Challenges and Barriers to Electric Shared Micro-Mobility use in The Greater Toronto-Area Municipalities in Canada

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CONTEXT

As urban regions grow, transportation challenges intensify with congestion and urban sprawl increasing commute times, especially for suburban residents working in the urban core. Public transportation in the suburban context can often be unevenly dispersed and have sporadic service delivery. As a result, for suburban commuters wanting to take public transit into the city, it is not always available, or it is inconvenient because there is still a need to drive to a transit hub to access the public transit systems, which may also contribute to local congestion.

In response to growing congestion and pressure on existing transportation infrastructure, governments are shifting toward multi-modal solutions (Ontario Ministry of Transportation, 2022a). Shared electric micro-mobility can help fill gaps in suburban transport networks, especially for short trips and transit connections (Baek et al., 2021; Buehler et al., 2021; Kopplin et al., 2021; Mathew et al., 2019).

Micro-mobility refers to lightweight vehicles such as bicycles and scooters, used mainly for short trips. These can be human-powered (e.g., bicycles) or electric (e-bikes and pedal-assisted e-scooters). In Ontario, the Ministry of Transportation regulates the specification of electric micro-mobility vehicles, wherein e-bikes must not exceed 32 km/h, weigh under 120 kg, and have motors under 500 watts; and e-scooters must not exceed 24 km/h, weigh under 45 kg, and also use motors under 500 watts (Ontario Ministry of Transportation, 2022b, 2022c).

The availability and use of shared micro-mobility—rentable bikes, e-bikes, and e-scooters typically accessed via apps—has grown rapidly across the US and Canada, from 3.7 million trips in 2010 to 157 million in 2023 (NACTO, 2023). Dockless e-bike and pedal-assisted e-scooter systems, introduced in 2018, allow users to park vehicles anywhere within guidelines, improving convenience for first- and last-mile travel. In 2023, shared e-scooters made up 44% of all micro-mobility trips (69 million), while dockless bikes and e-bikes saw lower, stable use—peaking at 10 million trips in 2019 and totaling 7 million in 2023 (NACTO, 2023).

The Ontario provincial government first introduced an e-scooter pilot program in 2019 with the intent of creating overarching standards for municipalities to follow if they decide to introduce a program in their jurisdiction. Additionally, municipalities interested in introducing a pilot program were to monitor their program and report back to the province. In the Fall of 2024, in light of feedback the province received from the participating municipalities, Ontario extended the provincial pilot program for another 5 years (Ontario Ministry of Transportation, 2022b). The pilot program has been fundamental to municipalities introducing not just shared e-scooter systems, but also more holistic shared micro-mobility strategies, which can also include shared e-bikes.

This report focuses on three of the suburban municipalities in the Greater Toronto Area (GTA) – the Town of Ajax, the City of Brampton, and the City of Mississauga (Map 1). While the three municipalities have unique characteristics, they share many similar characteristics as primarily commuter communities, segregated land use patterns where there is clear separation between residential and non-residential communities, primarily automobile-centric road network design. All three municipalities have local bus-based public transit but the service is limited in many neighbourhoods. All municipalities are serviced by the regional GO Transit system, and each has at least one train station, which are primarily used by residents to commute to the major employment centre (City of Toronto).

Ajax is situated in Durham Region, which is just East of the City of Toronto. Ajax is the smallest municipality included in our study both in terms of population and geographical size (Statistics Canada, 2023a). In 2023, Ajax started a micro-mobility pilot program that included e-bikes and e-scooters, as part of the provincial pilot. Brampton is the second largest by population and by land area (Statistics Canada, 2023b). Brampton is part of Peel Region, which is just West of the City of Toronto. Brampton's micro-mobility program, which started in 2022, only includes shared e-scooters. Brampton is the only municipality in our study area that does not have shared e-bikes to this point. Mississauga is the largest of the three municipalities by population and size, and is also part of Peel Region along with Brampton. Not starting until the summer of 2024, Mississauga introduced their micro-mobility pilot later than Ajax and Brampton and provides services that include both e-scooters and e-bikes.

All municipalities have introduced only dockless systems with electric vehicles (e-bikes and/or e-scooters) as part of their micro-mobility pilot programs. Dockless systems mean that users do not have to lock the vehicles at any specified locations, making the vehicles more flexible for the users at the end of their trips. The three municipalities do however have rules on where users can park the vehicles, including some special restrictions in areas where e-scooters and/or e-bikes cannot be parked.

Table 1: Municipalities included in the study

Municipality	Size	Population	Commute Mode Share		% Residents Working Outside of Home Municipality
			Car	Public Transit	
Town of Ajax	66.64 km2	126,666	86.9%	7.9%	72.9%
City of Brampton	265.89 km2	656,480	85.9%	10.3%	59.2%
City of Mississauga	292.74 km2	717,961	82.7%	11.4%	41.1%

(Statistics Canada, 2023a, 2023b, 2023c)

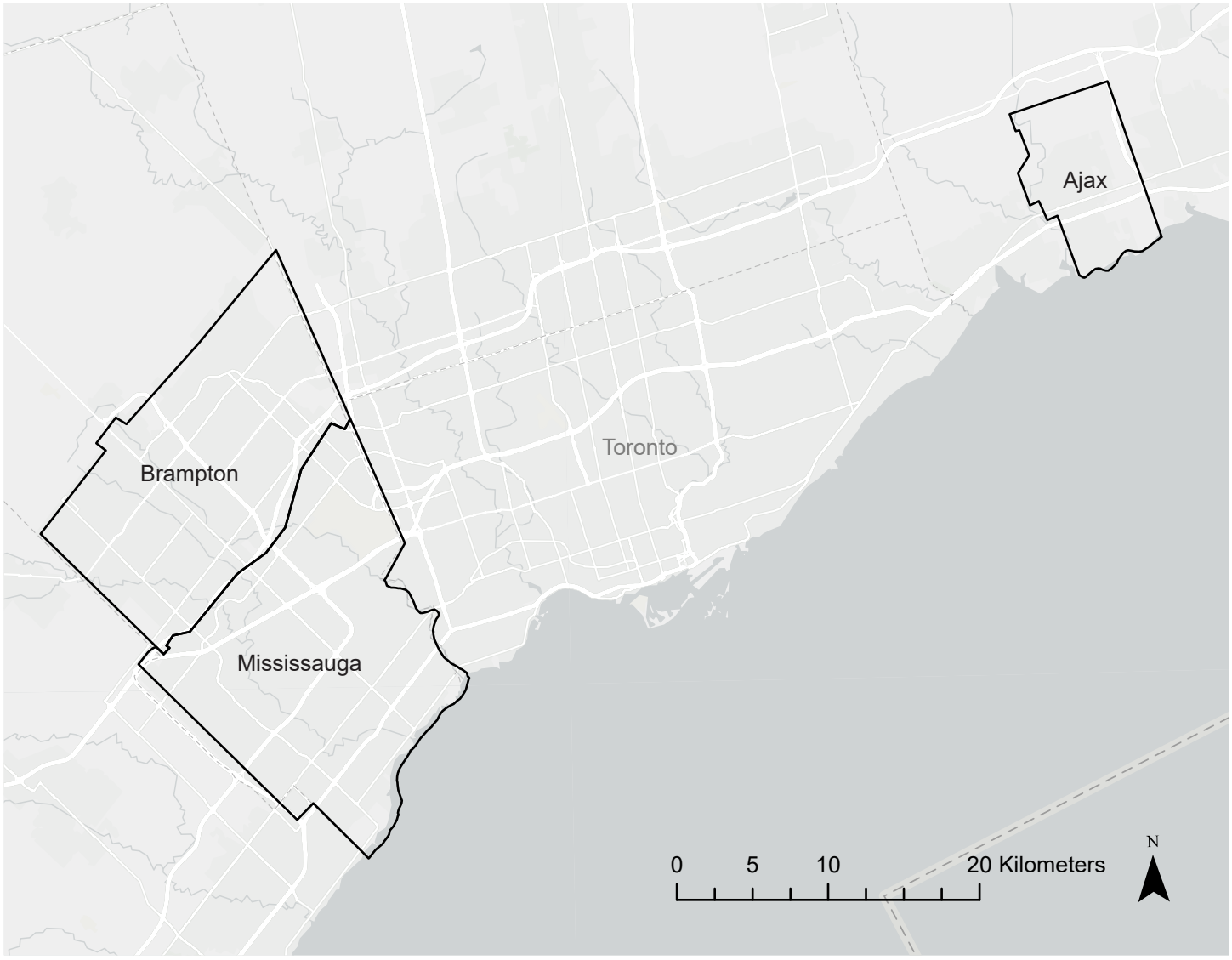


Figure 1: Case study municipalities.

STUDY PURPOSE

The majority of research on micro-mobility takes place in the urban context of downtown cores of major cities. Micro-mobility use in the suburban context remains an understudied topic. In suburban communities, shared micro-mobility can play a key role in filling an important gap in transportation systems, offering an opportunity to take short trips using alternative modes of transportation. While direct research on this topic is limited, previous studies show higher ridership in areas of low bus stop density and limited route frequency (Luo et al., 2021; Ziedan et al., 2021).

However, suburban environments may also present unique challenges and barriers related to the uptake of shared mobility. This report explores the challenges and barriers that users face when using or considering shared micromobility in the suburban context.

By focusing on a qualitative approach that highlights thoughts and views by local residents in their own words, this report provides much needed insight into the nuanced perceptions of users and potential users.
It is important to note that the scope of this report is limited to challenges and barriers related to the use of shared electrified and dockless micro-mobility systems (i.e., e-bikes and e-scooters) only, and the results may not apply to challenges and barriers related to traditional bike share systems (which rely on human powered vehicles that need to be docked in specific locations) for example.

The findings from this study will help planners and policy makers make informed decisions about introducing, extending, or making permanent micro-mobility programs.

METHODS

Semi-structured interviews were conducted with residents living in the Town of Ajax, and Cities of Brampton and Mississauga over Zoom, with approval from Toronto Metropolitan University's Research Ethics Board (REB 2023-279).

To recruit interview participants, we partnered with three municipalities, who helped promote the study through their active transportation or pilot program webpages, public library posters, social media posts, and/or e-newsletters.

Interested individuals signed up via a Google Form, which collected basic information—including prior use of shared micro-mobility. Recruitment ran for about a month, though each municipality launched their materials at different times. In total, 460 people signed up, most of whom were young (89% aged 16–34), male (63%), and had previous experience with shared micro-mobility (72.2%). Brampton had the highest number of sign-ups (214), followed by Ajax (172) and Mississauga (74). These interested individuals were screened based on their municipality of residency, gender, and their level of use (current users, versus non-users who had considered using the shared micro-mobility system in their municipality). A rigorous protocol was also developed to screen out the potential imposters and fraudulent participants. In the end, a total of 17 interviews were conducted. Table 1 describes the breakdown of these participants by municipality, their gender and use level. Each interview conducted ranged in length from 25 minutes to an hour. Transcripts were analysed through thematic analysis using NVivo software. To maintain anonymity, participants are identified by pseudonyms, their municipality, and whether they are a user or potential user of micro-mobility. Most participants discussed e-scooters, likely due to their wider availability and broader interest in them.

When discussing perceived challenges and barriers related to the use of shared micromobility systems in their own municipalities, participants identified three major concerns. First, safety of the micro-mobility vehicles and existing infrastructure were identified as a major concern. Second, when deciding over the use of a shared micro-mobility vehicle and when to use it as an alternative transportation mode, cost was highlighted as a key barrier. Finally, the participants pointed out the importance of residents' awareness and understanding of the program and the vehicles, including how to find and use them safely.

Table 2: interview participants

	Have used shared micro-mobility	Would use shared micro-mobility	Total
By Gender			
Male	5	7	12
Female	3	2	5
By Municipality			
Town of Ajax	2	4	6
City of Brampton	2	4	6
City of Mississauga	4	1	5

KEY FINDINGS

Safety

Competing for space with vehicles

In a suburban community where the majority of streets have no active transportation infrastructure, participants held negative connotations to using shared micro-mobility when they had to share/compete for space with vehicles. This was particularly true among current users than potential users, and when discussing e-scooters rather than e-bikes. This concern was more pronounced among those who rode on a shared micro-mobility vehicle on major roads with more traffic and higher speed limits. One participant, in discussing their first trip on an e-scooter, described this conflict in these terms:

> "First ride I'm going down Britannia Road and it's busy, and I'm just like this is, this is terrifying. People are so close to me. They're flying right past …. It was very scary …. I just started taking Ubers because I just didn't feel safe. And I was like, I'm going to get into an accident eventually which I did, right?" (Liam, user, Mississauga)

This driver had been in a collision with a driver pulling out of the entrance to a commercial plaza that had not seen them on a scooter. Luckily, the participant was not seriously injured, but they are now reluctant to use micro-mobility. Micro-mobility users getting into collisions with vehicles is a real concern because they are largely unprotected and vulnerable, and participants highlighted the need for improved awareness by vehicle drivers.

> "Drivers may find it challenging, right? Because now here's another user that they have to share the road with. Somebody who may not go as fast as them." (Benjamin, user, Ajax)

Preferred Infrastructure

Given that many participants were concerned about competing for space on the roads with vehicles, they discussed where they felt unsafe using micro-mobility and their preferred infrastructure when using the vehicles. Unsurprisingly, the majority had concerns about using the vehicles on major roads in their municipality. A potential micro-mobility user, in thinking about the route they might take, stated:

> "… wherever possible, I would like to use the trails or the side roads or the side pathways rather than the main road" (Noah, potential user, Brampton).

A similar sentiment is shared by another participant who lived in a different municipality in the study:

> "I would say like most of the roads in Mississauga, they're literally designed like highways. So, let's say these devices have like a no ride zone on sidewalks and you know the speed limit of a road is like 80 or 70 kilometers in most cases. Most people will choose the sidewalk because like they're not comfortable with mixing in traffic when their e-bike can only go maximum of like 20 kilometers." (Logan, user, Mississauga)

"Like it'd be nice to have certain access points that there's always scooters or e-bikes available. Rather than going into the app and searching."

Participants also highlighted the lack of connectivity that users face when using routes on infrastructure that they are comfortable travelling on. Users of shared micro-mobility and other forms of active transportation feel the impacts as they come across gaps in the infrastructure:

> "first of all is actually having the safe road infrastructure that's consistent because a lot of these like trails that exist for, you know, micromobility and other traffic, they just start out of, the middle of nowhere." (Logan, potential user, Mississauga)

Sidewalk Use

With regard to preferred infrastructure for using shared micro-mobility, participants clearly preferred infrastructure that is sufficiently separated from vehicle traffic, but they all recognized the existing gaps in the active transportation infrastructure network. As a result, sidewalks became a key topic of discussion, with many supporting their use as a safer alternative when road conditions felt unsafe.

Participants that indicated they would be willing to, but have not as of yet, use a shared micro-mobility vehicle, were consistent in stating their preference for the use of sidewalks on e-scooters. One such participant, in thinking about where they would feel the safest using an e-scooter instinctively considered the rules on riding on a sidewalk while still expressing their preference for it:

> "I don't know if I could use it on a sidewalk. But if I'm allowed to use it on a sidewalk, I'd probably use it on the sidewalk" (Adam, potential user, Brampton).

However, all three municipalities in this study have made the use of micro-mobility vehicles on sidewalks illegal and asked the companies providing the vehicles to geo-fence the sidewalks, and other restricted areas (City of Brampton, n.d.; City of Mississauga, 2023; Town of Ajax, n.d.). Through this technology, users on an e-scooter or e-bike will have their device shut down and gradually stop propelling them forward in the event that the user mounts the sidewalk or enters other restricted areas (Radcliff, 2020). Expressing some frustration in geo-fencing, one participant described the results of going onto the sidewalk one time:

> "We shouldn't go that way, but sometimes the road is a little clogged or you feel more safe on the side, but then the scooter doesn't allow that" (Olivia, user, Brampton).

Another participant that had not yet used shared micro-mobility, and was not aware of the geo-fencing ability, made a similar connection about being able to get on the sidewalk when the user feels unsafe:

> "Well, the law is not so tight. You can go on the sidewalk, right? So that's a major thing. At least I'm not aware of it, right? So, people can stay safe. A lot of people bike on the sidewalk too in Mississauga." (Jack, potential user, Mississauga)

At the same time, this participant acknowledges the challenges with riding micro-mobility vehicles on the sidewalk:

> "We'll get into more accidents on the sidewalk, bump into people. It's bound to happen"

Ultimately, the sentiment on this topic shared by participants in the interviews can be summed up by this quote from one of the interviews:

> "They're gonna have to have some sort of some amnesty for small sections of, of a sidewalk areas. Because there's just simply no safe way to do it except to get on that sidewalk" (Harvey, user, Ajax)

While some participants recognized that micro-mobility vehicles do not belong on the sidewalk, they still felt that there needed to be a compromise in their ability to use the vehicles while feeling safe from harm.

COST

All 17 participants highlighted the high cost of use as one of the key barriers to using shared micro-mobility in their municipality. The conversations around cost as a barrier to shared micro-mobility adoption varied widely, but two main subthemes came to the forefront: relative cost of using shared micro-mobility versus other forms of transportation, and connection to public transportation.

Micro-Mobility vs. Other Options

When evaluating the cost of taking a ride on a shared e-scooter or e-bike, participants used a variety of different mobility options as a comparison. Additionally, participants regularly spoke about their generalized travel cost, that is, overall cost to travel including out of pocket expenses as well as other costs like time, convenience, and comfort. The most common comparison was public transit. Because public transit is generally cheaper than renting a shared micro-mobility vehicle, many participants heighted cost of use as a major barrier leading to people not using the service. In the event that someone is transferring from the bus route to shared micro-mobility, this cost would also be an extra payment in the persons' trip.

> "'A' is definitely cost. I think though it is a little lesser than what the traditional Uber would be. It's definite-

> ly significantly higher than bus. Again, I don't expect it would just take $3 for 10 kilometers or something, but it could definitely be something more for like longer rides of say five six kilometers I think it's still showing probably 60%-70% of what an Uber would charge but a bus would just take you in $3." (Charlotte, user, Mississauga)

However, participants were at times contradictory when discussing shared micro-mobility and public transit. Many participants described shared micro-mobility as complementing public transit because micro-mobility can fill gaps in connectivity and provide first/last mile transit options:

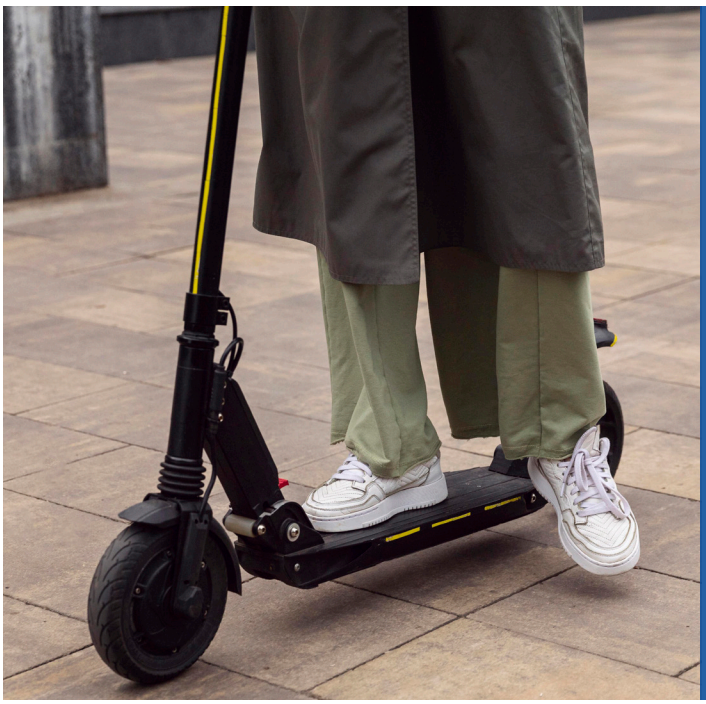
> "well, in my neighborhood, I think scooters can do wonders. Because just two kilometers is the Sheridan College from my home. And there is no direct public transport" (Olivia, user, Brampton).

Other participants discuss the challenges related to finding an e-scooter, which could be a few minutes walk away, and potentially in the opposite direction, which adds to their generalized cost of travel:

> "And like I said, it takes me 30 minutes, seven minutes if I go and pick my scooter, and then from that point to my (destination) another 10 minutes, so 17 minutes. So, then I have to think do I need to actually save the 10 minutes? And is it even worth the (money) I would then additionally be spending." (Olivia, user, Brampton)

Even if e-scooters are faster than walking, the time savings can be minimal if users must walk a distance to access one.

Another participant mentioned how shared micro-mobility is more convenient than rideshare services because one does not have to wait for a driver to come pick them up,



"We'll get into more accidents on the sidewalk, bump into people. It's bound to happen."

however, as noted by other participants, the high cost of use continues to be a key barrier, deterring the use of shared micro-mobility.

Connections with Public Transit

One of the common suggestions for addressing the cost concern from participants was to have shared micro-mobility systems connected to the GTA's Presto payment system used for public transit. The suggestion of adding shared micro-mobility to this network was held by participants across all three municipalities studied and was shared by both users and potential users. One participant discussed using micro-mobility as a last mile option in their commute:

> "It's not my main mode of transportation and because it's not really implemented in like transit, sort of like the transfer when taking transit transportation, I try refraining from it, but I mean, it is enjoyable, so I don't mind taking it here and there." (James, user, Brampton)

When asked if they would be using shared micro-mobility more if they could transfer from the bus to an e-scooter or e-bike, they responded:

> "I guarantee I would be taking it all the time" (James, user, Brampton).

Similarly, one participant chooses the bus over shared micro-mobility to reach the GO train, citing lower cost and the benefit of seamless transfer to regional rail.

> "Where there is frequent transit, it didn't make sense to me, because it would have been like $9 or $10, right? And the bus, you know, with transfer to the GO station, you know, it would have been like $3 or $4 bucks." (Aiden, potential user, Ajax)

PROGRAMMING

With regard to barriers and challenges related to programming, respondents highlighted two key aspects, namely-communication, and the distribution of vehicles.

Communication

Interview participants who had previously not used shared micro-mobility expressed that they felt they did not have enough information about the program. Similarly, participants who had used the shared vehicles felt that municipalities and private operators are not doing enough to promote the benefits of this new mode of transportation. About half the participants in this study had not used a shared micro-mobility vehicle at the time of the interview. All knew about the program and had seen the shared e-scooters and/or e-bikes parked throughout their municipality, but some did not know much more than that.

> "I think a lot of people don't realize how easy it is to take one of these. They think it's a complicated process. They think it's super expensive. They may think that I have to upload a driver's license. I might have to set it up like a couple days before they don't realize that within minutes, they can use one. So, I think there's an educational component, whether it's advertising, marketing, doing some videos, YouTube videos, whatever." (Benjamin, user, Ajax)

Some participants discussed safety concerns in relation to this topic, and highlighted that there needed to be consistent messaging from the municipality and shared micro-mobility operators:

> "We still have advertisements (on) wearing seat belts in a car. So, people have to choose to be safe, and people have to choose to wear a helmet and to share the road" (Cathy, potential user, Ajax).

Distribution of Vehicles

A common concern among participants who had used shared micro-mobility systems was the difficulty of finding e-scooters or e-bikes at the start of their trips. Particularly on the trip home, some participants found them to be conveniently placed in strategic locations allowing them to grab one and go:

> "I was going home from school and then I noticed that the latest bus from the station was going to be like 20 minutes. So, I just chose to take the scooter home because it was also nearby" (James, user, Brampton).

In contrast, when discussing trips that started from home, participants found that shared micro-mobility vehicles were not always conveniently accessible to them:

> "Well, I guess, like speaking from my experience I don't really find that many of them are totally accessible right now. Like if I really wanted to take one from my house, I'd have to walk to it first, which is maybe like a 10-minute walk. And then use it, which sort of defeats the purpose." (James, user, Brampton)

Similar to assessing the cost of using the services, if the participants felt that walking to the vehicles was too far or inconvenient for them, they would choose to use another mode of transportation. The participants recognized that the

shared mobility apps provide locations of nearby vehicles, but that does not always mean they are close. The idea of having specific stations was brought up by a few of the participants:

> "It'd be nice to have like stations. Like I knew, for example, if I go down by Union Station, I know there's a station there (where) I can drop off my bike. Like it'd be nice to have certain access points that there's always scooters or e-bikes available. Rather than going into the app and searching. And then I realized, okay, there's one kilometer away and then I walk a kilometer." (Benjamin, user, Ajax)

Interestingly, participants that had not yet used shared micro-mobility did not believe locating an e-scooter or e-bike for use to be an issue. When asked if they knew where they would find a shared micro-mobility vehicle if they were to use one, many said yes, or would comment how they frequently see them parked, and that they do not believe finding one would be a challenge.

"I think a lot of people don't realize how easy it is to take one of these."

POLICY IMPLICATIONS

In this study, three main themes were distilled from the interviews providing nuanced insights into the perceived challenges and barriers to the adoption and regular use of shared electric micro-mobility in suburban municipalities. These insights offer opportunities for suburban municipalities as they review the current shared micro-mobility pilot programs, and may inform the creation of more supportive conditions for shared micro-mobility as an alternative transportation option.

A key challenge for shared micro-mobility users relates to the lack of clarity around where e-scooters and e-bikes belong within the transportation landscape. Interview participants expressed their concerns with using shared micro-mobility vehicles in their communities because of the conflicts and perceived danger associated with automobiles/cars. Streets with high-volume, high-speed and large vehicle traffic create an unsafe environment for physically vulnerable micro-mobility users. Participants highlighted the importance of awareness and respect on the side of the drivers. This result is consistent with findings from previous studies, where cyclists hold drivers more responsible for conflicts between the two types of road users (Paschalidis et al., 2017).

Almost all participants viewed shared micro-mobility as a compliment to public transit, however, they would also describe times when they would use an e-scooter as a substitute for a bus trip. Sometimes these substitute trips are because there are no direct bus routes, but other times it can be to skip the wait time for the next bus.

Payment integration for shared micro-mobility and public transit was discussed as a suggestion by many participants. In 2024, Ontario introduced one payment system for all public transit providers in the Greater Toronto Area (GTA). This includes all municipal local buses, and the regional GO transit provider. The benefit was easier and cheaper connectivity and accessibility across the GTA with an estimated $1,600 a year in savings for commuters (Government of Ontario, 2024). Research has suggested that shared micro-mobility can fill the first/last mile connection to transit (Baek et al., 2021; Buehler et al., 2021), however, needing to pay twice for connecting shared micro-mobility to public transit negatively impacts the effectiveness of the first/last mile potential. Connecting the payments would make the first/last mile options more tenable (Beale et al., 2023).

However, this approach may also place shared micro-mobility services (which are provided by profit-driven private-sector operators) and public transportation (which are municipality-run and funded by taxpayer money) in competition with one another. This dichotomy of shared micro-mobility as a compliment and a competitor to public transit is found in past research (Aarhaug et al., 2023; Bieliński et al., 2021; Kong et al., 2020; Wang et al., 2023). In the suburban context, where bus service is less frequent and can have gaps in coverage, sometimes success in the shared micro-mobility programs may come at the cost of declined ridership in public transit, at least for short trips.

Those who have used shared micro-mobility vehicles highlighted that the availability of vehicles can be inconsistent and unreliable. The uncertainty related to finding a dockless vehicle led some participants to discuss the need for fixed locations or a docked system. However, a recent study by Chen et al. (2020) found that user experience is better at the end of trips for dockless systems because of the user's ability to end their trip at their destination rather than at a dock location. While participants in this study expressed some displeasure at having to walk some distance at the beginning of trips, especially in instances of trips starting from home, under a docked system the need to park the device at a predetermined location will result in the need to walk from the dock to their destination, which is less desirable.

Overall, this study has provided insight into the challenges and barriers impacting the use of shared micro-mobility from the perspectives of users and potential users in suburban municipalities. Municipalities and private operators can apply these insights to their local contexts, with an acknowledgement that all challenges or barriers may not apply to every community. To improve safety, municipalities may consider allowing shared micro-mobility vehicles on selected sidewalks where there is no alternative active transportation infrastructure in the short-term, while investing in a connected network of on-street and of-street cycling and multi-use facilities. Integrating payment systems with public transit would encourage adoption, particularly providing better access to low-income individuals. Lastly, improving parking strategies would make shared micro-mobility more reliable and a viable transportation option for more users.

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