



The logo for UTTRI, featuring the letters 'UTTRI' in a bold, blue, sans-serif font. Above the letters are several horizontal lines of varying lengths, creating a stylized, modern look.

Research Report

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**Exploring the Impacts  
of COVID-19 on Ride-  
sourcing use in the  
Greater Toronto Area**  
Results from the  
second cycle of the  
SiSTM satellite survey

A dark blue background with abstract, glowing light trails and lines that create a sense of depth and movement, resembling a futuristic or data-driven environment.

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# Exploring the Impacts of COVID-19 on Ride-sourcing use in the Greater Toronto Area

Results from the second cycle of the SiSTM satellite survey

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## INTRODUCTION

- The COVID-19 pandemic has affected activity and travel behaviour in cities across the world
  - Many have changed where and how they participate in certain out-of-home activities
  - The pandemic has also resulted in a shift in modal preferences, primarily due to the perceived risks associated with using different modes of travel
- Studies on the impacts of the COVID-19 pandemic on travel behaviour typically find:
  - A strong preference for private vehicles and active modes (i.e., walking and bicycling)
  - An apprehension towards using so-called shared modes (such as public transit, taxis, and ride-sourcing services) (1–4)
  - The use of private vehicles and active modes has rebounded more strongly than the use of public transit (5)
  - While public transit use has increased, it still remains below pre-pandemic levels (2,6)
- Ride-sourcing services can act as an accessibility enhancer for those without access to a private vehicle, and as an alternative or complement to public transit
- Before the COVID-19 pandemic, the introduction of ride-sourcing services typically had a disruptive impact on transportation systems in cities across the world
  - The introduction of ride-sourcing services tends to induce travel demand, influence activity patterns and schedules, and affect how existing modes of travel are used (7–9)
- The growing prominence and use of ride-sourcing increases the potential to produce positive and negative externalities
  - **Negative:** the potential to induce travel demand (8), draw demand away from more sustainable modes (e.g., public transit and active modes) (10)
  - **Positive:** can be an “accessibility enhancer” for those without access to a private vehicle (11)
  - Shared ride-sourcing services (where customers are offered a discounted fare for sharing their trip

with another customer travelling to a similar destination (12)) have the potential to increase vehicle occupancies and reduce vehicle-kilometers travelled (11,13)

Given the impacts of ride-sourcing services on urban mobility, it is crucial to understand both the short- and long-term impacts of the COVID-19 pandemic on ride-sourcing use.

- To investigate the impacts of COVID-19 on the use of ride-sourcing services in the Greater Toronto Area (GTA), Canada, the Travel Demand Modelling Group at the University of Toronto initiated the *Study into the use of Shared Travel Modes* (SiSTM)

### Goals of SiSTM:



Understand the short- and long-term impacts of COVID-19 on ride-sourcing use in the GTA



Examine the influence of attitudinal factors on the use of ride-sourcing



Explore how ride-sourcing use has changed over the course of the pandemic

- To support these goals, two cycles of the SiSTM survey were administered using a web-based survey interface

**Table 1:** Survey period and sample size for each cycle

Cycle	Survey Period	Sample Size
1	July 2020	920
2	July 2021	806

- This report presents preliminary findings of the second cycle of the SiSTM survey, including a comparison to the results from the first cycle of the survey
  - Key questions:
    - How is ride-sourcing being used in the GTA during the COVID-19 pandemic?
    - What might ride-sourcing usage look like in the post-pandemic world?
    - How have attitudes and perceptions changed over the course of the pandemic?



## SURVEY METHODS

### Survey design

- Both cycles of the SiSTM survey distinguished between *exclusive* ride-sourcing services and *shared* ride-sourcing services
  - **Motivation:** the potential for customers to be paired with other customers when using shared ride-sourcing

#### Exclusive ride-sourcing

- Customers are not matched with other users
- Examples: UberX, Lyft Classic

#### Shared ride-sourcing

- Customers are offered a discount in exchange for sharing their ride
- Examples: UberPool, Lyft Shared

- To understand the potential short- and long-term impacts of COVID-19 on ride-sourcing usage, the study period was divided into three distinct time periods (*Table 2*)

**Table 2:** Definition of time periods in the survey

Time Period	Description
Pre-COVID	The period of time prior to the declaration of a state of emergency in Ontario (March 17, 2020) (14)
Pandemic	The period of time between when the state of emergency was declared and the point in time when COVID-19 is no longer considered a public health threat
Post-COVID	The period of time after COVID-19 is no longer considered a public health threat

- Survey sections:
  - Questions about ride-sourcing usage:
    - How often exclusive and shared ride-sourcing services are used
    - The type(s) of trips for which exclusive and shared ride-sourcing were used
    - How the use of ride-sourcing changed due to the pandemic, and the reason(s) for the change

- Question about attitudes and perceptions:
  - Perceptions of risk
  - Willingness to travel
  - Impact of COVID-19 on travel preferences
  - Changes in the willingness to use ride-sourcing compared to earlier in the pandemic
  - The importance placed on various pandemic-related factors when considering ride-sourcing usage
- Stated preference (SP) experiments:
  - Used to capture the influence of various factors on the decision to use ride-sourcing for different trip purposes and at different periods of time
- Questions about socio-economic and household attributes:
  - **Examples:** age, gender, the municipality in which they reside, and their household income
- Pandemic-specific questions:
  - **Examples:** vaccination status, views on social distancing, how the pandemic has affected their daily routine, and adherence to public health guidelines
- Questions about modal preferences
  - Typical mode(s) used, by trip purpose and time period (see *Table 2*)
  - **Purposes:** commute trips, non-commute trips

### Survey conduct

The two cycles of the SiSTM survey were conducted in July 2020 and July 2021 using a web-based survey interface. Survey invitations were sent to a random sample of members of a market research panel comprised of GTA residents. The GTA is composed of the City of Toronto and the four surrounding regional municipalities (York, Peel, Durham, and Halton) (see *Figure 1*). Per the 2016 Canadian Census, the GTA is home to approximately 6.4 million residents (15).

The first and second cycle of the survey received a total of 1,250 and 966 responses, respectively; after the data were cleaned and invalid responses were removed, a total of 920 and 806 responses remained, respectively.




**Figure 1:** The Greater Toronto Area (GTA) (16)


- A comparison of the distributions of key sample statistics to the 2016 Canadian census is shown in *Figure 2*
- Current employment status (see *Table 3*):
  - 69% were employed
  - 12% were not employed at the time of the survey
  - 3% selected 'other' when reporting their employment status
  - Compared to the first cycle, more respondents reported they were working at their workplace


**Table 3:** Work location among those who were employed at the time of the survey

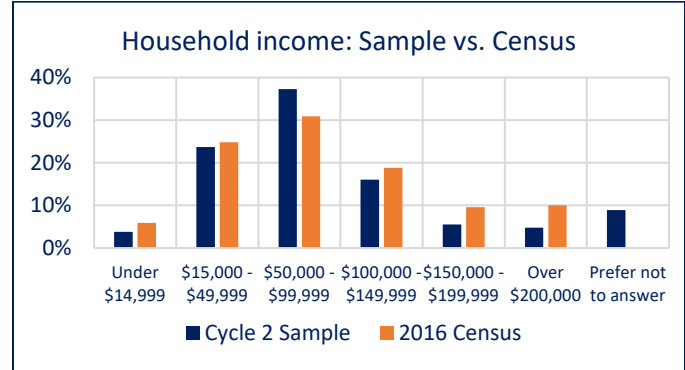
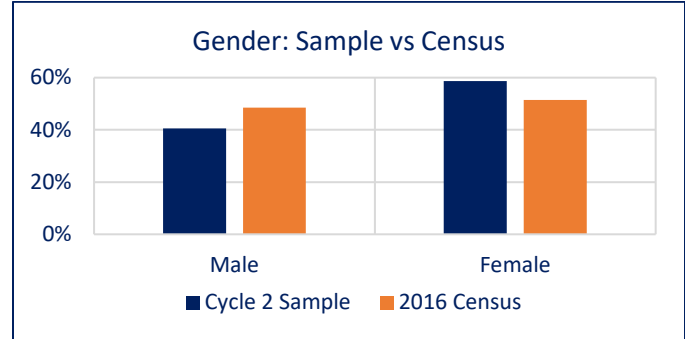
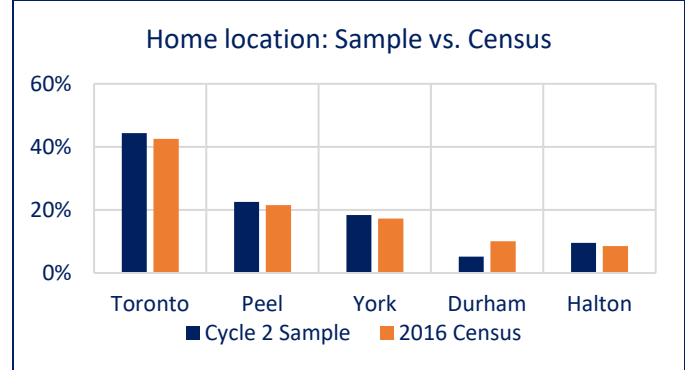
Employment Status	Work Location		
	At workplace	At home	Hybrid
Full-time	29.3%	19.8%	4.3%
Part-time	8.3%	6.0%	1.2%

 44% of respondents had a bachelor's degree or an advanced degree

**Vaccination status of respondents:**


 68.8% of respondents were fully vaccinated against COVID-19 at the time of the survey


 14.9% of respondents have only received their first dose of the COVID-19 vaccine




**Figure 2:** Distributions of key demographic variables

**Mobility tool ownership:**

 85% of respondents have a driver's license

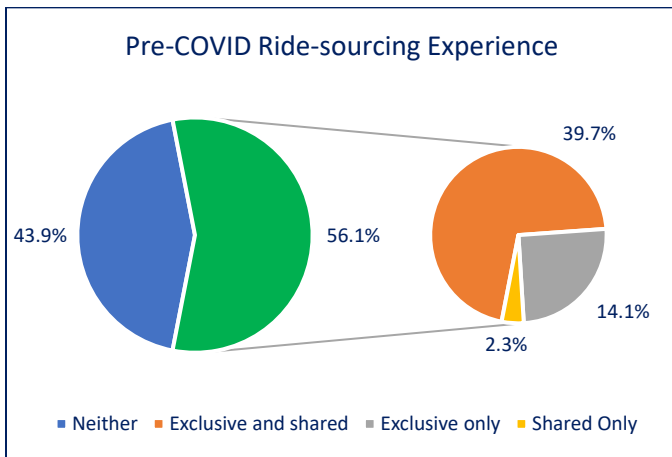
 87% of respondents have access to a private vehicle (as either a driver or passenger)

 40% of respondents own a transit pass

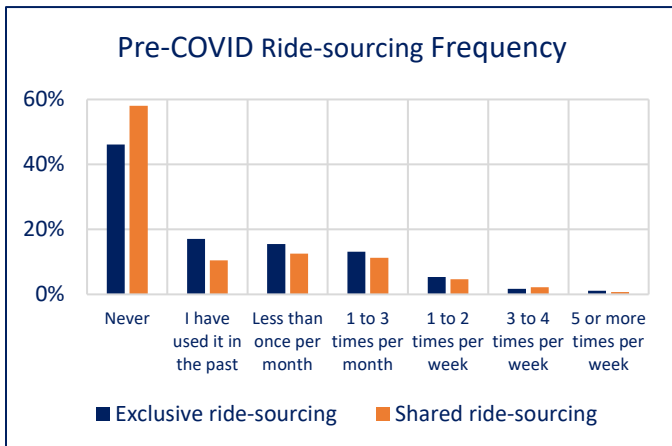
## RIDE-SOURCING USE PRE-COVID

As shown in *Figure 3*, more than half of the respondents indicated that they had experience using exclusive or shared ride-sourcing services before the COVID-19 pandemic.

- Most respondents with pre-pandemic ride-sourcing experience have used both exclusive and shared services
  - Respondents who only had experience using one type of service were more likely to have used exclusive ride-sourcing
- Most respondents used ride-sourcing on a relatively infrequent basis before the COVID-19 pandemic



**Figure 3:** Ride-sourcing experience among respondents prior to the COVID-19 pandemic



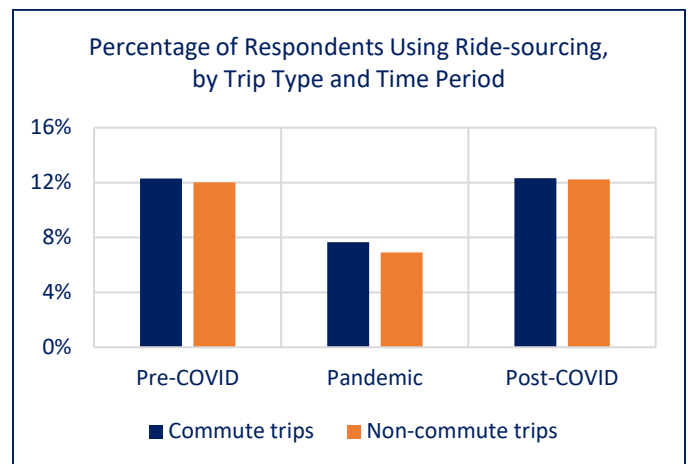
**Figure 4:** Pre-pandemic ride-sourcing frequency among respondents

## IMPACTS OF COVID-19 ON RIDE-SOURCING USAGE

### Modal preferences

As shown in *Figure 5*, the percentage of respondents that use ride-sourcing for both commuting and non-commuting trips has decreased during the COVID-19 pandemic.

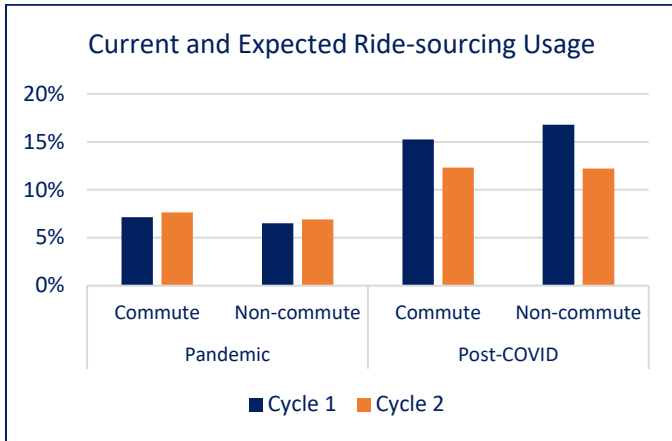
- The results suggest that these values could return to pre-pandemic levels once COVID-19 is no longer a public health threat
- This decline can partly be attributed to the overall decline in travel that has resulted from the pandemic
  - This decline could also stem from the relatively negative perception of ride-sourcing services during the pandemic (4)
  - A similar trend was observed in cycle 1, which suggests that ride-sourcing demand will not return to pre-pandemic levels until COVID-19 is no longer considered a public health threat



**Figure 5:** Percentage of respondents indicating that they used/ would use ride-sourcing

- Compared to cycle 1 of SiSTM, the respondents of the second cycle were less likely to indicate they would use ride-sourcing in the post-COVID period (as shown in *Figure 6*)
  - This could stem from individuals finding new ways to make trips that they previously made using ride-sourcing

- These results suggest that it will take time for ride-sourcing use to return to pre-pandemic levels

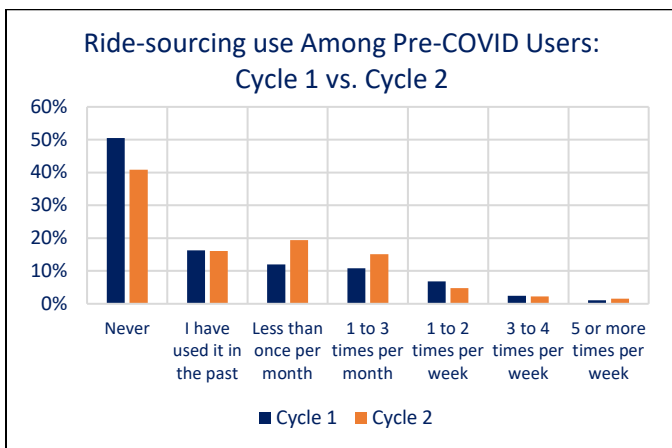


**Figure 6:** Comparison of current and expected ride-sourcing use in cycles 1 and 2 of SiSTM

### Ride-sourcing Usage During the Pandemic

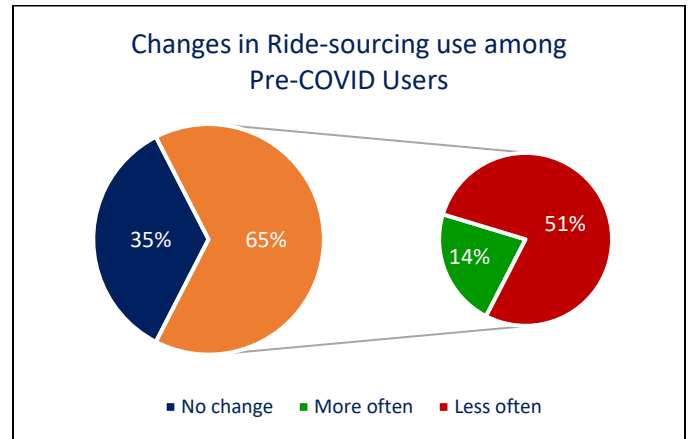
In both cycles of the SiSTM survey, respondents were asked a series of questions about their use of ride-sourcing services during the pandemic.

- A small percentage (2.1%) of respondents began using ride-sourcing services during the pandemic
  - These individuals could be reluctant to use public transit for longer trips, or may lack sufficient access to a private vehicle
- Compared to the first cycle, a greater percentage of respondents are using ride-sourcing on a relatively infrequent basis (as shown in Figure 7)



**Figure 7:** Comparison between ride-sourcing use among pre-COVID ride-sourcing users during the pandemic

- Respondents were asked about whether they changed their ride-sourcing usage as a result of the pandemic
  - Those who changed their ride-sourcing usage due to the pandemic were asked about the factors that led to their decision



**Figure 8:** Changes in ride-sourcing usage during the pandemic among pre-COVID ride-sourcing users

- Among those who reduced their use of ride-sourcing during the pandemic (see Figure 9):
  - The most common reason was that they were travelling less overall
  - Concerns about the risk of infection (including concerns about health, shared surfaces, and the cleanliness of vehicles) motivated respondents to reduce their use of ride-sourcing
  - Some respondents also reduced their ride-sourcing use as a result of their apprehension about travelling with strangers
- Among those who increased their use of ride-sourcing during the pandemic (see Figure 10):
  - The most common reasons stemmed from concerns about public transit and a reluctance to spend time in crowded areas
  - Similar results regarding concerns about using public transit have also been found in other studies about the impacts of COVID-19 on travel behaviour (3,4,17)
  - Some respondents also increased their use of ride-sourcing during the pandemic because

they were unwilling or unable to use a private vehicle or active modes for some of their trips

### Factors Influencing Ride-sourcing use During the Pandemic

Given the potential for attitudes and perceptions about the COVID-19 pandemic to affect activity and travel behaviour, it is important to understand the factors that influence the willingness to engage in certain activities. With this in mind, respondents were asked about the extent to which different factors affect their utilization of ride-sourcing services.

First, respondents were asked whether the implementation of health and safety measures would increase their willingness to use ride-sourcing during the pandemic (see Figure 11).

- The implementation of these measures would be more impactful for respondents that had ride-sourcing experience prior to the pandemic
  - The most popular health and safety measures among respondents were the implementation of mask mandates, the provision of hand sanitizer, and the disinfection of vehicles

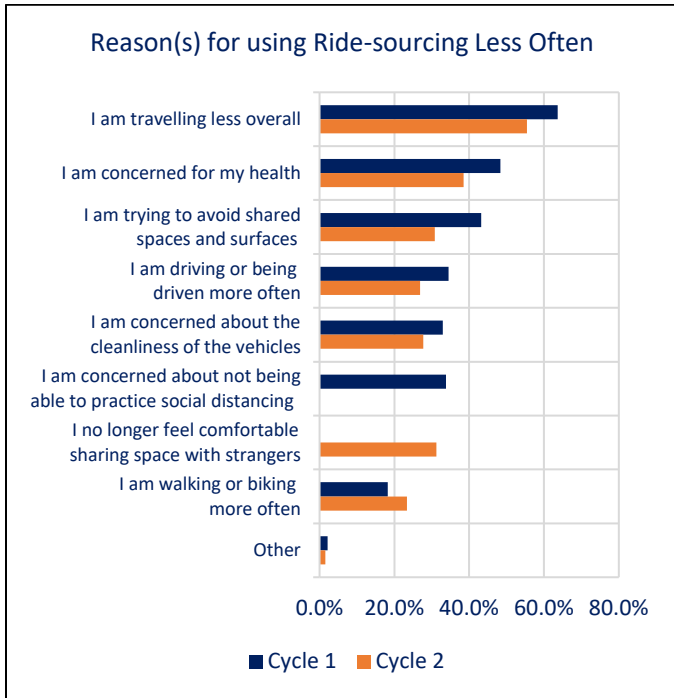


Figure 9: Reason(s) why ride-sourcing users have reduced their ride-sourcing use during the pandemic

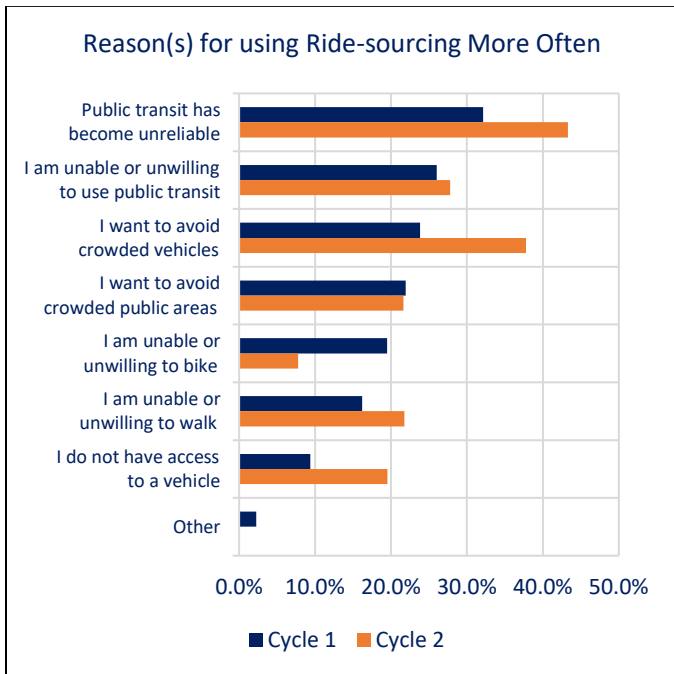


Figure 10: Reason(s) why ride-sourcing users have increased their ride-sourcing use during the pandemic

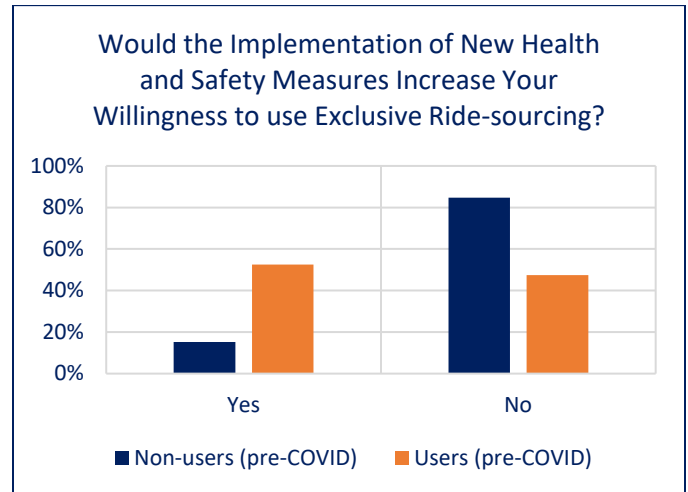
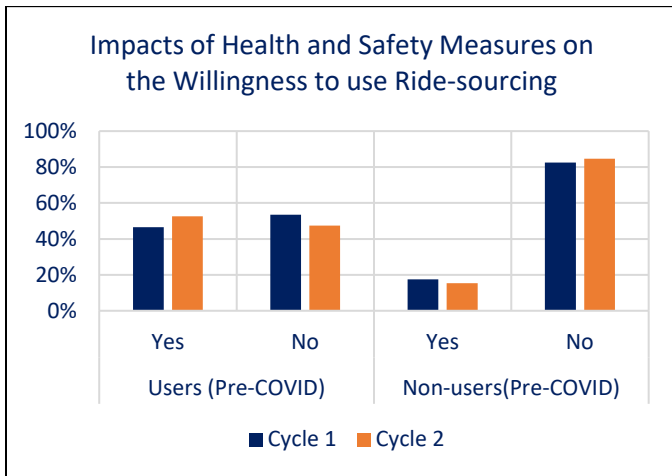


Figure 11: Impacts of additional health and safety measures on the willingness to use ride-sourcing

- The implementation of health and safety measures appears to have a greater impact of the willingness of cycle 2 respondents to use ride-sourcing during the pandemic compared to cycle 1 respondents (see Figure 12)



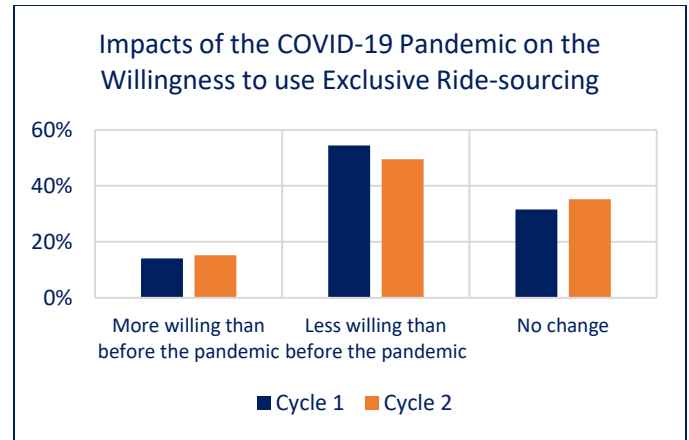
- This could be reflective of a greater willingness to use ride-sourcing services in July 2021 than in July 2020



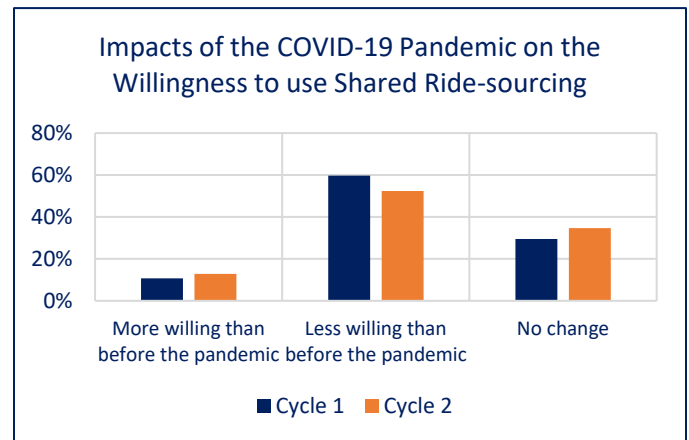
**Figure 12:** Comparison of the impacts of health and safety measures on the willingness to use ride-sourcing between SiSTM cycles 1 and 2

To help understand the impacts of the COVID-19 pandemic on ride-sourcing services, respondents were also asked to indicate their willingness to use exclusive and shared ride-sourcing compared to the pre-COVID period.

- As outlined in *Figures 13 and 14*, slightly less than half of the cycle 2 respondents were less willing to use exclusive ride-sourcing services, while slightly more than half of the cycle 2 respondents were less willing to use shared ride-sourcing services.
- Compared to the cycle 1 respondents, a smaller share of cycle 2 respondents indicated that they were less willing to use exclusive and shared ride-sourcing services
  - This may suggest that some individuals have become less apprehensive towards using ride-sourcing services over the course of the pandemic
  - This shift could also stem from people being less concerned about travelling with strangers and coming into contact with shared surfaces than they were earlier in the pandemic



**Figure 13:** Willingness to use exclusive ride-sourcing, compared to the pre-COVID period



**Figure 14:** Willingness to use shared ride-sourcing, compared to the pre-COVID period

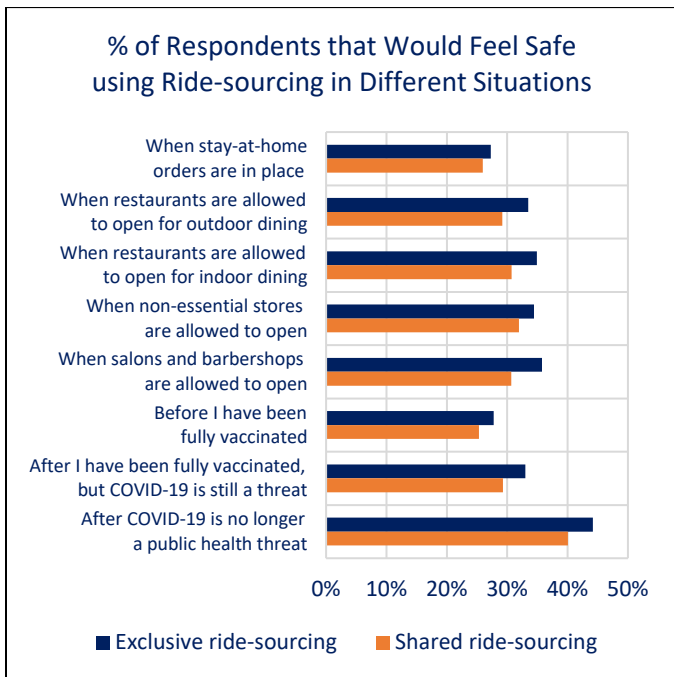
In Ontario, the nature of pandemic-related public health measures has changed as the situation surrounding the pandemic has continued to evolve. Specifically, public health measures became more restrictive when the number of new daily COVID-19 cases was relatively high and were relaxed when case counts were relatively low. To help explore how these changes affected the utilization of ride-sourcing services, respondents were asked to indicate whether they felt safe using ride-sourcing in different situations (see *Figure 15*).

- Roughly 40% of respondents indicated they would feel safe using exclusive and shared ride-sourcing once COVID-19 is no longer a public health threat
  - Vaccination appears to have a positive impact on the extent to which respondents would feel safe using ride-sourcing

- A greater percentage of respondents would feel safe using ride-sourcing during periods of time where restaurants, non-essential stores, and hair salons are allowed to operate
- The greatest level of disagreement was observed for the statements regarding the implementation of stay-at-home orders and the respondent not being fully vaccinated

- This is reasonable, as these factors help characterize the current state of the pandemic situation

- Over half of the respondents also indicated that they take changes in public health restrictions into account when they are considering using ride-sourcing
  - This may suggest that changes in public health measures influence the perceptions of risk associated with the pandemic



**Table 4:** Percentage of respondents who place an importance on given factors when considering using ride-sourcing

Factor	% of Respondents
The positivity rate of COVID-19 tests	68%
The number of new COVID-19 cases	67%
The % of vaccinated Ontario residents	67%
The total number of COVID-19 cases	65%
The number of new COVID-19 deaths	63%
Public health measures being tightened	62%
Public health measures being relaxed	61%
The total number of COVID-19 deaths	59%

**Figure 15:** Percentage of respondents that would feel safe using ride-sourcing, based on the pandemic situation

To help understand the factors influencing the decision to use ride-sourcing during the pandemic, respondents were asked to indicate the importance they placed on various aspects of the pandemic when they are considering using ride-sourcing services. The percentage of respondents that indicated a given factor was important or somewhat important when they are considering using ride-sourcing is summarized in *Table 4*.

- Respondents were most likely to indicate that they regarded the positivity rate of COVID-19 tests, the number of new COVID-19 cases, and the percentage of Ontario residents that are vaccinated against COVID-19 as important factors

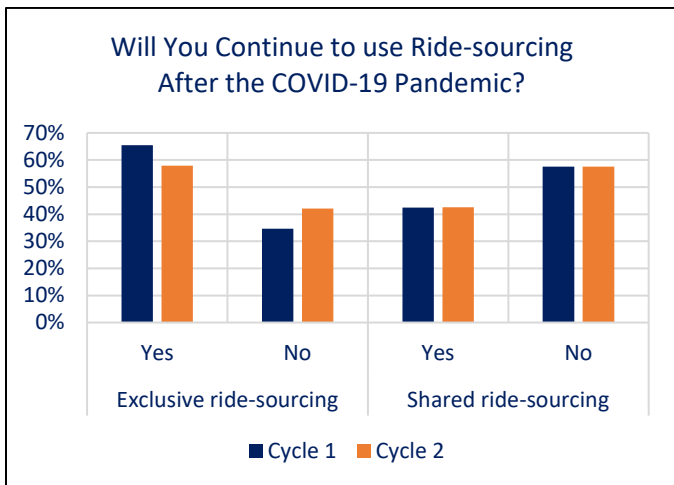
### RIDE-SOURCING USAGE IN THE POST-COVID PERIOD

Given the unprecedented nature of the COVID-19 pandemic, and the relative novelty of ride-sourcing services, it remains to be seen whether the pandemic will have long-term impacts on ride-sourcing usage. Consequently, respondents were asked a series of questions regarding their potential use of ride-sourcing services in the post-COVID period.

As part of these questions, respondents were asked whether they believe that they will continue to use exclusive and shared ride-sourcing services in the post-COVID period (see *Figure 16*).

- Respondents were more likely to indicate that they would use exclusive ride-sourcing in the post-COVID
  - This may stem from a continued reluctance to travel with strangers, or it could be due to a lack of experience using shared ride-sourcing prior to the pandemic

- The percentage of respondents anticipating that they will use exclusive ride-sourcing in the post-COVID period in cycle 2 of SiSTM was lower than in cycle 1
  - Given that ride-sourcing tends to be used on an infrequent basis, it is possible that some respondents have found alternative means of making trips that were previously made using ride-sourcing
  - Because the adoption of ride-sourcing has the potential to induce travel demand, it is also possible that a subset of pre-COVID ride-sourcing trips will not be made in the post-COVID period
- The percentage of respondents anticipating that they will use shared ride-sourcing in the post-COVID period was consistent between the two cycles



**Figure 16:** Anticipated use of ride-sourcing in the post-COVID period among respondents with pre-COVID ride-sourcing experience

Respondents who indicated that they anticipate using ride-sourcing in the post-COVID period were asked whether they believe their usage of these services will differ from their pre-COVID usage

- Roughly half of this subset of respondents believe that their use of ride-sourcing services in the post-COVID period will be similar to their pre-COVID

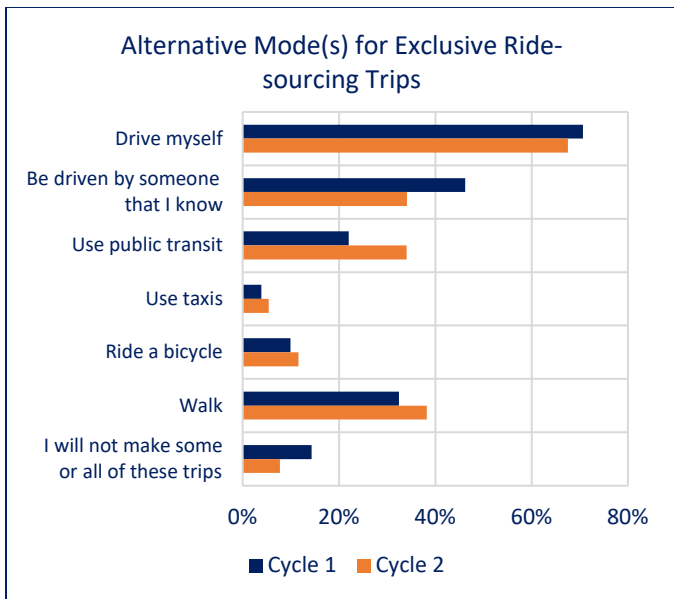
**Table 5:** Anticipated changes in ride-sourcing use in the post-COVID period, compared to the pre-COVID period

Change in Ride-sourcing Use	Exclusive Ride-sourcing	Shared Ride-sourcing
More often	24%	25%
Less often	25%	17%
No change	51%	57%

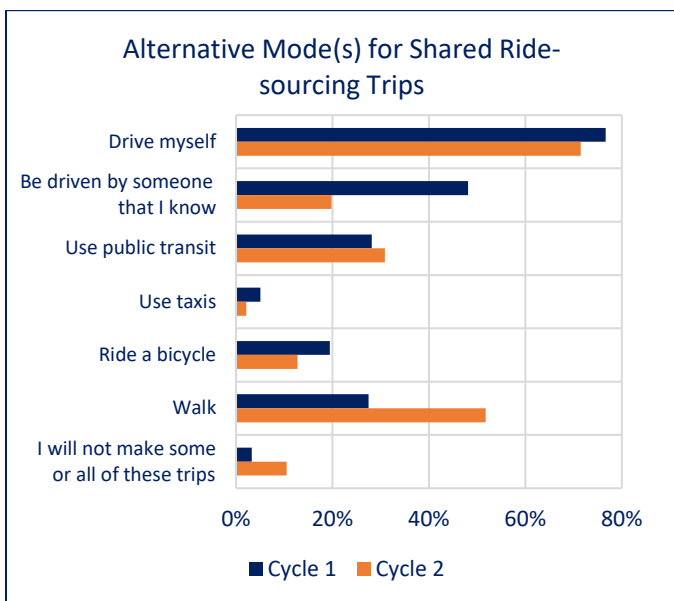
Respondents who indicated that they anticipated using ride-sourcing less often than they did in the pre-COVID period were asked about the mode(s) that they would use instead

- As shown in *Figures 17 and 18*, most respondents indicated that they would use private vehicles to make some of the trips that were made using ride-sourcing services prior to the pandemic
- The percentage of respondents indicating that they would walk and use public transit was greater in cycle 2 of SiSTM than in cycle 1
  - This could suggest that people were more willing to use public transit at the time that cycle 2 of SiSTM was conducted
  - This result is consistent with prior studies, which have found that ride-sourcing has the potential to be a substitute for more sustainable modes of travel (i.e., public transit and active modes) (10,11,18)
- In both cycles of the SiSTM survey, there is a subset of respondents that indicated that would not make some or all of their pre-COVID ride-sourcing trips
  - This suggests that the introduction of ride-sourcing services in the GTA induced travel demand prior to the pandemic





**Figure 17:** Anticipated alternative mode(s) for pre-COVID exclusive ride-sourcing trips

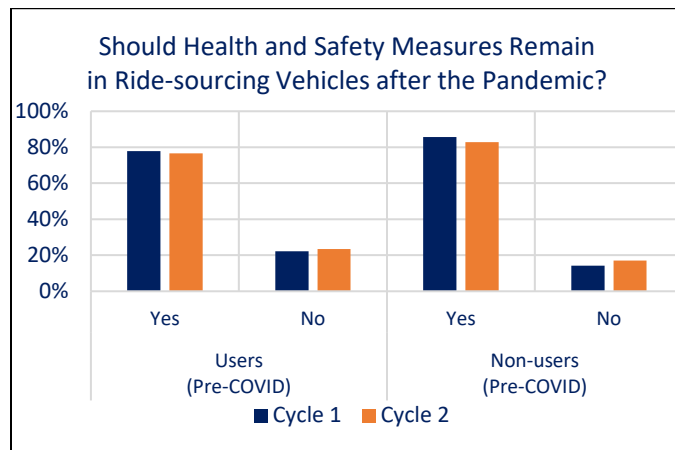


**Figure 18:** Anticipated alternative mode(s) for pre-COVID shared ride-sourcing trips

Respondents were also asked whether they would like to see various health and safety measures continue to be implemented in ride-sourcing vehicles in the post-COVID period (see Figure 19).

- There is strong support among both users and non-users for health and safety measures to remain in place in the post-COVID period

- A slight decline is observed in the percentage of respondents who believe that health and safety measures should remain in place in the post-COVID period in cycle 2 of SiSTM
- Among respondents who supported keeping health and safety measures in place, the most popular measures were requiring drivers and passengers to wear masks and providing hand sanitizer in vehicles



**Figure 19:** Comparison of views on whether health and safety measures between SiSTM cycles 1 and 2

### IMPACTS OF COVID-19 ON ATTITUDES AND PERCEPTIONS

Given the threat posed by COVID-19, it is important to understand how the pandemic has affected attitudes and perceptions related to activity and travel behaviour. To help explore the impacts of the COVID-19 pandemic on attitudes and perceptions among GTA residents, respondents were asked a series of attitudinal questions, including their perceptions of risk, their willingness to travel, and their preferences when they do travel. Respondents were also asked to complete a similar set of questions based on how they believe they will feel once the pandemic is over. The attitudinal questions asked respondents to indicate their level of agreement with a series of statements and used a five-point Likert scale to collect information (1: strongly disagree, 5: strongly agree).

## Attitudes Towards Travel and Perceptions of Risk During the Pandemic

- In most cases, more than 50% of respondents believed (i.e., agreed or strongly agreed) that there is more risk associated with using shared modes during the pandemic (see *Table 6*)
  - Compared to cycle 1 respondents, cycle 2 respondents were less likely to believe there was increased risk associated with using shared modes during the pandemic
  - 25% of cycle 2 respondents indicated that they would feel safe using ride-sourcing during the pandemic (compared to 17% of cycle 1 respondents)
  - 25% of cycle 2 respondents indicated they would feel safe taking a taxi during the pandemic (compared to 18% of cycle 1 respondents)

**Table 6:** Comparison of the percentage of respondents who believe there is greater risk associated with using shared modes during the pandemic

Shared Mode	Cycle 1	Cycle 2
Ride-sourcing	75%	62%
Taxi	74%	64%
Carpooling	76%	68%
Car-sharing	75%	62%
Bicycle sharing	57%	46%

- As shown in *Table 7*, fewer cycle 2 respondents indicated that they are less willing to spend time travelling and less willing to spend time outside of their home compared to cycle 1 respondents
  - However, more than half of respondents are still less willing to travel than they were before the pandemic



43% of respondents believe they will be less likely to use shared modes in the post-COVID than they were pre-COVID

**Table 7:** Comparison of respondent travel preferences during the pandemic period

Statement	% of respondents who agree with the statement	
	Cycle 1	Cycle 2
I am less willing to spend time outside of my home than before the pandemic	61%	50%
I am less willing to spend time travelling than before the pandemic	67%	55%
I am less willing to visit places far from my home than I was before the pandemic	71%	59%
I prefer to stay away from others when travelling	77%	67%

- In addition to their perceptions of risk during the pandemic, respondents were also asked about whether they believe the risk associated with using ride-sourcing in the post-COVID period will be greater than it was during the pre-COVID period (see *Table 8*)
  - While fewer respondents in cycle 2 of SiSTM believe that there is more risk associated with using ride-sourcing and taxis in the post-COVID period, the perception of increased risk still remains
  - This suggests that it will take time for ride-sourcing use to return to pre-pandemic levels even after COVID-19 is no longer a public health threat

**Table 8:** Comparison of the percentage of respondents who believe there is greater risk associated with ride-sourcing and taxis in the post-COVID period than in the pre-COVID period

Mode	Cycle 1	Cycle 2
Exclusive ride-sourcing	51%	43%
Shared ride-sourcing	59%	48%
Taxi	56%	50%

- As shown in *Table 9*, it appears that the impacts of the COVID-19 pandemic on the willingness to spend time travelling and the willingness to spend time outside of one's home will linger in the post-COVID period

**Table 9:** Comparison of anticipated respondent travel preferences during the post-COVID period

Statement	% of respondents who agree with the statement	
	Cycle 1	Cycle 2
I am less willing to spend time outside of my home than before the pandemic	41%	39%
I am less willing to spend time travelling than before the pandemic	42%	38%
I am less willing to visit places far from my home than I was before the pandemic	45%	40%
I prefer to stay away from others when travelling	51%	43%


**Changes in Attitudes and Perceptions During the Pandemic**

- As part of cycle 2 of the SiSTM survey, respondents were asked about how their attitudes and perceptions at the time of the survey differed from their attitudes and perceptions earlier in the pandemic
  - The percentage of respondents who disagreed (i.e., disagreed or strongly disagreed) and agreed (i.e., agreed or strongly agreed) is summarized in *Table 10*
- Roughly half of the respondents agreed that they believed there were fewer risks associated with leaving their home at the time of the survey compared to earlier in the pandemic
  - This could be the result of people learning to live with the threat posed by COVID-19, or it could stem from the availability of COVID-19 vaccines
- While some respondents indicated that they are less concerned about COVID-19 than they were earlier in the pandemic, there is also a subset of respondents who indicated that they are more concerned at the time of the survey than they were before the pandemic

- Respondents were more likely to disagree that they were more willing to use both ride-sourcing and taxis at the time of the survey compared to earlier to the pandemic than they were to agree with these statements

**Table 10:** Summary of responses to attitudinal questions regarding shifts in attitudes and perceptions

Statement	% of respondents who:	
	Disagreed	Agreed
I am less concerned about COVID-19 than I was earlier in the pandemic	29%	44%
I am more concerned about COVID-19 than I was earlier in the pandemic	35%	34%
I become more concerned about COVID-19 when the government tightens public health restrictions	18%	49%
I believe that there are fewer risks associated with leaving my home now than there were earlier in the pandemic	19%	49%
I am more willing to use ride-sourcing now than I was earlier in the pandemic	44%	25%
I am more willing to use taxi services now than I was earlier in the pandemic	46%	23%



30% of respondents agreed that being fully vaccinated against COVID-19 would increase their willingness to use ride-sourcing; 35% disagreed

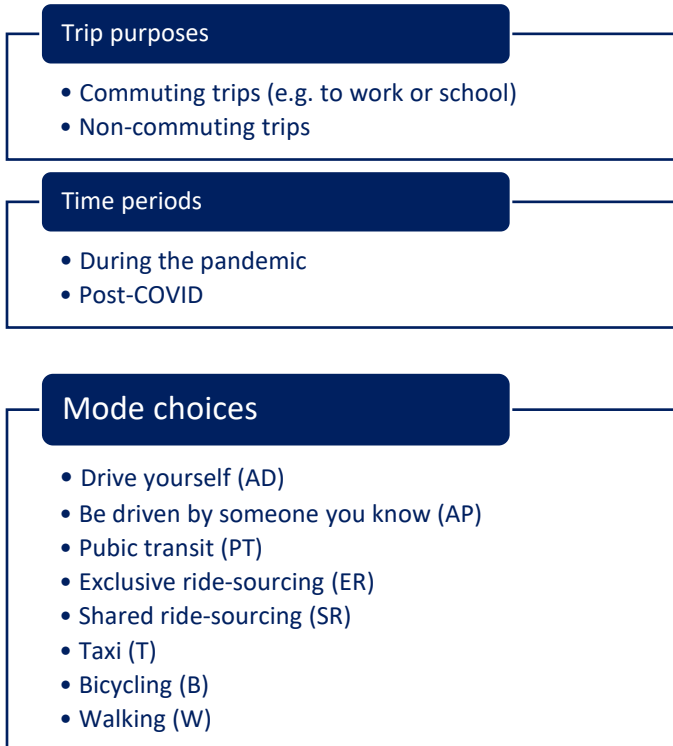


## STATED PREFERENCE (SP) EXPERIMENTS

To explore the factors that influence the mode choice process during the pandemic and in the post-COVID period, respondents were asked to complete 12 SP questions. Respondents were presented with four sets of choice experiments – one for each combination of trip purpose and time period (as shown below).

Each SP question asked the respondents to choose from one of eight modes. The experiments were designed based on the average travel distances (motorized modes) and the 95<sup>th</sup> percentile trip distances (active modes) in the most recent iteration of the regional household travel survey, the Transportation Tomorrow Survey (19).

The SP questions were designed by applying the d-efficient experimental design approach in the software Ngene. *Table 11* shows the attributes in the SP experiments that pertained directly to COVID-19. The choices made by respondents in the two cycles of the SiSTM survey are summarized in *Figures 20* to *23*.



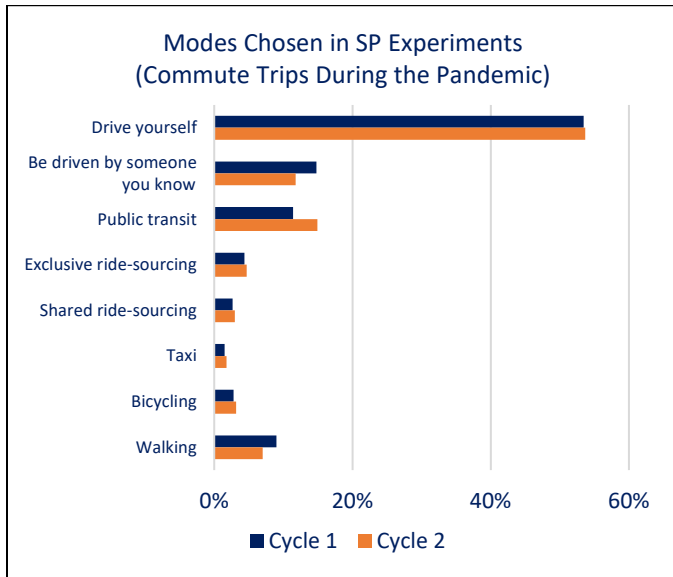
**Table 11:** Pandemic-related attributes included in the SP experiments

Pandemic-related Attribute	Alternative			
	PT	ER	SR	T
Level of crowding	✓			
Passengers and operators required to wear masks [Y/N]	✓	✓	✓	✓
Vehicles are disinfected at the end of each day [Y/N]	✓	✓	✓	✓
Physical barrier between the driver and passengers [Y/N]		✓	✓	✓
Is the respondent fully vaccinated against COVID-19? [Y/N]	✓	✓	✓	✓
Has mass vaccination against COVID-19 been achieved? [Y/N]	✓	✓	✓	✓

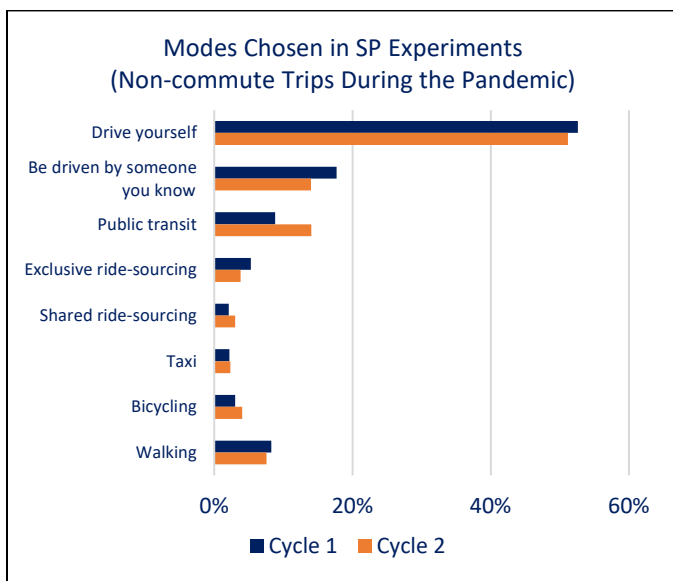
- Cycle 2 respondents appear to be more willing to use public transit, both during the pandemic and the post-COVID period, than cycle 1 respondents
  - This suggests that people were less reluctant to use public transit in July 2021 compared to July 2020
- The percentage of respondents choosing to bike was greater among cycle 2 respondents than cycle 1 respondents, while the opposite was true of walking
  - This could stem from the implementation of policies that aimed to encourage cycling during the pandemic (such as ActiveTO (20))
- The percentage of respondents choosing to drive was relatively consistent between the two cycles, while the percentage of respondents choosing to be driven by someone they know decreased from the first cycle to the second
  - Given the shifts in modal shares between the two cycles, this may suggest that people were more open to using public transit and bicycling in July 2021 compared to July 2020
- Similar to the results of the cycle 1 of the SiSTM survey, the most significant difference in modal shares between the pandemic and post-COVID periods is the reduction in the market share of the *drive yourself*

mode and the increase in the market share of the *public transit* mode

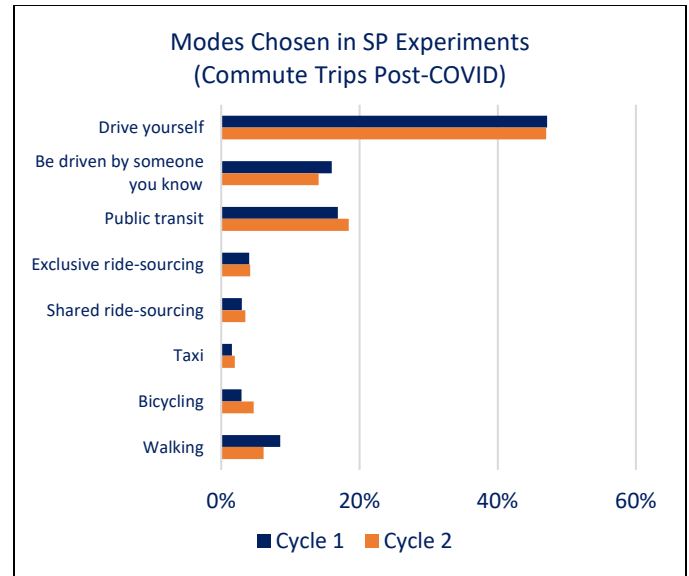
- The percentage of respondents choosing to use exclusive ride-sourcing for commuting trips remained relatively stable across the two cycles
- A slightly larger percentage of cycle 2 respondents chose shared ride-sourcing in the four sets of choice experiments compared to cycle 1 respondents



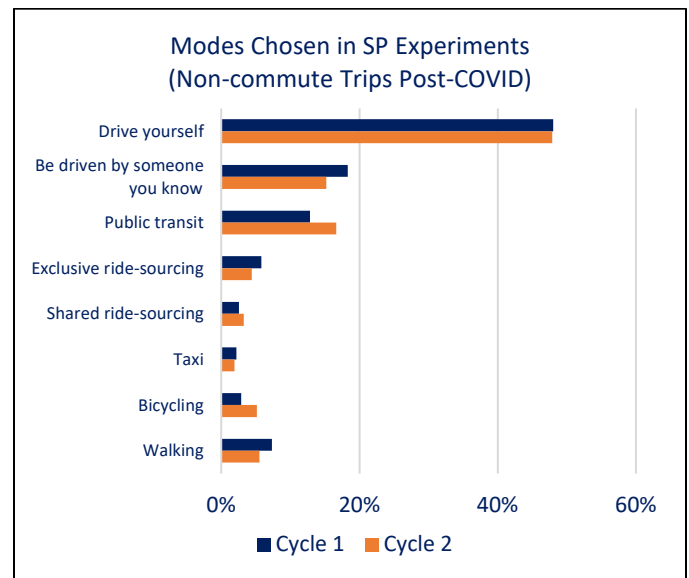
**Figure 20:** Comparison of views on whether health and safety measures between SiSTM cycles 1 and 2



**Figure 21:** Comparison of views on whether health and safety measures between SiSTM cycles 1 and 2



**Figure 22:** Comparison of views on whether health and safety measures between SiSTM cycles 1 and 2



**Figure 23:** Comparison of views on whether health and safety measures between SiSTM cycles 1 and 2

## CONCLUSIONS

This report presents the preliminary findings of a study that aims to understand the impacts of the COVID-19 pandemic on the use of ride-sourcing services in the Greater Toronto Area (GTA). As part of this study, a two-cycle, web-based survey was developed and administered to GTA residents in July 2020 and July 2021. Respondents were asked to provide information on their use of ride-sourcing services, their attitudes

and perceptions towards the pandemic, and their socio-economic attributes. The survey also asked respondents to complete a series of stated preference experiments that aimed to explore the impacts of the COVID-19 pandemic on mode choices for commuting and non-commuting trips.

The results of the study aim to provide insights into the short- and long-term impacts of the pandemic on the use of ride-sourcing services. Given the extent to which ride-sourcing services can affect urban mobility and the transportation system, it is essential to understand how these services may be used in the post-COVID period.

- The COVID-19 pandemic has resulted in a decline in ride-sourcing use, as well as a reduced willingness to use ride-sourcing services
  - However, there is a subset of ride-sourcing users that are using ride-sourcing more often during the pandemic than they did before the pandemic
  - There is also a small percentage of respondents (2.1%) that started using ride-sourcing services during the pandemic
- Reductions in ride-sourcing use were typically attributed to reductions in overall travel and concerns about the risk of infection associated with using ride-sourcing
  - Increases in ride-sourcing use were typically attributed to concerns about public transit and a reluctance to spend time in crowded areas
- Compared to cycle 1, a smaller percentage of cycle 2 respondents indicated that they were less willing to use ride-sourcing during the pandemic than they were before the pandemic
  - However, a smaller percentage of cycle 2 respondents believe that they will continue to use exclusive ride-sourcing in the post-COVID period
- The data from the two cycles of the SiSTM survey suggest that there have been shifts in attitudes and perceptions towards the pandemic between July 2020 and July 2021
  - Cycle 2 respondents were less likely to believe that there is more risk associated with using shared modes than prior to the pandemic, however, this

belief is still held by roughly 60% of respondents (compared to roughly 75% of cycle 1 respondents)

- There is a subset of respondents (44%) that were less concerned about COVID-19 at the time of the survey compared to earlier in the pandemic
  - Only one-quarter of respondents indicated they were more willing to use ride-sourcing and taxi services at the time of the survey than they were earlier in the pandemic
- The results suggest that the impacts of the COVID-19 pandemic on the perceived risks associated with using shared modes (such as ride-sourcing and taxi) and the willingness to travel and spend time away from home may persist for certain individuals in the post-COVID period
    - While these perceptions and preferences could eventually return to their pre-pandemic state, it may take time for certain individuals to adjust to COVID-19 no longer being a public health threat
    - Consequently, activity and travel behaviours in the post-COVID period may initially undergo an adjustment period before eventually stabilizing
    - It is still unclear whether the perceived risk associated with using so-called shared modes (such as public transit and ride-sourcing) will return to pre-pandemic levels in the post-COVID period
    - The perceived risk associated with using ride-sourcing services in the post-COVID period being greater than the pre-COVID period has the potential to affect the extent to which ride-sourcing services impact the transportation system

The data collected through the first two cycles of the SiSTM survey will be used to further examine the impacts of the COVID-19 pandemic on ride-sourcing use and how these impacts may have changed over the pandemic and the extent to which these impacts vary among members of the population. Additionally, the information provided by respondents who participated in both cycles of the survey will be analyzed to explore the shifts in the behaviours, attitudes, and perceptions of these individuals over the course of the pandemic.



## REFERENCES

1. Molloy J. MOBIS-COVID19/05: Results as of 04/04/20 [Internet]. ETH Zurich. 2020 [cited 2020 May 7]. Available from: [https://ivtmobis.ethz.ch/mobis/covid19/reports/mobis\\_covid19\\_report\\_en\\_2020-05-04.html](https://ivtmobis.ethz.ch/mobis/covid19/reports/mobis_covid19_report_en_2020-05-04.html)
2. Beck MJ, Hensher DA. Insights into the Impact of COVID-19 on Household Travel and Activities in Australia - The Early Days of Easing Restrictions. *Transp Policy*. 2020;99:95–119.
3. de Haas M, Faber R, Hamersma M. How COVID-19 and the Dutch 'intelligent lockdown' change activities, work and travel behaviour: Evidence from longitudinal data in the Netherlands. *Transp Res Interdiscip Perspect* [Internet]. 2020;6:100150. Available from: <https://doi.org/10.1016/j.trip.2020.100150>
4. Shamshiripour A, Rahimi E, Shabanpour R, Mohammadian A (Kouros). How is COVID-19 reshaping activity-travel behavior? Evidence from a comprehensive survey in Chicago. *Transp Res Interdiscip Perspect* [Internet]. 2020;7:100216. Available from: <https://doi.org/10.1016/j.trip.2020.100216>
5. Molloy J. MOBIS-COVID19/28: Results as of 16/11/2020 (Second Wave) [Internet]. 2020 [cited 2020 Dec 1]. Available from: [https://ivtmobis.ethz.ch/mobis/covid19/reports/mobis\\_covid19\\_report\\_en\\_2020-11-16.html](https://ivtmobis.ethz.ch/mobis/covid19/reports/mobis_covid19_report_en_2020-11-16.html)
6. ETH Zurich. MOBIS-COVID-19 - Institute for Traffic Planning and Transport Systems | ETH Zurich. 2020.
7. Alemi F, Circella G, Mokhtarian P, Handy S. Exploring the latent constructs behind the use of ridehailing in California. *J Choice Model* [Internet]. 2018;29:47–62. Available from: <https://doi.org/10.1016/j.jocm.2018.08.003>
8. Clewlow RR, Mishra GS. Disruptive Transportation: The Adoption, Utilization, and Impacts of Ride-Hailing in the United States. *UC Davis Inst Transp Stud* [Internet]. 2017 Oct; Available from: <https://escholarship.org/content/qt82w2z91j/qt82w2z91j.pdf>
9. Wang H, Yang H. Ridesourcing systems: A framework and review. *Transp Res Part B Methodol*. 2019 Nov;129:122–55.
10. Gehrke SR, Felix A, Reardon TG. Substitution of Ride-Hailing Services for More Sustainable Travel Options in the Greater Boston Region. *Transp Res Rec*. 2019;2673(1):438–46.
11. Lavieri PS, Bhat CR. Investigating objective and subjective factors influencing the adoption, frequency, and characteristics of ride-hailing trips. *Transp Res Part C Emerg Technol* [Internet]. 2019;105:100–25. Available from: <https://doi.org/10.1016/j.trc.2019.05.037>
12. Brown AE. Who and where rideshares? Rideshare travel and use in Los Angeles. *Transp Res Part A* [Internet]. 2020;136:120–34. Available from: <https://doi.org/10.1016/j.tra.2020.04.001>
13. Tirachini A. Ride-hailing, travel behaviour and sustainable mobility : an international review. *Transportation (Amst)* [Internet]. 2019;1–37. Available from: <https://doi.org/10.1007/s11116-019-10070-2>
14. Nielsen K. A timeline of the novel coronavirus in Ontario [Internet]. 2020 [cited 2020 Nov 15]. Available from: <https://globalnews.ca/news/6859636/ontario-coronavirus-timeline/>
15. City of Toronto. City Halls - GTA municipalities & municipalities outside of the GTA [Internet]. 2017 [cited 2020 Jul 28]. Available from: <https://www.toronto.ca/311/knowledgebase/kb/docs/articles/311-toronto/information-and-business-development/city-halls-gta-municipalities-and-municipalities-outside-of-the-gta.html>
16. Wikimedia Commons. File:Greater toronto area map.svg [Internet]. 2006 [cited 2020 Nov 19]. Available from: <https://commons.wikimedia.org/w/index.php?curid=1268021>
17. Teixeira JF, Lopes M. The link between bike sharing and subway use during the COVID-19 pandemic: The case-study of New York's Citi Bike. *Transp Res Interdiscip Perspect* [Internet]. 2020;6. Available from: <https://doi.org/10.1016/j.trip.2020.100166>
18. Alemi F, Circella G, Sperling D. Adoption of Uber and Lyft, Factors Limiting and/ or Encouraging



Their Use and Impacts on Other Travel Modes among Millennials and Gen Xers in California. In: (No 18-06713). 2018.

19. Data Management Group. Design and Conduct of the Survey [Internet]. Toronto; 2018. Available from:  
[http://dmg.utoronto.ca/pdf/tts/2016/2016TTS\\_Conduct.pdf](http://dmg.utoronto.ca/pdf/tts/2016/2016TTS_Conduct.pdf)
20. City of Toronto. COVID-19: ActiveTO [Internet]. 2020 [cited 2020 Nov 24]. Available from:  
<https://www.toronto.ca/home/covid-19/covid-19-protect-yourself-others/covid-19-reduce-virus-spread/covid-19-activeto/>

