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Commuting matters: Association between work travel and perceived health and well-being in Canada☆

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ABSTRACT

Beyond its functional role, commuting can have far-reaching consequences on the health and well-being of workers. This study examines the relationship between commute mode choice and physical health (PH), mental health (MH), and life in general (LiG) using data from the Canadian Mobility Survey (N = 6,671). We estimate weighted logistic regression models, accounting for commute duration, reasons for mode choice, sociodemographic characteristics, and concurrent life and health satisfaction. Results show that cycling and walking to work were associated with better PH, MH, and LiG than driving. Rapid transit users reported better PH, while bus commuters had lower odds for LiG than drivers. Overall, the findings highlight that commuting experiences are linked to multiple dimensions of well-being. Policies that prioritize active commuting and improve the quality and accessibility of public transit may contribute to better physical, mental, and overall well-being of commuters.

1. 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 min 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 min 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

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study contributes to the literature by exploring the direct association between commuting and perceptions of health and well-being.

This study examines the association between commute mode choice and perceived physical health (PH) and mental health (MH) and life in general (LiG), while distinguishing individual commute modes, including different forms of public transit, across metropolitan contexts of different sizes in Canada. For the analysis, we rely on a subset of the Canadian Mobility Survey (CMS), which is a nationwide survey conducted in 2024 across 12 Canadian metropolitan regions (N = 15,962). The survey collects data on participants' commuting behaviour and perceived 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 disaggregated commute mode-specific perceived relationships across diverse regions, 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.

2. 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. 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 (Olsson et al., 2013).

Given the existing literature, this study makes several empirical contributions. Our findings are based on commute-specific indicators of perceived PH, MH, and LiG, while most previous studies relied on measures of only general well-being as dependent variables. Furthermore, we control for concurrent satisfaction with life and health as well as attitudes towards mode choice, which enables us to more accurately estimate the association between commute-specific characteristics and satisfaction. Secondly, we expand the findings of the past studies that focused on general categories of transportation modes by distinguishing the association between different types of public transit modes and well-being. Lastly, we analyze the relationships between commute modes and well-being in regions of different sizes, enhancing the relevance of findings to diverse geographic contexts.

3. 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 (Fig. 1). The CMS collected data about commuting behaviour, well-being ratings, 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 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 focused only on completed questionnaires (8,508 incomplete responses removed), and used exclusion criteria based on repeated participants' IP (400 responses dropped) and e-mail addresses (181 responses excluded), invalid location pins of home, like outside of a metropolitan region, or on a water body (385 responses removed), location of work and/or school outside of the CMA, or invalid, like on a bridge (354 responses dropped), and survey completion time, measured as the top 5% response speed (1,315 responses removed). 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 their most recent commute trip, and in the case of multiple modes, identified their main mode as the one covering the greatest distance. Participants reported their agreement with the reasons that influenced their mode choice (e.g., shorter travel time, more comfortable, able to be productive) through a series of "Yes/No" choices. At the same time, participants reported satisfaction with health and life using an ordinal scale ranging from 0 to 10, with the lower value corresponding to lower satisfaction. Responses to the main dependent variables – self-reported impacts of commute on PH and MH and LiG using a five-point Likert scale ranging from "*very negatively*" to "*very positively*".

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 min or more, or if their reported travel time was greater than 105 min.

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[1] 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. Fig. 2 shows the distribution of the sample in each region based on the home location and commute mode of the participants.

4. 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. The decision to stratify data by regions was guided by the existing differences in transit infrastructure, service levels, and the built environment, and to produce meaningful policy-relevant estimates of the association between commute modes and well-being.

Ordered logit and probit models have been used in past travel satisfaction studies where survey responses provide ordinal data

[1] In this study, subway includes the SkyTrain that serves Metro Vancouver.



Fig. 1. Regions surveyed in the CMS.

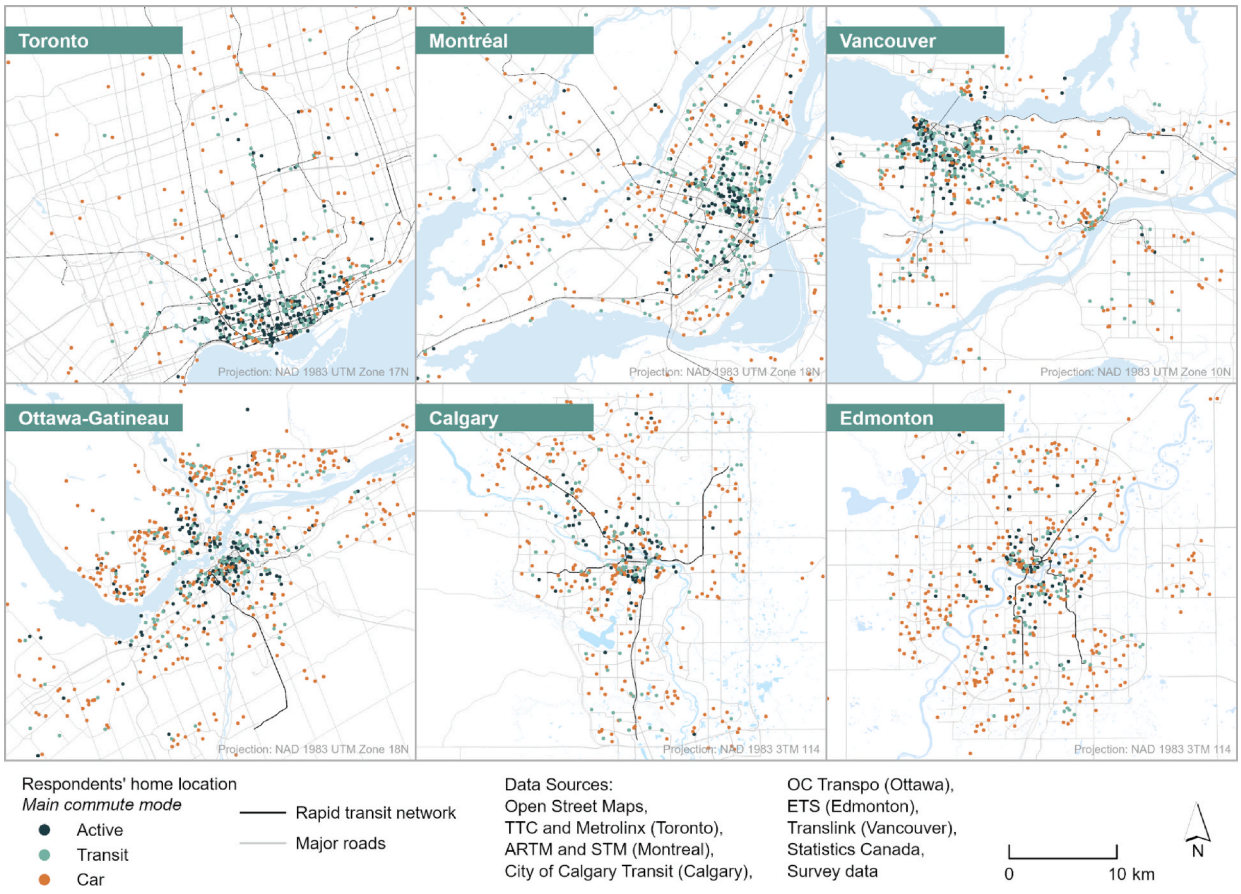


Fig. 2. Home location and main commute mode of respondents in large and mid-size regions.

(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

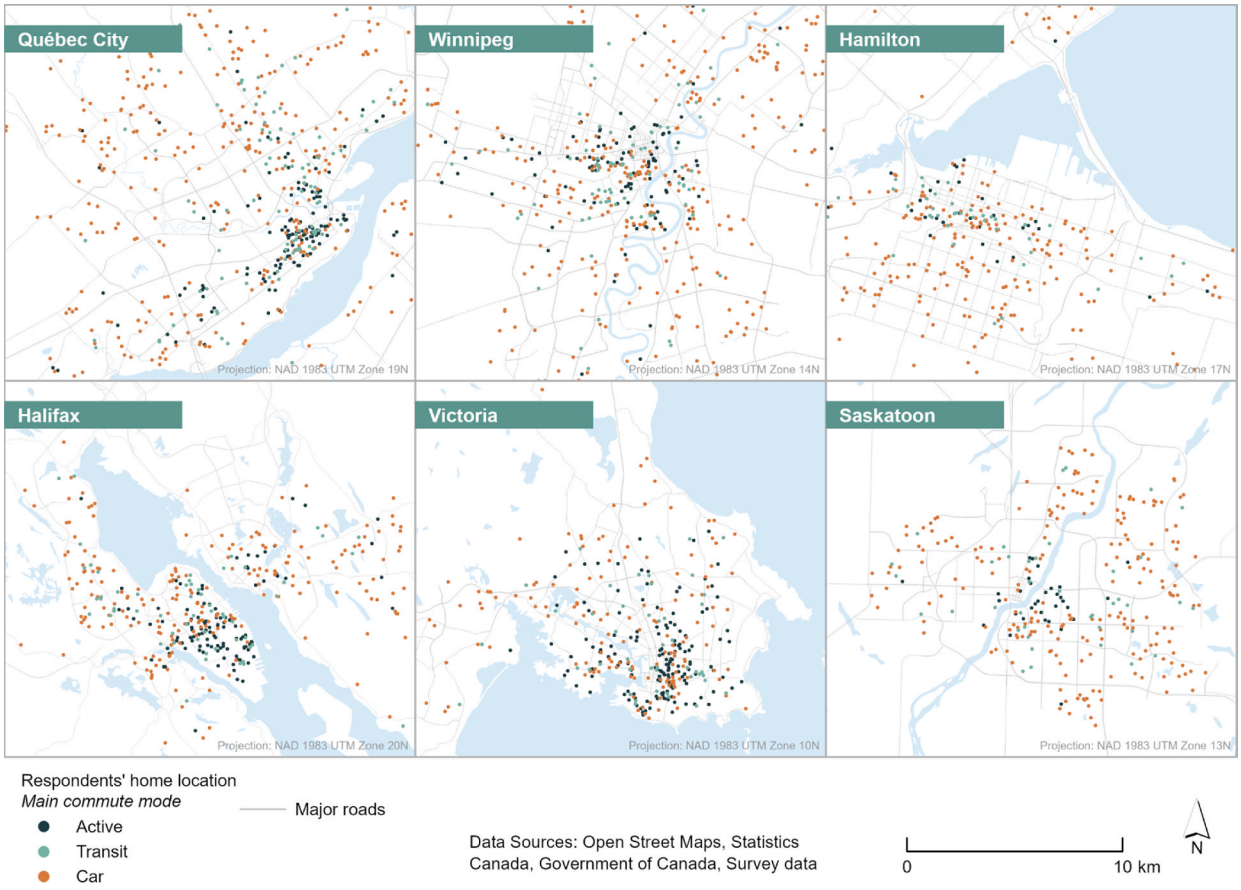


Fig. 2. (*continued*).

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 weights were calculated for all valid responses using the anesrake R package (Pasek, 2018), which follows an iterative proportional ranking process without trimming (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). In practice, this means that we used the latest official data on demographic shares at the census tract level and CMA-level shares on mode choice to calculate the weights for the analysis, particularly accounting for the commuting information overlapping with the CMS, rather than the 2021 Census transportation reporting collected during the COVID-19 pandemic, and thus heavily influenced by the dominance of the work-from-home policies. Since public transit and active modes shares were only reported as aggregate categories by Statistics Canada, we evenly distributed them across respective modes. Table A1 in the Appendix illustrates how the weighting process allowed the study sample to be more representative of the population. The robustness of the estimates was further confirmed by estimating a series of Firth penalized logistic regressions that reflected the general pattern of the coefficients produced by weighted logistic regressions. We also estimated models without respondents who selected the neutral response category as a sensitivity test, and confirmed the stability of the observed coefficients and their magnitude. As such, only results of the weighted logistic regressions are reported in the paper.

Each statistical model examined the association between the 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." Variables that represented motivations for the mode choice were included as attitudinal controls, in line with the prior research that suggested confounding of the relationship between commute mode and well-being (Manaugh & El-Geneidy, 2013; Ye & Titheridge, 2017). For example, people who prioritize comfort or environmental sustainability in their mode choices may report higher well-being independently of the transport mode. Controlling for these preferences allows us to reduce confounding from the association between outcomes and underlying attitudes. A potential downside of this approach is that

some mode choice reasons could function as mediators rather than confounders, like choosing walking or biking, reinforcing environmental attitudes over time, and resulting in over-control bias for the mode variables. To assess this, we estimated a set of models without mode choice reasons as a sensitivity test, which produced implausibly large odds ratios for active modes, suggesting substantial residual confounding by underlying attitudes and preferences. As such, we retained mode choice reasons as attitudinal controls, while acknowledging that the observed effect of modes might represent the conservative level of estimates. Mode choice reasons were removed from the models when they were insignificant across all subsample models. Furthermore, for the consistency of the analysis, we retained all mode choice controls that were statistically significant for at least one geographic category for a given outcome. 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.

5. Results

5.1. Descriptive statistics

Roughly two thirds of respondents across the three subsamples reported that their commute mode positively impacted their LiG (Table 1). 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 min in small regions to 35.2 min 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

Table 1
Subsample 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 $60 k	315	14.9%	268	13.9%	528	20.0%
$60 k to $120 k	761	36.1%	703	36.6%	1,036	39.3%
More than $120 k	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	26.0	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)					

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.

Fig. 3 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.

5.2. Statistical model results

This section presents the results of the weighted logistic regression models of association between commute mode and PH (Table 2), MH (Table 3), and LiG (Table 4). 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 0.245 to 0.311 and 0.220 to 0.230, 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 (or 80.2%, 79.7%, and 82% predicted probabilities). 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 (probabilities ranging from 65.2% to 50.2%), 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.

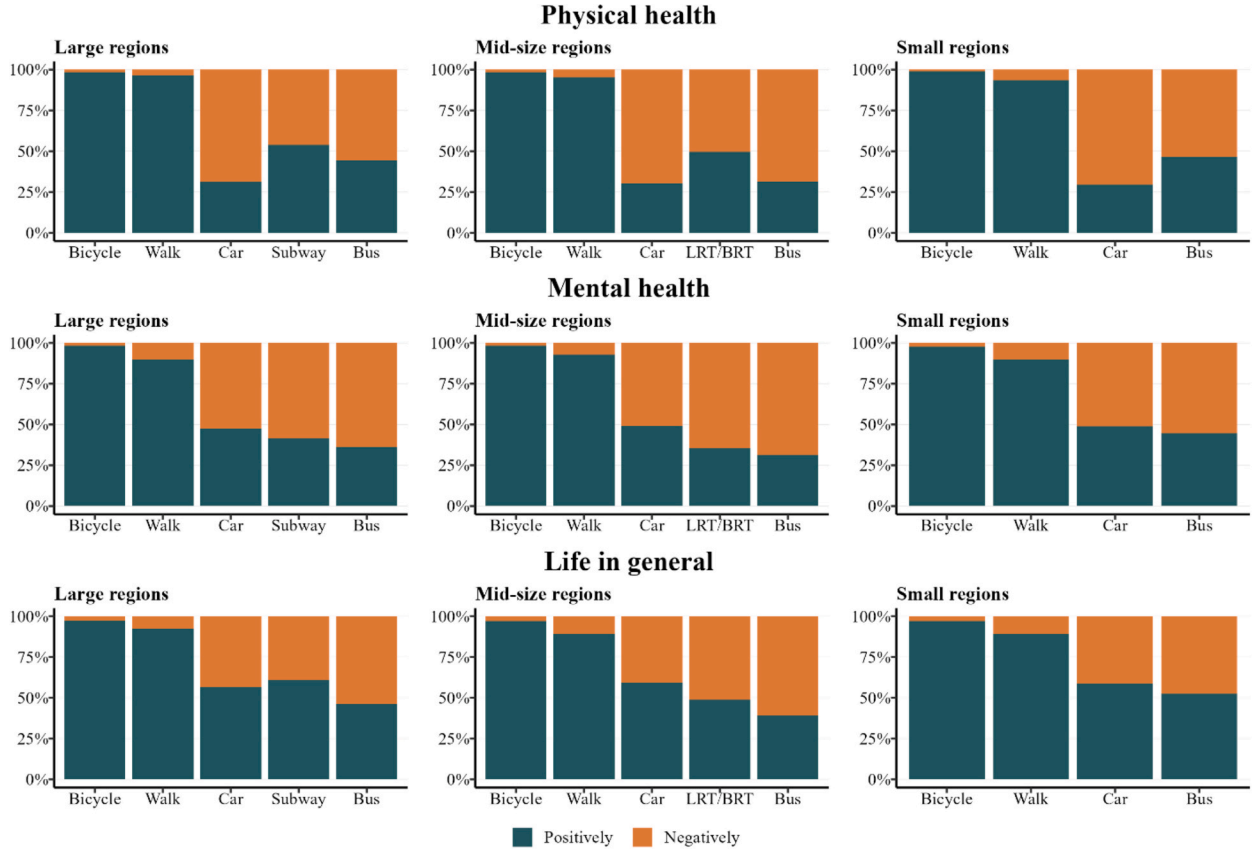


Fig. 3. Respondents' self-assessment for the impact of commute mode on physical health (PH), mental health (MH), and life in general (LiG) by region size.

Table 2
Physical health (PH) weighted logistic regression models.

	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 ***	(0.03—0.19)	0.04 ***	(0.02—0.11)	0.06 ***	(0.03—0.13)
Age	1.01 †	(1.00—1.02)	1.02 **	(1.00—1.03)	1.02 ***	(1.01—1.03)
Gender (Women)	1.15	(0.88—1.52)	1.16	(0.88—1.53)	0.97	(0.77—1.22)
Disability	1.98 **	(1.28—3.07)	1.76 **	(1.15—2.70)	2.11 ***	(1.48—3.01)
Income (ref. Above $120 k)						
Less than $60 k	2.28 ***	(1.54—3.37)	1.89 **	(1.22—2.94)	1.57 **	(1.13—2.18)
$60 k to $120 k	1.50 **	(1.13—2.00)	1.43 *	(1.08—1.89)	1.36 *	(1.06—1.74)
Days teleworking	0.98	(0.89—1.08)	0.97	(0.88—1.08)	0.92 *	(0.85—0.99)
Satisfaction with health (0–10)	1.16 ***	(1.07—1.25)	1.20 ***	(1.10—1.30)	1.16 ***	(1.08—1.24)
Main mode (ref. Car)						
Bicycle	55.33 ***	(17.02—179.94)	88.22 ***	(25.72—302.57)	78.40 ***	(21.90—280.65)
Walk	25.65 ***	(9.84—66.85)	20.31 ***	(8.21—50.25)	17.28 ***	(7.64—39.06)
Bus or streetcar	1.52	(0.88—2.61)	0.97	(0.56—1.68)	1.31	(0.83—2.06)
Subway	1.90 **	(1.26—2.86)				
LRT or BRT			2.10 *	(1.15—3.81)		
Commute duration (5 mins)	0.94 ***	(0.90—0.97)	0.95 †	(0.91—1.00)	0.91 ***	(0.87—0.95)
Reasons for mode choice						
Better for environment	2.37 ***	(1.51—3.72)	1.85 **	(1.16—2.94)	4.73 ***	(2.91—7.69)
More comfortable	1.85 ***	(1.38—2.47)	1.64 ***	(1.23—2.18)	1.74 ***	(1.36—2.23)
Able to be productive	1.47 †	(0.98—2.22)	2.06 ***	(1.35—3.16)	1.53 *	(1.07—2.20)
Cheaper	1.13	(0.79—1.62)	1.29	(0.90—1.86)	1.38 †	(0.96—1.97)
Shorter travel time	1.09	(0.79—1.50)	0.86	(0.62—1.18)	0.74 *	(0.56—0.97)
Region						
Toronto (ref.)						
Montréal	1.08	(0.77—1.51)				
Vancouver	0.95	(0.67—1.33)				
Edmonton (ref.)						
Calgary			0.91	(0.66—1.28)		
Ottawa-Gatineau			0.87	(0.63—1.22)		
Hamilton (ref.)						
Halifax					1.11	(0.73—1.69)
Québec					1.33	(0.88—2.01)
Victoria					0.7	(0.44—1.13)
Winnipeg					1.15	(0.76—1.72)
Saskatoon					1.34	(0.85—2.09)
R^2 Tjur	0.343		0.344		0.376	
			† $p < 0.10$ * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$			

Active mode use was similarly associated with positive impacts on MH and LiG. In large, mid-size, and small regions, cyclists had 62.1, 27.1, and 9.4 times greater odds, respectively, for positive MH impacts than drivers, ceteris paribus (or 93.8%, 79.8%, and 69% probabilities). There was a positive relationship between cycling to work and LiG with an OR of 23.1 in large regions, 8.6 in mid-size regions, and 8.7 in small regions, compared to commuting by car, holding all other variables at their mean value (probabilities of 86.4%, 48.5%, and 69.9%, respectively). 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 5.1 times (55.5% probability) compared to those who drive in large regions, 8.3 times (54.6% probability) mid-size regions, and 4.3 times (50.3% probability) 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 4.2 (53.5% probability) in large regions, 4.5 (32.9% probability) in mid-size regions, and 3.2 (45.8% probability) 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 min 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 min 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

Table 3
Mental health (MH) weighted logistic regression models.

	Large regions (N = 2,109)		Mid-size regions (N = 1,923)		Small regions (2,639)	
Predictors	*OR*	*CI (95%)*	*OR*	*CI (95%)*	*OR*	*CI (95%)*
(Intercept)	0.24 **	(0.10—0.60)	0.15 ***	(0.06—0.33)	0.24 ***	(0.12—0.48)
Age	1.01 *	(1.00—1.02)	1.02 ***	(1.01—1.03)	1.01 *	(1.00—1.02)
Gender (Women)	1.36 *	(1.04—1.78)	1.49 **	(1.16—1.92)	1.13	(0.91—1.40)
Income (ref. Above $120 k)						
Less than $60 k	1.3	(0.88—1.91)	1.13	(0.74—1.72)	1.34 †	(0.99—1.81)
$60 k to $120 k	1.24 †	(0.93—1.65)	1.32 *	(1.01—1.72)	1.16	(0.92—1.46)
Days teleworking	0.92	(0.84—1.01)	0.98	(0.89—1.08)	0.98	(0.91—1.06)
Satisfaction with health (0–10)	1.12 **	(1.04—1.21)	1.12 **	(1.05—1.20)	1.08 *	(1.02—1.15)
Main mode (ref. Car)						
Bicycle	62.18 ***	(25.05—154.32)	27.12 ***	(8.63—85.24)	9.41 ***	(3.27—27.06)
Walk	5.10 ***	(2.58—10.07)	8.26 ***	(3.39—20.18)	4.28 ***	(2.31—7.95)
Bus or streetcar	0.64	(0.38—1.09)	0.63 †	(0.39—1.02)	0.73	(0.48—1.11)
Subway	0.73	(0.49—1.10)				
LRT or BRT			0.8	(0.45—1.42)		
Commute duration (5 mins)	0.89 ***	(0.86—0.93)	0.89 ***	(0.85—0.94)	0.89 ***	(0.85—0.92)
Reasons for mode choice						
Better for environment	2.09 ***	(1.35—3.22)	1.76 *	(1.09—2.85)	4.56 ***	(2.90—7.19)
More comfortable	2.53 ***	(1.91—3.34)	1.96 ***	(1.51—2.54)	2.41 ***	(1.93—3.01)
Able to be productive	1.86 **	(1.22—2.82)	2.37 ***	(1.48—3.80)	1.3	(0.92—1.83)
Other modes don't go where I need to go	0.74 †	(0.53—1.03)	0.81	(0.59—1.11)	1.14	(0.88—1.48)
Region						
Toronto (ref.)						
Montréal	1.27	(0.92—1.75)				
Vancouver	1.14	(0.82—1.60)				
Edmonton (ref.)						
Calgary			1.01	(0.73—1.39)		
Ottawa-Gatineau			1.13	(0.83—1.54)		
Hamilton (ref.)						
Halifax					1.13	(0.78—1.66)
Québec					1.99 ***	(1.38—2.87)
Victoria					1.3	(0.85—1.97)
Winnipeg					1.22	(0.85—1.76)
Saskatoon					1.27	(0.84—1.91)
R^2 Tjur	0.311		0.264		0.245	

† $p < 0.10$ * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

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% and 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 1.7 and 1.2) and MH (ORs ranging from 1.1 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.

6. 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 association between cycling and walking was 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

Table 4
Life in general (LiG) weighted logistic regression models.

	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)	0.27 **	(0.11—0.70)	0.11 ***	(0.04—0.27)	0.27 ***	(0.13—0.57)
Age	1	(0.99—1.01)	1.02 ***	(1.01—1.03)	1	(0.99—1.01)
Gender (Women)	1.44 **	(1.10—1.90)	1.74 ***	(1.34—2.25)	1.19	(0.96—1.48)
Income (ref. Above $120 k)						
Less than $60 k	1.70 *	(1.12—2.60)	1.31	(0.86—2.00)	1.29	(0.95—1.75)
$60 k to $120 k	1.27	(0.94—1.71)	1.46 **	(1.11—1.92)	1.33 *	(1.05—1.69)
Days teleworking	0.87 **	(0.79—0.96)	1	(0.91—1.10)	0.98	(0.91—1.06)
Satisfaction with life (0–10)	1.26 ***	(1.15—1.37)	1.20 ***	(1.11—1.30)	1.17 ***	(1.10—1.25)
Main mode (ref. Car)						
Bicycle	23.12 ***	(10.40—51.40)	8.57 ***	(2.97—24.74)	8.68 ***	(2.82—26.77)
Walk	4.20 ***	(2.04—8.63)	4.45 ***	(2.09—9.47)	3.17 ***	(1.66—6.05)
Bus or streetcar	0.89	(0.53—1.51)	0.59 *	(0.36—0.96)	0.8	(0.53—1.19)
Subway	1.35	(0.89—2.05)				
LRT or BRT			0.91	(0.52—1.58)		
Commute duration (5 mins)	0.85 ***	(0.82—0.89)	0.89 ***	(0.85—0.93)	0.86 ***	(0.83—0.90)
Reasons for mode choice						
Better for environment	2.06 **	(1.22—3.49)	2.00 **	(1.23—3.24)	3.02 ***	(1.92—4.76)
More comfortable	2.19 ***	(1.64—2.93)	1.68 ***	(1.29—2.19)	2.32 ***	(1.84—2.94)
Able to be productive	1.17	(0.70—1.95)	2.18 **	(1.33—3.57)	1.49 *	(1.01—2.21)
Shorter travel time	1.46 *	(1.06—2.00)	1.44 *	(1.07—1.94)	1.15	(0.90—1.47)
Other modes don't go where I need to go	0.78	(0.56—1.08)	0.70 *	(0.51—0.96)	1.1	(0.85—1.43)
Region						
Toronto (ref.)						
Montréal	1.39 *	(1.00—1.91)				
Vancouver	1.26	(0.90—1.78)				
Edmonton (ref.)						
Calgary			1.06	(0.76—1.47)		
Ottawa-Gatineau			1.15	(0.84—1.57)		
Hamilton (ref.)						
Halifax					1.23	(0.84—1.79)
Québec					2.07 ***	(1.43—3.00)
Victoria					1.49 †	(0.97—2.31)
Winnipeg					1.15	(0.80—1.64)
Saskatoon					1.15	(0.76—1.73)
R^2 Tjur	0.230		0.226		0.220	

† $p < 0.10$ * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

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 perceived impact of travel mode on perceived health and well-being outcomes. Generally, placing value on the 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 were associated with 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 a positive relationship between their commute mode and their PH, but greater understanding is needed to explain transport-related health impacts for these individuals.

7. Conclusion

This study examined the association between commute mode and self-assessed 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 suggest 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 are most likely to benefit from their commute mode across all health and well-being outcomes. Subway and LRT/BRT commuting might be associated with PH benefits, while bus commuters in mid-size regions were associated with 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 potentially enhance the quality of commutes, which is more likely to support 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. Furthermore, while the inclusion of mode choice reasons in the models allowed for correcting for attitudinal confounding, the cross-sectional nature of the data could still be subject to endogeneity, as respondents' reasons for mode choice could be influenced by the same perceptions of well-being captured by the outcome variables. Likewise, it is possible that the commute mode self-selection was not fully accounted for with the available set of controls. Potential solutions to these challenges would be the use of longitudinal data and/or a quasi-experimental research design. Future studies may also 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.

CRediT authorship contribution statement

Andie Heck: Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Formal analysis. **Hisham Negm:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Bogdan Kapatsila:** Writing – review & editing, Validation, Methodology, Formal analysis. **Jonas De Vos:** Writing – original draft, Visualization, Validation, Supervision, Methodology, Formal analysis, Conceptualization. **Ahmed El-Geneidy:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix

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Table A1
Sample raw, weighted, and Census target distributions of the demographic and mode categories used for weighting.

	Large (N = 2,109)			Mid-size (N = 1,923)			Small (N = 2,639)		
	Raw	Weig.	Target	Raw	Weig.	Target	Raw	Weig.	Target
Age	40.9	40.8	41.1	41.1	41.6	39.5	41.9	42.0	41.8
Gender (women)	53.4%	49.8%	51.1%	61.4%	49.6%	50.6%	60.3%	52.3%	50.1%
Income									
Less than $60 k	14.9%	24.2%	34.0%	13.9%	18.3%	26.3%	20.0%	25.0%	32.7%
$60 k to $120 k	36.1%	33.0%	38.0%	36.6%	35.0%	37.4%	39.3%	38.7%	35.6%
Above $120 k	49.0%	42.8%	28.0%	49.5%	46.6%	36.3%	40.7%	36.2%	31.7%
Main comm. mode									
Car	42.3%	70.3%	70.5%	60.1%	77.6%	81.9%	62.8%	82.0%	81.2%
Bicycle	17.0%	7.8%		12.7%	6.3%		11.7%	5.1%	
Walk	10.5%	5.2%		8.6%	4.8%		11.2%	5.6%	
Active total	27.5%	13.7%	7.1%	21.3%	11.1%	5%	22.9%	10.7%	7.2%
Bus or streetcar	10.9%	5.7%		11.5%	6.8%		14.3%	7.3%	
Subway	19.3%	10.8%							
LRT or BRT				7.0%	4.5%				
Public transit total	30.2%	16.5%	21.8%	18.5%	11.3%	11.2%	14.3%	7.3%	10.4%

Data availability

The data that has been used is confidential.

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