

Measuring the impacts of the Réseau express métropolitain (REM)

Progress Report 2019–2023



EST SUD
EAST SOUTH
La Prairie / New York
2,5 km

EST SUD
EAST SOUTH
Varenes
La Prairie / New York
2,5 km

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All photos and maps used in this report have been sourced from the Transportation Research at McGill (TRAM) lab.

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Territorial Acknowledgment

We would like to acknowledge that McGill University is located on unceded Indigenous lands. Tiohtià:ke/Montréal has long served as a site of meeting and exchange amongst Indigenous peoples, including the Kanien'kehà:ka of the Haudenosaunee Confederacy, Huron/Wendat, Abenaki, and Anishinaabeg, among others. TRAM recognizes and respects these nations as the traditional stewards of the lands and waters. We respect the continued relationship these diverse Indigenous peoples have with the territory upon which we now gather.

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Summary

The Réseau express métropolitain (REM), a new light-rail system in Montréal, opened its first branch of service from Downtown to the South Shore in Summer 2023, with three more branches to open between 2024 and 2027. This 67-km light-rail network is expected to have major impacts on residents across the Montréal metropolitan region, providing a unique opportunity to study the outcomes of a major public transport investment in the Canadian context. This report complements [the one published in 2023 \[1\]](#), which provided an overview of the first three waves of surveys conducted by the Transportation Research at McGill (TRAM) Group and Sphere lab in the fall of 2019 (wave one), 2021 (wave two), and 2022 (wave three). This report integrates data from the fourth wave of the survey, conducted in Fall 2023 after the opening of the first branch of the REM, providing insights into changes in travel behaviour and quality of life. The surveys form a part of the multiyear project titled “Impacts of the new Réseau express métropolitain (REM) on mobility, health and equity: A pre-post intervention study,” funded through the federal government’s Collaborative Health Research Projects (CHRP) program. This report documents the methodology used for the surveys and provides a summary of the findings from waves one (N= 3,533), wave two (N= 4,063), wave three (N= 4,065), and wave four (N= 5,312).

Key findings

- In terms of **travel behaviour**, transit use increased by 39%, active-mode use increased by 11%, and car use decreased by 9% in 2023 compared to 2022. These changes represent an accelerating recovery for sustainable mobility after the repercussions of COVID-19 seen in 2021 and 2022.
- After the opening of the South Shore branch, **intentions to use the REM** around future stations decreased by 8 percentage points for commuting trips and increased by 10 percentage points for shopping purposes.
- Previous survey waves highlighted that significantly more men intended to use the REM than women. Current South Shore REM use shows a fairly equal split of ridership between men and women.
- The two **main purposes** for which the South Shore REM was used were work (30% of users) and leisure (28% of users).
- When deciding to commute using the REM, shorter travel time was the most frequently reported factor (44% of commuters).
- REM commuters reported one of the highest **levels of satisfaction** with their health, second only to cyclists.

Sommaire

Le Réseau express métropolitain (REM), un nouveau système de métro léger automatisé à Montréal, a ouvert sa première branche de service entre le centre-ville et la Rive-Sud à l'été 2023, la mise en service des trois autres branches étant prévue entre 2024 et 2027. Ce réseau de 67 km devrait avoir un impact majeur à travers la région métropolitaine de Montréal, offrant une occasion inédite pour étudier les résultats d'un investissement majeur en transport en commun dans le contexte canadien. Ce rapport suit [celui publié en 2023 \[1\]](#), qui résumait les trois premières vagues d'enquêtes menées par le groupe de recherche en transport de l'Université McGill (TRAM) et le Sphere Lab à l'automne 2019 (première vague), 2021 (deuxième vague) et 2022 (troisième vague). Ce rapport intègre les données de la quatrième vague de l'enquête, menée à l'automne 2023 après l'ouverture de la première branche du REM, donnant un aperçu des changements dans les comportements de déplacement et la qualité de vie des Montréalais. Les sondages font partie d'un projet continu intitulé « Les impacts du nouveau Réseau express métropolitain (REM) sur la mobilité, la santé et l'équité : une étude pré- et post-intervention » financé par le programme de Projets de recherche concertée sur la santé (PRCS) du gouvernement fédéral. Ce rapport documente la méthodologie utilisée pour les enquêtes et fournit un aperçu des résultats tirés des vagues un (N= 3533), deux (N= 4063), trois (N= 4065) et quatre (N= 5312).

Principaux résultats

L'utilisation des transports en commun a augmenté de 39 %, celle des modes actifs de 11 % et celle de la voiture a diminué de 9 % en 2023 par rapport à 2022. Ces changements démontrent la reprise de la mobilité durable après les répercussions de COVID-19 observées en 2021 et 2022.

Suite à l'ouverture de la branche Rive-Sud, les intentions d'utiliser le REM autour des futures stations ont diminué de 8 pourcents pour le navettage et augmenté de 10 pourcents pour le magasinage.

Les vagues d'enquête précédentes ont mis en évidence que les hommes étaient beaucoup plus nombreux que les femmes à avoir l'intention d'utiliser le REM. L'utilisation actuelle du REM de la Rive-Sud montre une répartition assez égale entre les hommes et les femmes.

Les deux principaux motifs d'utilisation du REM de la Rive-Sud sont le travail (30% des usagers) et les loisirs (28 % des usagers).

Une durée de trajet réduite est le facteur le plus fréquemment cité par les navetteurs ayant choisi d'utiliser le REM (44%).

Les navetteurs utilisant le REM se sont déclarés parmi les plus satisfaits de leur santé, juste derrière les cyclistes.





1 Introduction

In 2018, the Caisse de dépôt et placement du Québec (CDPQ) began constructing the Réseau express métropolitain (REM), a fully automated, 67-kilometer light-rail network in the Montréal region. When complete in 2027, the \$8 billion project will link numerous suburbs and the Montréal-Trudeau International Airport to the Montréal downtown with frequent, high-speed rail service (Figure 1.1). The project is planned to open in several phases: the first branch to the South Shore, which started operation in Summer 2023; the second two branches opening by the end of 2024; and the final branch to the airport expected to open in 2027.

As one of the largest public-transit investments currently being built in North America, this state-of-the-art, universally accessible light-rail network is expected to fundamentally alter travel and land-use patterns across the Montréal region. The REM's construction is already impacting local built-environments and travel behaviour [2-4], with additional impacts projected over the coming decades on the health and wellbeing of residents. In addition to positive impacts on the health of local populations [5-8], public transit improvements have been associated with environmental [9, 10], social [11-13], and economic benefits [14, 15].

Due to the considerable impacts that the construction of the REM is having on the metropolitan area, there is a need to understand people's changing perceptions and behaviour before, during, and after the project's implementation. For this purpose, the Montréal Mobility Survey has been implemented as a multi-wave data collection process which intends to provide longitudinal insights into respondents' perceptions of the REM's impact,

and therefore improve overall understanding of such infrastructure developments. A total of four waves of surveys have been collected so far: wave one during the months of October and November of 2019, wave two in October and November of 2021, wave three in October and November 2022, and wave four in October and November 2023.

The surveys were administered in the Montréal Census Metropolitan Area (CMA) to participants of 18 years of age and older, including a total of 3,533 valid responses in wave one, 4,063 valid responses in wave two, 4,065 valid responses in wave three, and 5,312 valid responses in wave 4. Recruitment for each wave was done directly by the TRAM team through online and in-person methods, and additional recruitment was undertaken by the Leger market-research agency.

In addition to collecting multiple waves of data, the Montréal Mobility Survey includes the collection of a panel dataset, which includes people who answered at least two waves of the survey. The longitudinal and panel design of the Montréal Mobility Survey has become particularly relevant since the outbreak of the COVID-19 pandemic. This report makes use of the substantial data collected by the team before (2019), during (2021-2022), and after (2023) the COVID-19 pandemic to control for the effects of the pandemic on travel behaviour.

Due to construction delays, the opening of the first branch of the REM was postponed from 2021 to 2023. Construction impacts, perceptions and intentions of using the REM were the main focus of wave 2 and 3 of the survey. The collection of wave 4, after the opening of the first branch of the REM that links Downtown Montréal to the

South shore, allowed for the assessment of the actual impacts of the REM's operation on health, wellbeing, and travel behaviour for its users.

This report focuses on the collection, validation, and analysis of waves one to four of the Montréal Mobility Survey. Section two presents a detailed description of the survey methods, including the recruitment, data-cleaning, and validation processes. Section three presents the sample's demographic characteristics and spatial distribution. Section four details general travel behaviour and telecommuting patterns. Section five examined the intention to use the REM in

areas where it is not operating yet. Section six examines the travel behaviour of participants located in the South Shore with the availability of the REM in the area. Section seven presents the impact of the REM on quality of life for users in the South Shore, in addition to their satisfaction with their health. The evidence generated from these longitudinal assessments will be relevant to policies in the Montréal CMA, where future REM extensions are being studied, and beyond, as other regions weigh similar investments to promote health, travel, environmental, social, and economic objectives.



REM stations ○

1 - Brossard	10 - Ville de Mont-Royal	19 - Grand-Moulin
2 - Du Quartier	11 - Côte-de-Liese	20 - Deux-Montagnes
3 - Panama	12 - Montpellier	21 - Des Sources
4 - Île-des-Soeurs	13 - Du Ruisseau	22 - Fairview-Pointe-Claire
5 - Griffintown-Bernard-Landry	14 - Bois-Franc	23 - Kirkland
6 - Central Station	15 - Sunnybrooke	24 - L'Anse-à-l'Orme
7 - McGill	16 - Pierrefonds-Roxboro	25 - Marie-Curie
8 - Édouard-Montpetit	17 - Île-Bigras	26 - YUL-Aéroport-Montréal-Trudeau
9 - Canora	18 - Sainte-Dorothée	

— REM - operating

— Metro

Data Sources:

0 2.5 5 10 Km



— REM - under construction

— Commuter train

CDPQ Infra, STM

Figure 1.1 Réseau express métropolitain (REM) line and stations

2 Recruitment and Validation Methods

2.1 Recruitment

Recruitment of wave four participants was performed between October and November 2023. Similar to the recruitment strategies used for the first three waves of the survey, various recruitment techniques recommended by Dillman et al. [16] were employed to ensure the representativeness of the sample. Two URLs were used to circulate the survey and recruit participants in English and French: www.mobilitymontreal.ca and www.mobilite-montreal.ca. While all respondents filled out the survey online, recruitment was performed by the TRAM team using both in-person and online methods. In-person methods included the distribution of bilingual flyers advertising the survey around operating REM stations in the South Shore. Online methods included recruitment through paid advertisements on Facebook and Instagram for people within the Montréal CMA, with a focus on people within half a mile (around 800 meters) of REM stations. Figure 2.1 shows the digital flyers used to advertise on these platforms. Additionally, recruitment of the panel sample was done by contacting all participants of previous waves who provided their e-mail addresses to invite

them to participate in wave four. As in all previous waves, to complement recruitment done directly by the TRAM team, additional recruitment was performed by Leger, a company specializing in public opinion and surveys in Canada. The company contacted respondents from their proprietary stable of potential survey respondents who live in areas surrounding existing and future REM stations. Recruitment for the panel sample was also done by Leger by contacting the same respondents who answered at least one previous wave of the survey.

Since emails from Leger respondents were not available to the TRAM team, a unique identifier (or “token”) was created for each respondent and was used to link responses from panel respondents. Table 2.1 presents a summary of the pre-validation responses recruited by TRAM and Leger for all four waves.

Table 2.1 TRAM and Leger total recruitment (pre-validation)

Recruited by	Wave 1	Wave 2	Wave 3	Wave 4
TRAM	3,675	4,670	4,147	7,281
Leger	2,267	2,317	2,275	1,613
Total	5,942	6,987	6,422	8,894

In keeping with best practices for survey recruitment [16], incentives were employed to encourage participation in the survey. The following prizes were advertised to respondents and distributed based on a draw after finishing data collection:

- 1 x iPad Air
- 1 x Fitbit Smart Watch
- 4 x Kindle Paperwhite
- 1 x Apple Airpods
- 1 x Samsung Galaxy Buds
- 8 x Echo Dot Smart Speaker
- 2 x Bose Portable Speakers
- 4 x EBODA Portable Speakers
- 4 x Fire TV Stick 4K Max

2.2 Data validation

A thorough data-cleaning procedure was applied to the four waves of the Montréal Mobility Survey. The cleaning process was subdivided into several sequential steps, each of which constituted a filter and modified the number of valid responses. Some of these steps were cross-sectional, meaning that each wave was cleaned and validated only using information from said wave. Other steps were based on panel data, from which it was possible to perform further validation by comparing the answers of survey respondents from multiple waves. It is important to apply the same cleaning procedure to all waves of the survey to ensure consistency in the exclusion criteria of unreliable responses. Because of this, the same procedure was applied to all four waves of the Montréal Mobility Survey. What follows is a description of each step of the cleaning process, which were applied sequentially in the order presented here:



Figure 2.1 Digital flyers used to advertise on Facebook and Instagram

1. Incomplete answers: All surveys that were not answered to completion were dropped.

2. Multiple IP addresses 1: If more than two surveys were submitted from the same IP address, all observations from this IP were dropped.

3. Repeated e-mail: If the same e-mail was submitted for more than one survey, all observations from this address were dropped.

4. Multiple IP addresses 2: If more than one survey was submitted from the same IP address, and at least one of these came from the survey company Leger, all observations from this IP were dropped.

5. Age above 90: If a person indicated that they were born more than 90 years previous to the survey year, their response was dropped.

6. Invalid home location: If home location was either not provided, outside of the Montréal CMA, or located in an invalid location (e.g., on water or on a bridge), the observation was dropped.

7. Work or school outside of CMA: If a work or school location was outside of the Montréal CMA, or located in an invalid location (e.g., on water or on a bridge), the observation was dropped.

8. Project awareness: If the person said that they were aware of the REM project in a previous wave but not in a posterior wave, the observation was dropped. This filter is only for people who participated in multiple waves.

9. Answer speed: Surveys in the top 5% of speed of completion were dropped. It must be noted that different groups of respondents, depending on their answers, got different sets of questions. Each of these groups were cleaned according to their own respective top 5% speed.

10. Age and height change: If a person's reported age changed inconsistently across waves, or if their height changed more than 3cm from one wave to another, the observation was dropped. This filter is only for people who answered multiple waves.

The results of the cleaning process are summarized in Table 2.2, showing how many observations were dropped in each of the steps. The resulting sample sizes for the panel responses by wave participation is presented in Figure 2.2. A total of 3,313 participants have responded to two or more waves of the survey, 274 of which have responded to all four waves.

Table 2.2 Number of dropped and validated observations by filtering step

STEP	2019		2021		2022		2023	
	Dropped	Remaining	Dropped	Remaining	Dropped	Remaining	Dropped	Remaining
0 Raw Database	-	5,942	-	6,987	-	6,422	-	8,894
1 Complete answers	1,794	4,148	1,862	5,125	1,575	4,847	2,655	6,239
2 Multiple IP addresses 1	67	4,081	67	5,058	43	4,804	103	6,136
3 Repeated e-mail	10	4,071	74	4,984	24	4,780	32	6,104
4 Multiple IP addresses 2	180	3,891	212	4,772	140	4,640	109	5,995
5 Age above 90	2	3,889	3	4,769	1	4,639	0	5,995
6 Invalid home location	53	3,836	124	4,645	64	4,575	99	5,896
7 Invalid work or school	37	3,799	35	4,610	63	4,512	67	5,829
8 Project awareness			243	4,367	149	4,363	64	5,765
9 Answer speed	196	3,603	229	4,138	227	4,136	305	5,460
10 Age and height change	83	3,520	80	4,058	71	4,065	148	5,312
Final Cleaned Database		3,520		4,058		4,065		5,312

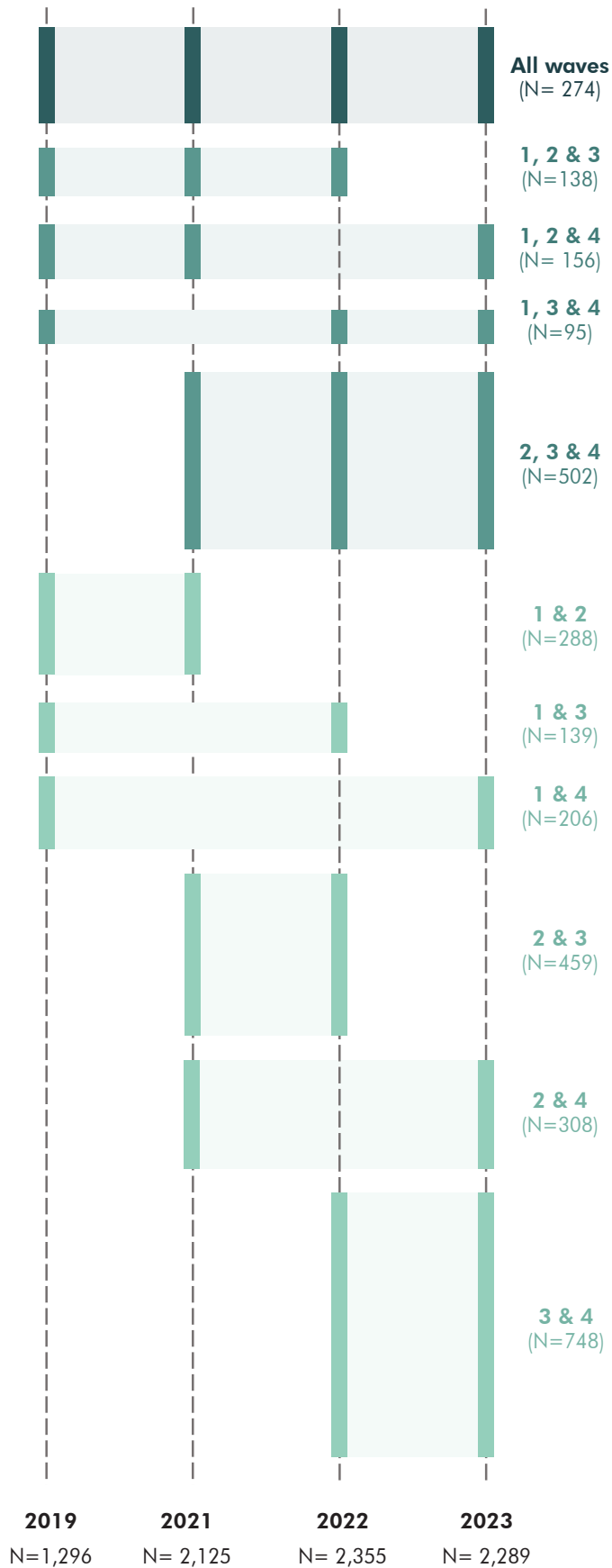


Figure 2.2 Number of valid observations for all panel responses



3 Sample Characteristics

3.1 Demographic characteristics

Across the four waves, the samples' demographic characteristics show a fair distribution among different genders, age groups,

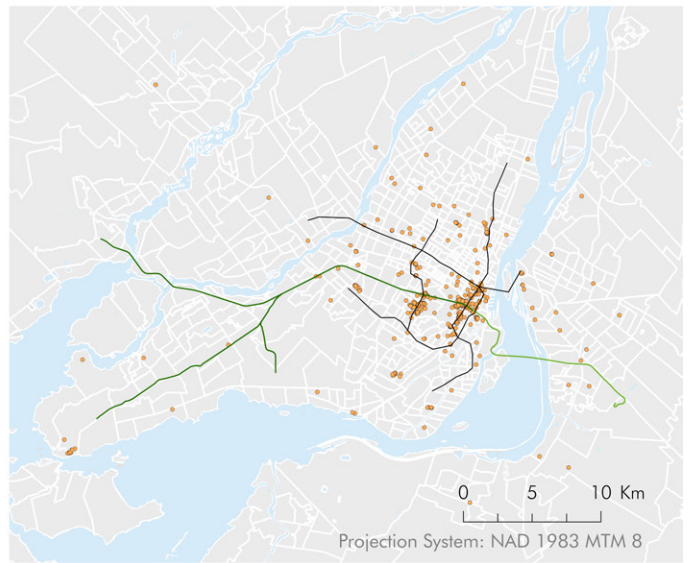
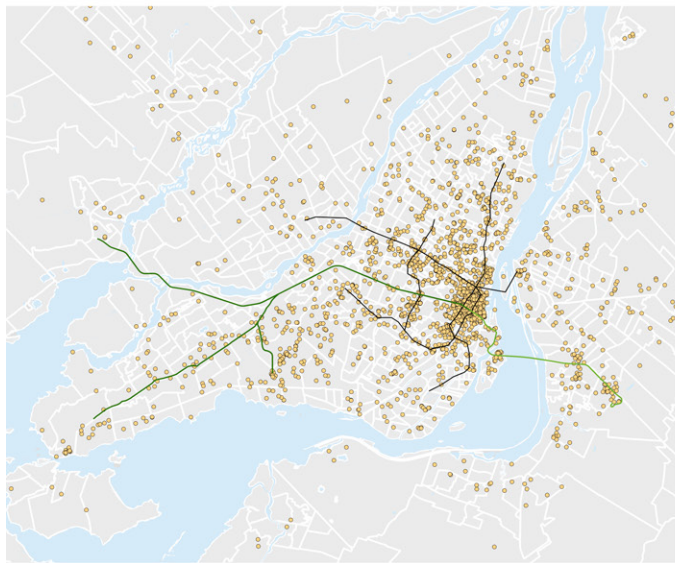
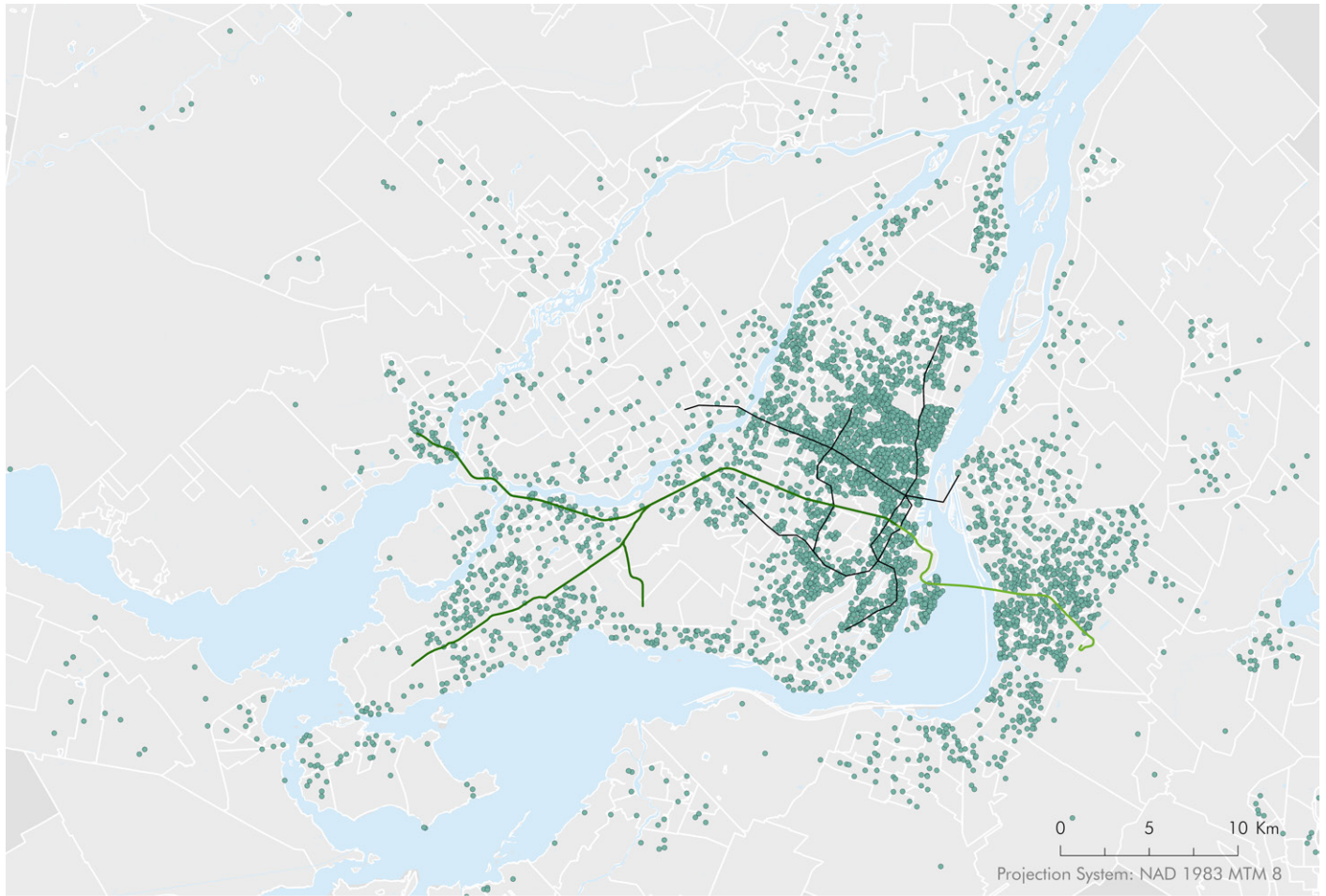
income brackets, visible-minority statuses, and employment types (Table 3.1) compared with the 2021 population census of the Montréal CMA (Statistics Canada, 2023). Figure 3.1 shows the fair distribution of the wave 4 sample's home, work, and school location across Montréal.

Table 3.1 Demographic characteristics for the four waves compared with Montréal CMA census

		Wave 1 (2019)	Wave 2 (2021)	Wave 3 (2022)	Wave 4 (2023)	Montréal CMA
Total N		3,533	4,063	4,065	5,312	4,291,635
Gender	Man	45.29%	59.54%	52.72%	46.03%	49.04%
	Woman	53.13%	38.35%	45.66%	51.17%	50.96%
	Other	1.59%	2.12%	1.62%	2.80%	-
Age group	18 to 24	12.62%	5.34%	4.23%	9.71%	8.14%
	25 to 44	42.17%	36.40%	36.21%	34.96%	27.70%
	45 to 64	33.17%	38.08%	39.11%	35.94%	26.17%
	65 to 74	9.65%	15.65%	15.65%	14.91%	9.90%
	75 and over	2.38%	4.53%	4.80%	4.48%	8.10%
Income bracket (in CAD)	Under \$30,000	14.89%	9.67%	8.83%	8.13%	14.44%
	\$30,000 to \$59,999	27.43%	21.49%	22.61%	21.29%	24.20%
	\$60,000 to \$89,999	21.00%	22.08%	21.08%	21.91%	20.25%
	\$90,000 to \$149,999	25.73%	29.02%	29.32%	30.06%	24.41%
	\$150,000 and over	10.95%	17.75%	18.15%	18.60%	16.69%
Migrant status	Non-immigrant	76.37%	76.79%	78.70%	75.96%	71.84%
	Immigrant	22.90%	22.45%	20.47%	22.87%	28.16%
Visible minority	Visible minority	19.87%	14.15%	14.76%	19.09%	27.19%
	Not a visible minority	80.13%	85.85%	85.24%	80.91%	72.81%
Work status	Employed	66.52%	63.01%	65.76%	65.85%	60.75%
	Unemployed	5.41%	3.67%	2.95%	3.54%	5.54%
	Not in the workforce	15.94%	23.41%	23.12%	20.41%	33.71%
	Student	16.64%	8.32%	6.45%	12.18%	-

*Population of Montréal in 2021

3.2 Sample spatial distribution



- Home location
 - School location
 - REM - Operating
 - Work location
 - Metro lines
 - REM - Under construction
- Data Sources: REM, STM, MMS, and Statistics Canada



Figure 3.1 Home, work, and school locations of respondents for the fourth wave of the survey

4 Travel Behaviour

4.1 Weekly travel

Across the four waves, participants reported the number of trips performed during the previous week for four purposes (work, school, shopping, and healthcare) and three travel modes (car, transit, and active travel). The average total trip frequency by travel mode is presented in Figure 4.1. Results from 2023 show a slight increase in transit and active-mode use, as well as a slight reduction in driving frequency compared to the previous year. These changes represent a small recovery from the impacts of COVID-19 on mode shares seen in 2021 and 2022.

Figure 4.2 presents a diagram of changes in panel respondents' dominant transport modes from 2019 to 2022 and 2023 (N= 615) for all reported purposes. A respondent's dominant

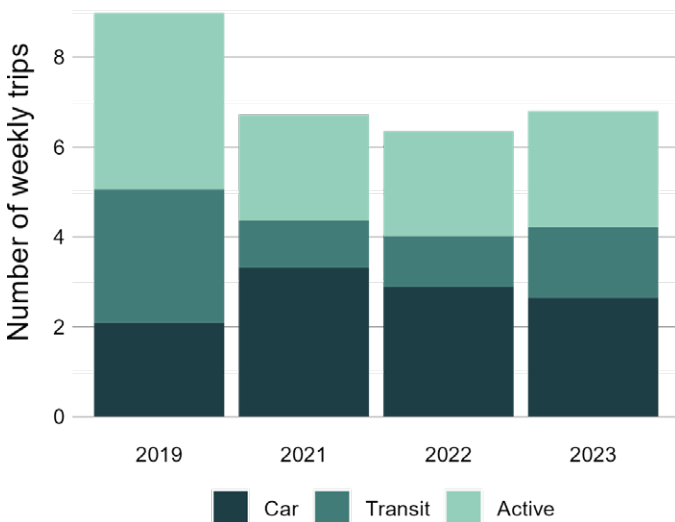


Figure 4.1 Average weekly trip frequency by mode and year

mode is that being used for more than 50% of all reported trips. Respondents without a dominant mode were classified as multimodal. These results were weighted to match wave one mode shares to the 2018 Montréal Origin-Destination Survey. Results presented in Figure 4.2 indicate that in 2023, active modes have increased their share as dominant mode, whereas driving has receded. These panel results also show that there has not been a recovery in transit as a dominant mode in 2023 compared to previous waves.

4.2 Commute modal share

The commute modal share throughout the four waves in comparison with the Montréal CMA is displayed in Figure 4.3. The main mode of travel used to commute to work is presented under four categories: walking, cycling, public

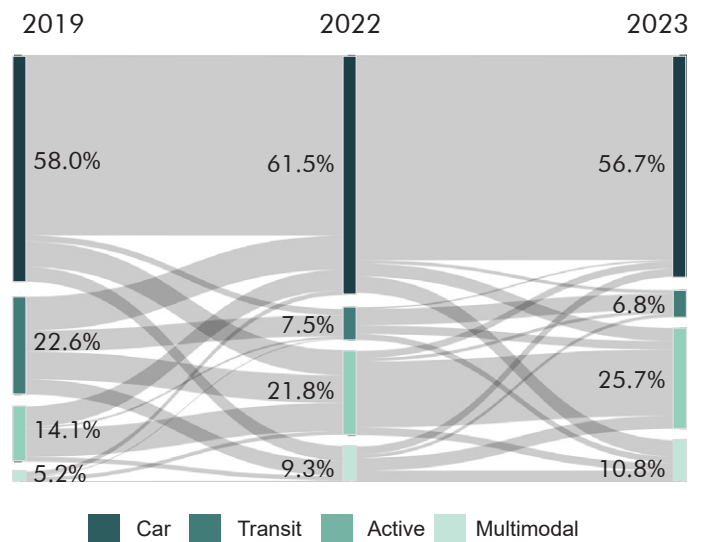


Figure 4.2 Changes in dominant mode (N= 615)

transit, and car. For respondents with multiple commute modes, the mode that they travelled the furthest with was considered their main mode. Wave 4 results (2023) show a relative recovery of commute modal shares to the pre-COVID levels seen in wave 1 (2019). Notably, the share of commuting by car has returned to the same levels as 2019. These results show that, although the overall mode share recovery from COVID has only been partial, in terms of commuting specifically, mode shares are nearly back to pre-COVID levels.

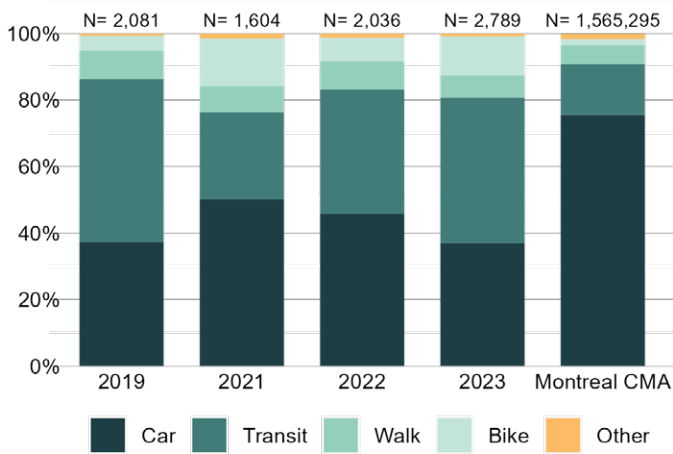


Figure 4.3 Commute modal share

4.3 Telecommuting

The multiple waves of data collected by the team encompass the periods before (2019), during (2021), and after (2022, 2023) the pandemic-related travel restrictions. This provides a unique opportunity for studying changes in the frequency of telecommuting (working from home) and hybrid work (a combination of workplace and remote working). Figure 4.4 shows the share of workers in each survey year by their weekly frequency of telecommuting. As expected, the popularity of telecommuting increased drastically after the first wave of the survey (2019) due to the pandemic. This popularity has overall remained consistent, as results show that people not telecommuting have maintained a share of 40% from 2021 to 2023. However, telecommuting patterns in terms of weekly frequency have changed between 2021 and 2023. Whereas telecommuting five days per week was the most common telecommuting pattern in 2021, in 2022 and 2023 a hybrid schedule has become increasingly more frequent.

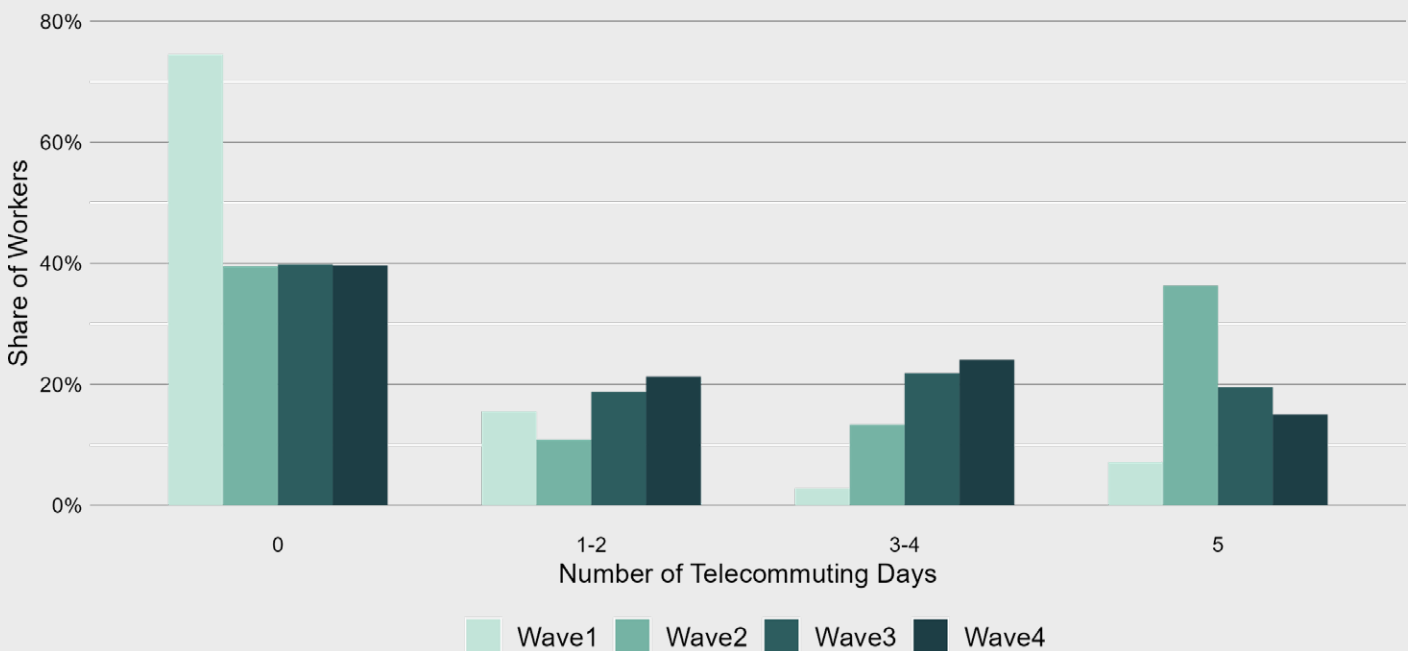


Figure 4.4 Share of telecommuting workers by frequency of telecommuting

5 Intention to Use

5.1 Intention to use the REM by mode

In the first three waves, participants were asked about intentions to use the REM. In wave four, only irregular- and non-users (using the REM once a month or less) were asked about future intentions. Since regular users were mostly concentrated in the South Shore, respondents with primary home locations in this area were excluded for consistency. Intentions to use the REM decreased by seven percentage points from wave one to three. Intentions increased by three percentage points between waves three and four, which might be related to station openings. Intentions were compared between inhabitants living within and farther than 1.2km of the nearest REM station, as this distance is an appropriate walking distance to

access commuter-rail stations [17]. Subsets were divided into car-dominant (using cars for over 50% of weekly trips) and sustainable-transport users (using public or active transport for over 50% of trips). Inhabitants within 1.2km were more likely to intend on using the REM than those living farther away for both car-dominant and sustainable transport users (Figure 5.1). Station proximity appeared more important than mode: car-dominant users within 1.2km were more likely to have a positive intention for using the REM than distant sustainable-transport users. There was an uptick in likelihoods for car-dominant users within 1.2km in wave four, a reversal in previously declining intentions. Conversely, intentions among sustainable-transport users within 1.2km declined—a five percentage point decrease from wave one to four.

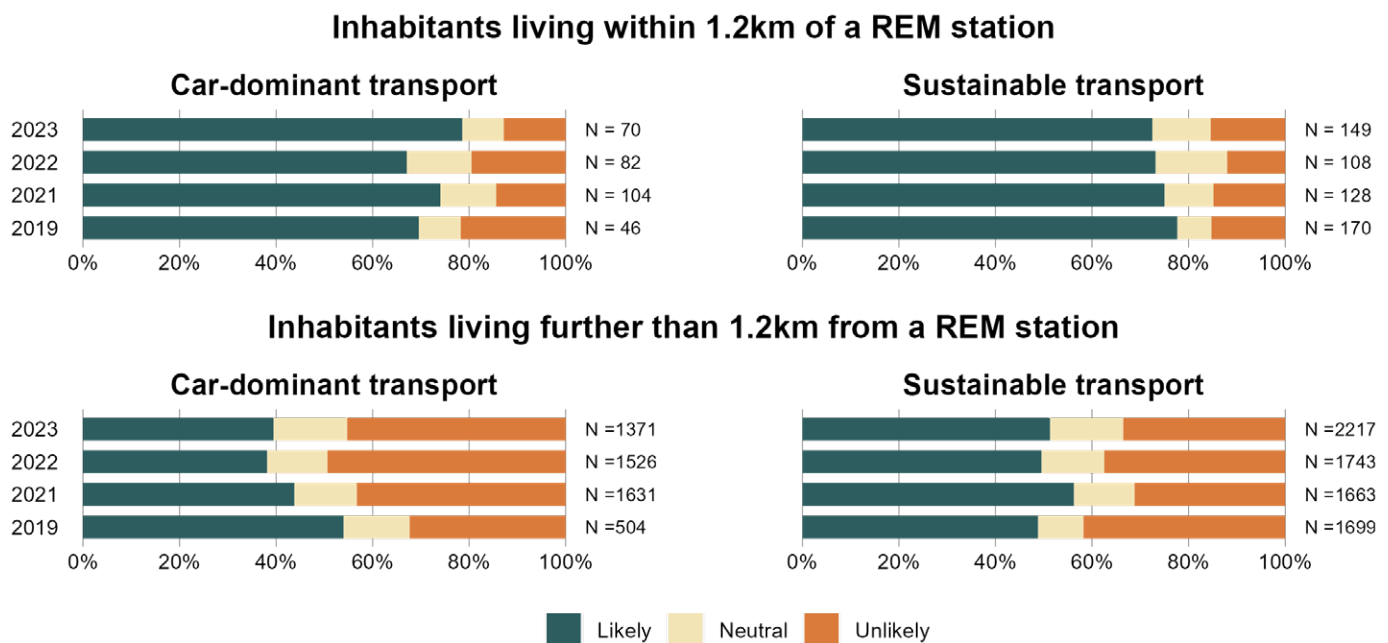


Figure 5.1 Intention to use the REM by current travel behaviour

5.2 Intention to use the REM by purpose of travel

The survey identified specific purposes for which respondents planned to use the REM: work, school, shopping, leisure, and airport trips. Across all waves, respondents overwhelmingly planned to use the REM for leisure and airport trips (Figure 5.2 & 5.3). Intentions to use the REM for these purposes have remained nearly identical since wave two. The first three waves of the survey showed a tendency of decreasing intentions to use the REM for commuting to work or school. Wave four showed a continuation of this trend regardless of respondents' distance to the nearest station. Contrastingly, in wave four, shopping intentions increased substantially. Intentions to use the REM for this purpose increased by ten percentage points for respondents living within 1.2km of a station. For respondents residing farther away, the intention to use the REM for shopping increased by 20 percentage points.

5.3 Intention to use the REM by gender

Responses regarding intentions to use the REM were grouped by gender to identify whether responses diverged between men and women. The disparity between men's and women's intentions to use the REM, as discussed in the previous REM report [1], has remained consistent (Figure 5.4). Across all four waves, women were 8-9% less likely than men to use the light-rail system. The analysis revealed a slight reversal in previously declining intentions in wave four. Intentions to use increased by 4% and 3% for men and women, respectively. Now that some REM stations are open, comparisons between intended and actual ridership can be made to explore further the intersectional social factors that lead to these identified patterns.

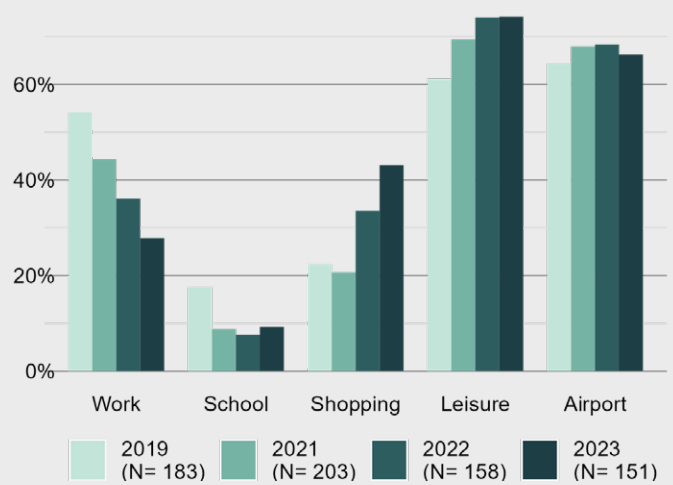


Figure 5.2 Intentions to use the REM by purpose of travel for respondents living within 1.2km of a REM station

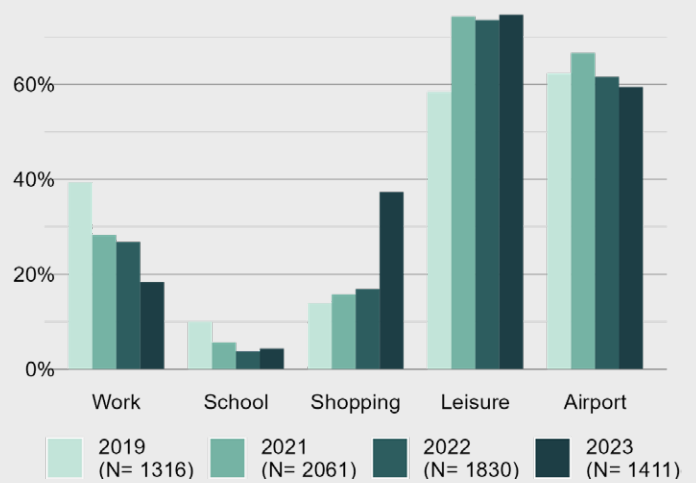


Figure 5.3 Intentions to use the REM by purpose of travel for respondents living further than 1.2km from a REM station

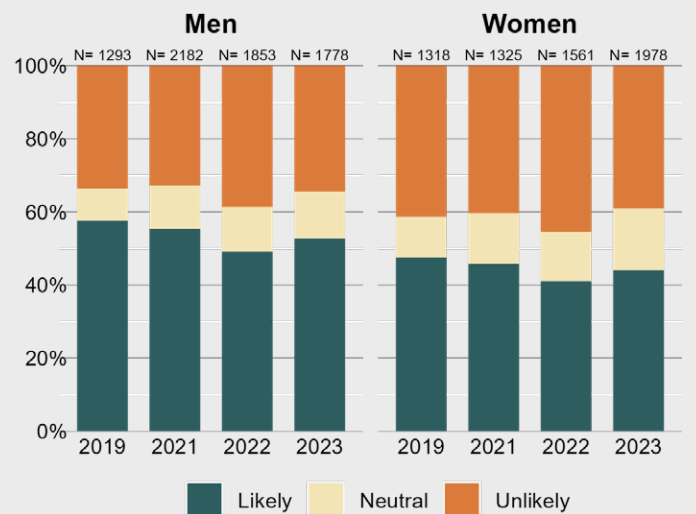


Figure 5.4 Intention to use the REM by gender

6 South Shore REM Use

6.1 Who is using the REM

Collected after the opening of the first branch of the REM, the fourth wave of the survey assessed the impacts of the REM's operation on travel behaviour, including an analysis of current ridership trends. Respondents were segmented by REM usage: those who have used the REM

more than once, only once, and never (Figure 6.1). The largest number and concentration of participants who have used the REM more than once reside near the currently operational portion of the light-rail network, which links Downtown Montréal to the South Shore area. In contrast, most respondents in the rest of the Greater Montréal Area indicated never having used the REM, with individuals who have tried it only once

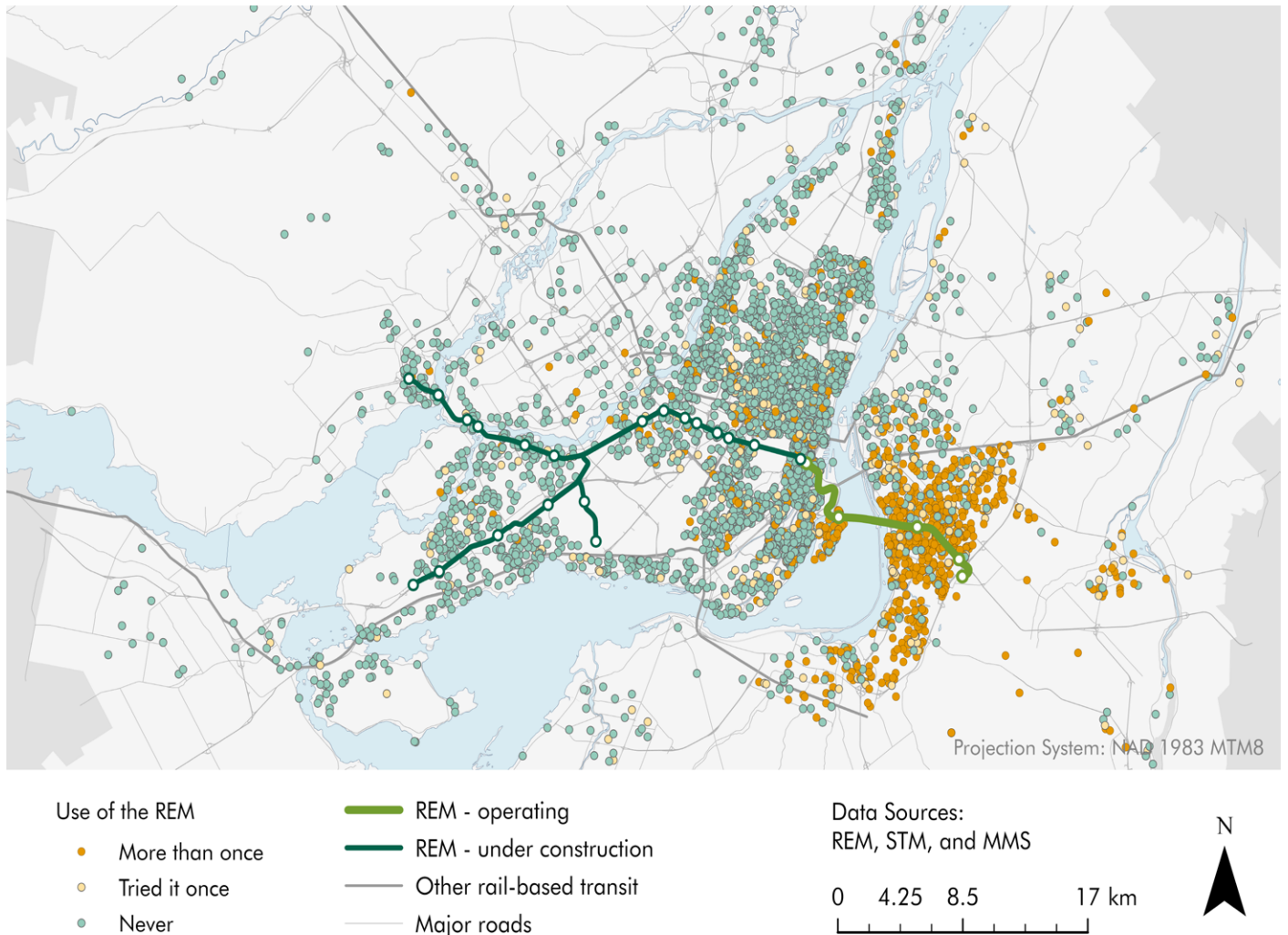


Figure 6.1 Distribution of the sample's home location by frequency of REM use

scattered throughout the metropolitan area.

A relevant aspect to explore regarding current light-rail ridership are gender dynamics. A study conducted by the TRAM team before the opening of the South Shore branch highlighted that significantly more men intended to use the REM than women [18]. However, current results show there is a fairly equal split of men and women who self-reported as users of the newly-opened branch, as shown in Figure 6.2. Analyzing gender dynamics through panel responses helps elucidate how participants' stated intentions translated (or not) to actual REM use.

Figure 6.3 reveals that 20% of men in the South Shore who stated a positive intention to use the REM did not use it, compared to 12% of women.

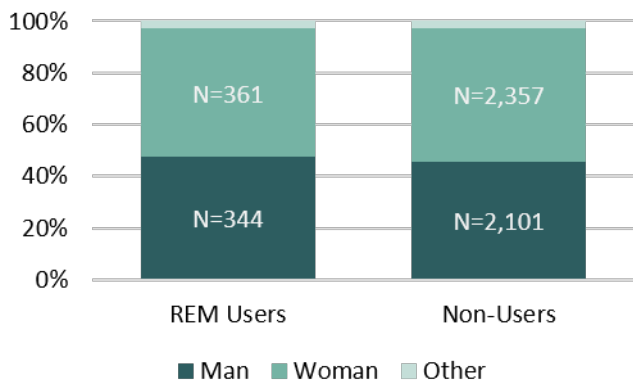


Figure 6.2 REM use by gender

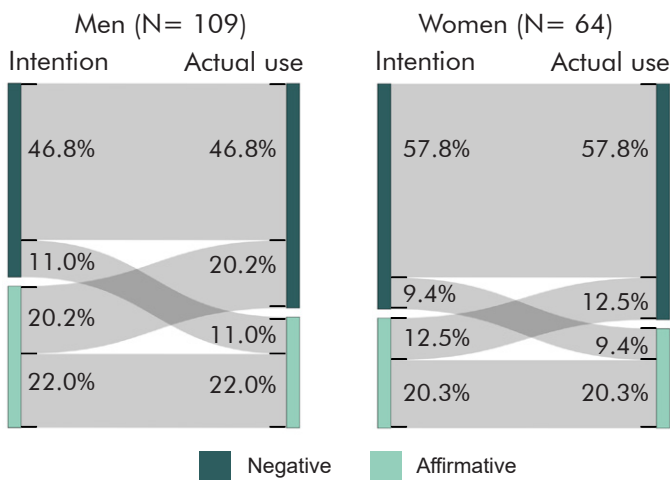


Figure 6.3 Intention (2019,2021 or 2022) and actual use (2023) of REM in the South Shore



6.2 How often and what for

Data on the actual ridership of the new light-rail branch can give light to its effectiveness in servicing the nearby population. Participants were asked about their current frequency of REM usage for any purpose. Responses were segmented into two groups – South Shore and Rest of the Montréal CMA – depending on participants’ primary home location (Figure 6.4). Results show that a minority of participants living outside of the South Shore reported being regular (once a month to daily) REM users. Instead, most respondents in the rest of the metropolitan area reported never having used the REM (82%). Contrastingly, 62% of South Shore respondents were consistent users, and less than 20% had never used the REM. These results demonstrate early signs of how a fully operational REM network might alter commuting behaviour in the rest of the CMA.

Participants were also asked about the specific purposes for which they have used the newly opened REM branch (Figure 6.5). The largest proportions of South Shore respondents reported using the REM for work-related or recreational travel (30% and 28%, respectively). A roughly equal number of participants reported using the new light-rail branch to commute to school, to shop (including groceries), or to visit family and friends (~12%). Finally, less than 7% of South Shore REM users used the system to commute to healthcare services (including medical appointments and pharmacies).

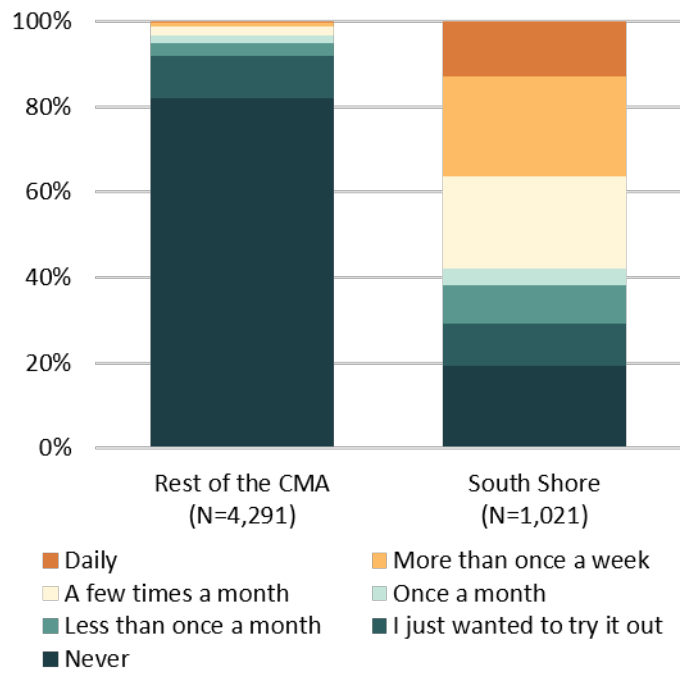


Figure 6.4 Frequency of REM use in the South Shore (right) and in the rest of the Montreal CMA (left)

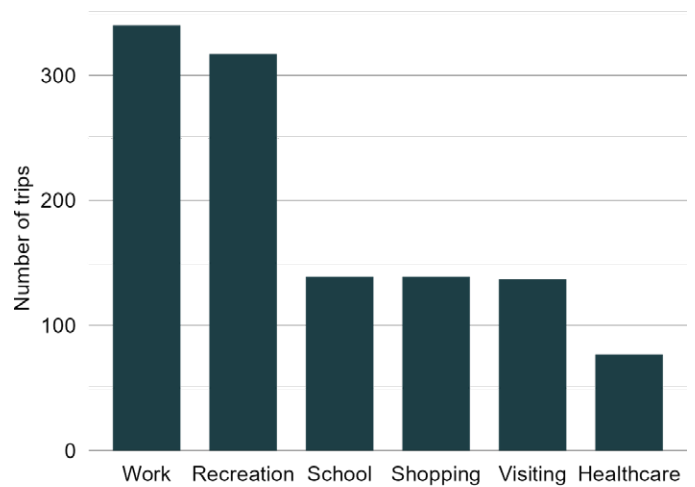


Figure 6.5 Purposes for which South Shore REM was used



6.3 Commute mode

Main mode of commuting was analyzed based on primary home location, as shown in Figure 6.6. Seeing as the REM is currently operational only in the South Shore region, a much greater portion of participants have adopted it into their commute. Around 42% of participants living in the South Shore have adopted the new LRT as their commute mode. The REM has thus become a leading mode of transport for those in the South Shore, rivaled only by car use, which represents a similar share of participants' commutes in the South Shore. In contrast, the portion of participants outside of the South Shore who reported using the REM as a main mode of commuting was less than 1%.

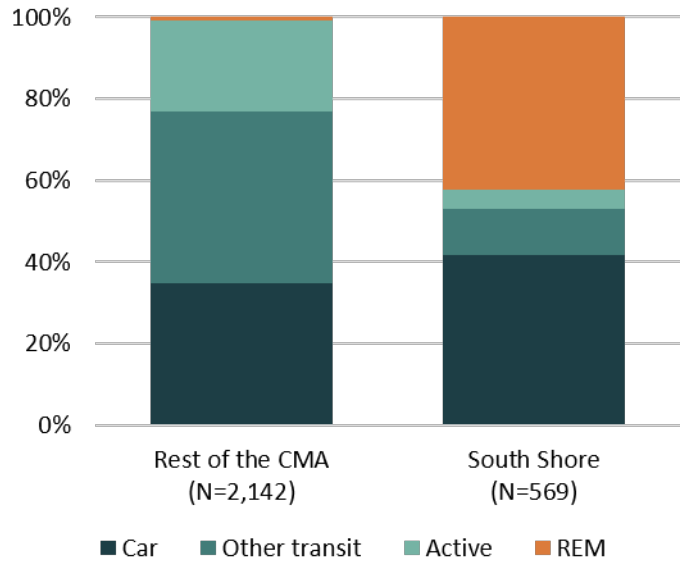


Figure 6.6 Main commute mode in the South Shore (right) and in the rest of the Montréal CMA (left)

6.4 Likelihood of future use

Intentions of using the REM in the future were analyzed depending on current use of the new LRT branch (Figure 6.7). Results show that more frequent users are more likely to continue using the service. A majority of regular REM users (~86%) reported that they were likely to continue using it in the future. Similarly, about 77% of irregular users reported that they would be likely to use the REM in the future. Within respondents who have not used the LRT, less than half of participants indicated a positive intention of using the REM.

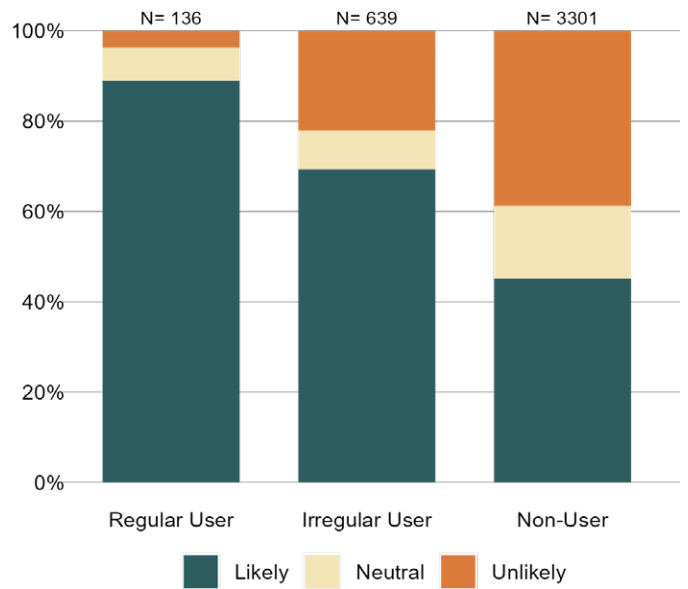


Figure 6.7 Intentions of using the REM in the future by current use



7 REM, Health, and Quality of Life

7.1 Commute choices

Relevant factors influencing commuting mode were identified, illustrating the importance of health and quality of life in decision-making processes. Workplace commuters were asked to select which of the following were important in deciding to use their main work-related travel mode: "My physical and/or mental health," "It is better for the environment than other modes," "It is cheaper for me than other modes," "I have a shorter travel time than with other modes," "I am more comfortable using this mode to travel than when using other modes," and "Other modes don't go where I need to go."

Figure 7.1 showcases the proportion of respondents that identified a given factor as important to their decision to take their chosen mode of travel. REM users largely identified shorter travel times (44%) as an important factor behind their decision. The following four factors were reported as having similar importance levels: destination connectivity (29%), environmental friendliness (28%), affordability (24%), and comfort (22%).

Physical and mental health was not found to be a primary factor influencing REM users' modal choices. With only 14% of REM commuters who selected health-related factors, even a larger proportion of car and other transit commuters (19% and 20%) attributed importance to this factor. The low importance of health factors among light-rail commuters contrasts most significantly with active travellers, who had over five times as many bikers and walkers considering physical and mental health in their mode choices.

7.2 Satisfaction with health

Respondents were asked about their satisfaction with their health on a scale from completely unsatisfied (0) to completely satisfied (10). Figure 7.2 explores differences in health satisfaction between REM commuters and those using other modes of travel. Although health was not found to be a primary factor influencing REM users' modal choices (Figure 7.1), this group was among the most satisfied with their health on average, second only to bike users. Furthermore, REM commuters had the smallest variance compared to other modes, highlighting a consistent level of high health satisfaction among LRT commuters.

7.3 Quality of life

REM users were asked to report their agreement to the statement "The REM positively impacts my quality of life" (Figure 7.3). This question aimed to better understand the change in quality of life associated with varying frequencies of REM use. Results reveal the highest level of agreement was among respondents who use the REM once a month, whereas those using the REM less than once a month had the lowest levels. Interestingly, those using the REM between a few times a month and daily report lower positive impact on quality of life than those using it only once a month. This agreement gap may point to a need for further attention towards more frequent users, as increasing REM usage yields diminishing returns on quality of life.

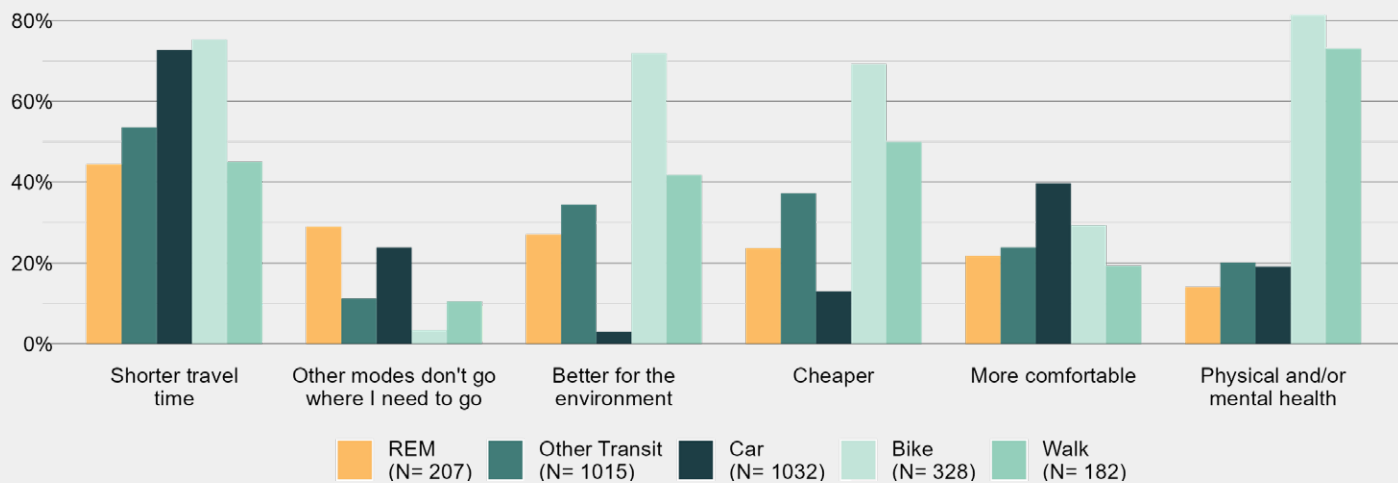


Figure 7.1 Important factors for deciding commute mode

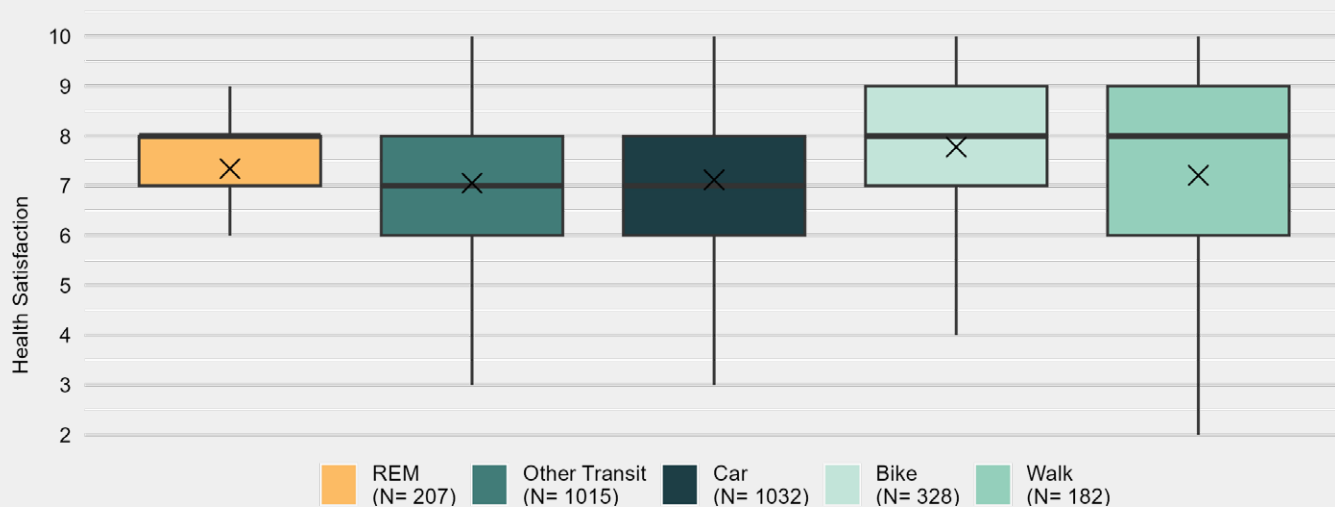


Figure 7.2 Health satisfaction rates among different commute modes

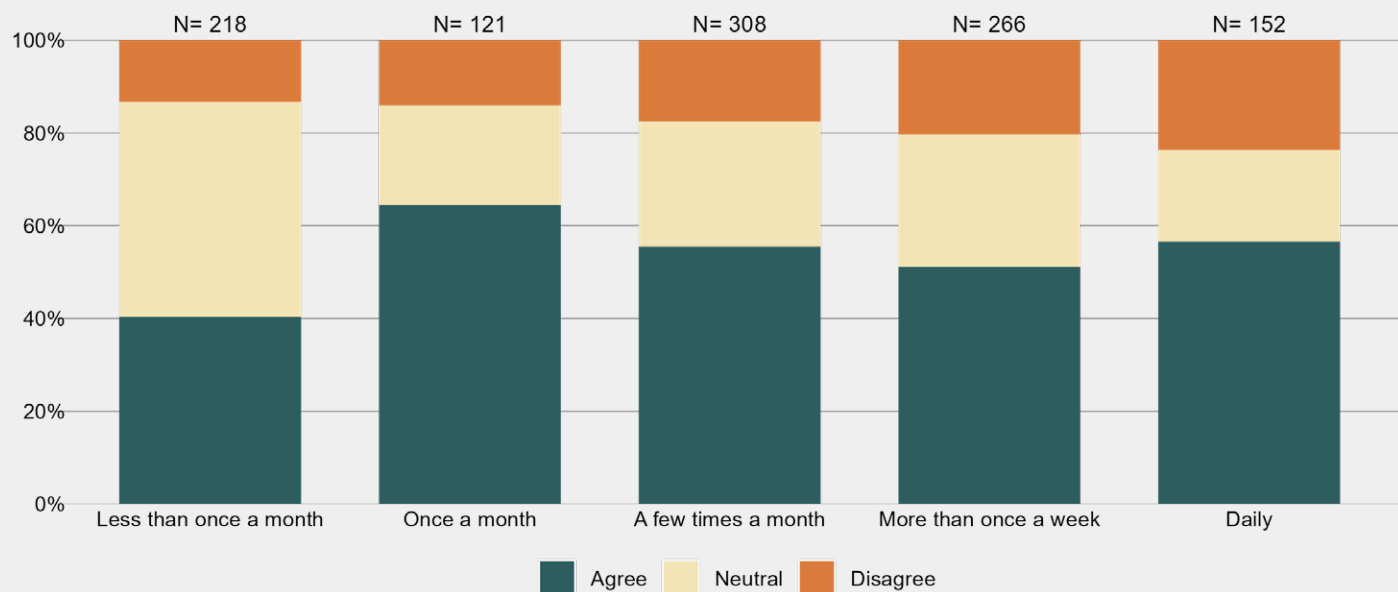


Figure 7.3 Positive impact of the REM on quality of life by frequency of use

8 Conclusion

The construction and opening of the REM represent a generational opportunity to examine the relationship between largescale public-transit projects and a variety of societal outcomes. To provide a comprehensive understanding of the impacts of this public-transport investment, this report has presented the results of a multi-wave data-collection process, including four waves of surveys collected between 2019 and 2023. Overall, the samples from wave one (N= 3,533), wave two (N= 4,063), wave three (N= 4,065), and wave four (N= 5,312) were found to be representative of the targeted population, with a slight underrepresentation of lower-income households. For the fifth wave of data collection scheduled for Fall 2024, the research team will continue to recruit participants through various means with the goal of maximizing the range of research potential.

The findings related to the different themes covered in the four waves of the survey and the panel dataset have allowed for some

significant comparisons. For instance, in terms of general travel behaviour, results from the fourth wave illustrate an accelerating recovery for sustainable mobility after the repercussions of COVID-19. More importantly, results from wave four provided insights into the newly-opened REM branch connecting Montréal's Downtown to the South Shore. The analyses shown in this report focused on multiple dimensions, including the impacts of the REM on travel patterns, health satisfaction, and quality of life.

The following wave of data collection in Fall 2024 and its analysis in 2025 will allow for the continuation of this comprehensive assessment of the impacts of the REM on health, wellbeing, travel behaviour, and social-equity outcomes. We hope that the lessons gleaned from this study and future research will not only be applicable to projects of similar scale, but also to smaller ones that aim to create healthier environments and a more resilient and equitable future.



References

1. Negm, H., et al., Réseau express métropolitain (REM) survey report: 2019-2022. 2023, Transportation Research at McGill (TRAM), McGill University: Montréal, Québec, Canada.
2. Daley, J., et al., Foot-based microscale audit of light rail network in Montreal Canada. *Journal of Transport & Health*, 2022. 24: p. 101317.
3. Rodrigue, L., et al., Factors influencing subjective walkability: Results from built environment audit data. *Journal of Transport and Land Use*, 2022. 15(1): p. 1-21.
4. Karman, J., et al., "They didn't have to build that much": A qualitative study on the emotional response to urban change in the Montreal context. *Emotion, Space and Society*, 2023. 46: p. 100937.
5. Wasfi, R., N. Ross, and A. El-Geneidy, Achieving recommended daily physical activity levels through commuting by public transportation: Unpacking individual and contextual influences. *Health & Place*, 2013. 23: p. 18-25.
6. Coomes, K.E., et al., Assessment of the health benefits to children of a transportation climate policy in New York City. *Environmental research*, 2022. 215: p. 114165.
7. Edwards, R.D., Public transit, obesity, and medical costs: Assessing the magnitudes. *Preventive Medicine*, 2008. 46(1): p. 14-21.
8. Tétrault, L.-F., et al., Estimating the health benefits of planned public transit investments in Montreal. *Environmental Research*, 2018. 160: p. 412-419.
9. Beaudoin, J., Y.H. Farzin, and C.-Y.C.L. Lawell, Public transit investment and sustainable transportation: A review of studies of transit's impact on traffic congestion and air quality. *Research in Transportation Economics*, 2015. 52: p. 15-22.
10. Miller, P., et al., Public transportation and sustainability: A review. *KSCE Journal of Civil Engineering*, 2016. 20(3): p. 1076.
11. Currie, G. and J. Stanley, Investigating links between social capital and public transport. *Transport Reviews*, 2008. 28(4): p. 529-547.
12. Foth, N., K. Manaugh, and A.M. El-Geneidy, Towards equitable transit: examining transit accessibility and social need in Toronto, Canada, 1996–2006. *Journal of transport geography*, 2013. 29: p. 1-10.
13. El-Geneidy, A., et al., The cost of equity: Assessing transit accessibility and social disparity using total travel cost. *Transportation Research Part A: Policy and Practice*, 2016. 91: p. 302-316.
14. Cervero, R. and M. Duncan, Land value impacts of rail transit services in Los Angeles County. Report prepared for National Association of Realtors, Urban Land Institute, 2002.
15. Bowes, D. and K. Ihlanfeldt, Identifying the impacts of rail transit stations on residential property values. *Journal of urban Economics*, 2001. 50(1): p. 1-25.
16. Dillman, D.A., J.D. Smyth, and L.M. Christian, *Internet, Phone, Mail, and Mixed-Mode Surveys: The Tailored Design Method*. 4th ed. 2014: Wiley.
17. El-Geneidy, A., et al., New evidence on walking distances to transit stops: identifying redundancies and gaps using variable service areas. *Transportation*, 2014. 41(1): p. 193-210.
18. Villafuerte-Diaz, J., et al., Who Does Light Rail Serve? Examining Gendered Mobilities and Light-Rail Transit in Montreal, Canada. *Transportation Research Record*, 2023. 2677(9): p. 104-115.

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