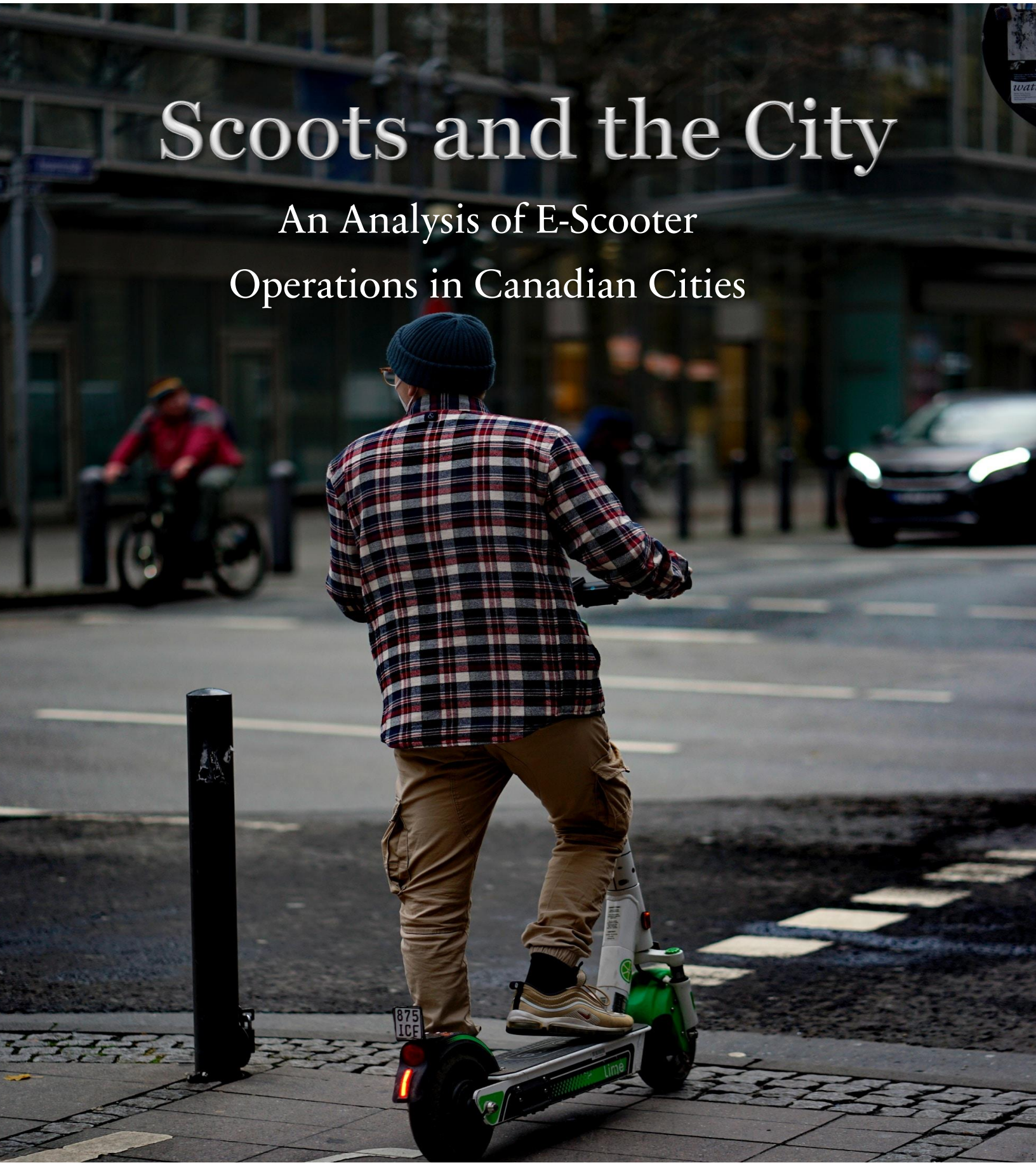
Scoots and the City

An Analysis of E-Scooter Operations in Canadian Cities



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See, my daddy always told me to be just like a duck. Stay smooth on the surface but paddle like hell underneath. – Kris Kristofferson

Executive Summary

Figure 1: Lime E-scooter leaned against the wall. (Alexander Schimmeck on Unsplash)

Shared e-scooters services are entering into our cities at a rapid pace. As the devices are unique compared to our current modes of transportation, cities have been quick to accept them due to their perceived benefits. While the new services do offer solutions to different societal problems such as a dependence on private vehicle, they are also introducing new and unexpected challenges to public space. These new challenges are occurring both when the devices are being used by riders, as well as when they sit idle. To establish a better understanding of these challenges, this research reviewed academic literature, documents, and conducted semi-structured interviews with municipal staff managing their communities' e-scooter file in Canada. The research aims to identify challenges presented e-scooter services and document the strategies used to address these challenges. At the end of the report, six key challenges that municipalities interested in launching an e-sooter pilots need to be aware were identified. As well, eight recommendations were suggested to help new e-scooter pilots be successful.

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Humans are an innovative species. Over time, we have transformed how we move from simply walking to establishing the personal car as our primary mode of transportation. Doing so has allowed our communities to expand far and wide. However, the expansion of cities has led to environmental depletion as land is developed to preserve our current societal standards (Verburg et al., 2013; Verburg et al., 2015). Fortunately, the issues caused by land depletion are becoming better understood as organizations interested in community development state the need to compact development in the future (Canadian Institute of Planners, 2018; Federation of Canadian Municipalities, 2016; Planners Institute of Australia, 2018).

An idea often associated with compact development is to limit car use and push individuals to use alternative modes of transportation. However, the reality for most cities in North America is that the extent and capacity of these alternative modes of transportation do not offset the convenience associated with the personal car. With cities continuing to explore avenues to offset this concern, the introduction of shared e-scooter services or operations to promote compact development has grown in popularity amongst cities (Bozzi & Aguilera, 2021; Hermawan & Le, 2022; Kopplin et al., 2021)

Across the globe, cities have begun to rapidly introduce shared e-scooter services onto public streets to provide alternative (Bozzi & Aguilera, 2021). Although the pace of introducing e-scooters onto public streets has been impressive, it has not been without challenges (Bozzi & Aguilera, 2021; Hermawan & Le, 2022). Many of these criticisms result from the negative consequences associated with introducing e-scooters into public spaces. Knowing the prevalence of e-scooter services in cities, the focus of this research will be to better understand these criticisms and the strategy used to limit their impacts. The objective of this research therefore is to be an additional resource for interested municipalities to read through before launching their own e-scooter operation.

1.1 Document Structure

This capstone project has been broken into 12 chapters. The chapter following the introduction is the *Context* chapter, which provides background information on shared e-scooter services and the status of the operations throughout Canada, including Winnipeg. The background of shared e-scooters, including their perceived benefits and critiques, will be expanded on in the *Literature Review*. The document will then move to the *Research Methods* chapter, which will describe the qualitative research methods and the reasoning they were selected.

Following these introductory chapters, the document will discuss the research findings in three separate chapters. *Document Analysis, Professional Interviews (Public Space Challenges),* and *Professional Interviews (Mitigation Strategies)*. The *Discussion* chapter will then use the findings from the research to identify the key challenges municipalities interested in launching an e-scooter pilot need to be aware of. Eight suggestions are made in the *Recommendations* chapter. These suggestions should help future pilots be successful after being launched.

The *Conclusion* will then add final remarks for the research questions, other potential areas of research, and overall closing thoughts.

Chapter 2 - Context

Figure 4: Seven Voi devices parked on the sidewalk. (Markus Spiske on Unsplash)

2.1 Defining Shared E-Scooter Services

Shared e-scooter services are defined as a form of shared micromobility (Shaheen & Cohen, 2019). However, the term “shared micromobility” is ambiguous and unclear. Therefore, to best understand shared micromobility, an expansion on the two words that make up the term is required.

The term micromobility was first coined in 2017 by Horace Dediu, a mobility analyst, to describe any vehicle that weighed less than 500 kilograms (Dediu, n.d.). The term has evolved since then, with the U.S. Department of Transportation's Federal Highway Administration now defining micromobility as any small, low-speed device used by a single individual that does not exceed 48 kilometres per hour (Price et al., 2021). This definition is an umbrella term for any device that is either human or electric-powered (Price et al., 2021). Using this definition, examples of micromobility include scooters, all three classifications of bicycles (class 1- standard, class 2 – throttle assisted, class 3 – pedal assisted), segways, skateboards, and even hoverboards (Price et al., 2021).

While micromobility defines the physical devices or vehicles, shared services is more so a concept. The simplest definition for shared services is the idea that many devices are dispersed throughout a predetermined area, allowing individuals to rent them at a cost

to complete a trip (Transportation for America, 2019). Car-sharing companies like Evo or Modo are Canada's most recognizable examples of this concept.

The term “shared micromobility” can then be understood as the dispersion of lightweight, single-person vehicles across an area, allowing multiple individuals access to the vehicles to complete short-term trips. While this research will focus exclusively on dockless e-scooters – which do not require a docking station for parking, present-day shared micromobility options also include docked bicycles, dockless bicycles, and moped-style scooters (Shaheen & Cohen, 2019).

2.2 Defining Public Space

Public space can be difficult to define as dozens of understandings and beliefs about the term exists (Arendt, 1958; Lynch, 1960; Carr et al., 1992). For this research, public space will be defined as a space that any individual can access and use without restrictions as long as they follow the rule of law. Examples of this definition are public sidewalks, trails, and roads. Public plazas and open spaces are also considered public space for this report. This definition does not cover semi-private spaces or privately-owned public spaces (POPS). These spaces are typically set aside by developers when constructing a new building in exchange for bonus floor areas or other perks (NYC Planning, n.d.). Potentially the most well-known POPS in Canada are commerce court in Toronto or True North Square in Winnipeg. The decision to eliminate the use of semi-private spaces is due to many of these spaces having vague standards for accessibility and equity which vary for each space (Lee, 2020).

2.3 Status of Shared E-Scooters in Canada

In June 2019, Bird, a private e-scooter company, announced they had chosen Calgary and Edmonton to host their inaugural fleets in Canada (Babych, 2019). Later in the summer of 2019, Montreal became the third Canadian city to introduce e-scooters into their public space (MacFarlane, 2019). Kelowna also launched a fleet of shared e-scooter services in the summer of 2019, but operations were limited to the Okanagan Rail Trail, a pathway connecting the Kelowna airport to the Okanagan waterfront (Chan, 2019). Although the pace of launching shared e-scooter into Canadian public space was rapid in 2019, it has only accelerated in the following years.

In the summer of 2022, 17 municipalities in the country had active pilot projects to allow private operators to launch their e-scooter fleets into the community (MOVMI, 2022; Cowley, 2023). Twelve of these municipalities are in Alberta. The concentration of e-scooter pilot projects in Alberta is attributed to the provincial government taking quick action to amend the province's Traffic Safety Act to include regulations for e-scooters as a vehicle (Babych, 2019). Doing this has allowed communities in Alberta to begin exploring pilot projects well before their counterparts in other provinces.

While the shared e-scooter space has been encouraging, objections and concerns remain for some cities. For example, in February 2020, the city council for Montreal decided to ban shared e-scooters after only one season, citing illegally parked scooters as the reason (Lau, 2020). The first challenge for shared e-scooter services was followed up shortly by the City of Toronto's council. The city council decided to suspend the service before it could launch after further consultation with the local accessibility community and Toronto's Accessibility Advisory Committee (City of Toronto, 2021). Both groups lobbied against the program citing concerns about the safety and impact on the disabled community if e-scooter were being used in the public space (City of Toronto, 2021). Toronto's Accessibility Advisory Committee also argued that e-scooters were a significant cause of injury which took up hospital beds (City of Toronto, 2021). Due to the timing of the potential pilot during the COVID-19 pandemic, all hospital beds needed to be directed towards the health emergency and not e-scooter accidents.

More recently, the City of Vancouver's staffers have decided to delay the bidding process for service operators until the fall of 2023 to allow for further consultation (Chan, 2022). Unfortunately, doing this has pushed back the arrival of the service in Vancouver an additional year (Chan, 2022). The most recent setback occurred in March 2023, as Roll Technologies Inc., an e-scooter operator, informed the municipalities they were serving that their company would no longer be able to continue operations due to a lack of funds (Cowley, 2023). The company operated in multiple cities and had just signed contracts late in the 2022 riding season to bring the devices to Blackfalds and Lacombe, Alberta (Cowley, 2023).

Although e-scooter operators have faced challenges, there is a sense of optimism to build upon the success of 2022. As of January 2023, both the City of Saskatoon and the City of Coquitlam have announced they intend to launch an e-scooter sharing pilot program in the summer of 2023 (Philip, 2022; Chan, 2023). The Region of Waterloo has also been interested in e-scooter operations but has taken a more patient approach by approving the use of personal e-scooters and reviewing the results from that pilot to gauge if shared e-scooters would be successful (Region of Waterloo, n.d.). The results of this pilot appear to be positive, as the Region states on their website a Request for Proposal (RFP) has been issued with the intent to have an e-scooter operator established in time for the 2023 riding season (Region of Waterloo, n.d.). Finally, Brampton, Hamilton, and Oshawa all announced in March 2023 that the e-scooter operator Bird, will begin operations as soon as April 2023 (Wilson, 2023). *Table 1* has a complete breakdown of the status of shared e-scooter services in Canada for the 2023 season.

Table 1: Canadian Cities and their Status of e-scooters.

City Name	Province	Population	Status of Pilot
Airdrie	Alberta	74,100	Ongoing
Blackfalds	Alberta	10,470	Uncertain
Calgary	Alberta	1,306,784	Ongoing
Cochrane	Alberta	32,199	Ongoing
Edmonton	Alberta	1,010,899	Ongoing
Lacombe	Alberta	13,396	Uncertain
Lethbridge	Alberta	98,406	Ongoing
Leduc	Alberta	34,094	Ongoing
Medicine Hat	Alberta	63,271	Ongoing
Okotoks	Alberta	30,405	Ongoing
Red Deer	Alberta	100,844	Ongoing
St. Albert	Alberta	68,232	Ongoing
Coquitlam	British Columbia	132,004	New
Kelowna	British Columbia	144,576	Ongoing
Richmond	British Columbia	209,937	Ongoing
Vancouver	British Columbia	622,248	Uncertain
Vernon	British Columbia	44,519	Ongoing
Brampton	Ontario	656,480	New
Hamilton	Ontario	569,353	New
Oshawa	Ontario	175,383	New
Ottawa	Ontario	1,017,449	Ongoing
Region of Waterloo	Ontario	647,540	New
Toronto	Ontario	2,794,356	Suspended
Windsor	Ontario	229,660	Ongoing
Montreal	Quebec	1,762,946	Suspended
Regina	Saskatchewan	224,996	New
Saskatoon	Saskatchewan	266,141	New

[1] All populations sourced from Statistics Canada Census Data. Region of Waterloo sourced from Region or Waterloo.com

Figure 5: Women riding an E-scooter (Pony on Unsplash)

Chapter 3 – Literature Review

Figure 6: Single Lime e-scooter on sidewalk. (Claudio Shwarz on Unsplash)

3.1 Literature Review Introduction

The purpose of this chapter is to review and discuss the points of contention regarding the conflict between shared e-scooter services and public space found in existing scholarly literature. However, the chapter will first begin discussing the perceived benefits of shared e-scooters. Beginning the chapter with this section will discern why municipalities have introduced the devices onto the public street in the first place. After discussing the contention points between e-scooter services and public space, the literature review will then shift to discuss the potential solutions to these challenges identified in academic literature. The final section of this chapter will then highlight the gaps in the literature regarding shared e-scooters services.

3.2 Perceived Benefits

Dockless e-scooter sharing services were initially launched in 2017 in Santa Monica, California (Dediu, 2019). Since then, approvals from municipalities to allow private companies to operate these services within their boundaries have rapidly increased (Bloom et al., 2021; Bozzi & Aguilera, 2021; Hall, 2017). The rapid expansion of e-scooter-sharing services around the globe calls into question why municipalities have been so enthusiastic about inviting companies to operate within their communities. The

most logical answer to this question is the perceived benefits shared e-scooter services bring to communities.

Like other forms of shared micromobility, shared e-scooter services are considered the next generation of transportation by offering a quick, sustainable method to effectively move around cities (Bozzi & Aguilera, 2021). Similar to the private vehicle and the previous generation, cities are viewing this newest generation of travel as a potential solution to the current issues troubling our modern cities; (1) dependence on private vehicles, (2) the first-last mile problem deterring public transit ridership (Dias et al., 2021; Kopplin et al., 2021; Li et al., 2022; Wang et al., 2022), and (3) decline of downtown cores (Kim & McCarthy, 2023; Volterra Partners, 2022). However, while results for the infancy of this transportation generation are promising, it has yet to be determined how successful shared e-scooter services and other forms of micromobility will have at correcting these modern problems.

3.2.1 The Reliance on the Private Vehicle

Since the mass introduction of private vehicles into society, the planning profession has worked to meet the needs of private vehicles above all other priorities (Baobeid et al., 2021). Unfortunately, a society dependent on private vehicles to meet their daily needs has resulted in cities becoming dominated by cars (Douglas et al., 2011; Gossling, 2020b; Khisty & Ayvalik, 2003). It is a daily occurrence to see roadways clogged with vehicles as individuals move between work and home (Levy et al., 2010). The dependence on private vehicles has now led to several public health concerns due to the quantity of greenhouse gas pollutants produced and the lack of physical activity by many in society (Ding et al., 2014; Douglas et al., 2011; Perry & Gee, 1994). The concerns caused by this societal dependence on private vehicles have cities looking for inventive approaches to get people out of their cars and use alternative forms of transportation. With the desire to get residents out of their vehicles, cities are now embracing shared e-scooter services as a way to provide a transportation alternative perceived to be more environmentally sustainable (Bozzi & Aguilera, 2021).

3.2.2 First-Last Mile Problem

The first-last mile problem is a universal dilemma encountered by almost every transit operator (Grosshuesch, 2020; Mohiuddin, 2021). The first-last mile problem is a complex issue. Although transit operators can provide adequate service along arterial roadways, it often leaves passengers having to first travel from their homes to a transit stop or vice versa. This problem is a substantial deterrent against the desire to increase public transit ridership (Karesdotter et al., 2022).

As a possible solution to this barrier, cities have been eager to introduce shared e-scooter services to their city to increase transit ridership and therefore fare revenue (Mohiuddin, 2021; Shaheen & Cohen, 2019). Although the implementation of e-scooter services to support public transit is still recent, Barnes (2019) and Baek et al. (2021) have indicated positive results for the use of shared e-scooter services as a solution to the first-last mile problem. Moreover, there is anticipation that the positive results early on can be built upon with continued research, design and development to allow shared e-scooters to be the solution transit operators have sought for decades.

3.2.3 Decline of Downtown Core

The downtown cores of cities have been in decline for decades after suburbs, and private vehicles have become foundational aspects of our society (Filion et al., 2004; Kures & Ryan, 2012; Kickert et al., 2020). In response to the decline, policymakers and academics have tried to conceive different treatments that can be applied to the downtown cores to encourage residents to return and stay in these spaces (Robertson, 1997; Faulk, 2006; Smart Growth America, 2015). However, despite revitalization projects ongoing in many cities, the results have been limited (Filion et al., 2004). Moreover, the lack of impact from these revitalization projects has left much of downtown retail and other businesses struggling, with many cases of businesses having to leave the downtown altogether (Gibbs, 2011; Volterra Partners, 2022).

Shared e-scooter services are now emerging as a tool to reverse the trend of hollowed-out downtown cores due to their perceived economic impact on street-level businesses (Neuron, 2022; Volterra Partners, 2022). In a study of the financial implications e-scooters had on local Canadian businesses, Neuron (2022) found that 70% of e-scooter

riders had made a purchase from a local business during one of their recent trips. Neuron (2022) also found that $27 was the average amount spent by e-scooter users per trip. In addition, Kim & McCarthy (2023) found that restaurants were the largest benefactor of the introduction of shared e-scooter services. Still, Kim & McCarthy (2023) argue that this increased income in the service sector did not take away revenue from other downtown businesses. Volterra Partners (2022) confirmed that the service sector was not taking revenue from other downtown businesses by indicating positive retail numbers in their study of shared e-scooters services in Bristol, U.K.

3.3 Disruptions to Public Space – Active E-Scooters

Many municipalities have accepted that these perceived benefits are valid, allowing private operators to launch their shared e-scooter fleets into communities. While the early results since launching e-scooters services have been positive, concerns still exist about the impact the devices have on public spaces when used (Bennett et al., 2021). Cities initially took a laissez-faire attitude toward operating and regulating the services. It soon became apparent that this approach was not viable, leading policymakers to continually revise legislation to construct solutions to the problems as they arose (Bozzi & Aquilera, 2021; Gossling, 2020a; Ma et al., 2021). Along with lagging policy, a lack of infrastructure appropriate for this new transportation mode led to public space being shared in ways never imagined.

3.3.1 Conflicts with Shared Infrastructure

Traditionally, cities built transportation infrastructure with the belief that different modes need to be separated from each other (Gossling, 2020a; Wu et al., 2021). Pedestrians, cyclists, and drivers are expected to stay within their designated infrastructure to limit interaction with the other modes as much as possible. With this long-held belief in transportation planning, introducing shared e-scooters to cities led to a substantial problem: where exactly should this new form of transportation be used?

Developing new infrastructure is often a long process that requires extensive consultation and studies to prove that any new development is necessary and does not negatively impact other aspects of society. Unfortunately, due to the slow speed of infrastructure developments and the rapid adoption of e-scooter services, the

infrastructure needed to support this new transportation mode has fallen behind (Wood et al., 2019). With this lack of infrastructure defined for e-scooters, e-scooter users have had to choose between riding on roads, bike lanes, or sidewalks (City of Portland, 2020; Zuniga-Garcia et al., 2021).

Zhang et al. (2021) found that the type of infrastructure that had the largest impact after introducing e-scooters was bike lanes or multi-use paths due the number of new users. However, when bike lanes or multi-purpose paths are not available to use, Zuniga-Garcia et al. (2021) found in their research that e-scooter users will almost always choose to ride on sidewalks. The decision to ride on sidewalks is due to riders feeling uneasy on roadways and perceiving that collisions with pedestrians are less severe than those with vehicles (Zuniga-Garcia et al., 2021). Ultimately this perception has led to increased hospitalizations due to collisions between e-scooter users and pedestrians (Toofany et al., 2021; Trivedi et al., 2019). Furthermore, even in cases where injuries are avoided, pedestrians stated that the presence of e-scooters on sidewalks has made them feel less safe than before (Bozzi & Aguilera, 2021; Gossling, 2020a).

Like pedestrians on sidewalks, drivers also noted a feeling of nervousness when e-scooter users entered onto the roads (Bozzi & Aguilera, 2021). Even though direct collisions between e-scooters and private vehicles are rare, near-misses are common (Tice, 2019). While direct collisions may be rare, there is a significant potential for near-miss events to transpire into severe collisions. A high level of potentially dangerous situations has heightened as municipalities continue to introduce e-scooters into communities without sufficient policy or infrastructure work completed.

3.3.2 Irresponsible Riding Behavior

Irresponsible riding behaviour can be interpreted in several different ways. This review defines irresponsible riding behaviour as e-scooter users who speed, ride intoxicated, or show a general disregard for regulations, either unintentionally or intentionally (Gossling, 2020a).

An essential component of overall transportation safety is determining the speed at which different transportation modes travel at (Donnell et al., 2009). For any transportation mode, excess speed contributes to collisions occurring at a higher

frequency and severity (Tranter, 2010). With a lack of appropriate infrastructure for e-scooters, there is a concern that speeding riders may increase the number of hospitalizations from e-scooter accidents. Although Zhang et al. (2021) states that users were more likely to ride at slower speeds on sidewalks, an active disruption to pedestrians using this public space is still occurring (Bozzi & Aguilera, 2021; Gossling, 2020a).

Like speeding, operating any vehicle while intoxicated is a severe concern to overall public safety. Unfortunately, many e-scooter users have the perception or attitude that riding an e-scooter while intoxicated is acceptable compared to driving a vehicle (Mehdizadeh et al., 2022). Approximately half of e-scooter injuries that require a hospital visit were sustained while riding under the influence of alcohol or illicit substances (Kobayashi et al., 2019). With such a high number of incidents stemming from intoxicated riding and a user base displaying an attitude that intoxicated riding is acceptable, there exists a significant concern for the disruptions to public space.

While Mehdizadeh et al. (2022) indicates that e-scooter users disregard regulations against operating a vehicle while intoxicated, Glenn et al. (2020) argues that the disregard for regulations may be unintentional. Glenn et al. (2020) & James et al. (2019) suggest that e-scooter users are often uninformed of current regulations due to frequent amendments. Overall, operators and local governments are both at fault for not providing enough information to potential riders to help them adhere to regulations. The lack of information puts the safety of all residents at risk.

3.4 Disruptions to Public Space – Parked E-Scooters

While the disruptions that e-scooters cause when actively used may dominate headlines due to newsworthy collisions, how e-scooters are parked is also a point of contention. Similar to the previous section, the rapid introduction rate of the services without the required policies in place has led to concerns when e-scooters are parked.

3.4.1 Obstructions to Infrastructure

For shared e-scooter services to operate as intended, a significant amount of space is required for vehicle parking throughout an area. Unlike docked micromobility, where users need to navigate to a station to pick up a vehicle, dockless micromobility is "free-

floating," meaning users can start a ride once they have located a scooter and end a ride once they arrive at their destination. While convenient to the user, this aspect of shared e-scooter services leads to conflicts among pedestrians. Without any provided parking infrastructure, e-scooter users will most likely end their trips on sidewalks, out of the way of moving private vehicles and bicycles. This could lead to more misparked e-scooters for pedestrians to navigate. A parked e-scooter could be misparked and disrupting public space if they are, blocking the right-of-way for pedestrians or vehicles, damaging property (ex., greenery), impeding access to fire hydrants/valves or obstructing any other utility located in public spaces (James et al., 2019).

The issue of misparked e-scooters led to a substantial generation of negative commentary (City of Portland, 2020; Gossling, 2020a; Zakhem & Smith-Colin, 2021). However, the research found that disruptions to public space due to e-scooters are minimal, with other forms of transportation often having a higher obstruction rate (Brown, 2021; Brown et al., 2020; James et al., 2019). Therefore, there appears to be a gap in the perceived versus the actual impact of misparked e-scooters. Nonetheless, even if the effect parked e-scooters have on public spaces is minimal, action still needs to be taken to ensure that public space is accessible to all individuals.

3.4.2 Concerns for the Disabled Community

Overall, e-scooters parked in public spaces have a minimal impact on the general public, with only a small percentage of e-scooters causing disruptions (Brown, 2021; Brown et al., 2020; James et al., 2019). Nevertheless, for individuals with impairments or health conditions that make mobility difficult, having an e-scooter block a right-of-way can be a significant burden (Dill & McNeil, 2021). As a result, contesting public spaces by those with disabilities has been an ongoing struggle. The introduction of shared e-scooter services only exacerbated this issue (Bennett et al., 2021).

Bennett et al. (2021) suggests little dialogue occurred between municipalities and the disability community as shared e-scooter services were introduced to public spaces. The result was an unexpected and negative alteration to public space for those with mobility impairments (Bennett et al., 2021; Bozzi & Aguilera, 2021; Gossling, 2020a). As policymakers initially took a laissez-faire attitude towards the regulations, the concern

for individuals with mobility impairments only heightened. The lack of dialogue with the disability community demonstrated that ableist attitudes are still prevalent in policymaking decisions of modern cities, even as many municipalities state their intention to be inclusive (Bennett et al., 2021; Dill & McNeil, 2021). With policymakers taking a hands-off approach when introducing shared e-scooter services to public spaces, many advocacy groups have spoken out against these scooter operations to remove them from public spaces (Accessibility for Ontarians with Disabilities Act Alliance, n.d.; Alliance for Equality of Blind Canadians, n.d.; CNIB Foundation, n.d.).

The lobbying by advocacy groups against e-scooters has been effective and has made many municipalities reconsider e-scooter services' place in the public realm. The City of Toronto made the most notable of these recommendations by outright suspending its e-scooter pilot program before even launching due to concerns raised by these advocacy groups (City of Toronto, 2021). The City of Toronto (2021) report confirms how parked scooters have negatively impacted disabled and impaired individuals' access to public spaces. Due to a lack of logical solutions, they outright banned shared e-scooter services within municipal boundaries. It should be noted that this ban does not include the docked bicycle services that continue to successfully operate in Toronto. The decision by Toronto to ban the services is a stark contrast to the plan many other municipalities have. This action may force policymakers in these municipalities to re-evaluate if shared e-scooter services are necessary if they come at a high cost to disabled community members.

3.4.3 Vandalism

The media often discusses Vandalism as a critical issue for e-scooters that sit idle in public spaces (Caspi & Smart, Gossling, 2020a; Moreau et al., 2020). Fietz (2020) predicted that frustrations by those already opposed to such services have grown due to media-reported stories on e-scooters generally having a negative context. The growing frustrations against e-scooters could embolden individuals to vandalize e-scooters in defiance, leading to even greater disruptions to public space (Fietz, 2020). Vandalized e-scooters could also disrupt public space in ways that do not impede an individual's ability to move. Examples are the environmental issues that could be caused by discarding the e-scooters into waterways (Trapp et al., 2022), putting them in dangerous

positions that could harm unaware individuals passing by, or decreasing the eye appeal of the community with the devices being clustered together (Fietz, 2020).

3.5 Potential Strategies to Limit Issues

The following section will now transition to reviewing strategies discussed in the literature to mitigate the issues identified in the previous sections. Reviewing the strategies identified in the academic literature provides a baseline understanding of how to mitigate the concerns associated with shared e-scooters. Doing this will provide a foundational understanding of potential mitigations strategies necessary for the following chapters.

3.5.1 Active Use strategies

Table 2: Active E-Scooter Mitigation Strategies

Infrastructure Use	Reckless Behaviour
Continue to build out bicycle infrastructure with the understanding it will be shared use (Harasym, 2022)	Implement maximum speed restrictions (NACTO, 2019)
Introduce small municipal fees for every e-scooter ride that is initated to fund the construction of infrastructure (Shaheen & Cohen, 2019). Could also require private operators pay a fee for the number of devices in their fleets (Shaheen & Cohen, 2019)	Introduce slow-speed zones in areas that high potential for cross-modal interactions (NACTO, 2019)
Develop a well defined geofenced area that will make use of desirable infrastructure already in place (Brown, 2021)	Introduce nightime riding bans of shared e-scooters to reduce intoxicated riding (Anderson et al., 2021)
Provide clear guidelines on how public space should be shared amongst transportation modes (Ma et al., 2021)	Develop a large-scale education campaigns for riders and non-riders (Pedestrian and Bicycle Information Center, 2019)

Infrastructure Use

According to Harasym (2022), the best thing cities can do to limit issues between e-scooters and other modes of transportation is to continue building bicycle infrastructure. Harasym (2022) identifies that e-scooters and bicycles have similar travel speeds leading to the understanding that these transportation modes should be paired together. Providing more bicycle infrastructure also avoids the need for e-scooter users to avoid coming off and on sidewalks, spaces where collisions most often occur between e-scooter users and bicycles (Harasym, 2022).

To help cities pay for the construction of new bicycle infrastructure, Shaheen & Cohen (2019) suggest targeting e-scooter operators or users with different fee structures . The type of fee structure could vary between municipalities, but Shaheen & Cohen (2019) have highlighted the example that a small fee could be put on every ride initiated. A fee of this type could be paid for by either the user or the operator. Another fee example municipalities could explore is requiring e-scooter operators pay an amount for the quantity of their fleets.

To ensure e-scooters are being used in spaces that do not put users or other individuals at risk of injury, Browne (2021) suggests geofencing areas. Geofencing is a strategy that will be discussed in-depth in the findings section of this document, but in general, it restricts access to spaces by e-scooter users that cities and operators do not want them to enter. The best example of geofencing was in Kelowna, which restricted e-scooters to one specific trail.

Finally, Ma et al. (2021) found that the best thing cities can do to limit the conflicts between e-scooter users and other transportation modes is to provide straightforward and easy-to-understand guidelines. As James et al. (2019) has suggested, the lack of clear guidelines provided to e-scooter users may be causing concerns with public space sharing. By providing guidelines that can be easily accessed and understood, Ma et al. (2021) feels that conflicts between e-scooter users and other transportation modes can be avoided.

Reckless Behaviour

NACTO (2019) suggested two strategies that can be used to limit the speeds of e-scooter users (both of which will be discussed further). The first mechanism cities can utilize is implementing speed limits that operator devices must adhere to. An e-scooter speed limit would act similarly to vehicle speed limits, but the operators themselves would govern device speeds. Also, slow speed zones can be introduced to reduce further speeds in areas where the risk of collisions with other modes of transportation is high. Potential areas where this strategy could be utilized are walking promenades or high-use pathways.

To curb the concerns of intoxicated riding, Anderson et al. (2021) have suggested that cities ban riding shared e-scooters at night. With Kobayashi et al. (2019) estimating that intoxication contributes to half of all shared e-scooter injuries, Anderson et al. (2021) states that restricting the use of these devices during peak times of intoxication will be critical for reducing the impact caused by intoxicated riding. However, private operators are assumed to oppose these restrictions (Anderson et al., 2021).

Simar to Ma et al. (2021), the Pedestrian and Bicycle Information Center (2019) indicated that the best strategy to mitigate any concerns with irresponsible riding is to have large-scale educational campaigns. Doing this will help clarify to e-scooter users the proper riding etiquette. In addition, educational campaigns can also be used to inform non-users of municipal expectations of users.

3.5.2 Parked Strategies

Table 3: Parked E-Scooter Mitigation Strategies

Obstructions to Infrastructure	Concern for Disability Community	Vandalism
Introduce parking corrals or other parking infrastructure in wasted public space (Transportation for America, 2022)	Limit the number of operators to one or two to ensure a strong working relationship is developed (Brown, 2021)	Ensure operators are able to track the devices in their fleets at all time (Transportation for America, 2022)
Regulate fleet rebalancing to ensure e-scooters are not clustered into only a select number of spaces (NACTO, 2019)	Ensure operators can effectively respon to any complaints recevied from residents (NACTO, 2019)	Regulate that e-scooters need to be locked to physical structures at the end of a ride (Transportation for America, 2022)
Set device caps to limit the number of e-scooters dispersed in the community (Brown, 2021; Shaheen & Cohen, 2019)	Put in place a customer service group that can effectively direct complaints (NACTO, 2019)	
Introduce incentives to encourage proper paking etiquette (Brown, 2021)		

Obstructions to Infrastructure

Installing parking corrals or other transportation infrastructure is the most obvious way to avoid conflicts with how e-scooters are parked (Transportation for America, 2019). Installing parking corrals can provide a tactical use of wasted space in the urban form. While using this infrastructure theoretically makes sense to eliminate misparked e-scooters, many other aspects make up the decision on where users will end their ride. To encourage individuals to use parking infrastructure Brown (2021) suggested the use

of different incentives. Incentives could be in the form of rebates on the current ride parked within parking infrastructure or providing reduced rates for future rides. The assumption would be that cities provide the incentive rebates and not the private operators.

NACTO (2019) has also suggested that cities strongly regulate the number of e-scooters parked in a space simultaneously. If too many devices are within a space, operators will be expected to retrieve a number of the e-scooters and move them to less populated spaces. The concern with having too many e-scooters in one area is that eventually, every safe place to park an e-scooter will be occupied, and any additional e-scooter parked in that area will obstruct infrastructure.

Both Brown (2021) and Shaheen & Cohen (2019) suggest the idea of cities having device caps. Introducing device caps ensures private operators can not flood communities with an excessive number of e-scooters. A correlation is suggested that any increase in the number of devices will inevitably lead to increases in misparked devices.

Concerns for Disabled Community

The strategies in this section all work together to ensure that e-scooters operations pose a minimal concern for the disabled community. Cities must first consider only allowing one or two operators to launch fleets in their community (Brown, 2021). This allows staff in the city to form a stronger working relationship with the private operator. A stronger working relationship allows each party to understand what is needed from the other ensuring a better service can be delivered to the public. As part of the effort to keep individuals with mobility concerns safe, NACTO (2019) suggested that cities ensure operators can quickly mobilize to remove a misparked e-scooter blocking an individual route. A possible opportunity to complete this is to establish a customer service group that can field calls and direct them to personnel responsible for removing misparked e-scooters (NACTO, 2019).

Vandalism

Transportation for America (2019) has also suggested several strategies to restrict the concern of vandalized e-scooters. Cites can first ensure operators have GPS tracking devices installed onto entire fleets. Installing GPS trackers allows e-scooters to be tracked and retrieved by operators if they are removed from the geofenced area. A stricter approach to vandalism reduction is to provide locking mechanisms for each e-scooter (Transportation for America, 2019). The expectation would be that the e-scooters would be locked to a permanent structure each time a ride was completed (Transportation for America, 2019).

3.6 Literature Gaps

An extensive collection of literature has been compiled in the five years since the introduction of shared e-scooters into public space in 2017 and the time of completing this literature review in 2022. Much of the research seeks to understand the impact e-scooter have had on other modes of transportation since their introduction (Baek et al., 2021; Dias et al., 2021; Mohiuddin, 2021) or the environmental effects (de Bortoli, 2021; Hollingsworth et al., 2019). While this is important to guide future policymaking decisions, there are several gaps in the literature.

The first identified gap in the literature is the need for more comparison between jurisdictions. The majority of literature on shared e-scooter services had a small scope, generally only focusing on one municipality. Different variables make each municipality unique, so transferring findings from a specific study to another location can be challenging. As e-scooters continue to become prevalent in urban centres, researchers must broaden their scope to include more focus areas.

The second gap is the need for more research specific to the Canadian context on the topic, as much of the research was completed using American or European sources. The need for this research will only grow as more Canadian municipalities continue to launch shared e-scooter pilots.

3.7 Literature Review Conclusion

This literature review shows the academic perspective on shared e-scooter services, their perceived benefits, the disruptions to public space they cause, and the corrective actions to reduce these disruptions. The literature provided three strong cases on why policymakers initially considered integrating shared e-scooters into cities. Although these services were introduced to provide communities with the perceived benefits associated of the operations, concerns have persisted about the negative impacts caused by the e-scooters, both when being actively used and parked. While scholars have provided different solutions to these concerns, the effectiveness of these solutions is unclear and unverified.

After completing this literature review, two critical gaps in the literature were identified. Firstly, there is an absence of research on any element regarding shared e-scooters that expanded across multiple cities. As well, much of the research on shared e-scooters was completed in America or Europe. While the literature review was completed using these resources, the qualitative research for this capstone project fills both gaps. The following chapters will discuss the methods used to collect information from multiple Canadian municipalities piloting shared e-scooters programs.

Chapter 4 – Research Methods

Figure 7: Woman riding an e-scooter. (Pony on Unplash)

4.1 Research Questions

After considering the status of shared e-scooters in Canada and available literature on the topic, the following research questions were selected:

1. What challenges to public space have municipalities encountered after introducing shared e-scooter services to their communities?
2. What strategies have municipalities used to remedy these challenges?
3. How can the results of the previous two questions be applied to municipalities interested in launching their shared e-scooter pilot projects?

4.2 Selected Research Methods

To help answer these research questions, a review of academic literature written to help researchers select the appropriate qualitative research methods for their study was conducted (Crabtree & Miller, 2022; Creswell et al., 2007; Northcote, 2012; Teherani et al., 2015). Conducting this review allowed for this study to be better informed of possible qualitative research methods. As this research focuses on wanting to discover background knowledge, Creswell et al. (2007) recommends using interviews and documents for the research methods. This determination was backed by Crabtree & Miller (2022) that suggested these two methods would allow the best possibility of

finding answers for the type of research questions posed. Due to time constraints, no quantitative research methods were utilized for this study.

The next step after selecting the two research methods of document analysis and interviews would be to determine what documents needed to be analyzed and what group should be interviewed. For this research, the document analysis reviewed publicly available engagement reports or "What we Heard Reports" from several communities piloting the shared e-scooters. The public engagement reports provided the results of surveys conducted by the municipalities on their shared e-scooter pilots. Several of the reports analyzed included commentary by city staff on what the survey results meant. In addition, to best understand the issues associated with shared e-scooters and strategies to mitigate concerns, interviews with professionals managing their municipality's shared e-scooter program were conducted.

4.2.1 Document Analysis

A document analysis was selected as a research method to understand the general trends found amongst Canadian municipalities that have already implemented shared e-scooter services. The document analysis aimed to understand how residents living in the municipalities currently piloting the services feel about them. In addition, the analysis focused on identifying the points of contention between e-scooters and the public space to establish general trends that carry over between communities. Identifying the trends already found in communities conducting these pilots will advise interested municipalities on where to expect opposition if steps are taken to launch similar pilots. By being aware of these trends, cities can better prepare to avoid the same potential oversights other communities may have had.

Communities Selected

In the early stages of the research for this capstone project, it was envisioned that there would be a comparison between reports published by Canadian and American municipalities with shared e-scooter pilots. Using the New Urban Mobility Alliance's Global Atlas a scan of over 100 communities in the U.S was completed in search of reports that could be used as part of this analysis. However, the search led to limited results, as only a handful of municipalities had published reports similar to those

published by Canadian cities. With a lack of comparable reports, the decision was made to focus the document analysis exclusively on reports released by Canadian municipalities.

Although 17 Canadian municipalities have begun piloting shared e-scooter services in their community as of the summer of 2022, only six have publicly released the reports generated from survey results, according to a search of online records. The six communities are Kelowna, Edmonton, Red Deer, Calgary, Okotoks, and Ottawa. Therefore, for the best results, all six community reports were analyzed.

4.2.2 Professional Interviews

While the document analysis was chosen as a method to identify the general sentiment of shared e-scooter pilots in communities, the documents lack specific details on challenges that the community has encountered as part of their pilot. There is also little discussion on the strategies policymakers have used to try and mitigate these challenges. To ascertain a more nuanced understanding of municipalities' challenges and mitigation strategies used in response, semi-structured interviews with professionals managing these pilots were selected as the second methodology. The interviews provided a deeper understanding of each municipality's unique challenges as part of their pilot programs and how they decided to remedy them.

Selection Criteria

The selection criteria used to determine a participant's eligibility was limited. The first criterion that participants had to meet was that they must be employed by a municipality piloting a shared e-scooter service either currently or in the past. To ensure every eligible municipality with a shared e-scooter pilot had an opportunity to be represented in this research, no limitations were put on the role or position of potential interviewees. The second aspect of the selection criteria was a consent form outlining the terms of the interview that had to be read, signed, and returned before the interview could take place. As part of this ethics approval, the names of the professionals and the municipalities they represented would not be named in the document. Instead, the professionals and municipalities were issued coded numbers in place of names.

The search for potential interview participants began on November 19, 2022. The initial recruitment emails were sent to a general or individual-specific email found on a municipality's webpage for all the municipalities currently hosting a pilot for shared e-scooter. The initial email had two respondents who accepted the invitation, with the interviews with these professionals taking place over the following months.

Phone calls were then made to the general municipal phone numbers of 14 communities looking to speak to anyone involved in their community's shared e-scooter pilot. Of the 14 communities that phone calls were made to, a connection was made with six professionals managing their community's e-scooter pilot. All six professionals initially agreed to be interviewed; however, one professional withdrew from the research before the interview was conducted. Altogether seven interviews were completed as part of this research method.

Professionals Interviewed

The interviews for the seven professionals that accepted the invitation and agreed to the terms of the interview were completed between December 2022 and January 2023. The average length of an interview was 40 minutes, with the longest interview spanning 62 minutes and the shortest conducted in 26 minutes. *Table 4* outlines the roles of the interviewees in their municipality and the coded numbers assigned to each professional and their municipality. *Table 5* shows the general size of municipalities represented in the interviews.

4.3 Research Limitations

The first limitation is the number of reports included in the document analysis. Ideally, this research method would have analyzed more reports to provide a stronger correlation between documents. However, this was not possible, with only a few Canadian municipalities publishing public engagement reports.

Secondly, no interviews were conducted with professionals involved with the suspended shared e-scooter programs in Toronto and Montreal. Interviewing a professional from one of these cities would have elevated and enriched the results by sharing how their city felt shared e-scooters were challenging public spaces. In addition, there was no

communication with individuals working for these private companies. Including the thoughts from the service operators would have enriched the collected data further.

Table 4: Coded Numbers and Participant Roles

Coded Number for Participant and Represented Municipality	Title or Role of Participant
1	Transportation Planner
2	Active Transportation Coordinator
3	Business Licensing Officer
4	Transportation Engineer
5	Business Licensing Officer
6	Transit Specalist
7	Mobility Initatives Lead

Table 5: Size of Represented Municipality

Coded Municipality Number	Municipal Size Category
1	Medium
2	Small
3	Medium
4	Medium
5	Medium
6	Small
7	Large

Legend

Small	**Medium**	**Large**
0-100,000 Residents	100,000-500,000 Residents	500,000+ Residents

Chapter 5 – Document Analysis

Figure 8: Clustering of Neuron E-scooters. (Nik on Unsplash)

This chapter will present the findings found in the document analysis. To do this the chapter has been broken into three sections. The first section will compare the types of questions asked in the surveys by categorizing them into ten separate themes. Comparing the questions asked in each individual survey will visualize the type of information municipalities wanted to gather from residents regarding their shared e-scooter pilots. The second section will interpret the data to find common trends for public space considerations amongst the municipalities. The final section will discuss three unique questions asked in two surveys that consider different aspect of public space disruption not discussed in any of the other surveys.

5.1 Report Question Comparison

As part of the document analysis, a comparison of questions asked in each community survey was completed as seen in table 5. As each municipality worded their questions differently, a general statement is used to encompass a theme of questions asked by the surveys. Cities with green checkmarks in the boxes below indicate that a city had

asked that theme of question in their surveys, while the red x-crosshair indicates that a certain question type was not asked.

Completing this table helped highlight the type of information municipal staff wanted to gather on the residents' feelings toward their shared e-scooter pilots. For example, most cities wanted general information like the number of times a respondent may have ridden an e-scooter, the reason for using an e-scooter, and if an e-scooter can be located when needed. However, Edmonton appeared to use the survey as an educational tool as questions focused on how well residents knew where e-scooter could be ridden or parked and if they knew where to locate information on the pilot if needed. *Table 6* provides a full list of the types of questions asked.

Table 6: Type of Question Asked in Each Survey

Question Wanted to Know...	Edmonton	Red Deer	Calgary	Okotoks	Kelowna	Ottawa
How many times respondant had ridden an e-scooter	✓	✓	✓	✓	X	✓
The reasons why a respondant may have not used an e-scooter	✓	X	✓	X	X	✓
How the respondant felt about the number of e-scooter currently disperesed	✓	✓	✓	X	✓	X
If the respondant ever had difficulties finding an e-scooter	X	✓	✓	✓	X	✓
If the respondant had witnessed an issue with an e-scooter, while being used or when parked	✓	✓	✓	✓	✓	✓
What could be done to enourage the respondant to use e-scooter more	X	X	X	✓	X	✓
If the introduction of e-scooters had any change in travel behaviour for the respondant	X	✓	✓	✓	X	✓
The primary infastructure respondants who had ridden e-scooter used	✓	✓	✓	✓	X	X
If the respondant felt there was any benefits with introducing e-scooter into the community	✓	✓	✓	✓	✓	✓
If the respondant knew where to find information on the e-scooter programs	✓	X	X	X	X	✓

5.2 General Identified Trends

5.2.1 Strongly Opposed Individuals

The first trend is that some individuals strongly oppose their city piloting shared e-scooter services. The trend was found by reviewing the answers to various questions from the Kelowna, Calgary, Edmonton, and Red Deer reports.

The first report that was reviewed was the Kelowna report which suggested this trend. Although the report does not state the percentage of the population that supports or opposes their shared e-scooter pilot, it does provide these two groups with an ideal number of e-scooters for the community. For those opposed to Kelowna's shared e-scooter pilot, 60% of respondents wanted the e-scooters removed altogether from the public spaces altogether, while another 28% felt there should be significantly fewer devices available. The Calgary and Red Deer reports affirmed this sentiment against the shared e-scooter pilots. Calgary, in particular, had a large subset of survey respondents opposed to e-scooters, as 17% wanted them removed entirely, with another 10% feeling there should be significantly fewer devices in public spaces.

Kelowna also found in their public engagement that 86% of respondents who had tried riding an e-scooter at least once supported the pilot. However, only 30% of those who had not ridden an e-scooter were in favour of the pilot. Edmonton also found this stark difference between riders and non-riders when they asked respondents whether they agreed with several posed statements. For example, 94% of e-scooter riders felt that shared e-scooters services were an enjoyable asset for the community. In comparison, only 43% of non-riders agreed with the statement. This trend indicates that a subset of the population strongly opposes e-scooter pilots in every community.

However, there was one outlier found against this trend. In the Okotoks survey, 96% of respondents were in favour of continuing the e-scooter pilot for next riding season at the time of the engagement was completed. This data point was unexpected after reviewing the responses in the Kelowna, Calgary, Edmonton, and Red Deer reports. The data from this survey may indicate that shared e-scooter pilots may have stronger reception in smaller communities than previously anticipated.

5.2.2 Misparked E-Scooters

The second trend concluded from the document analysis is that parked e-scooters are one of the strongest criticisms against shared e-scooter pilots. This conclusion was derived by reviewing the reports from Calgary, Edmonton, Red Deer, and Kelowna. Ottawa also appeared to ask respondents about their concerns about parking, but the results to the question were hidden in the "What we Heard Report."

The community where parking had the most significant criticism was Red Deer, as 57% of respondents selecting this issue when asked what they felt the pilot's most significant concern was. This issue was the most critical concern for the community as the second most preferred option, 'Other,' was only chosen by 31% of respondents. No other option was selected by more than 25% of respondents, showing that misparked e-scooters were the central issue of Red Deer's pilot.

Parking was also a significant concern in Kelowna, as 60% of respondents selected it as an option. However, it is unclear how to rank the percentage from Kelowna, as respondents could choose several concerns from a list, compared to Red Deer's survey, which only gave respondents the option to select one choice. Nonetheless, with 60% of respondents indicating this as an issue, parking is still a substantial concern for many of Kelowna's respondents.

However the responses from Kelowna and Red Deer's reports are somewhat outliers but overall still demonstrate a significant issue for e-scooter pilots. For Calgary, only 17% of respondents indicated parking as their top concern for the e-scooter pilot. However, this response rate placed the issue of parking third amongst other potential concerns, behind "Breaking the law – riders do not follow the rules" (which could also include rules broken for parked e-scooters) and "People on shared e-scooters do not share the sidewalk or pathway fairly with other people." Yet parking was only two percentage points behind the two other options, exhibiting that mismarked e-scooters are still a significant concern for Calgary’s pilot, albeit to a lesser degree than the pilots in Kelowna and Red Deer.

While Edmonton did not have a question asking about what respondents felt was the biggest concern for these pilots, it did ask individuals if they had experienced any a list

of five scenarios for potentially misparked e-scooters. The five scenarios given were "e-scooters blocking a travel path," "e-scooters were not parked in an upright position," "too many e-scooters in one location," and "e-scooters were parked in a way that blocked emergency door access," and "e-scooter parked in space designated for a vehicle." All five of these scenarios had a response rate of over 60% when asked if they had experienced these issues at least once. However, the most glaring problem was that 28% of respondents indicated that e-scooter blocked their travel path “very often”. Another 27% found that e-scooters were often not parked upright. These data points demonstrate that interested municipalities need to prepare strategies to manage issues of misparked e-scooters.

5.3 Unique Questions Asked for One Municipality

Although many of the questions asked by municipalities in the public engagement surveys can be grouped into ten main themes, an additional three questions were asked that stood out regarding the scope of this research. The first question was asked as part of Calgary’s public engagement survey, while the other two were asked in the Red Deer survey. Including these questions in the document was important as they provided more substantial insight into potential concerns regarding shared public space.

5.3.1 Calgary’s Question on Maintenance Issues

Calgary's community engagement survey asked respondents if an e-scooter they had ridden at some point had any maintenance issues. According to the Calgary survey, potential maintenance issues included issues with the brakes, lights, or if the e-scooter was not in good working condition. Using this criterion, an alarming 40% of respondents indicated they had experienced a maintenance issue when riding an e-scooter included in the pilot. Having this many respondents feel that the e-scooters they are riding have maintenance issues poses a significant safety issue for riders and those within the vicinity of riders.

5.3.2 Red Deer’s Question on Speed

Red Deer's engagement survey asked respondents about the permitted speed set for the shared e-scooter program. The approach taken by Red Deer is interesting, as this is the only municipality that looked to seek feedback from their residents on changing the

set speeds. The other municipalities instead opted for a more top-down approach regarding this aspect with the municipal staff setting the appropriate speeds. 63% of the respondents felt that the permitted speed was reasonable. However, the choice with the second highest selection is the permitted speed is "too slow." This data point goes against the first trend of the document analysis that highlights a vocal section of the population being opposed to anything e-scooter related. Only 4% of respondents felt that the permitted speed for e-scooter was "too fast".

5.3.3 Red Deer's Question About Inappropriate Activities

Red Deer's survey also asked respondents to identify their actions when riding an e-scooter. The options given for this question are all actions that are considered to demonstrate improper riding etiquette. These activities include double riding, riding without a helmet, allowing minors to ride, riding while intoxicated, and riding on major roadways. With 83%, the choice with the most selections was riding without a helmet. This answer is expected and is discussed further in section 6.4.2. The second highest selection was allowing minors to ride an e-scooter at 25%, followed by double riding at 16%. Less than 10% of respondents answered that they had ridden an e-scooter while intoxicated or on major roadways, with only 8% and 5% response rates. The inclusion of this question in the survey is interesting as no other reviewed document asked respondents to indicate if they had ridden an e-scooter improperly. Nonetheless, this survey question does highlight the areas where Red Deer staff need to increase the amount of effort and resources to change improper riding behaviour.

Figure 9: Single Bird E-scooter Parked Near Plants.
(Chandra Oh on Unsplash)

Chapter 6 – Professional Interviews, Public Space Challenges

Figure 10: Two E-scooter Knocked Over. (Ernest Ojeh on Unsplash)

6.1 Infrastructure Use

6.1.1 Riding Infrastructure

One of the first questions municipalities must ask themselves before launching a shared e-scooter program is the type of infrastructure e-scooters should be ridden on. The professional interviews demonstrated that there is no consensus on this question. Instead, each municipality interviewed opted for a different approach, including using sidewalks, pathways, roadways, bike lanes, or a combination of two or more.

Five of the seven participants felt that e-scooters should be used in bike lanes. Participant 7 went as far as to say that the bicycle infrastructure in their community was a significant reason why e-scooters had been so successful in their city. They described this by comparing two parallel streets, one with installed bike lanes and the other lacking similar infrastructure. The professional's data showed that ridership was significantly higher on the street with a bike lane. Participant 3 reiterated this data by stating that e-scooter users felt safer using this type of infrastructure and therefore was often used by riders. However, participant 5 did warn that conflicts between e-scooter users and cyclists could grow if municipalities did not put the necessary resources into expanding cycling infrastructure.

Allowing e-scooters on shared pathways was also considered a suitable riding infrastructure for five of the seven participants. Participant 3 also felt that their community's extensive pathways contributed to the success of e-scooters in their communities. The professionals worked with the assumption that e-scooters should be allowed to be used on shared pathways if bikes were already permitted. The issue of speed was a challenge to this assumption (see section 6.1.2). Yet, participant 1 found that disputes between e-scooter users and pedestrians occurred at a rate higher than expected on their primary pathways than conflicts between cyclists and pedestrians.

The professionals interviewed disagreed that e-scooters should be ridden on sidewalks. As participant 5's community viewed e-scooters as pedestrians, it made sense that their e-scooters be relegated to sidewalks. Sidewalk riding is permitted in four of the municipalities represented; however, using a bike lane or pathway was preferred if available. Though this agreement for e-scooters on sidewalks ended here, as municipality 1 and municipality 6 rejected the notion that e-scooters be ridden on sidewalks. Municipality 1 began their program with e-scooters banned from sidewalks due to the community categorizing e-scooters as bicycles, which also are forbidden from sidewalk riding

The final infrastructure type is roadways. While five of the seven communities agreed there should be a limit on the type of roads e-scooter are used on, municipalities 1 and 2 disagreed. Instead, e-scooters in these communities are approved to be used on all roadways regardless of the speed of the road within the service area. In comparison, some communities have encouraged e-scooters be used on roads within neighbourhoods. These communities did not report conflicts between vehicles and e-scooter users when used on these roads.

6.1.2 Speed of the E-Scooters

Every participant identified the travel speed of e-scooters as an issue. What was most difficult for policymakers is selecting a speed that ensured e-scooters could realistically be used to move throughout the community but would also not increase the likelihood of a collision occurring.

A major determinant for the speed e-scooters should travel at is the type of infrastructure being ridden on. For example, participants 3 and 5 stated that their community had conflicts between pedestrians and e-scooters on multi-use pathways as the vehicles were travelling too fast for this infrastructure type. While the average travel speed was too fast for pedestrian-shared infrastructure, it made sense for the e-scooter to travel at that speed on neighbourhood roads or bike lanes. Participants 1 and 7 also highlighted their concern about e-scooters travelling at inappropriate speeds in areas with significant pedestrian traffic.

Participant 3 and participant 6 also brought up an additional issue of speed due to privately owned e-scooters. Although private e-scooters are illegal to use on public infrastructure in these communities, it has not deterred a handful of individuals from purchasing these vehicles to use on public infrastructure. Privately owned e-scooters can travel much faster than the e-scooters used in the pilots. At a distance, these vehicles look similar to those in the shared e-scooter program, leading community residents to call the municipality to complain about the speeds the private e-scooters are travelling at. The personal e-scooter issue has caused a dilemma for the professionals as they now have to explain to residents that these vehicles are not a part of the shared e-scooter pilot. The professionals also explained that unless law enforcement catches an individual riding a personal e-scooter, little can be done to address the problem. Without being able to regulate these e-scooters, municipalities are unable to correct this issue.

6.1.3 Use of Infrastructure During Winter Months

E-scooters, like other forms of wheeled transportation, cannot operate effectively when snow and ice accumulate on riding infrastructure during the winter months. Riding an e-scooter when the infrastructure conditions are poor is a significant risk to the riders and nearby pedestrians. With snowfall inevitable for much of Canada, all seven participants mentioned their municipality’s approach regarding e-scooters in the winter. The interviews defined two approaches to this concern.

The first is that municipalities set hard deadlines for operators when the e-scooters must be removed from the public realm. This deadline is typically around when a municipality

can expect its first snowfall, with a return date not given until the spring thaw. Six of the professionals stated that their community utilized this approach during the winter months. However, with winter weather in Canada varied, the riding season can be different for each community.

Municipality 7 instead decided to approach winter e-scooter usage in another manner. The city now requires service providers to remove the vehicle from the public realm after a snowfall to provide space for equipment to clear the riding infrastructure. Operators can then return the e-scooters to the public realm once the infrastructure has been cleared. Until the summer season, the removal and subsequent return of e-scooters to public space is undertaken until the devices can be permanently released without concern about winter weather in late spring. Municipality 7 began their pilot using the first approach, but the city amended the pilot after a councillor wanted to increase transportation options for winter months. For a city to take this approach, proper equipment and resources are needed to ensure infrastructure can be cleared effectively.

It is worth noting that municipality 4 was also interested in taking this winter e-scooter approach. However, the operator in their community was not interested in continuing service in the winter due to economic reasons. Municipality 6 suggested they would be interested in e-scooter in public spaces during the winter, but a lack of municipal resources was cited as the reason this was not attainable.

6.2 Irresponsible Behaviour

6.2.1 General Mischief

This subsection will discuss the more minor issues identified by municipalities that do not warrant dedicated subsections. These issues include riding in buildings, double riding, and riding under the set mandatory age limit.

Three participants mentioned the issue of e-scooters entering buildings. An e-scooter user in municipality 3 had entered a mall, while another user in municipality 4 entered into a recreation centre. In municipality some users took the e-scooters to the top of parkade structures before joyriding the devices to the bottom. These isolated incidents

only occurred at the beginning of each municipality's e-scooter program as the cities have now established “no-go zones” to restrict access to these spaces.

Double-riding was mentioned in two of the seven interviews, but the issue is assumed to be prevalent in every community represented. Double-riding is understood as the issue of having two riders on one e-scooter. For riders that double-ride, there is a significant potential for serious injury to occur to both the riders and individuals around the e-scooters. With injury risks significantly higher when e-scooters are used in this manner, municipalities have been determined to stop this behaviour from continuing.

The final issue within the scope of general mischief is when riders are younger than the set age limit for riding the devices, which is typically 18 years old. Without verification, individuals younger than 18 can use e-scooters if they can access a smartphone and credit card. The concern of riders under the legal riding age was identified in three of the seven interviews, but it is also presumed to be a universal issue. The concern is that some youths are not physically developed enough to operate an e-scooter. Increasing the number of individuals who cannot correctly operate an e-scooter increases the risk of injury or property damage.

6.2.2 Intoxicated Riding

Intoxicated riding was identified as an issue in five of the seven interviews. This result represents the societal acceptance of operating an e-scooter while intoxicated. However, while many professionals acknowledged intoxicated riding as an issue, the level of concern was mixed. For the communities that participants 1 and 4 represented, intoxicated riding emerged as a primary issue in the community that required immediate action to curb the impact on public space. The law enforcement authority in municipality 4 went as far to threaten the city and the private operators about their desire to lock the e-scooters each night at 10 p.m. Each of these communities have since implemented approaches to address this issue that will be discussed in section 7.4**.**

The emergence of intoxicated riding as an issue in these communities where immediate action was limited to municipality 1 and 4. While three other communities did acknowledge that intoxicated riding was an issue, so far, no steps have been taken to diminish the impact intoxicated riding has on public space in the other communities. It is

unclear why intoxicated riding materialized as a significant issue in municipality 1 and 4, but less so in other communities.

An important note for this section is provincial working groups are currently being formed to discuss the issue of intoxicated e-scooter riding. Some in these groups believe that while not ideal, an intoxicated e-scooter rider is preferred over someone in the same state operating a vehicle. This understanding comes down to minimizing worst-case scenarios. For others, this is a non-discussion as they view e-scooters as vehicles that should not be operated while intoxicated. The results from these working groups have yet to be released. Still, it is essential to understand there is a diversified understanding on this issue as well as the appropriate level of response required.

6.2.3 Vandalism

Vandalism has also become an identified issue for some e-scooter pilots. Three of the seven interviews stated that e-scooter operators have had to repeatedly fish the devices out of the bodies of water running through the represented communities due to individuals throwing them in. Abandoning e-scooters in waterways is a nuisance to the community and poses a safety concern if the devices are launched from a height above to somewhere below. There are also environmental concerns about abandoning e-scooters in waterways. Trapp et al. (2022) found that leeched metals were detected in water after submerging an e-scooter battery. Participant 3 suggested a strong correlation between the number of e-scooters and the number of vandalism incidents.

6.3 Parking

6.3.1 Blocked Infrastructure

Three of the seven Participants stated that there had been reports of e-scooters blocking infrastructure in their communities. The participants mentioned sidewalks, roadways, and pathways as infrastructure types that had reports of e-scooters blocking travel paths. It is interesting to note that no participants mentioned these similar blockages occurring in bicycle infrastructure. In addition, the participants did not highlight any issues with e-scooters blocking the entrances of buildings. Overall, it was perceived in the interviews that blocked infrastructure by e-scooter was a minor concern for municipal pilots.

6.3.2 E-Scooter Stock

The interviews with the professionals also addressed the concern about the quantity of e-scooter stock, which contributed to increased parking issues. This issue was identified by four participants, whom all felt that when their municipality launched the e-scooter pilots, there was an excessive number of devices introduced into the community. All the professionals highlighted that public space went from having zero e-scooters to hundreds within days or weeks causing significant concerns. The professionals reiterated that staff were unsure of the ideal number of e-scooter for communities, leading policymakers, and operators to overcompensate. As a result, communities became oversaturated with e-scooters. This issue worked in conjunction with residents not understanding the new technology leading to many parking issues. Participant 5 also identified the issue of e-scooter clustering, which also is a result of an oversaturated community.

An increased quantity of e-scooters can also occur by allowing multiple operators to service a community. Unlike other municipalities that might have come to agreements with one to three private operators, municipality 3 used a business model that did not restrict the number of operator fleets in community. Operators only had to meet limited criteria and pay an application fee to launch e-scooters into public spaces. The result was six operators launching their e-scooter fleets into municipality 3's public space leading to the community being significantly oversaturated with devices. Instead of relying on government regulation, the city allowed the market to dictate the appropriate number of e-scooters and operators needed. Within only a couple of riding seasons, only two fleets are operating within municipality 3.

6.3.3 Charged E-Scooters

In the first year of municipality 6's shared e-scooter pilot, they encountered the issue of the private operator not having an effective charging strategy. As e-scooters can only be unlocked when their battery charge is above a certain threshold, the provider's lack of charging strategy led to residents often being unable to find an e-scooter with enough battery power to use. The lack of charging strategy by the operator often left unpowered devices scattered throughout the community for days at a time. A significant portion of

an operator's fleet without sufficient power could cause concern as devices would essentially be left in unideal spaces without being retrieved by another rider.

6.4 Health & Safety

6.4.1 Injuries

Four interviews raised the issue of users sustaining injuries when riding an e-scooter. However, the concern of this issue by the communities varied. The city with the most substantial outcry about injuries was municipality 1. Although the interview did not cover specific numbers on injuries, the professional highlighted the concern raised by dominant voices within the community against the e-scooter pilot. With strong community voices opposed to the pilot, local media began publishing articles opposed to having the e-scooters in the community. The local media's stance led to the pilot being a polarizing topic within the municipality 1. The city council inevitably took a much harsher stance against the pilot compared to other cities by drastically tightening regulations for the devices. Participant 1 saw this as a severe overreaction as the regulations are now being rolled back due to the community softer stance towards the devices. However, the experience relayed by participant 1 was unique as the other communities reported less severe results. Municipality 7, for example, knew that injuries were happening and even partnered with the provincial health authority to study the issue. The study reported that injuries were often minor and did not require hospital visits.

The interviews with participants 1 and 6 further diminished the concern about injuries as neither participant could not recall any significant injuries sustained while riding. Nonetheless, any interested municipality must consider that their residents could be at risk of sustaining a severe injury anytime they initiate an e-scooter ride.

6.4.2 Helmets

While wearing a helmet when cycling is now societally accepted, the same level of acceptance has not extended for e-scooter usage. The interviews with participants 2, 3, and 5 indicated this was the case in their community. The lack of individuals wearing helmets has occurred even as each city has by-laws in place requiring a helmet be worn when riding an e-scooter. Although there is a universal issue of riders not wearing

helmets, participant 2 hopes that the matter will have the same trajectory as the skiing and snowboarding industry did over time, as it is now uncommon to see someone on the mountain without a helmet.

6.5 By-law Enforcement

It was concluded that there is a range of how e-scooter by-laws are enforced. On one end of this spectrum is the relationship that municipality 7 had with their local law enforcement. City staff at municipality 7 work closely with law enforcement who are willing to conduct "by-law blitzes" when asked by policymakers. These blitzes help inform and educate individuals who may be improperly riding an e-scooter or issue a ticket when the offence is egregious.

On the other end of the spectrum is the relationship municipality 3 has with their local law enforcement. In this situation, law enforcement has been reluctant to enforce by-laws pertaining to e-scooter as they feel there is a lack of clarity in how the by-laws are worded. The friction between the city and law enforcement only increased as amendments were added to the by-laws to cover different circumstances that arose with the pilots. While this issue has been corrected, any disconnect between policy writing and policy enforcement as significant as the one seen in participant 3's community could be detrimental to the current or future success of a pilot.

While the findings from speaking to participant 7 and participant 3 are the extremes for this topic, participants 4,5 and 6 have all had varying experiences with how shared e-scooter by-laws are enforced. In the case of municipalities 4 and 6, law enforcement had a clear understanding of the municipal by-laws and how they should be enforced However, due to a lack of department resources, they have been unable to act against improper e-scooter riding. Participant 4 went as far as to say that it is often not worth the time for officers to take the time to write the ticket and write a report on it.

The law enforcement in participant 5's community has taken a different approach to by-law enforcement and views infractions made on e-scooters as more of a learning experience. Due to the e-scooter pilot only being launched within the past few years,

participant 5 felt this was an acceptable approach to by-law enforcement for the time. See *Table 7* for a complete summary of the challenges discussed.

Table 7: Summary of Challenges Discussed

Challenges	Municipality 1	Municipality 2	Municipality 3	Municipality 4	Municipality 5	Municipality 6	Municipality 7
Infrastructure Use							
Riding Infrastructure	✓	✓	✓	✓	✓	✓	✓
Speed of E-Scooters	✓	✓	✓	✓	✓	✓	✓
Winter Month Usage	✓	✓	✓	✓	✓	✓	✓
Irresponsible Behaviour							
General Mischief	✓		✓	✓		✓	✓
Intoxicated Riding	✓		✓	✓	✓	✓	
Vandalism		✓	✓		✓		
Parking							
Blocked Infrastructure			✓		✓		✓
E-Scooter Stock	✓		✓		✓	✓	
Charged E-Scooters							✓
Health & Safety							
Injuries	✓				✓	✓	✓
Helmets		✓	✓		✓		
By-law Enforcement			✓		✓		✓

Chapter 7 – Professional Interviews, Mitigation Strategies

Figure 11: Woman Unlocking an E-scooter. (Christina Spinnen on Unsplash)

This chapter will discuss the strategies and tactics being utilized by municipalities to remedy the issues outlined in the previous chapter. This chapter will follow the similar structure from the previous chapter, moving through remedies for Infrastructure Use followed by Irresponsible Riding Behavior and then Parking. A subsection on education will be used in place of Health & Safety. Not all the issues highlighted will have corresponding strategies to limit their impact.

7. 1 Infrastructure Use

7.1.1 Proper Signage

The use of signage was a strategy highlighted by participant 6 when the community launched their pilot. The municipality wanted to ensure riders understood the rules and regulations when using the community's shared pathways. For this strategy to succeed, rules must be conveyed in a simple, easy-to-understand manner with signage located in areas heavily trafficked by e-scooter users. Since introducing the signs, participants 6 indicated the riding habits of riders have been improving.

7.1.2 Sidewalk Detection Devices

As previously stated, municipality 1 decided that e-scooters should not be ridden on sidewalks. To ensure users adhere to this policy, municipality 1 has requested that e-scooter operators install a technology onto their fleets that allow the e-scooters to detect

if they are being ridden on sidewalks. If an e-scooter with this technology installed does detect that it is being used on a sidewalk it will automatically slow to a speed more appropriate for the sidewalk or stop altogether. There is also an option that the e-scooter will alert the rider that they should exit off the sidewalks by making an audible noise or having a push notification sent to a rider's smartphone. For communities interested in diverting e-scooter users from riding on sidewalks, stipulating that private operators install this technology onto their fleets could be included in an operator agreement.

7.1.3 Geofencing Infrastructure

Geofencing is a tool private operators use to create the boundary of a service area. When requested by a municipality, an operator can block out specific areas where e-scooter should not be ridden. The tool relies on the GPS tracking of a user's smartphone, which connects to the particular e-scooter the user is riding. When the user enters a restricted geofenced area, the scooter will stop and potentially send a push notification to the rider's smartphone, alerting them that they have entered a restricted zone.

Municipalities can use this technology to impose policies and regulations on where e-scooters should be ridden without using excess amounts of resources to do so. Geofencing can be used to restrict access to areas with two or more infrastructure types, such as a roadway or along secluded areas with one infrastructure type, like pathways. However, due to the finite scale of GPS data, geofencing can not be used on the micro-level to restrict access to an infrastructure that runs alongside other infrastructure types. Nevertheless, geofencing is one of the most powerful tools municipalities can use to limit the issues between infrastructure and e-scooter users. All seven municipalities represented in the interviews are using this tool due to the importance of maintaining e-scooter operations.

7.2 Speed

7.2.1 Universal Speed Governing

If the speed of e-scooters is a concern for a municipality, utilizing speed governors is an option to limit this issue. Speed governors are mechanisms that can be installed onto

the e-scooters and set the maximum speed a device can travel at. The most well-known use of this mechanism is in commercial vehicles. Six of the interviewed professionals mentioned using speed governors as an essential tool for community safety regarding e-scooters.

Due to the uniqueness of each municipality, it is up to individual city staff to consider all variables to determine a maximum speed that best fits their community. The overall benefit of introducing speed limits is the reduced risk of speed-related incidents occurring, as well as reducing the severity of a collision if one does occur. While the message of stating that e-scooters included in a pilot will be speed governed, there is also the issue of government being unable to force individuals to install the devices onto private e-scooters. The unregulated e-scooters can be confusing to residents who witness them travelling much faster than other e-scooters which can lead to issues for municipal staff.

7.2.2 Slow Zones

While governing the speed of e-scooters is the first tool municipalities can use to mitigate the issue e-scooter speed, there can still be some places where the universal maximum speed is still too quick for the circumstances. For these scenarios, municipalities can use slow zones. Slow zones use the same technology as geofenced areas, but instead of the e-scooters stopping as they enter a restricted area, they instead slow to a speed more reasonable for the circumstances. For example, this strategy has been introduced by municipality 7 in an area with significant foot traffic compared to the rest of the city. Although the municipality felt that the devices should still be able to be ridden in this space, the governed speed the e-scooters were set did not make sense for the environment.

7.3 General Mischief

7.3.1 Geofencing Buildings

To ensure that e-scooter riders are not entering buildings, the municipality needs to ensure they are geofenced. Participant 5 iterated that policymakers need to work with an internal GIS technician if a municipality employs one, or at the minimum, work with a technician employed by an operator, to ensure every building is established as a

restricted zone. Any municipality interested in piloting a shared e-scooter program must ensure they can implement and use this tool.

7.3.2 Pseudo Licence Plates

To identify and report general poor e-scooter riding, municipality 7 directed their private operators to install pseudo license plates onto each e-scooter. This was done to ensure that one e-scooter could be easily identified amongst an entire fleet of similar looking devices. If a passerby notices a user inappropriately riding an e-scooter, they can report the unique identifier and time to the operator. The operator can use this data to penalize the individual riding the e-scooter at that time. In addition, if any issues witnessed are criminal, the information can be evidence for law enforcement authorities to use.

7.4 Intoxicated Riding

7.4.1 Cognitive Testing

To curb impaired riding, municipality 1 now requires individuals pass a cognitive and reaction speed test when trying to initiate a ride during the evening or night. This test is administered on an individual's smartphone and must be passed before the e-scooter unlocks to be ridden. If the cognitive test cannot be completed, the e-scooter remains locked and cannot be ridden by someone presumed impaired.

7.4.2 Removal of Devices from Bar Districts

Another strategy municipalities can use to avoid impaired riding is removing e-scooters from areas with a higher density of drinking establishments than the rest of the community. To implement such a strategy, municipality 4 worked with their e-scooter operators to develop a geofenced area around the community's bar district that is only activated during the night. When this geofenced area is activated, no e-scooters can enter the space. In addition, the municipality has also mandated that the operator collect and remove any e-scooter within this area when the geofence is activated and transport them outside the zone. Municipality 1 has also introduced a similar approach of restricting e-scooter access in their bar districts during evening hours.

7.5 Parking

7.5.1 Enforcement of Operator Remediating Complaints

It was found in the interviews that when a resident complains to the municipality about a misparked e-scooter, the municipality will often forward that complaint to the operator. It is then the responsibility of the operator to remove the e-scooter from that area. Although participant 2 considered the operators to be reliable in rectifying misparked devices, there were still times that the issues were not addressed. In these situations, municipal operations teams would be dispatched to remedy the problem. To ensure operators take ownership of this problem two measures can be introduced by municipalities.

The first is having a timeline for when an e-scooter must be removed after a complaint. The strictest of these timelines was in municipality 5, which requires their operators to remove a misparked e-scooter within two hours of a complaint. Other communities like municipality 4 have more lenient guidelines, requiring the removal of the e-scooter within 48 hours of receiving a complaint. It is unclear what penalty municipalities issue to operators who do not meet these deadlines; however, one can assume that fines are issued. Another strategy municipalities could consider if a municipal operations crew has to retrieve an e-scooter is impounding the device and requiring operators pay a fee before it is returned. Participant 5 suggested this as a potential strategy to ensure operators abide by the regulations. However, participant 5 did reiterate that this is not a strategy currently being used by the city.

7.5.2 Establishing Parking Corrals

The use of physical and virtual parking corrals is a strategy several municipalities have begun to experiment with to decrease the amount of misparked e-scooters. Municipalities 1 and 7 have taken a standard approach to parking corrals by installing physical signage and infrastructure, indicating where a device should be parked. Both participants stated that the parking corral' locations are in spaces on the roads that are unusable by vehicles due to their proximity to intersections. It is worth noting that the e-scooter operator working with municipality 4 did offer to install parking corrals in the community but the offer was declined as it was not considered necessary.

While these communities focused on physical corrals, municipality 5 has instead used virtual parking corrals. The interviewed professional stated that their community had an issue with e-scooter parking, but the pilot had no associated budget. Therefore, virtual parking corrals were considered the best strategy to push people to park in more desirable spaces without spending any municipal budget. This style of parking corral indicates points on the GPS map of the operator's application running on a user's smartphone. Although simplistic, participant 5 suggested that this method has successfully mitigated some of the community's issues with parking.

7.5.3 Push Notifications Reminders

Municipality 6 has successfully encouraged users to practice proper parking within their community by sending push notifications on users' smartphones to remind the riders of proper parking etiquette, according to the professional interviewed. The professional interviewed from this community felt that sending out push notifications has been incredibly successful in their effort to reduce the quantity of misparked e-scooters.

7.5.4 Incentives

The idea of introducing an incentive for individuals who park in designated spaces was only raised by participant 7. Incentivizing e-scooter users to end trips in spaces more desirable by a municipality could be a method worth exploring as a potential idea to help avoid the issue of misparked e-scooters. However, none of the municipalities represented in the interviews have utilized this strategy, and therefore the viability or success of it is unclear.

7.5.5 Operator and Vehicle Caps

What appears to be the best strategy to mitigate issues with misparked e-scooters is to cap the number of private operators working within a municipality and the number of e-scooters they can launch into the community. All seven interviews confirmed that implementing operator and vehicle caps is critical for municipal pilots. Participant 3 even went as far as to say that the number of misparked e-scooters correlated closely to the number of e-scooters within the municipality. Participant 1 stated that because their community allowed so many e-scooters to be launched into the public space at one time, it was common to see them misparked.

An excellent model to follow is municipality 6, as the participant interviewed felt that the success of their e-scooter program was due to the city only allowing the operator to launch a small number of e-scooters at a time. The municipality slowly allowed more e-scooters to be introduced into the community's public space until they felt there was proper coverage and the community had achieved an appropriate level of saturation.

Another aspect addressed by participant 4 is that municipalities should only start with one e-scooter operator when a pilot is launched. This allows policymakers to establish a knowledge foundation for adequately managing a shared e-scooter file. Starting with only one operator also allows the municipality to avoid repeating messages to two or more operators. Having only one operator also allows a stronger partnership to form which generally benefits all parties involved. Once a municipality gains the experience needed to launch a shared e-scooter operations then a municipality can begin to explore introducing new operators.

7.5.6 Requiring a Charging Strategy

To avoid unpowered e-scooters being littered throughout a community, participant 6 has suggested that municipalities regulate that the operator and local manger have charging strategies in place before a pilot is launched. A charging strategy will also ensure that devices are not abandoned in one space for days at a time with the fleets being circulated consistently.

7.6 Education

7.6.1 First Ride Assistance

With e-scooters being such a new technology and experience, a learning curve exists for first-time riders to become acquainted and comfortable with the devices. Due to this, municipality 1 now requires that when a user initiates their first ride, the device will be set to a speed lower than the typical governed speed for the city. First-time rider assistance can be a strategy to help ease new users into using the devices and can be beneficial to help avoid potential collisions.

7.6.2 Walking Volunteers

Last year municipality 6's private operator hosted a public information session. This information session was standard; however, an intriguing result came out of it. After

discussions with a concerned resident, the private operator allowed this resident to act as a representative on behalf of the company when walking within the community. Participant 6 stated that the resident was retired and often took walks along the community pathways. By acting as a representative for the private operator, the resident served as a mobile educational hub by informing individuals if they were misusing an e-scooter. Although this was not a municipality-led initiative, interested municipalities could compel private operators to implement something similar in their communities.

7.6.2 Private Operator Education Event Mandate

Municipality 3 and 4 explicitly stated that regulations were in place to ensure operators hosted educational events. Requiring operators to host these events makes for a safer community, as the experts on the subject matter can advocate for the e-scooters and answer any questions concerned residents may have. These events also provide a safe environment for individuals interested in trialing the e-scooters as well as highlight the regulations new riders should be aware before they initiate their first ride. Going out into the community also allows those vehemently opposed to the e-scooters to learn more about the devices. Overall, this could be important to avoid a polarized community.

7.6.3 Operator Education Fees

To increase the amount of community education opportunities, municipality 3 introduced an education fee that e-scooter applicants must pay. The education fee has allowed the city to begin hosting pop-up education events within the community without having to fund the events internally. Doing this has increased the total number of educational events within the community, as municipality 3 still mandates that private operators also host their own events. The expectation is that increasing the number of educational events within the community allows for more coverage of the city allowing for more connections with residents. By increasing the number of connections made with residents it is assumed that the population overall will be more informed about e-scooters.

7.7 Micromobility Management Software

Participant 5 stated that they recommend that micromobility management software like Populace or Ride Report are purchased by any municipality interested in launching an

e-scooter fleet to the public space. Participants 5 and 6 considered this software mandatory for policymakers to effectively manage an shared e-scooter pilot. The participants felt the software was compulsory due to the plethora of data the software provides to policymakers. By purchasing and using this software, policymakers can access all the quantitative data that may be needed to aid in solving a potential issue with a pilot. Participant 7 also found that the management software was essential to their pilot but did mention that the media ran stories opposed to the city collecting this type of data. See table 8 for a summary of the mitigation strategies discussed.

Table 8: Summary of Mitigation Strategies Discussed

Mitigation Strategies	Municipality 1	Municipality 2	Municipality 3	Municipality 4	Municipality 5	Municipality 6	Municipality 7
Infrastructure Use							
Proper Signage						✓	
Sidewalk Detection Devices	✓						
Geofencing Infrastructure	✓	✓	✓	✓	✓	✓	✓
Speed							
Speed Governing	✓		✓	✓	✓	✓	✓
Slow Zones							✓
General Mischief							
Geofencing Buildings					✓		
Pseudo Licence Plates							✓
Intoxicated Riding							
Cognitive Testing	✓						
Removal of Devices				✓			
Parking							
Operator Enforcement		✓		✓	✓		
Parking Corrals	✓				✓		✓
Push Notification Reminders						✓	
Incentives							✓
Operator & Vehicle Caps	✓	✓	✓	✓	✓	✓	✓
Charging Strategies						✓	
Education							
First Ride Assistance	✓						
Walking Volunteers						✓	
Private Operator Event Mandate			✓	✓			
Operator Education Fees			✓				
Micromobility Software					✓		✓

Chapter 8 - Discussion

Figure 12: Woman Riding an E-Scooter in Front of a Store. (Pony on Unsplash)

To help answer the third question of this research, “How can the results of the previous two questions be applied to municipalities interested in launching their shared e-scooter pilot projects?”, the discussion chapter intends to wrap the results from the literature review, document analysis, and professional interviews together to define the key challenges municipalities need to prepare for before a shared e-scooter fleet can be launched in a community. Using the findings from this research, six key challenges will be discussed in this chapter. These challenges were singled out as key challenges due to their continued identification as issues throughout the research. It should be noted that the order the challenges are listed in have no bearing on significance, but instead should be considered simultaneously.

8.1 Vocal Opposition

As highlighted in the documents analysis, there exists a subset of the population in almost every community that is strongly opposed to the approval of an e-scooter operation. The most glaring of these indications was the Kelowna report which had 60% of survey respondents declaring they wanted the devices removed from the public space altogether. Results from the Calgary, Edmonton, and Red Deer surveys furthered the point that a portion of the population is opposed to e-scooter pilots, albeit to a lesser degree than the results from the Kelowna survey. Although there only six documents

were able to be reviewed, having four out of six reports highlight this concern does indicate that this problem is pervasive for communities that have e-scooter in the public space.

However, it is also important to recognize that in some communities like the Town of Okotoks, the reception towards the devices has been generally positive with 96% of respondents indicating they wanted their pilot to continue. It is unclear why there is such a significant difference in resident feedback between Okotoks and the four municipalities previously mentioned. For smaller communities interested in launching their own e-scooter fleet, Okotoks may act as a good precedent to model their efforts after.

The findings from the literature review also indicate that city staff need to be prepared for criticisms from community members opposed to the approval of e-scooter pilots. Caspi & Smart (2022) and Gossling (2020a) both found that when e-scooter are featured in media they are often depicted with a negative bias. The depiction of the devices by the media with a negative prejudice has led to a resentment towards e-scooter growing within the population (Caspi & Smart, 2022). However, the negative media reporting and resentment towards the devices by population may not be warranted due to findings by Brown (2021), Brown et al. (2022), and James et al. (2019) that e-scooter cause a minimal number of disturbances in the public space compared to other forms of transportation. James et al. (2019) suggests that due to the public's limited knowledge on the e-scooter laws, their information on the services and devices is drawn from local media, which appears to mostly take a negative stance against the devices. All these aspects together are leading to residents in many communities becoming disillusioned with shared e-scooter services.

Together, the findings demonstrate that cities that are interested in launching their own e-scooter fleet, need to be prepared for the criticisms that will most likely be posed against a potential pilot. If city staff and leadership are in agreeance that a shared e-scooter operation would benefit their community, the need for mitigation strategies and tools to limit the concerns that many of the community will most likely name need to be pre-prepared. It is recommended that cities review the strategies and tools discussed in

chapter 9 to be prepared for the criticism that will be brought up by community members opposed to a pilot.

8.2 Parking

The concern about e-scooter parking was cited in all aspects of this research. The literature review discussed the concern about parked e-scooters causing obstructions to infrastructure, impeding the access to public space by the disabled community, and being a potential target for vandals. Infrastructure obstructions and vandalism were further discussed in the research methods, but surprisingly the commentary about the concern for the wellbeing of the disabled community was limited. However, with Toronto's Accessibility Advisory Committee continuing to push for Toronto city council to uphold the suspension of the services within the city, municipalities interested in launching their own e-scooter pilots need to consider if a potential service is right for their community and will not restrict access to the public space for the disabled community.

The document analysis also found that misparked e-scooters was a critical issue for residents who responded to their communities' surveys in the document analysis. It was found that 57% of respondents in the Red Deer survey indicated that misparked e-scooters were the most significant concern about the cities' e-scooter pilot. Therefore, it was demonstrated that misparked e-scooters were a central issue to the community, as no other option received over 25% of the respondent's choice. The concern about misparked e-scooters also appeared in some form for the surveys that were completed in Kelowna, Calgary, and Edmonton.

Misparked e-scooters were also a concern identified by some of the professionals interviewed, but most of there critiques of the program was due to the number of e-scooters that were made available within the community. While the literature noted that misparked e-scooters often caused obstructions to infrastructure, the professionals interviewed stated this concern was a minor issue for their community. The literature also did not list any reasons why the obstructions to infrastructure were occurring. But after speaking with professionals, it was determined that the number of e-scooters made available in a community is a significant cause of concerns of misparked e-

scooters. Although municipal staff did not consider misparked e-scooters to be a significant concern, interested municipalities need to proactive steps at ensuring e-scooters are parked in a coordinated manner, as misparked e-scooters appears to be a considerable concern for community residents.

8.3 Infrastructure Uses

The type of infrastructure shared e-scooter should be used on was also a key challenge was identified in the literature, as well as the semi-structured interviews. Cities have traditionally been built to separate different modes of transportation, allowing for only limited interactions between them (Bozzi & Aquilera; Gossling, 2020a; Ma et al., 2021). However, the adaption of e-scooters into the public space has led to municipal staff being unsure where this new transportation mode should be used, as there is no infrastructure designated for e-scooter use. However, there is no clear answer to this question.

8.4 Reckless Behaviour

If a municipality is interested in launching an e-scooter pilot, there needs to be an understanding that there will be some individuals who are willing to test the boundaries that are set out by the municipality and operator. Municipalities should expect for this to occur as reckless behaviour by e-scooter users was a common theme between the literature and professional interviews. The literature found that speeding and intoxicated riding were the most common concern under reckless behaviour. The professionals interviewed also identified that riding in buildings, double riding, and underage riding as other forms of reckless behaviour. The professionals also stated the issue with speed, but it was found that installing speed governors was an easy solution to this problem and it is no longer considered a concern.

If a municipality is interested in launching an e-scooter pilot, municipal staff need to be prepared for the different behaviour individuals may have after an e-scooter fleet is launched into the public space. The severity of this key challenge could be elevated if by-laws are not properly enforcement, which is also a key challenge discussed in section 8.6.

8.5 Health & Safety

The health and safety of riders also needs to be taken into consideration when the discussions about launching an e-scooter service takes place. In municipality 1, the concern about the number of injuries occurring with e-scooter riders become a central issue within that community. While the level of severity for this issue was highest in municipality 1, this issue was also discussed in three other communities. As previously discussed in section 8.2, there also exists the concern about the health of disabled community with the introduction of e-scooters into the public space. Therefore, the health of a municipality's population should be a core consideration for any municipality that is interested in launching an e-scooter pilot. Internal discussions between municipal staff and leadership need to be held to determine if a pilot can safely be operated with the available infrastructure in place in the community.

To further protect residents, municipal staff need to consider if a helmet by-law should be put in place. Participant 2 felt very strongly about pushing towards greater helmet use to protect against head injuries. They suggested that if steps are taken, the use of e-scooters could follow a similar trend on ski mountains, where currently helmets are standard pieces of equipment, where in the past this was not the case. If communities have by-laws in place to regulate that helmet be worn when riding a bicycle, a simple move to increase helmets usage for e-scooter riders would be to categorize the e-scooters are bicycles as well.

8.6 By-Law Enforcement

Although by-law enforcement was only identified in some of the interviews with professionals, it was felt that a lack of regulation fulfilment could be a large concern for future pilots. The best example of this was in municipality 3, where law enforcement was reluctant to enforce by-laws as they felt the regulations could not be clearly interpreted. This led to by-laws having to be amended several times in municipality 3 to get them to a point where law enforcement felt they could properly uphold the regulations. Participants representing municipality 4 and 5 also noted a concern with by-law enforcement, but these concerns were more of the lack of willingness by officers to apply the laws due to time constraints and paperwork.

For municipalities that are interested in launching their own e-scooter pilot, a lack of by-law enforcement could be detrimental to a future pilot if key challenges like parking and reckless behaviour are not restricted. A lack of by-law enforcement could also lead to a negative association with e-scooter by a community's residents if these problems become overbearing. To avoid this issue, it is suggested that policymakers and law enforcement come together to craft by-laws that make sense for both parties, but also ensure that an e-scooter pilot can be safety operated.

Figure 13: Yellow Rain Jacket on an E-Scooter. (Yana Hurskaya on Unsplash)

Chapter 9 – Recommendations

Figure 14: Two Lime E-Scooters Parked in Front of a Marina. (Lyle Hastie on Unsplash)

Chapter 9 will not discuss eight different recommendations interested municipalities should consider before launching an e-scooter pilot into their community. Like the key challenges, the recommendations are not listed in a specific order. Instead, the recommendations should be viewed as a collective approach to ensure that future pilots can be implemented successfully, limiting the key challenges listed in chapter 8.

9.1 Prioritize Education

It is recommended that municipalities consider education efforts as part of their e-scooter pilots. Educational campaigns should be conducted through a partnership between the municipalities and private operators to achieve maximum results. Pop-up events in high traffic areas may be the most impactful education strategy that can be used.

Providing educational opportunities for the population can help riders or potential riders become more familiar with the regulations and the devices. The clarification of rules and regulations for riders may lead to a lower number of infractions by users who may not be familiar with the expectation. For those who are familiar with the regulations but choose not to abide by them these events could also be used to confirm the

consequences for breaking infractions. It is recommended that spaces to trial the devices are provided during pop-up events. Having these spaces available allows individuals interested in trialling the devices to do so in a low-stress environment. Allowing an individual to become comfortable with the devices in these spaces around experts will hopefully lower the impacts that new riders may cause.

Along with helping riders become more familiar with rules and regulations, educational events can also help non-riders. According to James et al. (2019) most of the population is unaware of shared e-scooter regulations. By providing spaces where regulations can be more easily understood with potential questions being able to be answered, it may lead to the devices becoming less divisive for those in the community who choose not to ride them.

While partnerships are preferred if an operator is resisted towards hosting educational events, a mandate should be put in place. As well, municipalities should also put in place educational fees that operators must pay. For educational events or campaigns launched by the municipality, these fees can be used as funding sources instead of using a municipality's general budget.

9.2 Have Device and Operator Caps

It is recommended that municipalities cap the number of devices that operators can launch into the public space as oversaturating a service area with e-scooters can lead to substantial concerns of misparks or vandalism. Instead, municipalities should seek to achieve full saturation of a service with devices. However, the number of devices needed to do this can be difficult to specify. To determine the correct number of devices needed to achieve saturation it is recommended that devices are slowly launched into the public space week by week instead of in one large sum.

Along with having caps on the number of devices, it is also recommended that municipalities only approve one or two operators to service a community during the beginning on a pilot. The positives for municipalities in only having one or two operators servicing an area is request or mandates do not need to be repeated more than a couple times. This reduces the chances that information can be misinterpreted. As well,

stronger partnerships can be formed between the municipality and operators if there is only a few. Establishing strong partnerships is a benefit for every party involved including community residents.

9.3 Utilize Micromobility Management Software

It is recommended that municipalities interested in launching an e-scooter pilot purchase micromobility management software due to use the quantitative data this technology provides. Examples of this software includes Populace or Ride Report.

The quantitative data provided by this software should allow municipalities to visualize the trends that are occurring within their community. Using these trends may allow municipalities to be proactive in launching different strategies or tools when problems arise.

9.4 Ensure that Regulations are Clearly Written

It is recommended that regulations for shared e-scooter be written in plain language making them easier to read than typical government documents. By having regulations be written in clear, plain language the intention would be that residents would be able to achieve a stronger understanding of the expectations. Increasing the number of riders who better understand regulations should reduce the number of infractions that occur.

It is also recommended that law enforcement be involved in the policy writing for e-scooters regulations. Having law enforcement be seated at the table with policymakers to write by-laws should help municipalities avoid the challenge of unenforceable regulations. An added benefit of including law enforcement in policy writing is steps could be taken to streamline the ticketing process. Doing this should make it more feasible for officers to write tickets without the concern of time constraints that the current system has.

Along with being easy to understand, regulations should also be made easily accessibly. Therefore, it is recommended that regulations be posted on municipal websites with clear indication of where to click to access them. It is also recommended that signage be installed in areas with high e-scooter traffic with QR codes to direct individuals to the regulations. If the use of this technology is not possible then installing

signage when simple reminders about regulations is also an option. Having regulations be easy to access by the residents should allow for less infractions to occur by individuals simply unaware of the regulations.

9.5 Utilize Smartphone Technologies

It recommended that municipalities make significant use of the current level of smartphone technology at the time a pilot begins. The bare minimum for this recommendation is that municipality work with the operator to review and identify all buildings and other spaces that need to be geofenced as restricted areas. Using smartphone GPS technology can also be used to introduce slow zones when necessary. The benefit of using geofencing technology is it should protect riders and other individuals by eliminating the possibility of a device entering an unsafe area.

Aside from geofencing, smartphone technology can also be used to administer checks, such as the cognitive or reaction speed tests to ensure that potential riders can operate a device safety. Technology can also be used to limit the speed of the devices when it is the first time a rider initiates a ride. Both examples are intended to help protect riders and those around them. As smartphone technology continues to be innovated to provide more safety options, municipalities should be quick to adopt them.

Finally, smartphone technology can also be used to provide reminders of riding or parking etiquette in the form of push notifications. Providing periodic reminders to riders should help eliminate simple regulation infractions where an individual is simply unaware of what they are doing.

9.6 Craft Mitigation Plans

It is recommended that municipalities take the time before an e-scooter pilot is launched to craft mitigation plans that can be quickly implemented if an e-scooter problem is growing within the community. Mitigation plan examples include propositions to reduce intoxicated riding, reduce e-scooter cluttering, or ensure that e-scooter are being properly charged. The hope would be that municipalities would not have to use these plans due a seamless integration of the devices into the community. However, having plans already prepared should allow for municipal staff to provide a rapid response to

problem as they as occur instead of having to be reactive to potential challenges. The crafting of these plans should be done in conjunction with the private operators and law enforcement.

9.7 Keep Devices Updated

It is recommended that municipalities mandate that service operators keep their fleets mechanically sound. To ensure the devices are mechanically sound and safe to be used by residents, municipalities should mandate that e-scooters are routinely pulled out of the public space to have features like brakes, throttle, and steering are in good working order. Features like light and audible instruments should also be made mandatory on entire fleets. Having e-scooter fleets be mechanically sound will increase the safety for riders and individuals around these as the devices are less likely to malfunction.

Along with keeping the e-scooters mechanically sound, municipalities should also mandate that instruments to increase the safety of the devices are installed on fleets as they become available. A recent example of these instruments are sidewalk detection devices. While this this particular instrument may only be suitable for communities that feel e-scooters should not be ridden on sidewalks, as more become available municipalities should ensure they are installed on e-scooter fleets.

9.8 Invest into the Physical Infrastructure

It is recommended that municipalities invest into the physical infrastructure that can help make e-scooter pilots successful. Firstly, investments should be made into a community's bike lanes and multi-use pathways, as this research has determined these infrastructure types to be the best match for e-scooter use. The expansion of bike lanes and multi-use pathways should allow for e-scooter users to travel to their destination without having to use sidewalks or roadways, both of which are spaces where conflicts for e-scooter users are likely to occur.

In addition to building out desirable riding infrastructure, municipalities should also make investments into signage. As alluded to in section 9.4, signage should be erected in high traffic areas to provide e-scooter reminders on expected etiquette when riding and

parking the devices. Signage can also help direct riders towards desirable infrastructure types and away from sidewalks or roadways.

Investments should also be made into parking corrals or makeshift spaces where e-scooters can be parked out of the way of pedestrians or vehicles. These parking spaces should be established areas where a high number of trips are expected to end to ensure the devices are not obstructing other modes of transportation. It is important to note that these spaces should only be constructed in a limited number of areas as overusing these spaces could lead to a diminished return on the potential benefits shared e-scooter services provide.

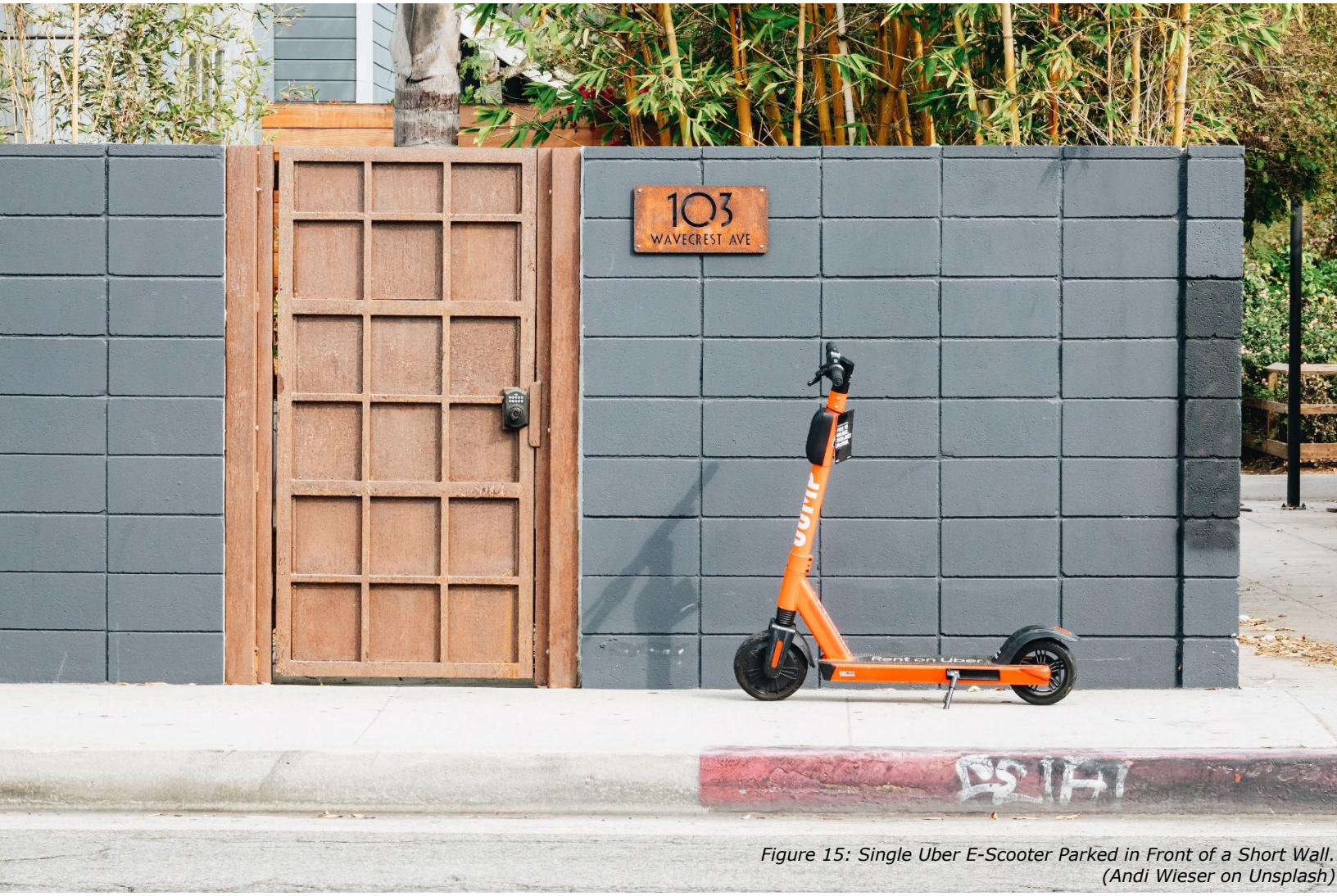
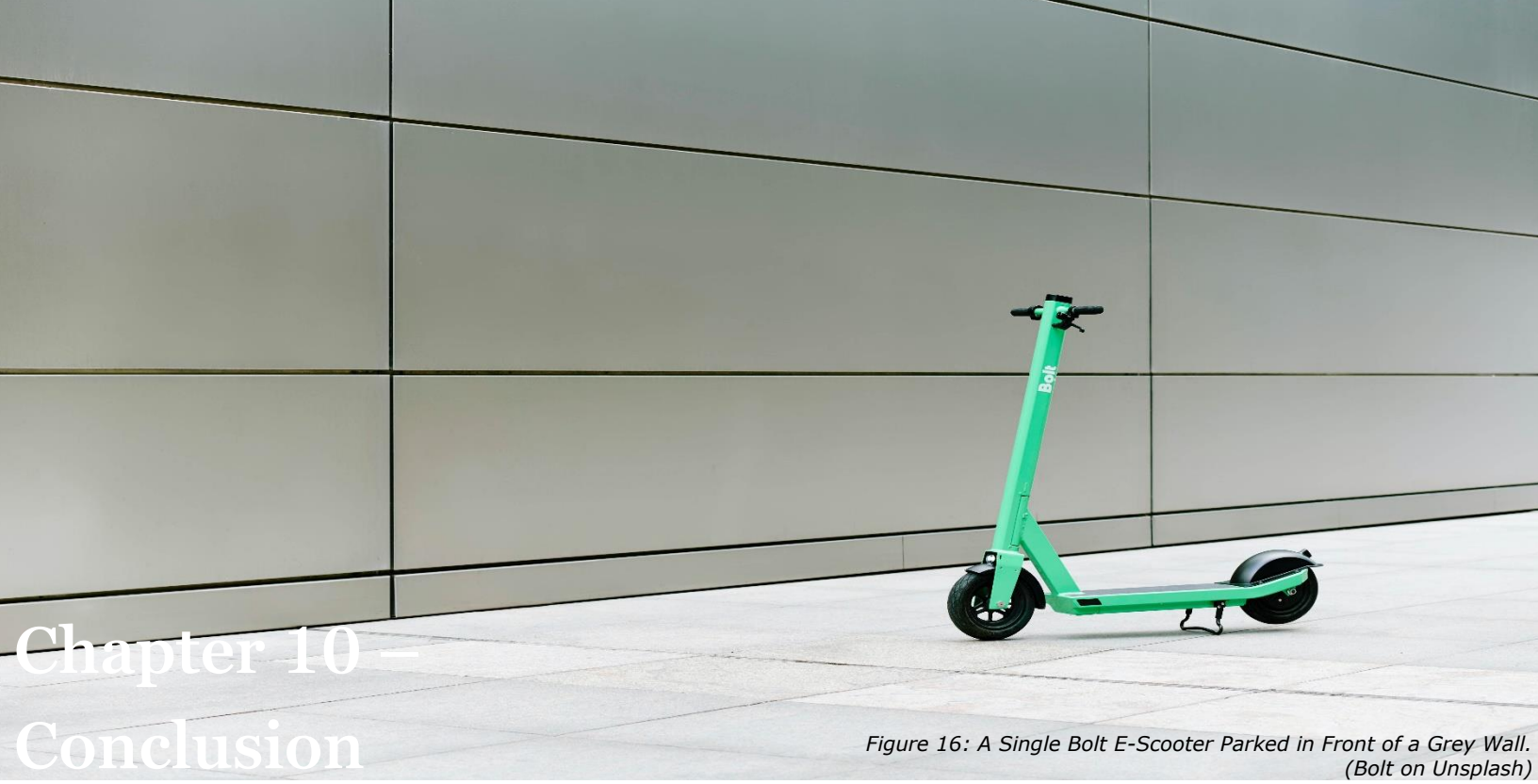


Figure 15: Single Uber E-Scooter Parked in Front of a Short Wall. (Andi Wieser on Unsplash)



Chapter 10 – Conclusion

Figure 16: A Single Bolt E-Scooter Parked in Front of a Grey Wall. (Bolt on Unsplash)

The purpose of this capstone report was to provide an analysis of shared e-scooter services, their problems, and methods to rectify identified challenges. It is felt that after completing the research and analysis the initial purpose of the document has been achieved. To conclude the document this chapter will address how the research questions were answered, why this research was important in the first, and identify areas of further research. A closing thoughts section will act as the completion of the document.

10.1 Addressing the Research Questions

1. *What challenges to public space have municipalities encountered after introducing shared e-scooter services to their communities?*

It was concluded from the research that shared e-scooter services introduce a variety of different challenges to public space. These challenges occur both when e-scooters are being used, as well as when they are sitting idle. When e-scooters are used in public spaces, the academic literature, document analysis, and semi-structured interviews found that that infrastructure riding choice, speeding, and general reckless riding behaviour were the most often cited concerns. The document analysis also found that most residents considered misparked e-scooters to be the most impactful challenge to public space when the e-scooters sat idle. However, the interviews did not agree with

this strong sentiment found in the documents. Instead, the professionals considered the overall quantity of e-scooters the most significant challenge to public space. For a full list of challenges refer to Table 7.

2. *What strategies have municipalities used to remedy these challenges?*

Municipalities have implemented a wide variety of different strategies to remedy these challenges. The research found that municipalities have introduced some remedy for every indicated challenge intending to limit the impacts on public space. While all strategies and tools have some mitigation success, the best thing municipalities and operators can do is go into the community for educational events. Exposing residents to the devices and the associated guidelines helps ensure users adhere to the rules that keep everyone safe when they are in the community. For a full list of strategies and tools refer to Table 8.

3. *How can the results of the previous two questions be applied to municipalities interested in launching their shared e-scooter pilot?*

After reviewing the findings for this research, six key challenges that interested municipalities need to be aware of if an e-scooter pilot is launched were identified. The six key challenges include:

1. A subset of the population will be vocally opposed to having an e-scooter pilot take place.
2. Where and how e-scooters are parked will be a concern for the community.
3. The type of infrastructure available in a community for e-scooters to ride on.
4. The reckless behaviour of some e-scooter users.
5. The Health & Safety of e-scooter users as well as community residents.
6. The enforcement of by-law regulations.

Eight recommendations were also suggested for municipalities interested in launching an e-scooter pilot. The eight recommendations are:

1. Prioritize Education
2. Have Device and Operator Caps

3. Utilize Micromobility Management Software
4. Ensure Regulations are Clearly Written
5. Utilize Smartphone Technology
6. Craft Mitigation Plans
7. Keep Devices Updated
8. Invest into the Physical Infrastructure

These eight recommendations should help new pilots be successful, and allowing e-scooter to be a community asset.

10.2 Importance of the Research

As evidenced by section 3.2, there is a place for shared e-scooters in our communities to help achieve the goal of compact development. However, due to the recent adoption of e-scooters into our communities, we are still learning how this new transportation mode fits within our cities. Unfortunately, like most things, e-scooters cannot be placed in our cities without an assortment of challenges that must be rectified before communities can take advantage of their perceived benefits. This research intends to be an asset interested municipalities can refer to as a reference to better understand potential challenges as well as strategies to limit their impacts.

10.3 Areas for Further Research

Several areas were identified as this research was being conducted where more study is required. The first is a better understanding of where conflicts occur between shared e-scooters and those with a disability that impedes their mobility. When conducting the literature review, the amount of research actuality compiled on this topic was limited. However, it was assumed that a substantial amount of research would be completed on the subject due to this particular issue being why the City of Toronto pilot was suspended before the e-scooters could even be launched. However, little literature could be located using different keywords in databases. Having a clear understanding of the severity of potential conflicts and where they would likely benefit by municipal leadership to determine if the reward provided by e-scooter is worth the risk to the disabled community. It would also provide the steps and action that would need to be

taken to limit risk and severity of conflicts occurring between an e-scooter and disabled individuals.

The second area of research that needs to be expanded is how shared e-scooter operation can be better connected and optimized with other transportation modes. Section 3.2 discusses how the e-scooters are a potential solution to the first-last mile, but more must be done to allow for further optimization. Nevertheless, there exists an opportunity for e-scooter pilots to be the catalyst for change in our societies. Therefore, researchers and policymakers need to come together to use this technology to its full capacity.

The third area of potential research is reviewing how different genders operate e-scooters. The intent would be to understand if there is a difference in riding behaviour and if certain steps need to be taken towards a particular group to ensure proper riding etiquette is followed.

The final area of research that should be explored is simply expanding on this capstone project. This capstone project only reviewed six “What we Heard Reports” and interviewed seven professionals that manage their community's e-scooter pilot in Canada. However, hundreds of communities worldwide have e-scooters in their public spaces. Therefore, there may be potential to create a universal document for interested municipalities to review before they begin work on launching their pilot. This document could include the challenges encountered and mitigation strategies used, and other aspects like where the file should be placed within a municipality’s administration or how to build a relationship with private operators.

10.4 Closing Thoughts

Cities are adaptable entities that change over time, allowing for the next great societal idea to have the space to grow and thrive. With most new things, however, these ideas can expect to have growing pains, and this has undoubtedly been the case for shared e-scooters. Nevertheless, as we move forward, shared e-scooters will continue to be integrated into our communities as attitudes change towards them and policy catches up. We may come to a point when e-scooters would be missed if they were removed

from the public space. As planners continue to push for denser communities, finding a way to utilize e-scooters is a meaningful conversation that needs to happen. Yet, before this discussion can happen, the challenges identified in this research must first be solved.

Figure 17: E-Scooter Knocked Over by a Lookout. (James Lee on Unsplash)

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Appendix A – Interview Consent Form

Consent Form

CITY 7050 CITY PLANNING CAPSTONE PROJECT

Department of City Planning, Faculty of Architecture

(Course Instructor: Dr. Orly Linovski)

CONTACT INFORMATION:

Student Name: Colt Maddock

Student's University Contact Information: maddockc@myumanitoba.ca

Course Instructor: Dr. Orly Linovski, Associate Professor

Department of City Planning, University of Manitoba

Telephone: 204-474-6242 e-mail: orly.linovski@umanitoba.ca

This Consent Form, a copy of which will be left with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully and to understand any accompanying information.

Name of Student: Colt Maddock

Title of Project: E-scooters services: The concerns they have brought to public space and the corrections that have followed

Specific Activities to be Completed by Project Participant and Time Frame: Project participants will be interviewed by the researcher. They will be given the opportunity to respond to 11 questions regarding their personal and/or professional views on the experience their municipality has had when introducing shared e-scooter services. Interviews will last approximately 45 minutes, and will be conducted via a licensed version of the video conferencing software Zoom.

Description of Course Assignment

City Planning graduate students must complete a Capstone Project as part of their Master's degree. The goal of the project is for students to conduct in-depth research on an issue of importance for planning practice. The students' information-gathering projects will be presented in class and will form the basis for a written report at the end of term. In this case, my objective is to understand the issues in how public space has been shared as shared e-scooter services have been introduced into communities, and the methods that have been used to rectify these issues. This information is intended to be compiled to inform planners for the City of Winnipeg of the issues that can occur with implementing these service and useful methods to limit these concerns.

The projects are undertaken under the supervision of the Course Instructor, Dr. Orly Linovski (see contact information below), in accordance with the protocols of the Human Ethics Research Board of the University of Manitoba for research involving human subjects. This research has been approved by the Research Ethics Board at the University of Manitoba, Fort Garry campus. Consent Forms listing Project Title and the specific activities to be completed by participants will be submitted to the instructor and kept on file for information purposes only for two years (or until the next City Planning program accreditation), in accordance with University ethics policies.

Benefits

Direct benefits may include the opportunity for participants to share their perspective on a planning issue or challenge. Indirect benefits are that the final Capstone Projects will contribute to planning knowledge and may result in new strategies or policy directions to address planning issues and challenges. Students will also benefit by learning about conducting ethical research.

Risks

The risk of participating in interviews is no greater than risks encountered in everyday life. One potential risk is a breach of confidentiality: that information may be shared in ways that enable you to be identified. To minimize the risk of this occurring, the following procedures will be undertaken.

Confidentiality

Information collected from participants will be used as part of the Capstone Project. Unless explicitly permitted, all names and other identifying details will be obscured/anonymized. Direct quotes may be published within the project report. Participants will be referred to by general descriptor (Participant 1, Participant 2…). Names of interview participants will not be disclosed.

The data collected through this research is confidential. This means that participants' names or any other personal or identifiable information will not be included in presentations or reports arising from the study.

Conflict of Interest Disclosure

At this time there is no conflict of interests present.

Audio and Video Recording

With your permission, this interview will be both audio and video recorded via licensed version of the video conferencing software Zoom. The video recording file will be destroyed after the completion of the interview. If you do not wish to have your video captured, you will be given the option to turn off your camera before the interview begins.

Transcription will be completed with the use of built in AI transcription software which is integrated into Zoom (Apps name: Automated Transcription). When transcription is complete, the video recording will be destroyed. The audio recording will be retained with all other data until the date of destruction as indicated in this consent form.

If you choose not to be recorded, handwritten notes will be taken.

If you as the participant request to end the interview, I will immediately end the interview and stop recording/taking notes. The interview data (notes/recording) will be destroyed immediately.

Feedback

The results from this project, including anonymized details, may be used for conference presentations and/or publication in journals and other academic and professional resources. Students' completed Capstone Projects will be publicly available through the University of Manitoba's website (https://umanitoba.ca/architecture/ department-city-planning). An executive summary will be available in May 2023.

Use of Data, Secure Storage and Destruction of Research Data

All information will be treated as confidential and securely stored in encrypted files and on the University of Manitoba-provided Individual File Storage system OneDrive under the researcher's personal University account using a multi-factor authentication system. Data will be subsequently destroyed at the end of the course (by the end of May 2023).

Copies of consent forms will be securely kept on file by the Course Instructor for information purposes only for two years and then destroyed, in accordance with University ethics policies. If consent is obtained verbally, transcriptions will be produced and stored in the same manner.

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at anytime, request that any data provided be omitted from the study (prior to February 28, 2023), refrain from answering any questions you prefer to omit, or request to stop the audio-video recording at any time, without prejudice or consequence. If you would like to withdraw, you must notify the researcher or the course instructor (below) by email prior to February 28, 2023. If you choose to withdraw, all files related to your participation will be destroyed. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

The University of Manitoba may look at your research records to see that the research is being done in a safe and proper way.

This research has been approved by the Research Ethics Board at the University of Manitoba, Fort Garry campus. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Coordinator at humanethics@umanitoba.ca; or 204-474-7122. A copy of this Consent Form has been given to you to keep for your records and reference.

Thank you for participating in this project. Your cooperation and insights are very valuable, and are greatly appreciated!

I, _____, consent to the dissemination of material

[Name of Participant: please print]

provided to the student for use in their Capstone Project and in course materials. I understand that the information I provide will be incorporated in a presentation and report. I understand also that all research data will be treated as confidential, stored in a

private and secure place, and subsequently destroyed at the end of the course by the student.

I agree to be audio-video recorded. Please note that if “No” is selected, handwritten notes will be taken by the interviewer.

Yes ☐ No ☐

I give permission for the results of this project, including anonymized details, to be used for conference presentations and/or publication in journals and other academic and professional resources

Yes ☐ No ☐

I would like to receive a summary of the results from this project. If yes, please provide your email address or mailing address below.

Yes ☐ No ☐

I would like to receive a copy of the final report (available June 2023). If yes, please provide your email address or mailing address below.

Yes ☐ No ☐

_____ _____

Signature of Participant Date

_____ _____

Mailing Address E-mail

Participant’s contact information (in order to receive a summary of the results from this project):

Appendix B – Information Sheet

Research Information Sheet

INFO SHEET

CITY 7050 CITY PLANNING CAPSTONE PROJECT

Department of City Planning, Faculty of Architecture

(Course Instructor: Dr. Orly Linovski)

Name of Student: Colt Maddock

Title of Project: E-scooters services: The concerns they have brought to public space and the corrections that have followed

Summary of Project: This research intends to review the issues that have occurred with how public space as municipalities have introduced shared e-scooter services. The research will also review any methods or techniques that have been utilized to limit this concern. It is intended that research inform City of Winnipeg planners interested in bringing such a service to the city of the issues and corrections they need to be aware of.

Description of Course Assignment

City Planning graduate students must complete a Capstone Project as part of their Master's degree. The goal of the project is for students to conduct in-depth research on an issue of importance for planning practice. The students' information-gathering

projects will be presented in class and will form the basis for a written report at the end of term.

The projects are undertaken under the supervision of the Course Instructor, Dr. Orly Linovski (see contact information below), in accordance with the protocols of the Human Ethics Secretariat of the University of Manitoba for research involving human subjects. This research has been approved by the Research Ethics Board at the University of Manitoba, Fort Garry campus.

Specific Activities to be Completed by Project Participant and Time Frame: Project participants will be interviewed by the researcher. All participants must be over the age of 18 and have consented to being interviewed. They will be given the opportunity to respond to 11 questions regarding the topic. Interviewees may be asked follow-up questions based on the answers they provide. Interview questions can be forwarded to participants prior to the interview upon request. Interviews will last approximately 45 minutes, and will be conducted via a licensed version of the video-conferencing software Zoom. With permission, activities, interviews, or other kinds of sessions may be video and audio-recorded and transcribed at a later date, so that analysing the material will be completed with greater ease and efficiency.

CONTACT INFORMATION:

Student Name: Colt Maddock

Student's University Contact Information: maddockc@myumanitoba.ca

Course Instructor: Dr. Orly Linovski, Associate Professor

Department of City Planning, University of Manitoba

Telephone: 204-474-6424 e-mail: orly.linovski@umanitoba.ca

Appendix C – Interview Questions

General Questions on Shared E-scooter services

1. What is your position within your municipality?
    a. Can you describe the role you had in bringing e-scooter services to your community?
2. What issues did your municipality consider before implementing shared e-scooter services?
3. Do you feel as though shared e-scooter services have been successfully implemented in your community? Why or why not?
4. Once implemented in your municipality, what were some challenges?
    a. What were the successes?
5. If you could have done something differently in your process of implementing shared e-scooter services in your municipality what would have it been?
6. Looking back, do you feel as though implementing shared e-scooter services in your community was the correct decision?

Specific Questions on Issues with Public Space Sharing

7. Have any concerns with public space sharing occurred when your municipality introduced e-scooter services?
    a. If so, what have been some methods your municipality has used to correct these concerns?
8. What has the response been since your municipality introduced these corrections?

Exiting Questions

9. What advice would you give to the City of Winnipeg planners currently working on the shared e-scooter file?