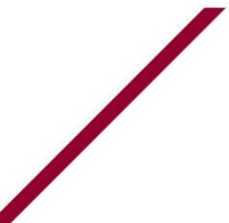




2023 COMMUTER HABITS SURVEY

APRIL 2024
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EXECUTIVE SUMMARY

In November 2022, a voluntary survey was disseminated by the Office of Sustainability in collaboration with the Office of Institutional Planning and Analysis. The purpose of the survey was to analyze commuter habits and preferences among the Concordia community on their commute to campus.

A stratified random sample of students were invited via direct email to complete the survey. All active employees, excluding casuals, teaching and research assistants, were also invited by direct email to participate. A total of 2,726 participants completed the survey, generating a response rate of 17%. The margin of error was established at $\pm 1.7\%$ at the 95% confidence interval.

The results showed that most Concordia community members are commuting to campus using public transportation. Active transportation is the next most common mode of transportation. There is seasonal variation in the use of active transportation as commuters switch to public transportation in the fall and winter term. There is little seasonal variation in the use of motorized vehicles by community members.

Type of transportation	Fall term percent of commuters	Winter term percent of commuters	Summer term percent of commuters
Active transportation	24%	18%	33%
Public transportation	64%	71%	57%
Motorized vehicle	11%	11%	9%

The average annual emissions per person from the survey population ranges from 0.19 – 0.47 tonnes of CO₂e, resulting in university-wide emissions from commuting for 2022-23 equal to 13,795 tonnes of CO₂e.

Based on survey results, we recommend that the university increase the use of sustainable transportation and minimize the use of single occupancy vehicles by Concordia community members in their commute to campus. To increase the use of active transportation, we recommend advocating at the municipal level for pedestrian and bicycle safety measures and greater connectivity of campuses to bicycle paths. We also recommend increasing access to indoor secure bicycle parking facilities and providing incentives to engage in active transportation.

To increase the use of public transportation, we recommend the university offer subsidies for public transit fares to both students and staff/faculty. In addition, advocate to the STM for increased connectivity through additional transit lines and/or frequency of scheduled buses to

both campuses and for accessibility to be integrated into Guy-Concordia metro station. To increase the use of the Concordia shuttle bus, we recommend providing more frequent shuttle buses to avoid overcrowding and a more reliable shuttle bus schedule.

To further minimize the use of single occupancy vehicles, we recommend the university promote the staff/faculty reduced monthly parking permit fee for carpooling and the Shoptalk Carpool channel. Concordia should also create a carpool matching program for students.

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INTRODUCTION

In November 2022, the Office of Institutional Planning and Analysis (OIPA) disseminated a voluntary survey on behalf of the Office of Sustainability. The purpose of the survey was to analyze commuter habits and preferences among Concordia staff, faculty and students on their commute to their primary campus. The survey was launched on Tuesday November 29 and closed on Tuesday December 20. It comprised of three sections: demographics, commuter habits, and commuter preferences of participants. Branching and splitting techniques were employed to reduce response burden and repetition in the survey.

METHODOLOGY

Research Questions

The Commuter Habits Survey was designed to address the following primary research questions:

- 1) What are the Concordia community's commuter habits?
- 2) What are the commuter preferences of the Concordia community and what influences them to adopt or avoid certain transportation modes?
- 3) What accessibility barriers impact the Concordia community's commute to their primary campus?
- 4) What are the greenhouse gas emissions associated with the Concordia community's commute?

Survey Design

The survey was designed using branching and splitting techniques to reduce response burden and repetition. Participants were asked to indicate their primary mode of transportation in fall, winter and summer semester to account for seasonal variations. The survey was created in collaboration with representatives from the Access Centre for Students with Disabilities, the Equity Office, Department of Geography, Planning & Environment faculty members and researchers from the Next-Generation Cities Institute. Accessibility was included across all sections of the survey and included as a dedicated open-ended question for community members to identify any accessibility barriers (due to a disability) that impact their commute.

The survey was distributed using a stratified random sampling method. A stratified random sample of 12,000 students enrolled in the Fall 2022 semester, proportionally representative of faculty and level of study, were invited via direct email to complete the survey. All active employees were also invited by direct email to participate. Two categories from the employee data provided by OIPA were removed entirely from the total population: Research and Teaching Assistants as well as Casual Employees. The former category comprised mainly students, so inclusion of this category would have resulted in the potential duplication of individuals in both populations (student and employee). The latter was removed based on the recommendation of OIPA staff, as this category comprises mainly individuals who work in a very limited and inconsistent capacity for the University.

The survey was launched on Tuesday November 29 and closed on Tuesday December 20. Two reminder emails were sent to participants to complete the survey. Overall, 16,266 individuals were invited to participate in the survey. A total of 2,726 participants completed the survey,

generating a response rate of 17%. The margin of error was established at $\pm 1.7\%$ at the 95% confidence interval. In addition to direct invitations, the survey link was promoted through various channels and did not require a PIN. With the survey being voluntary and the link promoted to the Concordia community at large, we must acknowledge that the results could be impacted by voluntary response bias.

COMMUTER HABITS RESULTS

Survey Participant Characteristics

Based on the table below, it is apparent that staff and faculty are over-represented in the survey results. Together staff and faculty make up 48% of the survey results, whereas they account for only 9% of the overall Concordia community.

Table 1 - 2023 Commuter Habits Survey participant roles at university

University Role	Sample Population	Proportion of survey participants
Undergraduate students	1,015	37%
Graduate students	423	16%
Faculty	423	16%
Staff	865	32%
<i>Total</i>	2,726	100%

The survey results indicated that 87% of participants were active in their role on a full-time basis, whereas 13% were active in their role on a part-time basis. Survey participants were asked to indicate their primary campus for each semester. A total of 28 participants indicated no primary campus for any semester. Their responses were removed from the survey results as the study is for community commuters in 2022-23. Participants primary campus per semester is used for the calculation of commuter greenhouse gas emissions. For aggregated results in the respondent characteristics section and commuter preferences their primary campus is assumed to be the one they identified for two out of three semesters. If a participant only commuted to Concordia for two semesters and their primary campuses were different, their Fall or Summer semester campus was considered their primary campus to account for active forms of transportation. Most participants' primary campus is the Sir George Williams campus as demonstrated in table 2.

Table 2 - 2023 Commuter Habits Survey participant primary campus

Primary campus	Percent of Students	Percent of Staff/Faculty
Sir George Williams	78%	83%
Loyola	22%	17%
<i>Total</i>	100%	100%

Participants were asked if they had monthly passes or memberships to the transportation services indicated in table 3. The results are below:

Table 3 - Transportation passes and memberships

Transportation Passes and Membership Types	Percent of Students	Percent of Staff/Faculty
Monthly transit pass on an Opus card for Montreal only	51%	19%
Monthly transit pass on an Opus card for Montreal and surrounding areas	20%	6%
Individual tickets on OPUS card	18%	49%
A 12-month subscription to OPUS for Montreal only	6%	6%
BIXI membership	7%	9%
A 12-month subscription to OPUS for Montreal and surrounding areas	5%	3%
Communauto membership	5%	8%
Circuit Electrique Membership	1%	2%
None	9%	17%
Other	4%	8%

Most students have a monthly transit pass on an Opus card for Montreal only while 49% of staff/faculty have individual tickets on OPUS card. These results could be influenced by the significant discount students receive on monthly transit passes through the OPUS recued-fare card.

Commuter Travel Time and Distance

Survey respondents were asked to indicate the total length (in minutes) of their one-way commute from home to their primary Concordia campus. The results are as follows:

Table 4 - Average travel time for university commute

Primary campus	Role	Average travel time	Average travel time in 2019
Sir George Williams	Student	38 minutes	28 minutes
	Staff/Faculty	43 minutes	25 minutes
Loyola	Student	46 minutes	38 minutes
	Staff/Faculty	38 minutes	34 minutes

Average travel time is longest for Loyola students (46 minutes) and for Sir George Williams staff/faculty (43 minutes). Since 2019, average travel time has increased most for Sir George Williams staff/faculty (13 minutes) and students (10 minutes).

Survey participants were asked how many days a week on average they commute to their primary campus in the fall, winter and summer term. Most students commute between two to five

days a week to SGW campus. In the fall and winter terms, approximately 27% of students are commuting 3 to 4 days a week. In the summer term, approximately 25% of students are commuting 2 to 3 days a week.

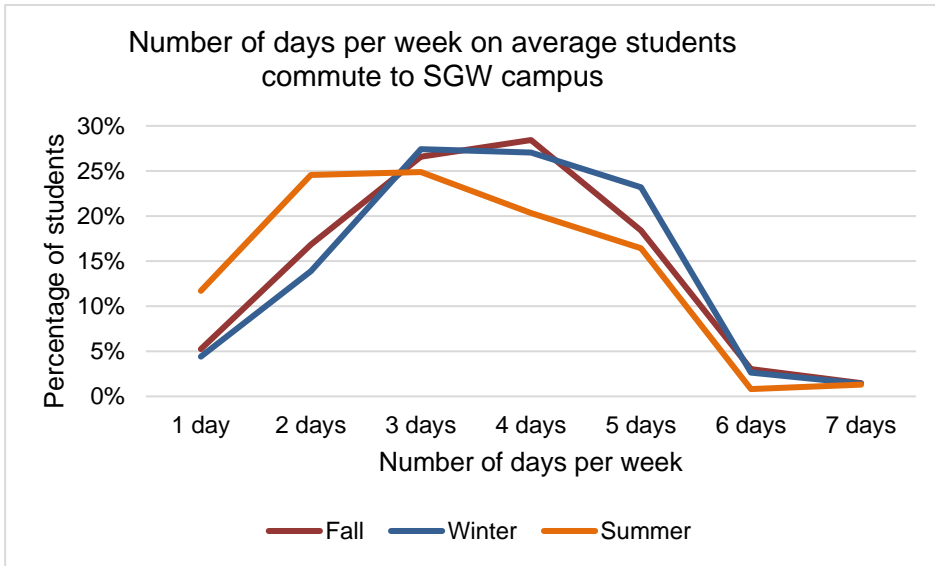


Figure 1 - Number of days per week on average students commute to SGW campus

Most staff/faculty are commuting to SGW campus two or three days a week. There is very little seasonal variation in the number of days per week on average staff/faculty commute to SGW campus.

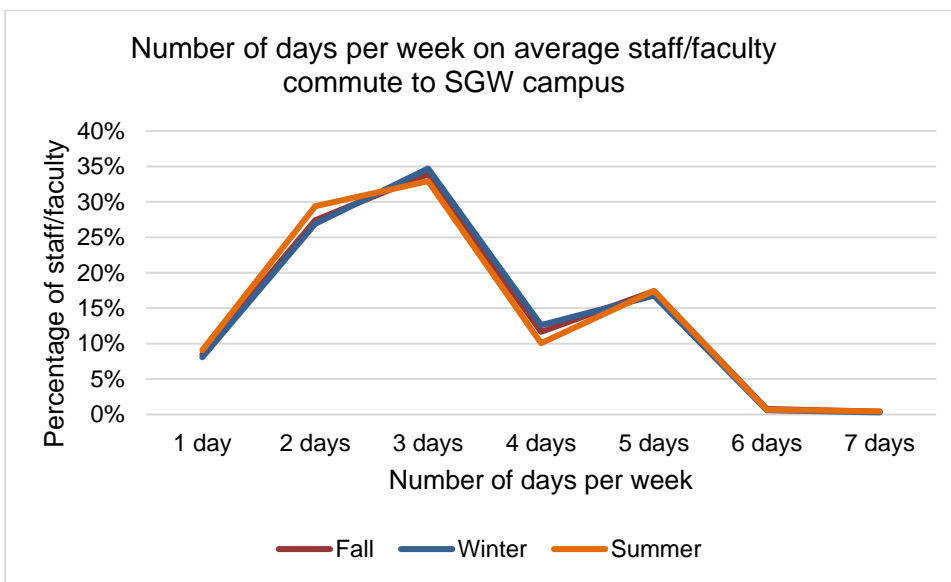


Figure 2 - Number of days per week on average staff/faculty commute to SGW campus

Students on average commute between two to five days a week to Loyola campus. In the fall term, 29% of students are commuting 4 days a week and 24% are commuting 3 days. In the

winter term, 29% of students are commuting 5 days a week and 28% are commuting 4 days a week. In the summer semester, a little over a third of students are commuting 5 days a week and 22% are commuting 2 days a week.

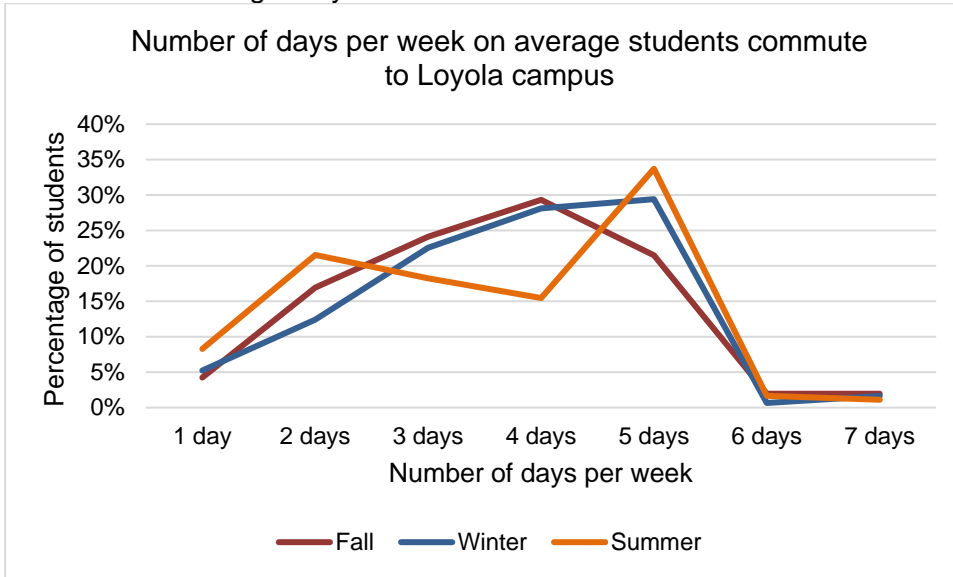


Figure 3 - Number of days per week on average students commute to Loyola campus

Most staff/faculty are commuting to Loyola campus three or five days a week. In the summer term, more staff/faculty (46%) are commuting to Loyola campus 5 days a week than in the fall (39%) and winter (40%) term. On average, staff/faculty whose primary campus is Loyola commute more days a week than those whose primary campus is SGW. This could be because of the type of employee positions that are located on the Loyola campus such as maintenance work or lab technicians.

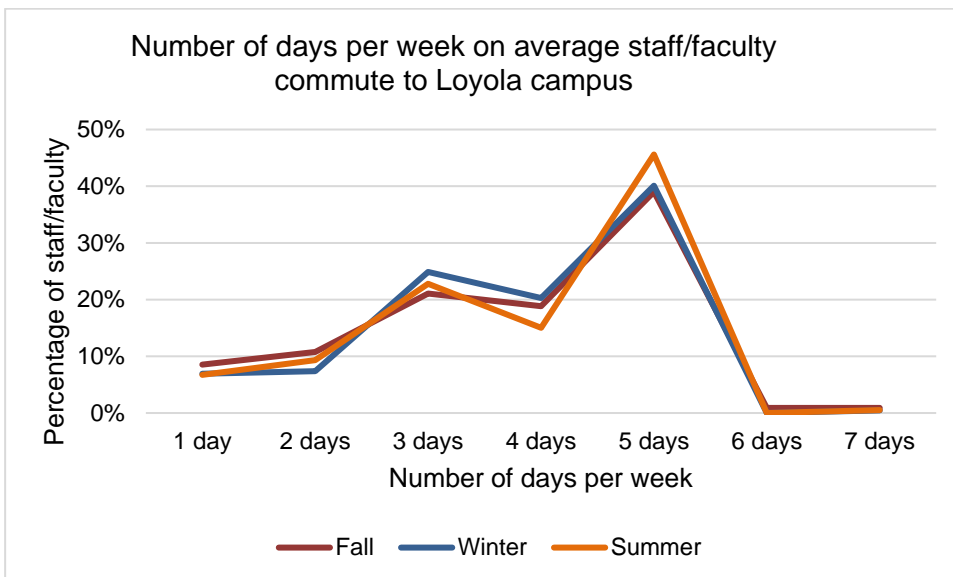


Figure 4 - Number of days per week on average staff/faculty commute to Loyola campus

On average, students travel 14.4 km from home to Loyola campus and 10.8 km from home to SGW campus. Staff/faculty travel 13.4 km from home to Loyola campus and 14.1 km from home to SGW campus. Loyola students travel the longest distance on average to commute from home to their primary Concordia campus, whereas students from Sir George Williams campus travel the shortest average distance. In general, Concordia community members are travelling further to get to campus than in 2019 (other than students whose primary campus is SGW).

Table 5 - Average distance travelled for university commute

Primary campus	Role	Average distance travelled	Average distance travelled in 2019
Sir George Williams	Student	10.8 km	11.3 km
	Staff/Faculty	14.1 km	12.4 km
Loyola	Student	14.4 km	13.4 km
	Staff/Faculty	13.4 km	12.5 km

Modal Share

Participants were asked a series of questions to determine their primary mode of transportation. First, they were asked to identify their primary campus (i.e., the campus that they commute to/from most frequently) for each term. The participants were given the option to indicate that they do not commute to campus. For example, if a student is not registered for the summer term, they would select the response “Not applicable – I will not be commuting to campus in the summer 2023 term”.

Next, participants were asked to identify their primary mode of transportation for their commute to their primary campus for each term. Primary mode of transportation was defined as the mode of transportation they take for the longest duration of time. Below are the results for participants who commute to campus in the fall term.

Most community members are commuting to SGW campus by public transportation in the fall term. Approximately a quarter of students and staff/faculty are using active forms of transportation to commute while 6% of students and 16% of staff/faculty are using motorized vehicles to commute.

Most students (59%) are commuting to Loyola campus by public transportation in the fall term. A little over a third of staff/faculty are using active transportation to commute to Loyola campus in the fall term, while a third use public transportation and 29% use motorized vehicles. Over twice as many students and nearly twice as many staff/faculty use a motorized vehicle as their primary mode of transportation in the fall term to commute to Loyola campus than SGW campus. Public transportation is more commonly used to commute to SGW campus than Loyola

campus. This could be a result of the downtown campus being better connected to the public transit network. Slightly more students (26%) are using active modes of transportation to commute to SGW campus in the fall term than to Loyola campus (21%). More staff/faculty (37%) use active modes of transportation to commute to Loyola campus in the fall term than to SGW campus (23%).

Table 6 - Modal share for fall term

Type of transportation	Mode of transportation	SGW campus		Loyola campus		Weighted average
		Students	Staff/ Faculty	Students	Staff/ Faculty	
Active transportation		26%	23%	21%	37%	24%
	<i>Walk / Run</i>	19%	11%	6%	19%	15%
	<i>Use wheelchair / electric wheelchair / mobility scooter</i>	0%	0%	1%	0%	0%
	<i>Bicycling on a personal bicycle</i>	4%	10%	10%	15%	6%
	<i>Biking on a BIXI</i>	1%	2%	1%	3%	1%
	<i>Rollerblading / Skateboarding</i>	2%	0%	3%	0%	2%
Public transportation		68%	61%	59%	34%	64%
	<i>Bus</i>	23%	17%	28%	12%	24%
	<i>Metro</i>	40%	30%	15%	6%	31%
	<i>Paratransit</i>	0%	0%	1%	0%	0%
	<i>Commuter train</i>	3%	12%	7%	13%	5%
	<i>Concordia shuttle bus</i>	2%	2%	8%	2%	4%
Motorized vehicle		6%	16%	20%	29%	11%
	<i>Gas or diesel vehicle</i>	5%	13%	17%	26%	9%
	<i>Electric vehicle</i>	1%	1%	1%	0%	1%
	<i>Plug-In hybrid vehicle</i>	0%	0%	0%	0%	0%
	<i>Hybrid vehicle</i>	0%	0%	0%	3%	0%
	<i>Carsharing vehicle (e.g., Communauto)</i>	0%	0%	0%	0%	0%
	<i>Motorcycle / Scooter</i>	0%	0%	1%	0%	0%
	<i>Taxi / Uber</i>	0%	0%	0%	0%	0%

Most community members commute to SGW campus using public transportation in the winter term. Approximately 20% of students and 13% of staff/faculty use active forms of transportation (mostly walking or running) to commute to SGW campus in the winter term. Slightly more than twice as many staff/faculty (16%) use motorized vehicles to commute than students (6%).

Similarly, for commuting to Loyola campus in the winter term, most students (67%) and 41% of staff/faculty use public transportation. Nearly a third of staff/faculty and 19% of students use a motorized vehicle to commute. Twice as many staff/faculty (28%) than students (14%) use active transportation to commute to Loyola in the winter term.

More community members are using motorized vehicles to commute to Loyola campus in the winter term than to SGW campus. The largest percentage of active transportation users (mostly walking or running) in the winter term is Loyola staff/faculty (28%).

Table 7 - Modal share for winter term

Type of transportation	Mode of transportation	SGW campus		Loyola campus		Weighted average
		Students	Staff/Faculty	Students	Staff/Faculty	
Active transportation		20%	13%	14%	28%	18%
	<i>Walk / Run</i>	16%	9%	4%	23%	12%
	<i>Use wheelchair / electric wheelchair / mobility scooter</i>	1%	0%	2%	0%	1%
	<i>Bicycling on a personal bicycle</i>	2%	3%	6%	5%	3%
	<i>Biking on a BIXI</i>	0%	0%	2%	0%	1%
	<i>Rollerblading / Skateboarding</i>	1%	0%	0%	0%	1%
Public transportation		74%	71%	67%	41%	71%
	<i>Bus</i>	25%	20%	35%	16%	27%
	<i>Metro</i>	43%	36%	14%	8%	33%
	<i>Paratransit</i>	0%	0%	1%	0%	0%
	<i>Commuter train</i>	4%	12%	6%	16%	5%
	<i>Concordia shuttle bus</i>	2%	3%	11%	2%	5%
Motorized vehicle		6%	16%	19%	31%	11%
	<i>Gas or diesel vehicle</i>	4%	13%	17%	25%	9%
	<i>Electric vehicle</i>	1%	1%	1%	1%	1%
	<i>Plug-In hybrid vehicle</i>	0%	0%	0%	0%	0%
	<i>Hybrid vehicle</i>	0%	0%	0%	4%	0%
	<i>Carsharing vehicle (e.g., Communauto)</i>	0%	1%	1%	0%	0%
	<i>Motorcycle / Scooter</i>	0%	0%	0%	0%	0%
	<i>Taxi / Uber</i>	0%	0%	0%	0%	0%

Most community members commute to SGW campus using public transportation in the summer term. A third of community members use active forms of transportation to commute.

Approximately 5% of students and 16% of staff/faculty use a motorized vehicle to commute to SGW campus in the summer term.

Most students (52%) use public transportation to commute to Loyola campus in the summer term. A third of students use active transportation and 15% use motorized vehicles to commute.

Approximately 40% of staff/faculty use active transportation to commute to Loyola campus in the summer term, with many of them walking/running or using a personal bicycle. More staff/faculty use a motorized vehicle (33%) than public transportation (27%) to commute to Loyola campus in the summer term. The percentage of staff/faculty using motorized vehicles to commute to Loyola campus is over twice as many as for SGW campus.

Table 8 - Modal share for summer term

Type of transportation	Mode of transportation	SGW campus		Loyola campus		Weighted average
		Students	Staff/Faculty	Students	Staff/Faculty	
Active transportation		34%	29%	33%	40%	33%
	<i>Walk / Run</i>	21%	12%	7%	18%	16%
	<i>Use wheelchair / electric wheelchair / mobility scooter</i>	3%	0%	1%	0%	2%
	<i>Bicycling on a personal bicycle</i>	6%	14%	20%	19%	11%
	<i>Biking on a BIXI</i>	3%	4%	3%	4%	3%
	<i>Rollerblading / Skateboarding</i>	1%	0%	2%	0%	1%
Public transportation		61%	55%	52%	27%	57%
	<i>Bus</i>	20%	16%	23%	9%	20%
	<i>Metro</i>	37%	26%	11%	5%	28%
	<i>Paratransit</i>	0%	0%	1%	0%	0%
	<i>Commuter train</i>	2%	11%	8%	11%	5%
	<i>Concordia shuttle bus</i>	1%	2%	9%	2%	3%
Motorized vehicle		5%	16%	15%	33%	9%
	<i>Gas or diesel vehicle</i>	4%	13%	12%	26%	7%
	<i>Electric vehicle</i>	1%	1%	1%	1%	1%
	<i>Plug-In hybrid vehicle</i>	0%	0%	1%	1%	0%
	<i>Hybrid vehicle</i>	0%	1%	1%	4%	0%

	Carsharing vehicle (e.g., Communauto)	0%	0%	1%	1%	0%
	Motorcycle / Scooter	0%	1%	1%	1%	0%
	Taxi / Uber	0%	0%	0%	1%	0%

Seasonal Variation and Trend in Modal Share

As shown in Figure 5, there is no seasonal variation for the use of motorized vehicles by community members who commute to SGW campus. For both students and staff/faculty, the use of active transportation for commuting increases in the summer term and decreases in the winter term as users switch to public transportation.

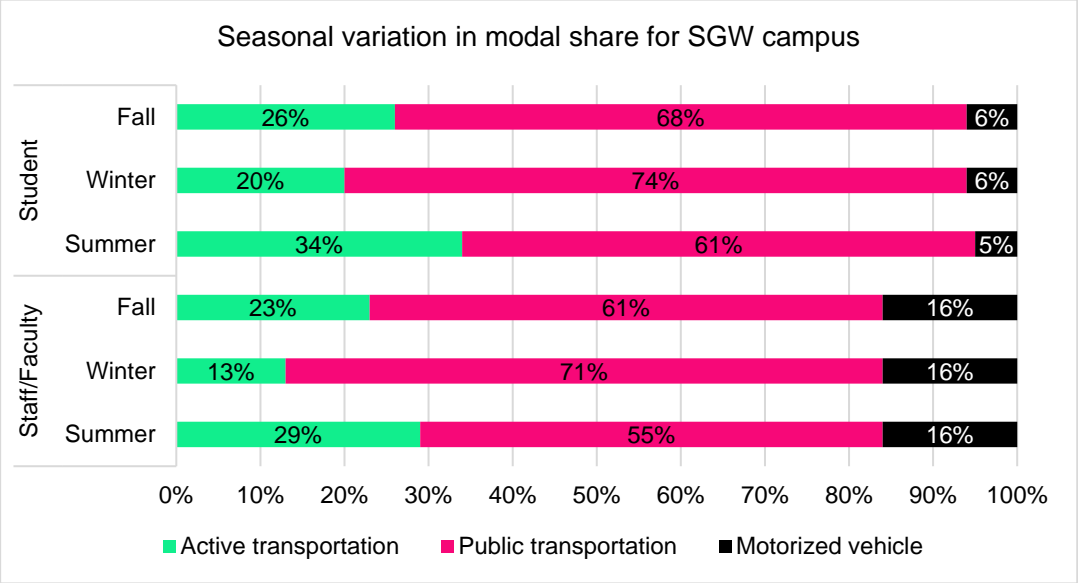


Figure 5 - Seasonal variation in modal share for SGW campus

As shown in Figure 6, students and staff/faculty commuting to Loyola campus use more active transportation in the fall and summer terms. The use of motorized vehicles by students drops slightly during the summer term. Conversely, the use of motorized vehicles by staff/faculty commuting to Loyola campus increases slightly in the summer term. This indicates that on average, some students who drive to Loyola in winter will shift to active transportation in summer, whereas staff/faculty who drive to Loyola in winter will not.

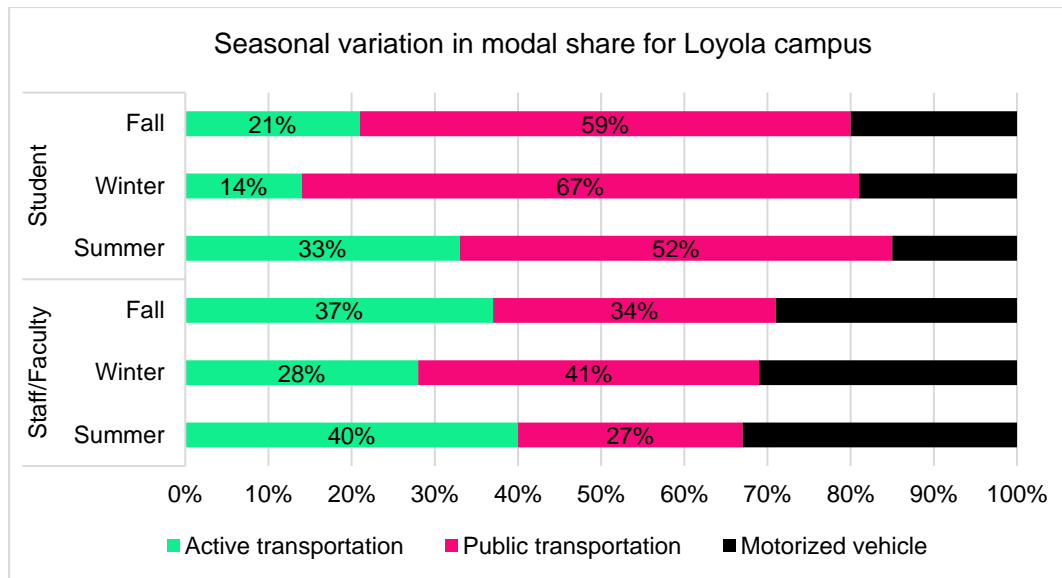


Figure 6 - Seasonal variation in modal share for Loyola campus

The modal share for active and public forms of transportation is relatively stable overtime, as indicated by the overall trend since 2005 and by the 2017-2023 comparison.¹ There is a downward trend in the modal share of motorized vehicles over time.

Table 9 - Trend in modal share at Concordia

Mode of transportation	2005	2008	2013	2017	2019	2023	Changes in modal share 2017-2023
Walking	N/A	N/A	15%	15%	8%	15%	0%
Bicycling	N/A	N/A	9%	9%	10%	9%	0%
Public transportation	50%	50%	60%	60%	54%	61%	1%
Concordia Shuttle	N/A	N/A	2%	3%	2%	4%	1%
Motorized vehicle	14%	14%	11%	10%	9%	11%	1%
Carpool	2%	2%	2%	2%	1%	N/A	N/A
Multiple	6%	6%	N/A	N/A	15%	N/A	N/A

¹ It is difficult to compare the modal share between 2023 and 2019 because the 2019 survey included an option for “multiple modes” of transportation.

Commuter Preferences and Factors Influencing Modes of Transportation

Respondents who indicated a particular mode of transportation were invited to select factors that influence their decision to adopt this mode. These respondents were then asked which factors would increase their frequency of adopting the same mode of transportation. Those who indicated that they did not adopt a particular mode of transportation were asked to select up to three factors that might increase their likelihood of using the mode of transportation in the future.

Active Transportation

WALKING / RUNNING / USING WHEELCHAIR

Approximately, 58% of students (or an estimated 26,383 students in total) and 61% of staff/faculty (or an estimated 2,602 staff/faculty in total) will walk, run or use their wheelchair for 10 minutes or more as part of their commute to Concordia.

The question specified 10 minutes or more to filter out student residents and community members walking, running or using their wheelchair to transition from their primary mode of commuting (e.g., metro, bus, paratransit) to campus.

Figure 7 lists the most important factors for community members when choosing to walk, run or use their wheelchair as part of their commute to Concordia. Exercise is the most important factor for both students and staff/faculty. For students, speed and weather conditions are other important factors when deciding whether to walk, run or use their wheelchair. It is important to note that 7% of students and 3% of staff/faculty choose to walk, run or use their wheelchair because other modes of transportation are unaffordable.

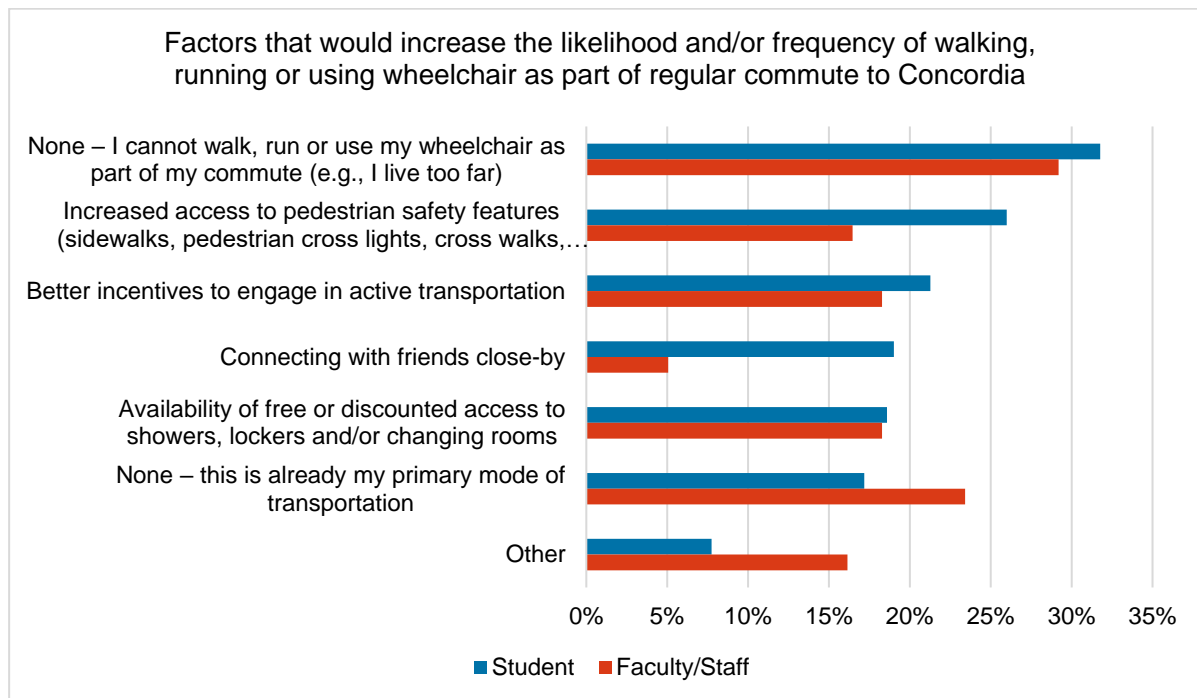


Figure 7 - Factors that would increase the likelihood and/or frequency of walking, running or using wheelchair as part of regular commute to Concordia

When asked which factors would increase the likelihood and/or frequency of walking, running or using wheelchair as part of regular commute to Concordia 26% of students and 16% of staff/faculty indicated increased access to pedestrian safety features like sidewalks, pedestrian cross lights and walks. Better incentives to engage in active transportation was also an important factor.

BICYCLING

Approximately, 25% of students (or an estimated 11,372 students in total) and 31% of staff/faculty (or an estimated 1,322 staff/faculty in total) will bicycle as part of their commute to Concordia.

Participants were asked to indicate what types of bicycles they ride as part of their commute to Concordia. The results are as follows:

Table 10 - Type of bicycles community members ride as part of their commute to Concordia

Type of bicycle	Percent of Students	Percent of Staff/Faculty
Personal bicycle	54%	74%
BIXI bicycle	33%	31%
Personal electric bicycle	18%	9%
BIXI electric bicycle	14%	12%
Personal bicycle adapted for people with reduced mobility	12%	1%
Cargo bicycle	1%	2%
Other	0%	1%

Most community members use their personal bicycle when commuting to campus. Approximately a third of students and staff/faculty use a BIXI bicycle when commuting to campus. Electric personal bicycles and BIXI bicycles are also among the types of bicycles being used by community members to commute to campus. It is important to note that approximately 12% of students (or an estimated 5,460 students in total) are using a personal bicycle adapted for people with reduced mobility such as an e-trike.

The type of bicycle being used by community members is important to consider when planning for bicycle parking on campus. For people with expensive bicycles or bicycles with personal adaptations, selecting secure bicycle parking is essential. The cost of new road (or road/mountain hybrid) bikes in Canada ranges from \$300 to \$800 for low- to midrange² and \$1,000 to \$7,500 for high-range models.³ The cost of electric bikes in Canada ranges from \$800 to \$1,600 for low- to mid-range⁴ and \$2,500 to \$10,000 for high-range models.⁵ The cost of bicycles adapted for people with reduced mobility can vary widely.

² Price range obtained from Canadian Tire at <https://www.canadiantire.ca/en/cat/toys-sports-recreation/bikesaccessories/bikes/hybrid-bikes-DC0002154.html>

³ Price range obtained from Cycle Neron at <https://www.cycleneron.com/us/bikes/road/>

⁴ Price range obtained from Best Buy Canada at <https://www.bestbuy.ca/en-ca/category/electric-citybikes/19904469?sort=priceLowToHigh>

⁵ Price range obtained from Cycle Neron at <https://www.cycleneron.com/us/bikes/e-bikes/hybrid/>

Below are the most important factors for community members when choosing where to park their bicycle on campus:

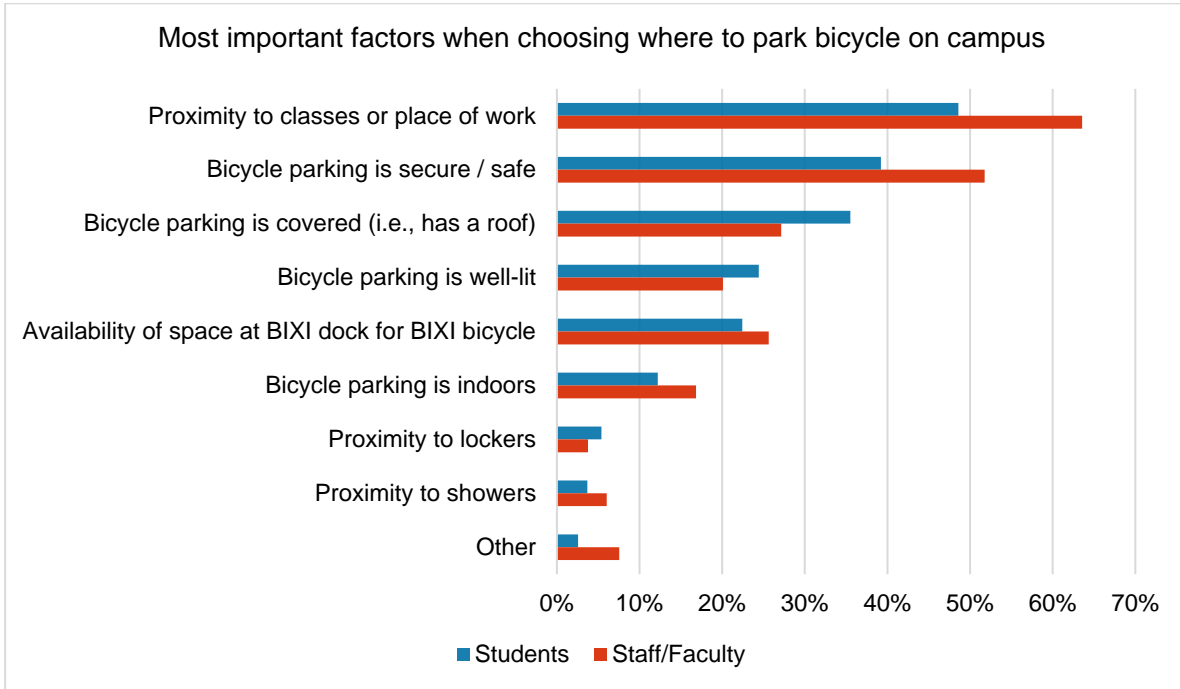


Figure 8 - Most important factors when choosing where to park bicycle on campus

After proximity to class or work, the most important factors are security of bike parking and covered bike parking.

The current secure bike parking facility located in the LB garage on Sir George Williams campus only includes the option to purchase an annual membership. Figure 9 shows that a seasonal (term-based) membership would be preferred among the community, with an annual membership being the least preferred option among students.

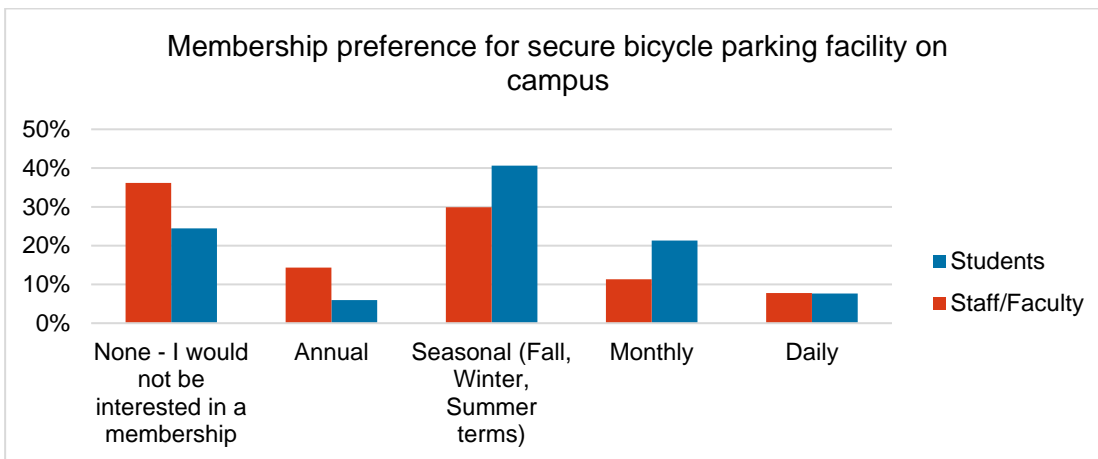


Figure 9 - Membership preference for secure bicycle parking facility on campus

Nearly half of students and staff/faculty identified bicycling as faster than other modes of transportation as one of the most important factors in their choice to bicycle to campus. Weather conditions and the fact that bicycling is better for the environment than other modes of transportation are among the other two most important factors for students in their choice to bicycle to campus. The most important factor for staff/faculty is to exercise. It is important to note that 8% of students and 4% of staff/faculty choose to bicycle to campus because other modes of transportation are unaffordable.

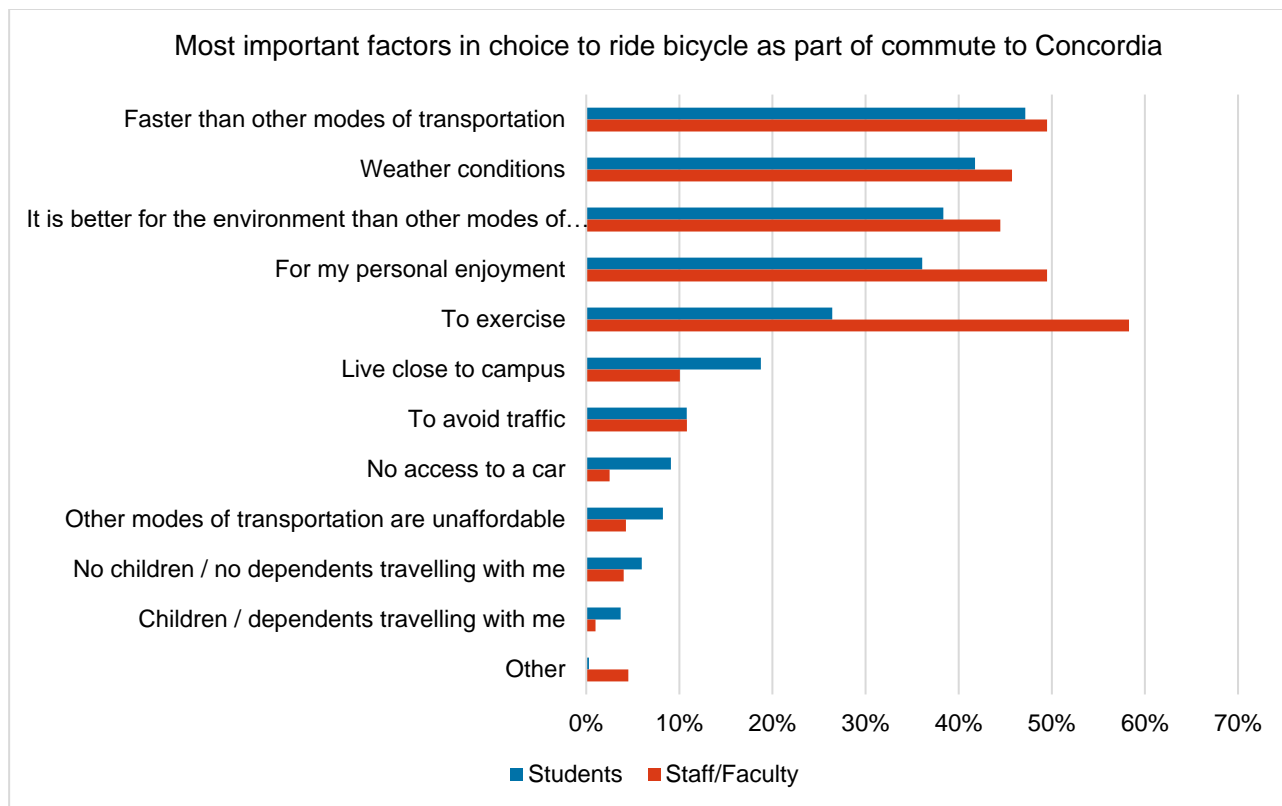


Figure 10 - Most important factors in choice to ride bicycle as part of commute to Concordia

The results for the factors that would increase the likelihood and/or frequency of community members bicycling as part of their regular commute to Concordia were separated by campus to see if there would be any significant differences; it was found that this is not the case.

For SGW campus, safer bicycle paths / networks and increased access to indoor secure bike parking facilities are the top two factors for both students and staff/faculty. Increased availability of covered outdoor bike parking and access to affordable bicycling equipment are also important factors that would increase the likelihood and/or frequency of students bicycling as part of their regular commute to Sir George Williams campus. Whereas availability of free or discounted access to showers, lockers and/or changing rooms was an important factor for staff/faculty. Approximately 18% of students and 12% of staff/faculty listed the availability of a free bicycle repair station as a factor. In May 2023, a free bicycle repair station funded through the university’s Climate Action Plan was installed on each campus.

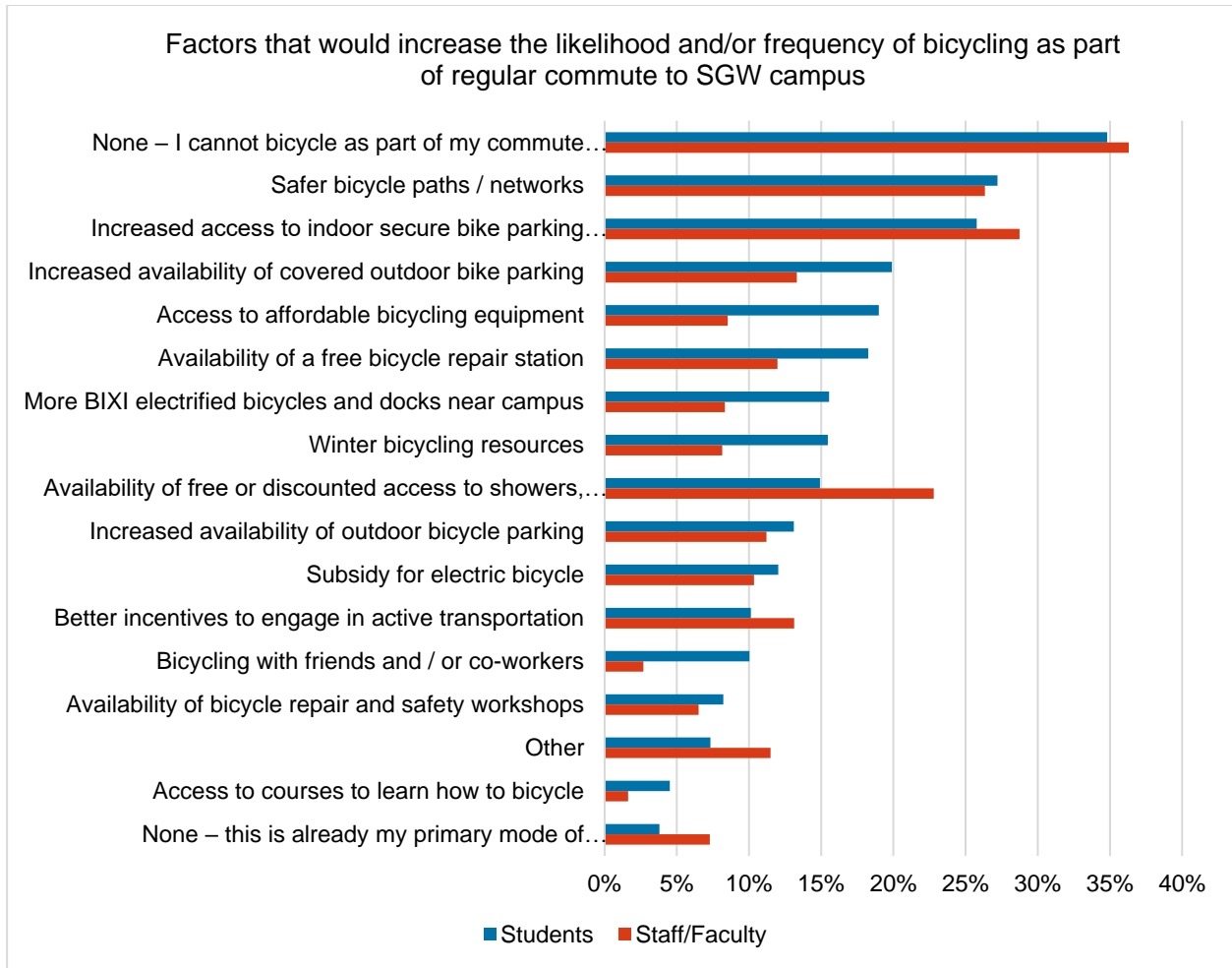


Figure 11 - Factors that would increase the likelihood and/or frequency of bicycling as part of regular commute to SGW campus

For Loyola campus, slightly more students (4%) and staff/faculty (3%) identified safer bicycle paths / networks to be an important factor. Increased access to indoor secure bike parking facilities remains the second most important factor for both students and staff/faculty.

Approximately 20% of students and 10% of staff/faculty listed the availability of a free bicycle repair station as a factor. As previously stated, in May 2023, a free bicycle repair station funded through the university’s Climate Action Plan was installed on each campus.

INTERCAMPUS BICYCLING

Approximately 20% of students (or an estimated 9,097 students in total) and 14% of staff/faculty (or an estimated 597 staff/faculty in total) commute by bicycle from campus to campus. Many students (40%) are bicycling between campuses more than twice a week but not every day. Most staff/faculty (57%) are bicycling less than once a week between campuses. When bicycling between campuses most students and staff/faculty take De Maisonneuve as their usual route.

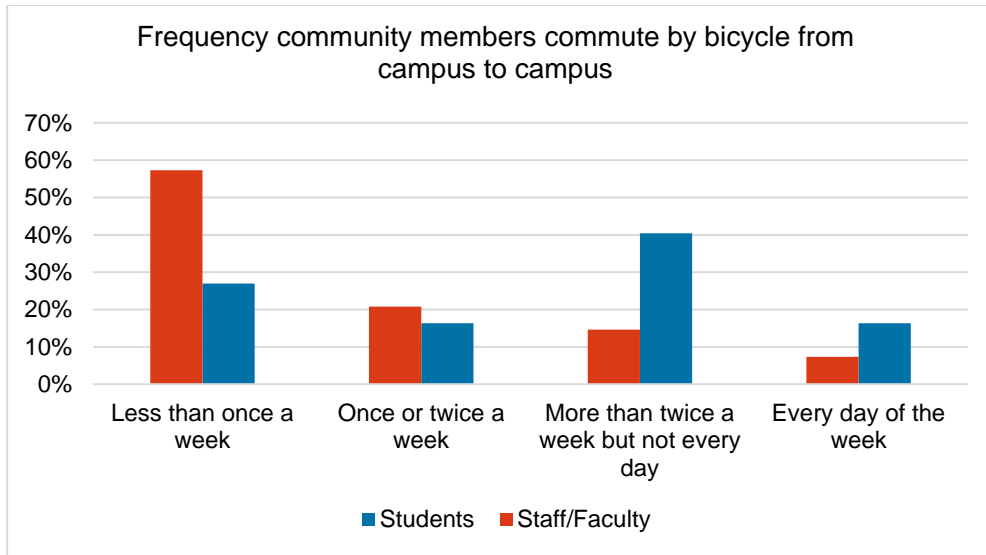


Figure 12 - Frequency community members commute by bicycle from campus to campus

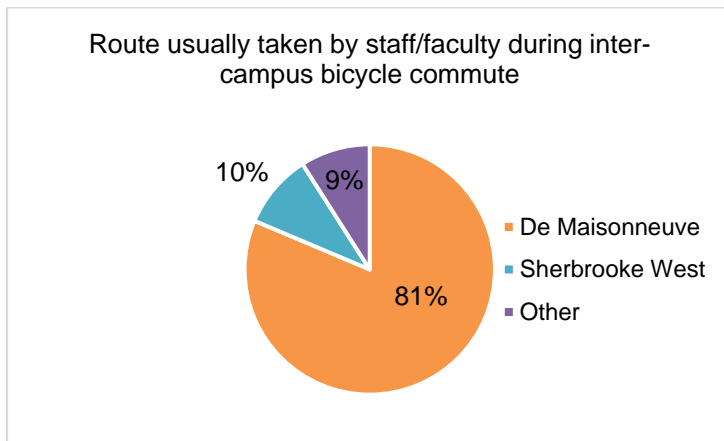


Figure 13 - Route usually taken by staff/faculty during inter-campus bicycle commute

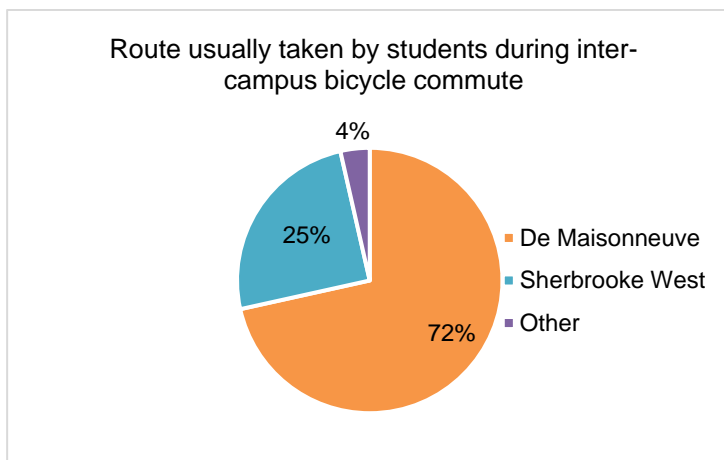


Figure 14 - Route usually taken by students during inter-campus bicycle commute

Public Transportation

Approximately 86% of students (or an estimated 39,120 students in total) and 82% of staff/faculty (or an estimated 3,500 staff/faculty in total) will use public transportation as part of their commute to Concordia. Public transportation includes the bus, paratransit, train and metro.

Nearly half of the students (48%) and staff/faculty (47%) choose to use public transportation because it is faster than other modes of transportation. The next two most important factors differ for students and staff/faculty. Students choose to use public transportation because they live too far to use active forms of transportation and they do not have access to a car. Whereas, staff/faculty choose to use public transportation because of weather conditions and to avoid traffic. Approximately 26% of students and 32% choose public transportation because it is better for the environment than other modes of transportation.

It is important to note that 12% of students and 6% of staff/faculty choose public transportation because other modes of transportation are unaffordable. For 6% of students and 2% of staff/faculty, they use public transportation because it is the only accessible option given their accessibility needs.

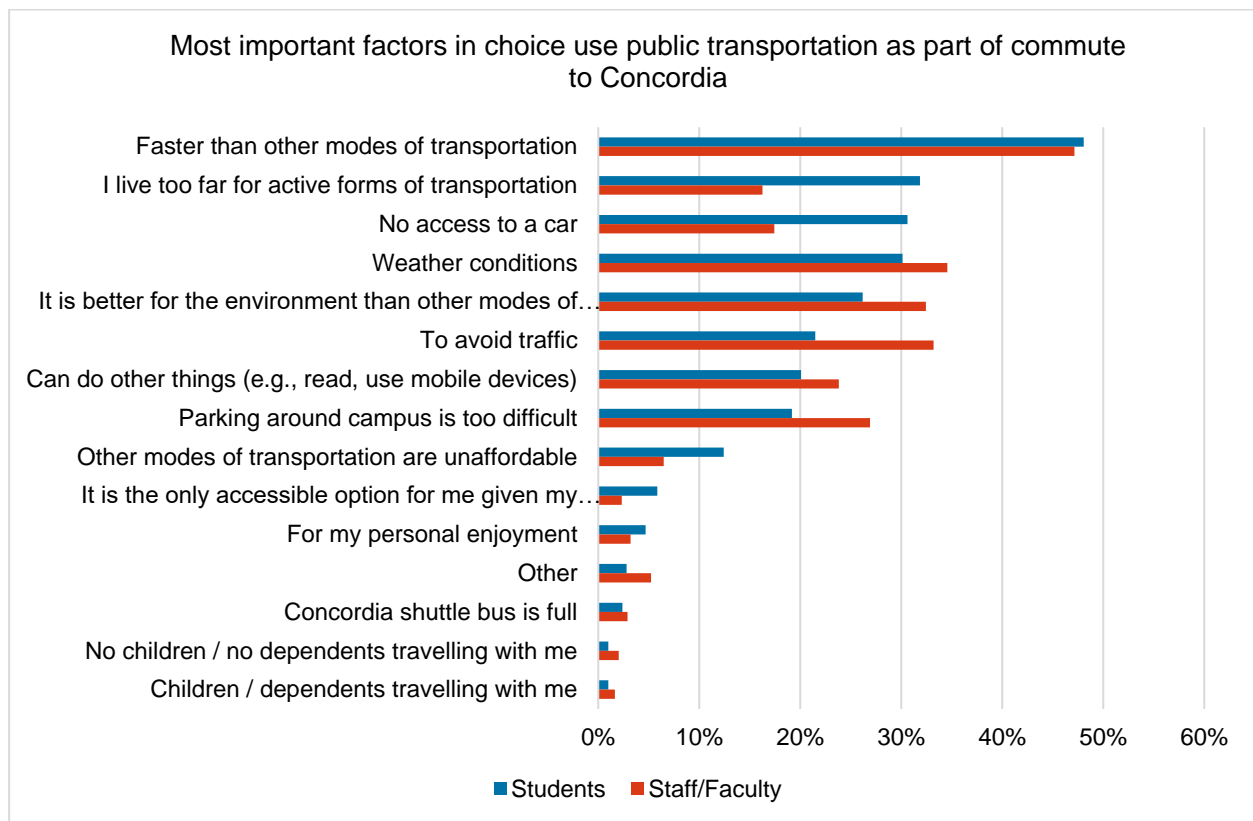


Figure 15 - Most important factors in choice use public transportation as part of commute to Concordia

The most important factor that would increase the likelihood and/or frequency of using public transportation as part of regular commute to Concordia for both students (36%) and staff/faculty (34%) would be a reduction in transit fares. Students currently have access to a reduced-fare student OPUS card. Staff/faculty are not entitled to a reduced-fare program. Over a third of students (35%) and staff/faculty (33%) indicated that public transportation is already their primary

mode of transportation therefore nothing would increase the likelihood and/or frequency of using this mode of transportation. Several of the factors such as faster commute, more reliable departure times and additional transit lines would increase the likelihood of students and staff/faculty using public transportation and should be shared with the Société de transport de Montréal (STM).

It is important to note that 6% of students and 3% of staff/faculty indicated that a more equitable experience for people who experience accessibility barriers would increase their likelihood and/or frequency of using public transportation. This should also be shared with the STM.

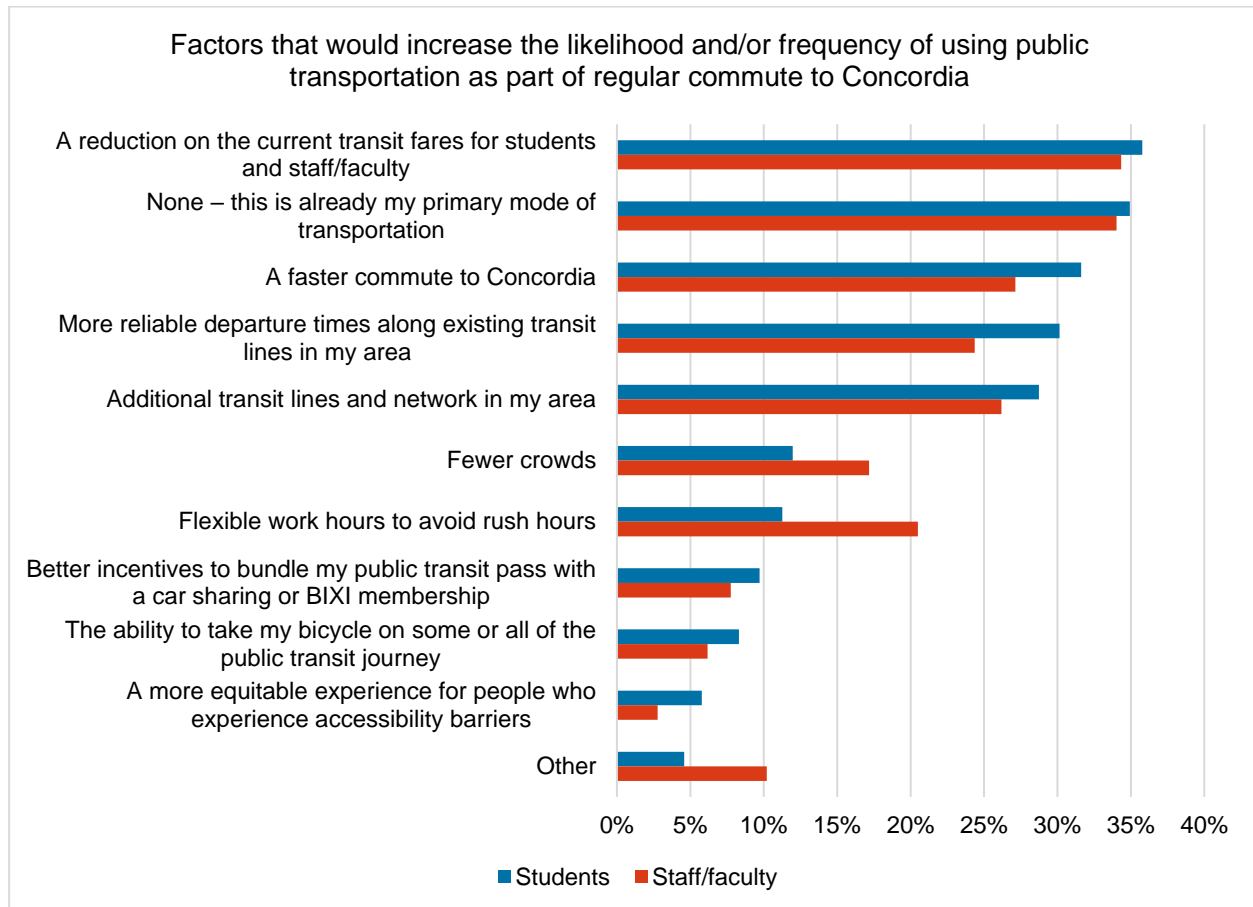


Figure 16 - Factors that would increase the likelihood and/or frequency of using public transportation as part of regular commute to Concordia

Concordia Shuttle Bus

Approximately, 32% of students (or an estimated 14,556 students in total) and 20% of staff/faculty (or an estimated 853 staff/faculty in total) will use the Concordia shuttle bus as part of their commute to Concordia. The Concordia shuttle bus offers Concordia students and staff/faculty a free ride between the SGW and Loyola campuses.

Most students (58%) and staff/faculty (52%) choose to take the Concordia shuttle bus as part of their commute to campus because it is faster than other modes of transportation. Unlike regular city buses, the shuttle bus does not make any stops and changes its route based on traffic

conditions. The community (22%) is also choosing to take the Concordia shuttle bus because it is better for the environment than other modes of transportation. Approximately 11% of students and 9% of staff/faculty choose to take the shuttle bus other modes of transportation are unaffordable.

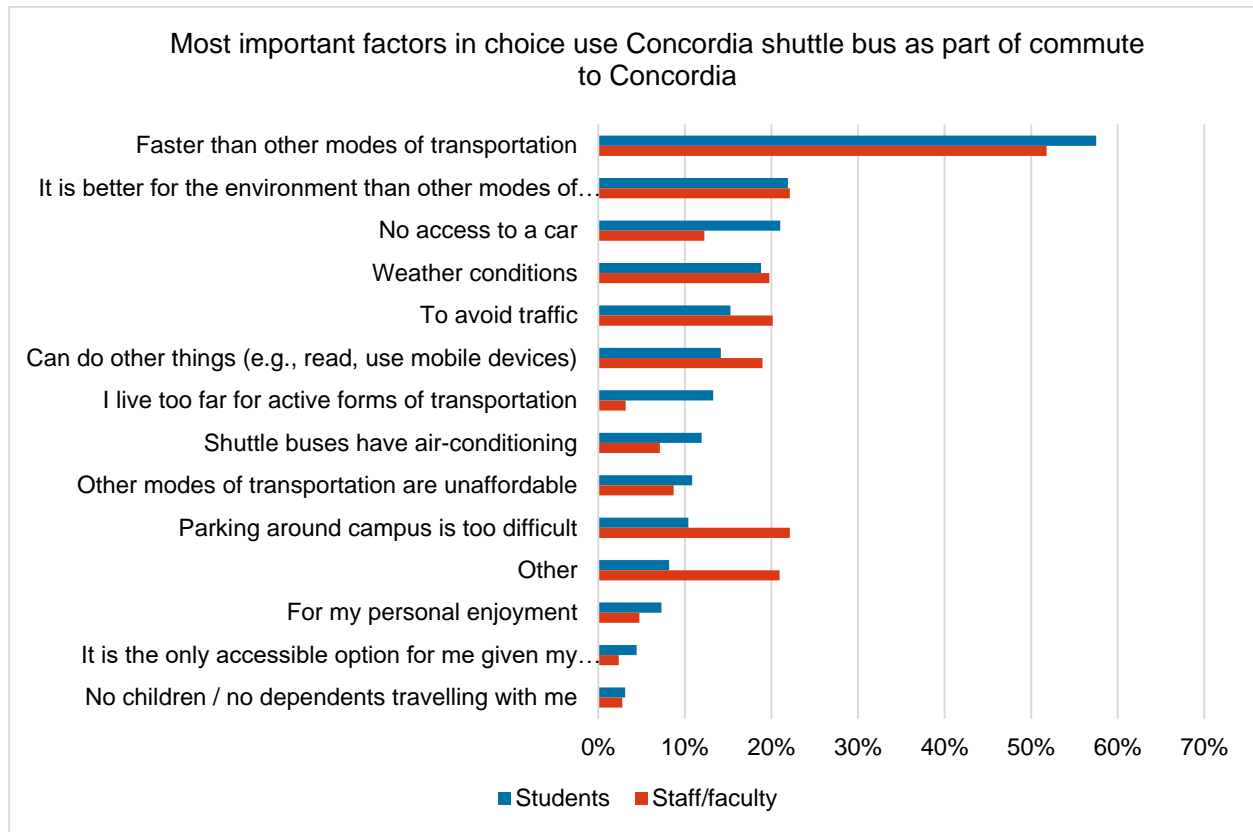


Figure 17 - Most important factors in choice use Concordia shuttle bus as part of commute to Concordia

When asked which factors would increase the likelihood and/or frequency of using the Concordia shuttle bus as part of their regular commute to Concordia, 33% of students and 35% staff/faculty indicated that they cannot take the shuttle bus as part of their commute. Another 33% of staff/faculty indicated that the question was not applicable to them as they are not supposed to be taking the shuttle bus as part of their commute to campus. Students would like more frequent and less crowded buses. They would also like a more reliable shuttle bus schedule.

The results from the questions regarding the shuttle bus will be shared with the relevant stakeholders in Facilities Management and hopefully integrated into future contracts and operations.

Personal Motorized Vehicle

Approximately, 26% of students (or an estimated 11,827 students in total) and 37% of staff/faculty (or an estimated 1,578 staff/faculty in total) will drive a personal motorized vehicle (e.g., car, van, electric wheelchair or mobility scooter) as part of their commute to Concordia. Participants were asked to indicate what type of vehicle they drive most often as part of their commute to Concordia. The results are as follows:

Table 11 - Type of vehicle Concordians drive most often as part of their commute to campus

Type of vehicle	Percent of Students	Percent of Staff/Faculty
Gas or diesel fueled passenger vehicle (e.g., passenger cars, minivans, SUVs)	73%	82%
Gas or diesel fueled light-duty truck (e.g., pickup trucks, full-size vans, extended-length SUVs)	7%	4%
Hybrid vehicle	5%	4%
Electric vehicle	5%	5%
Electric wheelchair or mobility scooter	4%	1%
Motorcycle	3%	2%
Plug-In hybrid vehicle	3%	2%

Most students and staff/faculty drive gas or diesel fueled passenger vehicles as part of their commute to Concordia. Approximately 13% of students and 11% of staff/faculty drive an alternatively fueled vehicle (electric, hybrid, plug-in hybrid).

The top three most important factors for students and staff/faculty in choice to use motorized vehicle as part of commute to SGW campus are: 1) faster than other modes of transportation, 2) flexible departure and arrival times 3) weather conditions. For students, living too far from campus and reliable departure and arrival times are other important factors. Whereas for staff/faculty, having multiple destinations before, during and/or after commute and needing to carry many things (dependents excluded) are important factors in their decision to use a motorized vehicle to commute to Sir George Williams campus. Approximately 2% of students and staff/faculty have reduced mobility and rely on their personal vehicles for transportation.

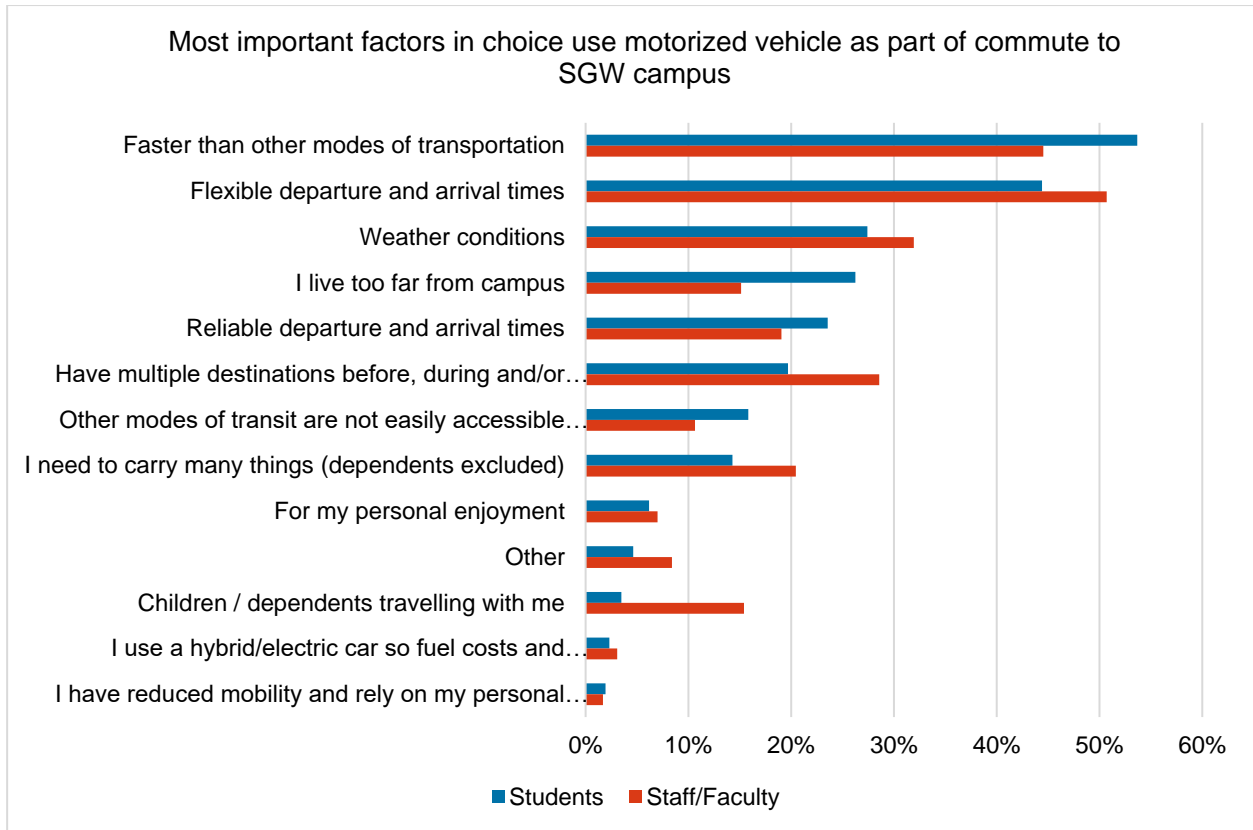


Figure 18 - Most important factors in choice use motorized vehicle as part of commute to SGW campus

For students commuting to Loyola campus, their top three most important factors in their choice to use a motorized vehicle differs from students commuting to SGW campus. For staff/faculty, their top three factors remain the same. Half of the students choose to use a motorized vehicle to commute to Loyola campus because of flexible departure and arrival times and because they live too far from campus. Approximately 36% of students consider needing to carry many things as an important factor in their choice. Having reduced mobility and relying on a personal vehicle is an important factor for 4% of students and 3% of staff/faculty.

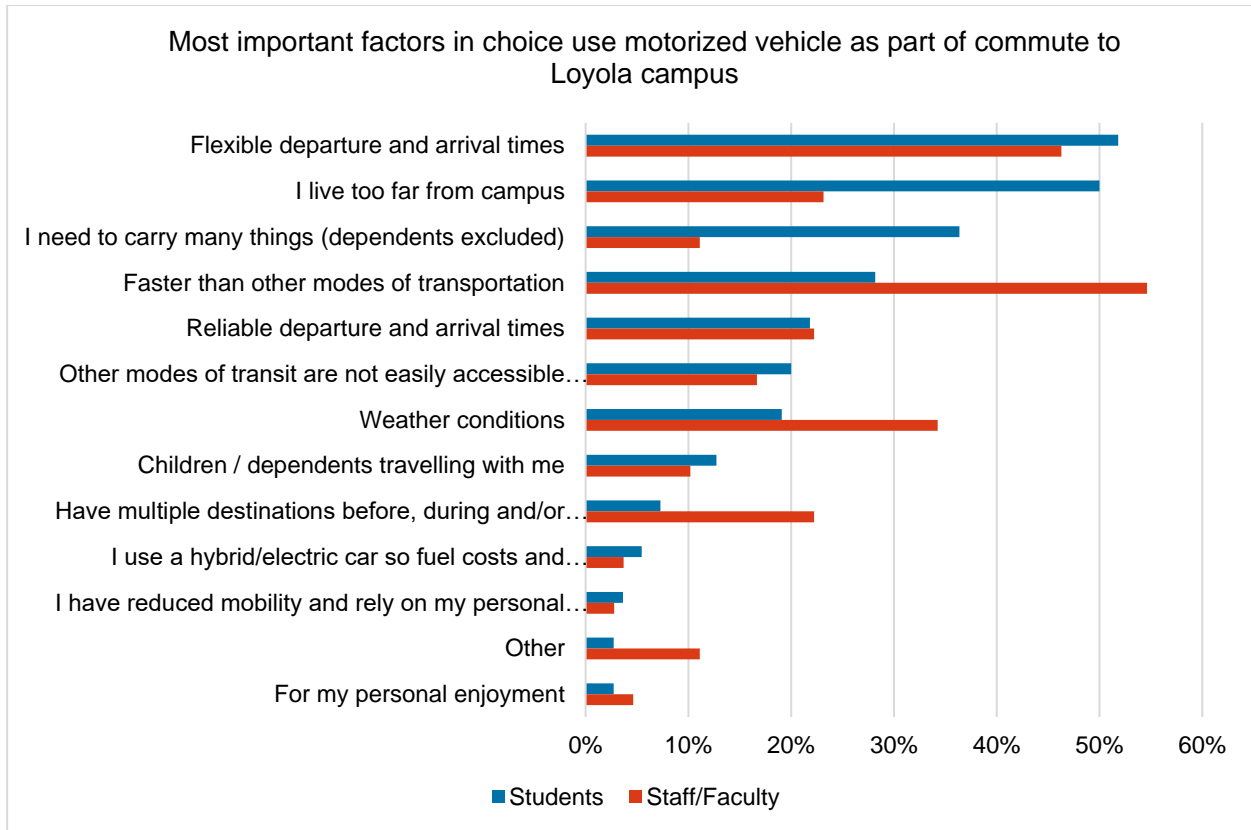


Figure 19 - Most important factors in choice use motorized vehicle as part of commute to Loyola campus

Carpooling

Carpooling was defined as an arrangement between people to make a regular journey in a single vehicle, and it could include getting a ride from parents / friends. Approximately, 18% of students (or an estimated 8,188 students in total) and 8% of staff/faculty (or an estimated 341 staff/faculty in total) will carpool as part of their commute to Concordia.

The three most important factors in both students and staff/faculty choice to carpool to SGW campus are the following: 1) Enjoy the company of the person(s) they carpool with, 2) can share expenses with others in group and 3) faster than other modes of transportation. The most important factors for community members in their choice to carpool to Loyola campus are not significantly different from those for SGW campus. For approximately 8% of students and staff/faculty they choose to carpool because it supports people with reduced mobility.

Not many community members are choosing to carpool because they are encouraged to by Concordia. Staff/faculty are incentivized to carpool by the university through a reduced monthly parking permit fee on both campuses. There is also a Shoptalk [Carpool channel](#) to facilitate carpooling among staff/faculty. It helps interested staff/faculty find potential carpooling partners by sharing schedules, locations, and destinations.

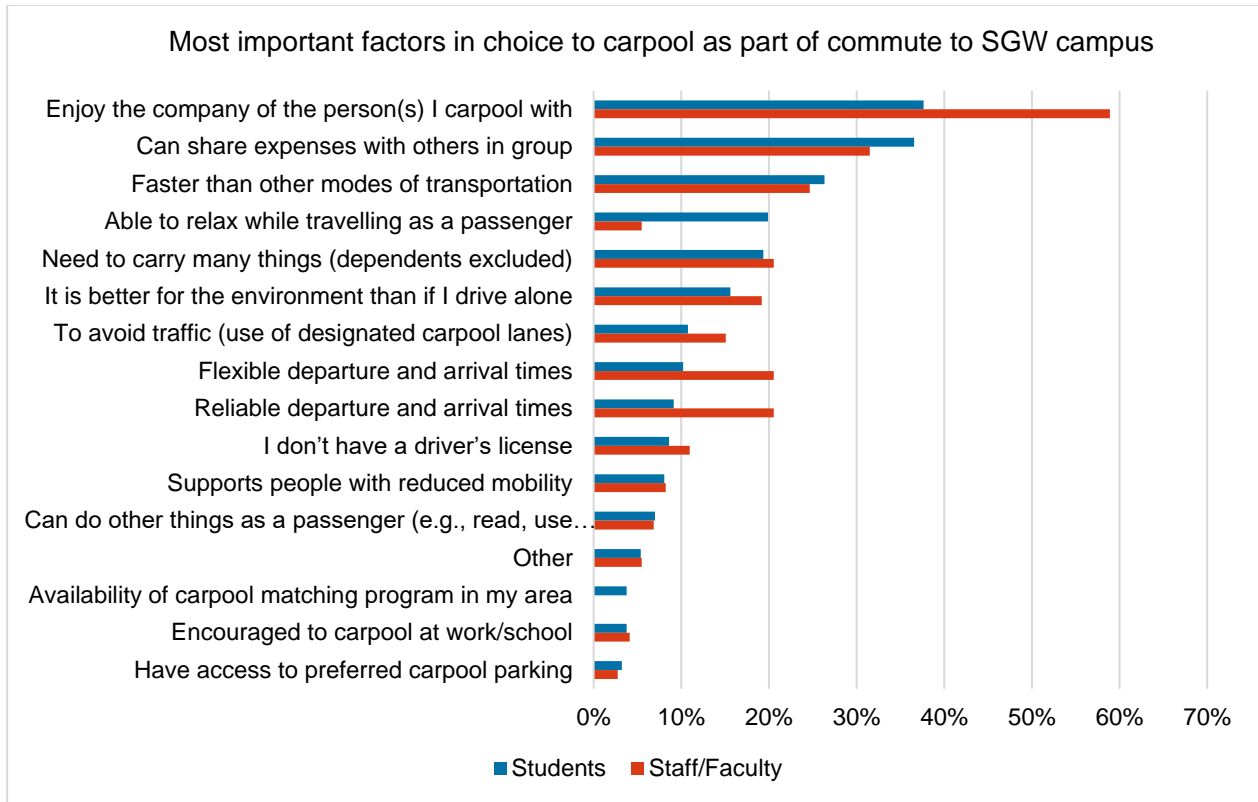


Figure 20 - Most important factors in choice to carpool as part of commute to SGW campus

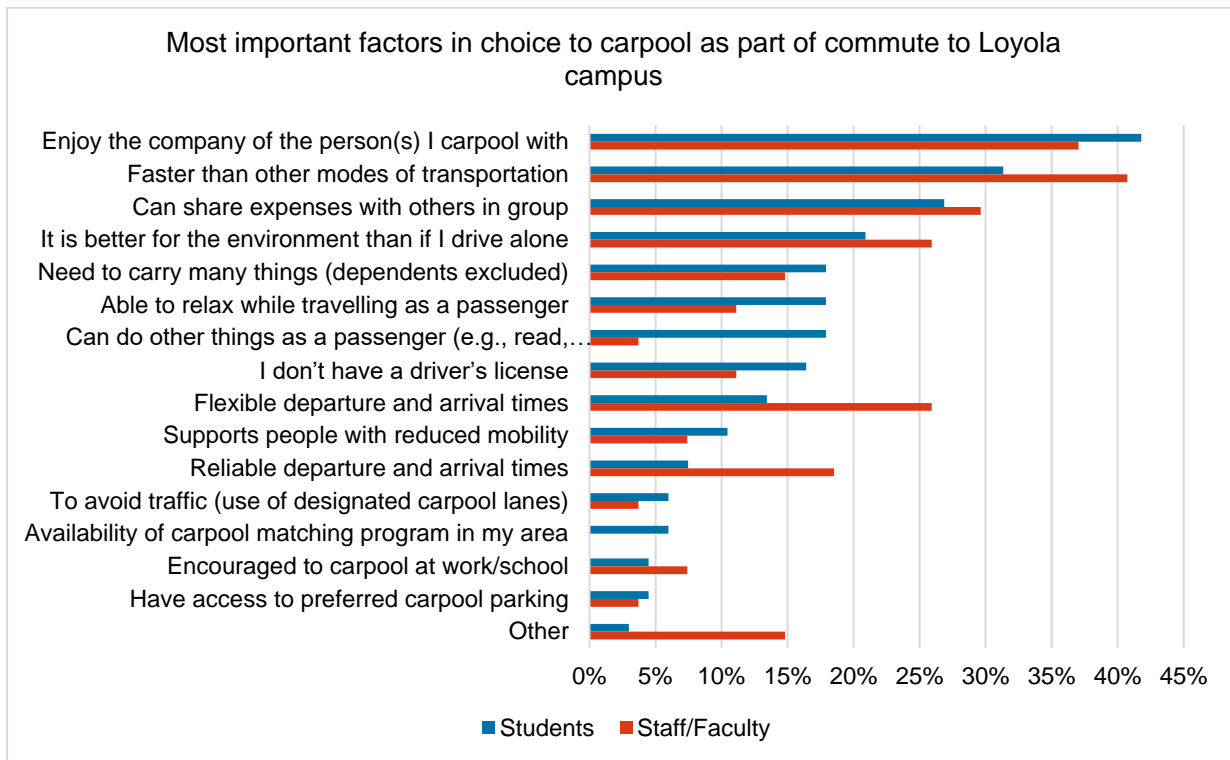


Figure 21 - Most important factors in choice to carpool as part of commute to Loyola campus

ACCESSIBILITY

For the 2023 Commuter Habits Survey accessibility was integrated across all sections of the survey. A draft of the survey questions was reviewed by a representative from the Access Centre for Students with Disabilities and Equity Office. It was important to add an optional open-ended question to give community members the opportunity to explain if they experience any accessibility barriers (due to a disability) that impact their commute to their primary campus. The goal is to minimize or eliminate the accessibility barriers community members experience during their commute.

A total of 941 participants responded to the question. Over 80% of responses were unusable as participants provided answers such as “No”, “I don’t know”, “None” or gibberish. This is likely a result of confusion as to whether the question was mandatory or not. In future iterations of the survey, it would be important to state at the beginning of the question that it is optional. Another issue with the remaining 20% of responses is that participants often indicated their disability but did not explain how it impacts their commute. Similarly, some participants would explain barriers they experience during their commute but not how their disability is related. The question should be clearer in the future to avoid incomplete responses.

After filtering the responses, only 52 responses were complete. Of these responses most people (54%) indicated that they had a physical disability and 8% of people indicated that they had a mental disability that impacts which mode of transportation they can use to commute to campus. For example, many participants stated that due to a physical disability they are unable to use active forms of transportation. Approximately 23% of respondents identified metro stations and their lack of elevators / accessibility features as being a barrier they experience due to a physical disability. Building accessibility (escalators, elevators, automatic door openers) and sidewalk conditions were a barrier for 6% of participants.

Having dependents with disabilities or being immunocompromised was a barrier for 4% of participants and impacted which mode of transportation they would take to commute to campus. Although not asked in the question, one participant flagged financial accessibility (i.e., cost different modes of transportation) as being a barrier to their commute. Although pregnancy would not be considered a physical disability, two participants indicated that they experience extreme fatigue due to being pregnant and that their condition impacted which mode of transportation they would use for their commute.

ELECTRIFICATION OF CAMPUS INFRASTRUCTURE

Sir George Williams Campus

Current Demand

Approximately, 23% of students (or an estimated 7,094 students in total) and 34% of staff/faculty (or an estimated 1,222 staff/faculty in total) will drive a personal motorized vehicle (e.g., car, van, electric wheelchair or mobility scooter) as part of their commute to Sir George Williams campus. Participants were asked to indicate what type of vehicle they drive most often as part of their commute to SGW campus. The results are as follows:

Table 12 - Type of vehicle Concordians drive most often as part of their commute to SGW campus

Type of vehicle	Percent of Students	Percent of Staff/Faculty
Gas or diesel fueled passenger vehicle (e.g., passenger cars, minivans, SUVs)	74%	83%
Gas or diesel fueled light-duty truck (e.g., pickup trucks, full-size vans, extended-length SUVs)	6%	4%
Hybrid vehicle	5%	3%
Electric vehicle	5%	5%
Electric wheelchair or mobility scooter	4%	1%
Motorcycle	3%	3%
Plug-In hybrid vehicle	2%	2%

Most students and staff/faculty drive gas or diesel fueled passenger vehicles as part of their commute to Concordia. Approximately 12% of students and 10% of staff/faculty drive an alternatively fueled vehicle (electric, hybrid, plug-in hybrid).

Approximately 7% of students (or an estimated 500 students in total) and staff/faculty (or an estimated 86 staff/faculty in total) will use a vehicle as part of their commute to SGW campus that requires to be charged (electric or plug-in hybrid). Electric (EV) and plug-in hybrid (PIH) vehicle users were asked when they mostly charge their vehicle. Most students (65%) and staff/faculty (80%) charge their vehicles during the night to morning when the car is idle. Approximately 16% of staff/faculty charge their vehicles during their working hours (i.e., between their trip to Concordia and coming back home). In other words, an estimated 40 staff/faculty would be using the Concordia or surrounding electric vehicle charging stations. For students, 15% indicated that they charge their vehicle anytime when their car is idle and 5% charge their vehicles during the day between their trips. This could mean that an estimated 432 students in total would be using Concordia or surrounding electric vehicle charging stations.

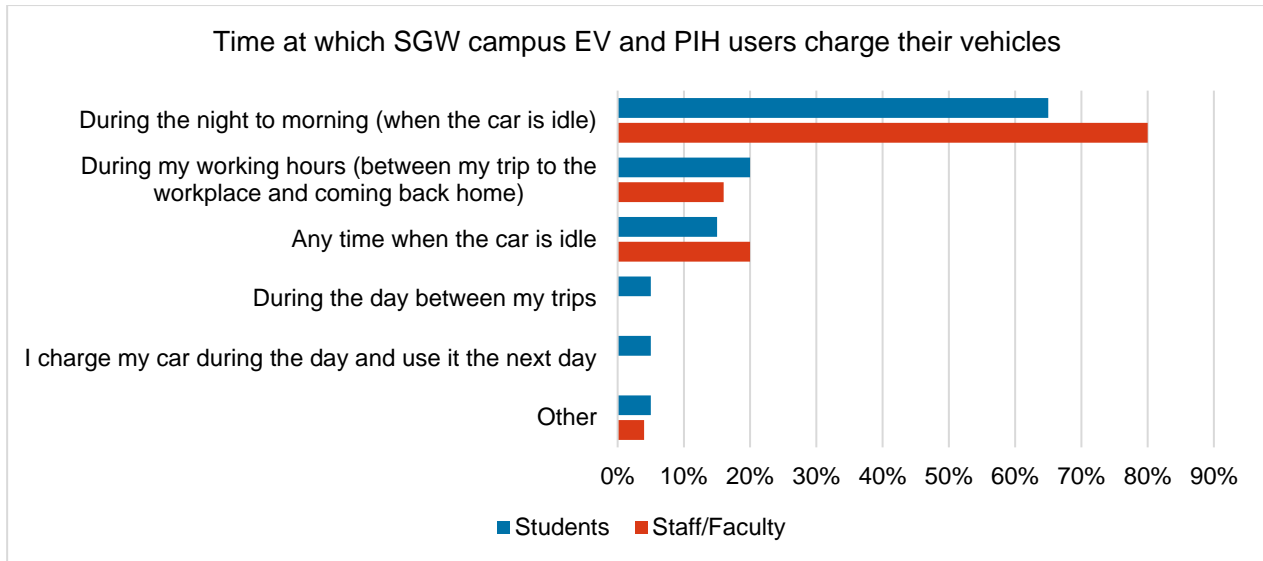


Figure 22 - Time at which SGW campus EV and PIH users charge their vehicles

Recommendations for electric vehicle parking at the SGW campus

Table 13 lists the services that respondents who currently drive alternatively fueled vehicles to Concordia would like to see. For both students and staff/faculty, additional charging stations at SGW campus are the most frequently cited service followed by faster charging stations at SGW campus for students and reduced parking permit fees for staff/faculty. Preferential parking was also listed as fairly high importance, especially for staff/faculty.

It is therefore recommended to:

- Ensure that all newly installed charging stations on campus are 240V or faster.
- Explore options for reduced price parking permits for EV holders.
- Seek to ensure that all newly installed charging stations are situated within close proximity to building entrances and / or exits.

Table 13 - List of services that respondents who currently drive alternatively fueled vehicles to Concordia would like to see

Services	Percent of Students	Percent of Staff/Faculty
More charging stations at Sir George Williams campus	48%	65%
Faster charging stations at Sir George Williams campus	45%	42%
Reduced parking permit fees	38%	59%
Preferential parking locations for alternatively fueled vehicles (e.g., close to building entrances and exits)	36%	55%
More charging stations at Loyola campus	17%	26%
Faster charging stations at Loyola campus	14%	26%
Other	6%	6%
None	4%	10%

Future demand for EV parking for the SGW campus

Of those who currently drive a gas or diesel fueled passenger vehicle (of any size) or a motorcycle to the SGW campus, 40% (or an estimated 2,750 people in total) plan on purchasing an alternatively fueled (i.e., non-petroleum) vehicle in the next five years.

Figure 23 shows the breakdown of which alternatively fueled vehicles SGW campus respondents are planning on purchasing. Of those who are planning to purchase an alternatively fueled vehicle, 73% (or an estimated 2,000 people in total) plan on purchasing an electric or plug-in hybrid vehicle in the next five years.

When combining this projected increase of 2,000 with the 586 people who are already estimated to drive an electric or plug-in hybrid vehicle to the SGW campus, the number rises to an estimated 2,590. Of these, 44% (or an estimated 1,730 people in total) indicate that they plan to charge their vehicles during their working hours.

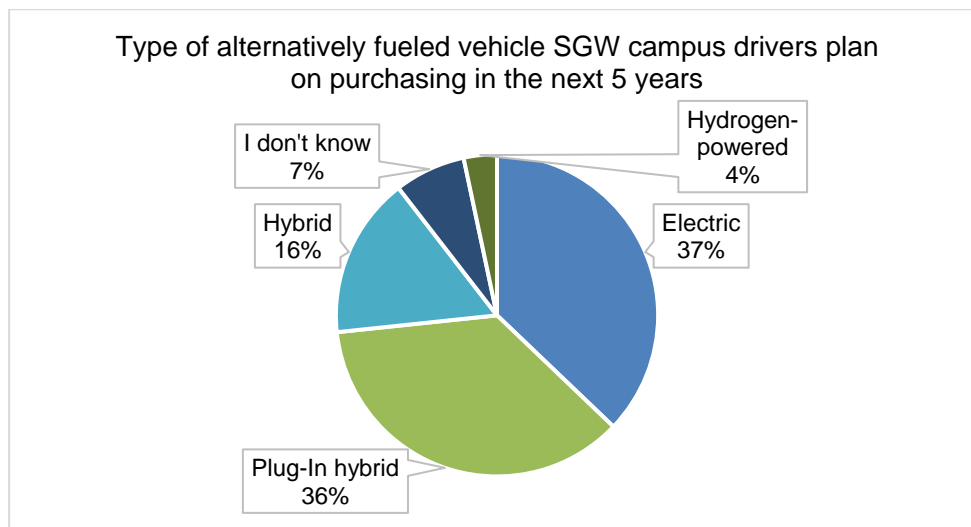


Figure 23 - A pie chart depicting the breakdown of which alternatively fueled vehicles are being planned for purchase by SGW campus respondents who currently drive gas or diesel fueled passenger vehicles or motorcycles.

Loyola Campus

Current demand

Approximately, 35% of students (or an estimated 5,126 students in total) and 49% of staff/faculty (or an estimated 329 staff/faculty in total) will drive a personal motorized vehicle (e.g., car, van, electric wheelchair or mobility scooter) as part of their commute to Loyola campus.

Participants were asked to indicate what type of vehicle they drive most often as part of their commute to Loyola campus. The results are as follows:

Table 14 - Type of vehicle Concordians drive most often as part of their commute to Loyola campus

Type of vehicle	Percent of Students	Percent of Staff/Faculty
Gas or diesel fueled passenger vehicle (e.g., passenger cars,	70%	81%

minivans, SUVs)		
Gas or diesel fueled light-duty truck (e.g., pickup trucks, full-size vans, extended-length SUVs)	11%	3%
Plug-In hybrid vehicle	5%	1%
Hybrid vehicle	4%	8%
Electric wheelchair or mobility scooter	4%	2%
Motorcycle	4%	0%
Electric vehicle	3%	5%

Most students and staff/faculty drive gas or diesel fueled passenger vehicles as part of their commute to Concordia. Approximately 12% of students and 14% of staff/faculty drive an alternatively fueled vehicle (electric, hybrid, plug-in hybrid).

Approximately 8% of students (or an estimated 410 students in total) and 6% of staff/faculty (or an estimated 19 staff/faculty in total) will use a vehicle as part of their commute to Loyola campus that requires to be charged (electric or plug-in hybrid). Electric (EV) and plug-in hybrid (PIH) vehicle users were asked when they mostly charge their vehicle. Most students (67%) and staff/faculty (83%) charge their vehicles during the night to morning when the car is idle. Approximately 33% of staff/faculty charge their vehicles during their working hours (i.e., between their trip to Concordia and coming back home). In other words, an estimated 7 staff/faculty would be using the Concordia or surrounding electric vehicle charging stations. For students, 22% indicated that they charge their vehicle during the day and use it the next day.

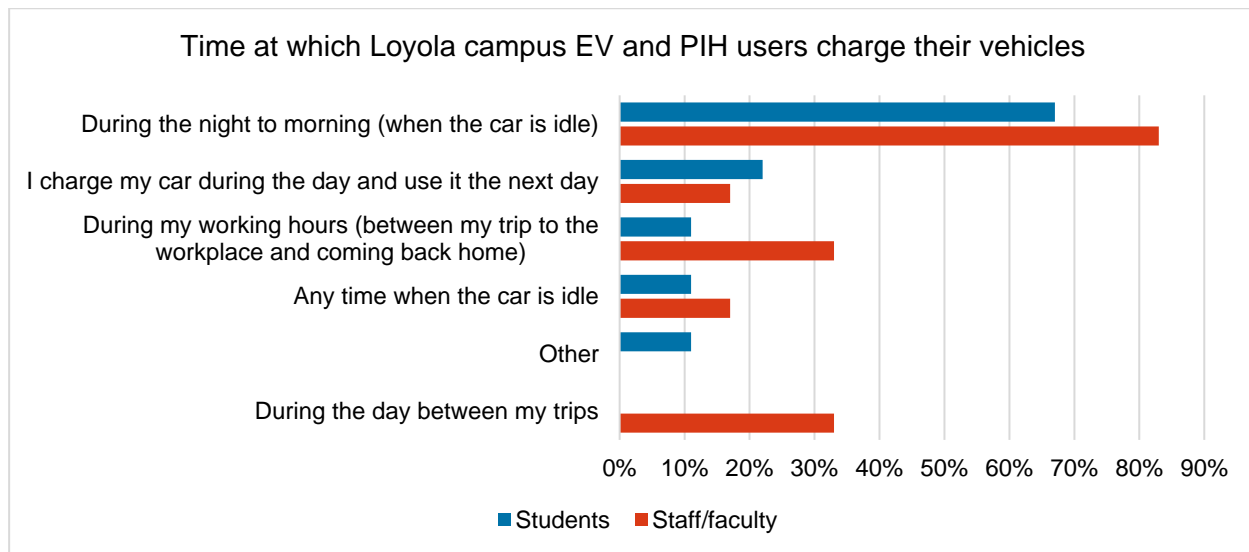


Figure 24 - Time at which Loyola campus EV and PIH users charge their vehicles

Recommendations for electric vehicle parking at the Loyola campus

Table 15 lists the services that respondents who currently drive alternatively fueled vehicles to Concordia would like to see. Approximately 26% of staff/faculty would like more and faster

charging stations at Loyola campus while 17% of students would like more and 14% would like faster charging stations on Loyola campus. Preferential parking was also listed as fairly high importance, especially for staff/faculty.

It is therefore recommended to:

- Ensure that all newly installed charging stations on campus are 240V or faster.
- Explore options for reduced price parking permits for EV holders.
- Seek to ensure that all newly installed charging stations are situated within close proximity to building entrances and / or exits.

Table 15 - List of services that respondents who currently drive alternatively fueled vehicles to Concordia would like to see

Services	Percent of Students	Percent of Staff/Faculty
More charging stations at Sir George Williams campus	48%	65%
Faster charging stations at Sir George Williams campus	45%	42%
Reduced parking permit fees	38%	59%
Preferential parking locations for alternatively fueled vehicles (e.g., close to building entrances and exits)	36%	55%
More charging stations at Loyola campus	17%	26%
Faster charging stations at Loyola campus	14%	26%
Other	6%	6%
None	4%	10%

Future demand for EV parking for the Loyola campus

Of those who currently drive a gas or diesel fueled passenger vehicle (of any size) or a motorcycle to the Loyola campus, 33% (or an estimated 1,558 people in total) plan on purchasing an alternatively fueled (i.e., non-petroleum) vehicle in the next five years.

Figure 25 shows the breakdown of which alternatively fueled vehicles Loyola campus respondents are planning on purchasing. Of those who are planning to purchase an alternatively fueled vehicle, 72% (or an estimated 1,054 people in total) plan on purchasing an electric or plug-in hybrid vehicle in the next five years.

When combining this projected increase of 1,054 with the 429 people who are already estimated to drive an electric or plug-in hybrid vehicle to the Loyola campus, the number rises to an estimated 1,483. Of those planning on purchasing an EV or PIH, 45% of students and 53% of staff/faculty (or an estimated 500 people in total) indicated that they would use the charging stations to charge their vehicles if it is provided in Concordia parking.

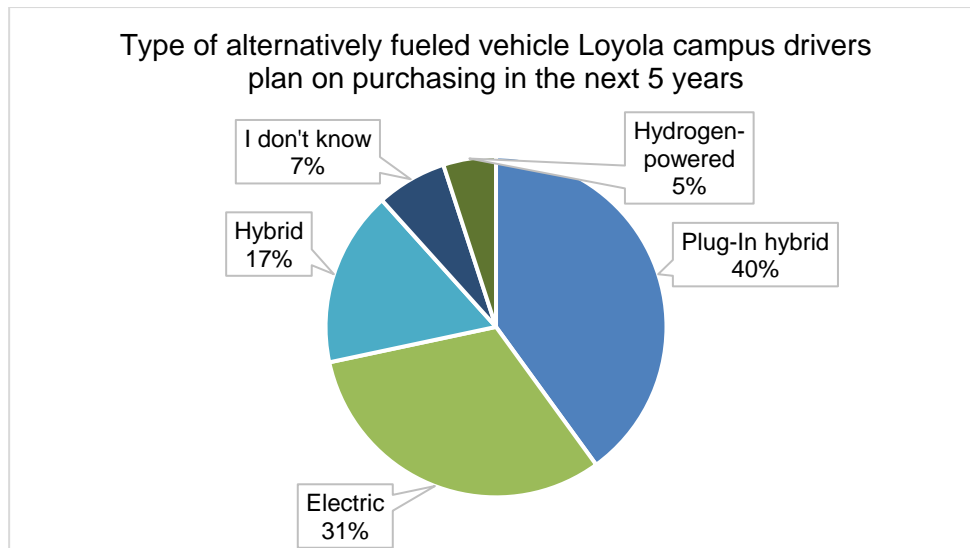


Figure 25 - A pie chart depicting the breakdown of which alternatively fueled vehicles are being planned for purchase by Loyola campus respondents who currently drive gas or diesel fueled passenger vehicles or motorcycles

Other Reasons to Electrify Campus Infrastructure

According to Business and Planning Services, publicly available Circuit Électrique Charging Stations on the SGW campus are in regular use. Because people need to move their cars from these spaces when charging is completed, Concordia campus users would likely prefer the opportunity to charge and park for the duration of their time on campus at a space in the Concordia parking garages. This also frees up the Circuit Électrique parking spaces for other city drivers.

Electric vehicles could prove the most accessible low-carbon option for those who cannot currently access more sustainable modes of transport. When asked to select their reasons for travelling to campus via personal motorized vehicle, 38% indicated reasons related directly to accessibility:

- 22% stated that they live too far from campus to rely on other modes.
- 14% stated that other modes of transit are not easily accessible from their home address.
- 2% stated that they have reduced mobility and rely on their personal vehicle for transportation.

It is important to note that there are risks such as fire safety associated to installing EV charging stations in indoor parking spaces. Further research to inform building norms and codes are emerging. In the meantime, it is recommended that Concordia prioritize installing EV charging stations in outdoor parking spaces.

EMISSION ANALYSIS

Methodology

In this survey, participants were asked to provide the following information to calculate their total annual greenhouse gas emissions from commuting to Concordia: 1) postal code, 2) primary campus for each term (fall, winter, summer), 3) their primary mode of transportation for each term, 4) number of days a week on average they commute to campus per term. As previously mentioned, participants could indicate that they did not / would not be commuting to campus for a specific term.

The first step in measuring commuter emissions involved calculating the distance between participants home address and their primary campus. This calculation was done by Ahad Farnood, a research assistant from the CERC in Smart, Sustainable and Resilient Communities and Cities team.

The methodology involved several key processes:

- a. **Data Preparation:** Raw survey data underwent cleaning and sorting processes to ensure consistency and accuracy. Entries were organized based on the participants' primary campus (SGW or Loyola) and the different modes of transportation utilized. Approximately 10% of participant responses could not be analyzed. This was largely because some participants did not enter their postal code, entered an inaccurate postal code, or otherwise indicated an address far outside of the study area.
- b. **Data Extraction:** The cleaned data was translated into Geographic Information System (GIS) maps. Postal codes were geocoded (i.e., identified with longitude and latitude coordinates) using the CanMap Postal Code suite data.
- c. **Data Analysis:** The primary focus was on calculating the shortest distance travelled by participants. GIS analysis, utilizing tools such as QGIS and ArcGIS, was instrumental in this regard. Interruptions were encountered during data processing due to the high volume of entries, necessitating troubleshooting for accurate data extraction. The Geocode database and OpenStreetMap were used to acquire related maps. The Geolocator tool was later used to translate the data into maps that would be readable by the GIS tool. After creating the geometry data, the ORS Plugin in QGIS software was used to analyse the shortest distance between participants home address and their primary campus based on their mode of transportation.⁶ Shortest path distance parameters were used to calculate distances. The ORS Tools plugin uses the Open Street Map road and bicycle networks for its calculations.

⁶ It is important to note that due to time and budget restraints, the distance between participants home address and primary campus for those using public transportation as their primary mode was calculated as if the participant were walking.

Emission Analysis

A number of steps were followed to determine the total annual commuter emissions for Concordia:

1. Distances calculated above were multiplied by two to account for trips to and from campus within a single day. Round trip distances were multiplied by the number of days per week on average a participant would commute to campus. This value was then multiplied by the number of weeks in the term (e.g., 18 weeks for fall / winter term and 16 weeks for summer term) to give a total distance travelled for the term.
2. The total distance travelled for the term was then multiplied by an emission factor associated with the participants' primary mode of transportation. Emission factors for nitrous oxide and methane were multiplied by global warming potentials to give total annual greenhouse gas emissions in tonnes of carbon dioxide equivalent (CO₂e).
3. Emissions for each term were calculated along with average CO₂e emissions per sub-population (participants role and primary campus).
4. The average CO₂e emissions per term for each subpopulation were added together to create an annual average CO₂e emission / subpopulation. The annual averages were then multiplied by the actual Concordia population to extrapolate emissions for the 2022-23 academic year.

Active transportation and travel by electric vehicle were considered zero emission. Emissions from participants whose primary mode of transportation was the Concordia shuttle bus were removed because these emissions are already included in the university's Scope 1 emissions.

Results

Figure 26 demonstrates average emissions per person by term within the survey results. Students have more seasonal variation in their average emissions per term than staff/faculty. Sir George Williams campus commuters have lower average emissions per term than Loyola campus commuters. SGW students have the lowest average emissions per term.

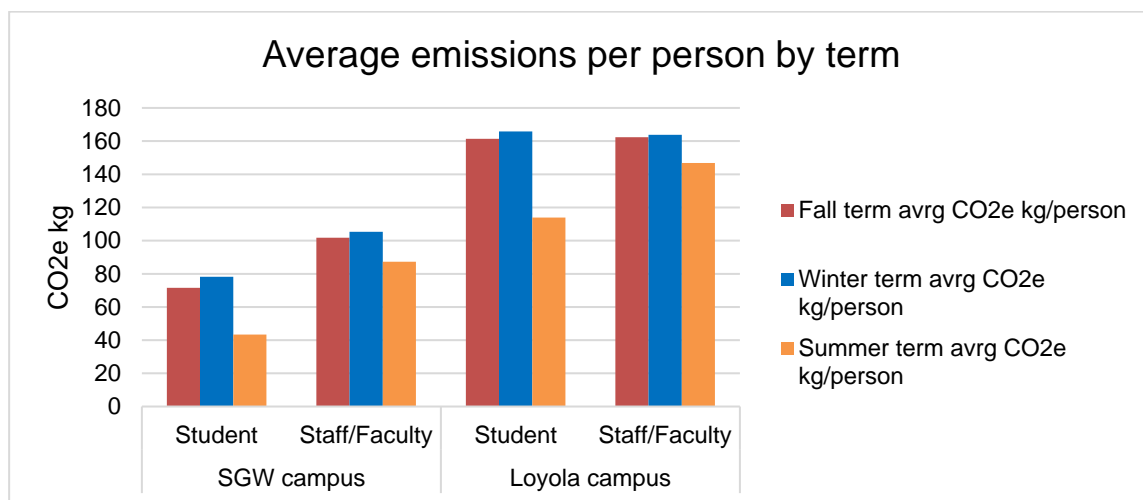


Figure 26 - Average emissions per person by term

As shown in table 16, Loyola staff/faculty have the highest average annual emissions per person. The total annual emissions for the survey population in 2022-23 is 607 tonnes of CO₂e.

Table 16 – Average annual emissions per subpopulation

Campus	Role	Average annual CO ₂ e tonnes / person
Sir George Williams	Students	0.19
	Staff/Faculty	0.29
Loyola	Students	0.44
	Staff/Faculty	0.47

The average annual emissions per sub-population for the 2023 Commuter Habits Survey were used to estimate total emissions for the actual Concordia population in 2022-23. The population sizes were derived from Concordia Fast Facts and reports used for the Campus Master Plan. As demonstrated in table 17, Loyola students emitted the most emissions in 2022-23. Although average annual emissions per person is highest for Loyola staff/faculty, because their population size is small they emit the least amount of total emissions. The total amount of emissions for 2022-23 is estimated to be at 13,795 tonnes of CO₂e.

The total estimated amount of emissions for 2022-23 is higher than the total of 11,766 tonnes of CO₂e estimated for 2018-19. This could be a result of participants commuting on average 1 kilometer further to their primary campus than in 2018-19. Another reason could be that the methodology used to calculate emissions for 2022-23 was more robust than in 2018-19 as questions on commuting were asked for each term rather than just for the fall term. To lower commuter emissions, sustainable transportation campaigns and incentives should target Loyola students.

Table 17 - Total annual greenhouse gas emissions from Concordia commuting in 2022-23

Campus	Role	Population size	Average annual CO ₂ e tonnes / person	Total CO ₂ e tonnes
Sir George Williams	Students	30,842	0.19	5,958
	Staff/Faculty	3,595	0.29	1,058
Loyola	Students	14,646	0.44	6,461
	Staff/Faculty	671	0.47	317
Total		49,754		13,795

ENCOURAGING MODAL SHIFT OF TARGET POPULATION

The target population consists of community members who use a motorized vehicle as their primary mode of transportation to commute to campus. Motorized vehicles include gas, diesel, electric, and hybrid single occupancy vehicles, a car sharing vehicle, taxi/uber and a motorcycle. Despite electric and hybrid vehicles having low emissions, they are included in our target

population because they add to the congestion of our city and can pose safety risks to active forms of transportation.

Almost no seasonal variation exists for the use of motorized vehicles by community members who commute to SGW campus and little seasonal variation exists for those who commute to Loyola campus. For this reason, survey responses from participants whose primary mode of transportation is motorized vehicle for the fall term were used for the analysis below.

As previously mentioned, in the fall term approximately 6% of students (or an estimated 1,851 people in total) and 16% of staff/faculty (or an estimated 575 people in total) use a motorized vehicle as their primary mode of transportation to commute to SGW campus. For the Loyola campus, 20% of students (or an estimated 2,930 people in total) and 29% of staff/faculty (or an estimated 195 people in total) use a motorized vehicle as their primary mode of transportation. Loyola staff/faculty are the group with the highest percentage of motorized vehicle users however, they represent the smallest number of users compared to students at both campuses and staff/faculty at SGW.

Factors in choice to use motorized vehicle

The top three most important factors for students and staff/faculty in choice to use motorized vehicle as their primary mode of transportation to commute to Concordia are: 1) faster than other modes of transportation, 2) flexible departure and arrival times 3) they live too far from campus. For staff/faculty, having children / dependents travelling with them is an important factor compared to students. There does not seem to be a significant difference in the factors for community members' choice to use a motorized vehicle to commute to Loyola or SGW campus. Approximately 2% of community members have reduced mobility and rely on their personal vehicles for transportation. It is important to note that driving a motorized vehicle may be the only mode of transportation available to someone with a disability or short-term injury. Accommodation on campus should be made in these cases.

Table 18 - Most important factors for students and staff/faculty in choice to use motorized vehicle as their primary mode of transportation to commute to Concordia

Factors in choice	SGW campus		Loyola campus	
	Students	Staff/Faculty	Students	Staff/Faculty
<i>Faster than other modes of transportation</i>	65%	57%	72%	77%
<i>Flexible departure and arrival times</i>	49%	52%	53%	49%
<i>I live too far from campus</i>	41%	25%	53%	32%
<i>Weather conditions</i>	24%	24%	28%	21%
<i>Have multiple destinations before, during and/or after commute</i>	22%	16%	15%	19%
<i>Other modes of transit are not easily accessible from my home address</i>	20%	16%	17%	16%
<i>Reliable departure and arrival times</i>	16%	24%	21%	28%
<i>I need to carry many things (dependents excluded)</i>	10%	7%	4%	5%
<i>For my personal enjoyment</i>	10%	7%	4%	5%

<i>Children / dependents travelling with me</i>	4%	20%	4%	16%
<i>I use a hybrid/electric car so fuel costs and emissions are low</i>	4%	6%	2%	5%
<i>I have reduced mobility and rely on my personal vehicle for transportation</i>	2%	2%	2%	2%
<i>Other</i>	2%	8%	2%	9%

Shift to active and public modes of transportation

When asked which factors would increase the likelihood and/or frequency of walking, running or using wheelchair as part of regular commute to Concordia most community members indicated none because they cannot use this mode of transportation for reasons like living too far away. For other community members who can engage in this mode of transportation, better incentives to engage in active transportation is an important factor. For students commuting to both campuses, increased access to pedestrian safety features like sidewalks, pedestrian cross lights and walks is a factor. For staff/faculty many indicated other factors such being connected to the Réseau express métropolitain (REM) will allow them to walk for a portion of their commute.

Table 19 - Factors that would increase the likelihood and/or frequency of walking, running or using wheelchair as part of regular commute

Factors that would increase the likelihood and/or frequency of walking, running or using wheelchair as part of regular commute	SGW campus		Loyola campus	
	Students	Staff/Faculty	Students	Staff/Faculty
<i>None – I cannot walk, run or use my wheelchair as part of my commute (e.g., I live too far)</i>	65%	53%	64%	58%
<i>Better incentives to engage in active transportation</i>	24%	16%	19%	14%
<i>Increased access to pedestrian safety features (sidewalks, pedestrian cross lights, cross walks, etc.)</i>	16%	9%	17%	7%
<i>Availability of free or discounted access to showers, lockers and/or changing rooms</i>	10%	11%	9%	9%
<i>Connecting with friends close by</i>	10%	2%	11%	5%
<i>Other</i>	6%	20%	6%	21%

Again, most community members indicated that no factors would increase their likelihood or frequency of bicycling to campus for reasons like living too far from campus. For community members who would bicycle as part of their commute, safer bicycle paths / networks and increased access to indoor secure bike parking facilities are important factors.

Another important factor, especially for staff/faculty, is the availability of free or discounted access to showers, lockers and/or changing rooms. Other factors that could entice community members to bicycle to campus include increased availability of covered outdoor bike parking and subsidies for electric bicycles.

Table 20 - Factors that would increase the likelihood and/or frequency of bicycling as part of regular commute

Factors that would increase the likelihood and/or frequency of bicycling as part of regular commute	SGW campus		Loyola campus	
	Students	Staff/Faculty	Students	Staff/Faculty
<i>None – I cannot bicycle as part of my commute (e.g., I live too far)</i>	67%	59%	72%	58%
<i>Safer bicycle paths / networks</i>	18%	20%	15%	21%
<i>Increased access to indoor secure bike parking facilities</i>	10%	20%	13%	11%
<i>Subsidy for electric bicycle</i>	10%	8%	4%	7%
<i>Availability of free or discounted access to showers, lockers and/or changing rooms</i>	8%	18%	13%	16%
<i>Increased availability of covered outdoor bike parking</i>	8%	11%	6%	11%
<i>Availability of a free bicycle repair station</i>	6%	7%	9%	7%
<i>Increased availability of outdoor bicycle parking</i>	6%	5%	11%	9%
<i>More BIXI electrified bicycles and docks near campus</i>	6%	7%	6%	5%
<i>Better incentives to engage in active transportation</i>	6%	8%	9%	11%
<i>Access to affordable bicycling equipment</i>	6%	5%	11%	11%
<i>Bicycling with friends and / or co-workers</i>	6%	1%	4%	4%
<i>Availability of bicycle repair and safety workshops</i>	4%	5%	6%	4%
<i>Winter bicycling resources</i>	4%	2%	9%	4%
<i>Other</i>		7%	2%	16%
<i>Access to courses to learn how to bicycle</i>	2%	1%	0%	2%

The most important factors that would increase the likelihood and/or frequency of community members using public transportation as part of regular commute to Concordia are: 1) Additional transit lines and network in my area, 2) a faster commute to Concordia, 3) a reduction on the current transit fares and 4) more reliable departure times along existing transit lines in my area. Another important factor for staff/faculty is flexible work hours to avoid rush hours.

Table 21 - Factors that would increase the likelihood and/or frequency of using public transportation as part of regular commute

Factors that would increase the likelihood and/or frequency of using public transportation as part of regular commute	SGW campus		Loyola campus	
	Students	Staff/Faculty	Students	Staff/Faculty
<i>Additional transit lines and network in my area</i>	51%	50%	45%	49%
<i>A faster commute to Concordia</i>	43%	52%	70%	54%
<i>A reduction on the current transit fares for</i>	37%	40%	53%	46%

<i>students and staff/faculty</i>				
<i>More reliable departure times along existing transit lines in my area</i>	35%	42%	51%	47%
<i>Fewer crowds</i>	20%	25%	13%	21%
<i>Other</i>	12%	13%	6%	19%
<i>The ability to take my bicycle on some or all of the public transit journey</i>	10%	7%	2%	2%
<i>Flexible work hours to avoid rush hours</i>	8%	37%	23%	33%
<i>A more equitable experience for people who experience accessibility barriers</i>	6%	2%	11%	7%
<i>Better incentives to bundle my public transit pass with a car sharing or BIXI membership</i>	4%	7%	13%	9%

Carpooling as an alternative

Carpooling was defined as an arrangement between people to make a regular journey in a single vehicle, and it could include getting a ride from parents / friends. Approximately, 41% of students and 11% of staff/faculty whose primary mode of transportation is a motorized vehicle will ever use carpooling as part of their commute to SGW campus. The percentage of staff/faculty (23%) is higher whereas the percentage of students (30%) is lower for those commuting to Loyola campus.

The three most important factors in both students and staff/faculty choice to carpool to campus are the following: 1) Enjoy the company of the person(s) I carpool with, 2) can share expenses with others in group and 3) It is better for the environment than if I drive alone.

There was a missed opportunity to ask community members whose primary mode of transportation is motorized vehicle what factors would increase the likelihood and/or frequency of using carpooling as part of their regular commute to campus. The survey application did not allow for advanced branching to ask the question to only this sub-population. However, the question to have been asked to all participants with one of the answer options being “not applicable”.

Feedback on Concordia transportation services

The feedback received on how to improve Concordia’s transportation services from community members whose primary mode of transportation is using a motorized vehicle was analyzed. Approximately 40% of responses had to do with improving public transportation networks or having a Concordia shuttle bus service in different parts of the island of Montreal. Many responses requested lowering the Concordia parking fees, increasing the number of parking spaces available and providing designated parking spaces to Concordia community members. Approximately 16% of responses indicated a desire for reduced public transit fares. Other ways the university could improve their transportation services is by providing a carpool program and offering hybrid work to reduce the number of trips people have to make to campus.

RECOMMENDATIONS

Below are recommendations based on the survey results to increase the use of sustainable transportation and minimize the use of single occupancy vehicles by Concordia community members in their commute to campus.

Increase the use of active transportation

- Advocate at the municipal level for pedestrian safety measures like pedestrian cross lights and walks, sidewalk snow-clearing and pedestrian-only streets.
- Advocate at the municipal level for connectivity of campuses to bicycle paths and bicycle safety measures like designated bicycle lanes, reducing the speed limit for cars on shared roads and snow-clearing in the winter.
- Provide incentives to engage in active transportation.
- Increase access to indoor secure bike parking facilities. After proximity to class or work, the most important factors for community members when choosing where to park their bicycle on campus were security of the bike parking and covered bike parking.
- For the secure indoor bicycle parking located in the LB garage, change the annual membership to a seasonal membership.
- Provide free or discounted access to showers, lockers and/or changing rooms.
- Increase availability of covered outdoor bike parking.
- Offer subsidies for students to access affordable bicycling equipment and subsidies for electric bicycles for all community members.

Increase the use of public transportation

- Offer subsidies for public transit fares to both students and staff/faculty. For staff/faculty this could be accomplished by participating in the OPUS & Cie program offered by the STM.
- Advocate to the STM for increased connectivity through additional transit lines and/or frequency of scheduled buses to both campuses.
- Advocate to the STM for accessibility to be integrated into Guy-Concordia metro station (e.g., elevators, ramps). Communicate that 6% of our students and 3% of staff/faculty indicated that a more equitable experience for people who experience accessibility barriers would increase their likelihood and/or frequency of using public transportation.
- For staff/faculty, offer flexible work hours to accommodate public transit schedules particularly the train schedule.
- The next iteration of the Commuter Habits Survey should include a question for paratransit users.

Increase the use of the Concordia shuttle bus

- Provide more frequent shuttle buses to avoid overcrowding.
- Provide a more reliable shuttle bus schedule (i.e., buses at fixed hours of the day rather than at 20–30 minute intervals).
- The next iteration of the Commuter Habits Survey should include branching, so staff/faculty cannot answer questions related to the shuttle bus.

Increase the use of carpooling for current single occupancy vehicle users

- Promote the staff/faculty reduced monthly parking permit fee for carpooling and the Microsoft Teams Shoptalk carpool channel.
- Create a carpool matching program for students.
- In the next iteration of the Commuter Habits Survey, include question for community members whose primary mode of transportation is a single occupancy vehicle on what factors would increase the likelihood and/or frequency of using carpooling as part of their regular commute to campus.

Community feedback on Concordia's transportation services and programs

The last question of the survey was an optional and open-ended question. It solicited suggestions from participants on how to improve Concordia's transportation services and programs that were not already covered in the survey. A total of 642 participants responded, however, only 381 responses were valid.

Responses were categorized or "coded" to facilitate interpretation. This was accomplished by identifying themes and patterns in the responses and then organizing them into different categories that summarize and bring meaning to the data. A combination of preset and emergent categories was used to categorize the data. Responses were first categorized by mode of transportation. Participants had the most suggestions on the following modes of transportation: public transportation (33%), bicycling (26%) and the Concordia shuttle bus (19%). Next responses were categorized within their mode of transportation by themes such as affordability, network and safety.

For public transportation, 77% of responses were related to the desire to reduce the cost of transit fares. Approximately 19% of responses were related to the expansion of the network, particularly between campuses. For bicycling, 45% of responses were related to increasing the number and the affordability of secure bike parking spaces on campus. Feedback also included increasing the number of bicycling parking spaces (22%) and incentives to bicycle to campus. The main themes that emerged for the Concordia shuttle bus were the schedule (61%) and the route/stops (36%). Feedback included increasing the frequency of the shuttle bus and providing a fixed schedule that would be more reliable. For the route, many participants suggested a stop at Vendome metro station.

Other themes that emerged that were unrelated to the mode of transportation included offering hybrid work/classes (5%) and flexible work/class hours (3%).