status or additional well-being metrics to complement the binary self-assessed measures used in this analysis. Finally, observed relationships regarding gender, disability, and hybrid working arrangements should be the object of future research and may benefit from a qualitative interview-based approach.



Conclusion:

Commuting Matters

This Supervised Research Project examined the perceived impacts of commuting across different domains of work performance, health, and well-being using large-scale survey data from 12 Canadian metropolitan regions. Across both chapters, the findings underscore that commuting is not a neutral transition between home and work. Commute mode and commute duration emerged as consistent factors associated with how individuals perceive their functioning at work and their health and well-being, with sociodemographic characteristics and reasons for mode choice also playing a role.

Active commuters—particularly cyclists—generally had the highest odds for positive work and health and well-being outcomes, though drivers tended to be better off in terms of punctuality to work. Transit users—especially those who take the bus to work—generally had the lowest odds of expressing positive impacts on all aspects of their work performance as well as their life in general. Those who used rapid transit modes such as subway, LRT, or BRT were more likely to feel positive physical health benefits than drivers. Differences across transit modes further suggest that not all forms of transit are experienced equally and may confer certain advantages or disadvantages over driving, given that rapid transit (Subway, LRT/BRT) was perceived more positively for physical health, but negatively for performance at work. All else being equal, longer commutes were negatively associated with all measures of work performance and health and well-being.

This research contributes to a more comprehensive understanding of how the experience of commuting can shape perceptions of performance at work and the health and well-being of Canadian workers. These findings suggest that planning for improved accessibility via active modes including connections with high-quality transit can enhance the quality of commutes which can support more favourable work and well-being outcomes for Canadian workers.

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