

# E-Scooter Time of Day Service Availability: Literature Review

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## SUMMARY

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- In Ottawa, e-scooters can operate from 6:00 AM to 11:00 PM, a total of 17 hours. There have been requests, mainly from the service providers, to expand service availability to operate 24-hours a day. The service providers have a financial prerogative to see an expanded service availability.
- Other North American cities that operate e-scooter have a mix of restricted service availability and 24-hour service availability.
- A literature review was completed related to e-scooter usage, safety, and where possible time of day. The literature highlights the lack of safety equipment, lack of user experience, and drug/alcohol use as major contributing factors to e-scooter injuries.
- There are on-going concerns about an increased level of risk if scooters were to be allowed to operate 24-hours a day.
- An expansion of e-scooters service hours has not been a major theme in the feedback received during the 2021 pilot.
- Therefore, it is not recommended to continue with the current limited e-scooter service availability and not proceed with a 24-hour service availability if the 2022 e-scooter pilot project is approved.

## 2 LITERATURE REVIEW DETAILS

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### 2.1 BACKGROUND

- Electric Share Scooters are a new mode of urban transportation that has gained a lot of popularity in the few years, around the world.
- However, they are not the safest of all forms of transportation; e-scooter riders have a greater chance to sustain an injury than cyclists and pedestrians.
- The e-scooter safety will most likely go up as function of time and utilization. There will be a 'safety in numbers' effect as e-scooters gain popularity with the public. (James, Swiderski, Hicks, Denis, & Buehler, 2019)
- In the later summer and early fall months of 2020, the city of Ottawa partook in the e-scooter pilot projects, allowed under provincial legislation, and is doing so once again this year, 2021.

### 2.2 TIME OF DAY USAGE IN NORTH AMERICAN CITIES

- In Ottawa, e-scooters can operate from 6:00 AM to 11:00 PM, a total of 17 hours.
- Calgary has had e-scooters since 2018 and over 200, 000 unique users rode an e-scooter for a total of 1.9 million trips. In Calgary, e-scooters can operate for all 24 hours of the day without interruption (Sedor & Oriold, 2020).
- Similarly, Edmonton has three main providers Lime, Bird and Spin and e-scooters are available to rent 24/7 (Mertz & Bartko, 2021).
- In Kelowna, BC, some areas of the downtown region will be inoperable to e-scooters from 10:30 PM to 4 AM, and as a result limit the operation of e-scooters overnight for some parts of Kelowna downtown (Jones, 2021).
- The City of Red Deer in Alberta has permitted e-scooter providers to operate in the for three years. There is a total of five providers: Bird, Neuron, Roll, Link and Spin. Helmets are not required but are strongly encouraged (City of Red Deer, 2021) There is no indication of the hours of operation for e-scooters and so it is quite possible there are no restrictions concerning hours for e-scooter operation.
- The City of Westmount in Québec had an e-scooter pilot project that began in August 2019 and decided not to renew the project for a subsequent season. There is no mention of 'operating hours in the By-Law Record outlining the rules for the use of shared e-scooters in the City of

Westmount. Since there is no mention, it is probable there was no restriction on the operation hours of e-scooters. (Wesmount, 2019)

- The City of Chicago, Illinois in the United-States is heavily invested in their e-scooter pilot project. Chicago has a total fleet of 10, 000 e-scooters divided equally amongst Lime, Bird and Spin providers. E-scooters can be operated from 5:00 AM to 10:00 PM (Transportation, 2020).
- The City of Newark, New Jersey in the United-States is participating in a six-month e-scooter pilot program where Bird and Veoride have a permit to operate. E-scooters can be operated from 6:00 AM until 11:00 PM (City of Newark, 2021)
- The City of Phoenix, Arizona, approved an e-scooter pilot program in September 2019 and will continue through March 2022. E-scooter can operate from 5:00 AM to 10:00 PM daily (Phoenix, 2019)
- San Francisco has e-scooters operating 24/7 to ensure scooters are available in hours where there is a limited transit services, during the day (Reiskin, 2018)
- Austin Texas allows overnight e-scooter operation as seen in their injury report. Most injuries occur between 6:00 PM and 6:00 AM. (Austin Public Health, 2019)
- Raleigh, North Carolina, is one of the United-States biggest tech hubs and has also been participating in an e-scooter pilot project since summer 2018. They have since then continued participating in the pilot project for subsequent years. In Raleigh, e-scooters can operate from 6:00 AM to 11:00 PM (Raleigh, 2021).

### 2.3 E-SCOOTER SAFETY

- With the first pilot season behind, there has been a safety concerns not only for e-scooter operators but also for pedestrians, cyclists, and motorists.
- E-scooters have been in operation in cities such as: Austin, Texas, Chicago, Illinois and Auckland, New-Zealand, just to name a few. With their operation, several studies have been conducted with respect to the injuries that are related to e-scooters.
- In 2018, the Auckland City Hospital conducted a retroactive analysis of 180 patients that entered the emergency department (or ED) of the hospital with an e-scooter related injury.
- The most common injury mechanism was stated as being an isolated fall, meaning it did not involve other individuals or a vehicle. This occurred to 165/180 (93.3%) of individuals within the study. (Brownson, Fagan, Dickson, & Civil, 2019)
- This hints at the fact that e-scooter inexperience is a factor in these injuries.

- Head injuries had a prevalence of 17.2% and only 1.7% of people stated they were wearing a helmet and or protective equipment when the injury was sustained. (Brownson, Fagan, Dickson, & Civil, 2019)
- Another study analyzed the severity of e-scooter injuries in relation to trip characteristics. The study recruited a total of 105 injured adults (e-scooter riders and a few non-riders).
- Only 2% of recruited individuals stated they wore a helmet and 37% of injured rider were on their first e-scooter trip. (Cicchino, Kulie, & McCarthy, 2020) Once more, inexperience played a significant contextual role in over 1/3 of injuries.
- There was a total of 14 trip incidents between 9:00pm and 5:59 am (Cicchino, Kulie, & McCarthy, 2020), indicating there might increase risk with operating an e-scooter in the late and early hours of the day.
- In Austin Texas, a study with 190 injured riders revealed that 33% of injured riders occurred on their first e-scooter rider. Also, 48% of injured riders sustained injuries to the head while 35% of injured riders sustained a limb fracture (Austin Public Health, 2019)
- Moreover, a study looked at craniofacial injuries due to shared electric scooters in an urban setting, it was populated with 90 patients containing 56 males and 34 females with a mean age of approximately 32. None of the patients admitted they wore a helmet when they sustained their injury.
- In this study, 57.7% of patients sustained head or facial injuries, with various degrees ranging from, but not limited to, concussions, skull fractures and subarachnoid/subdural hemorrhage (Trivedi, et al., 2019). The lack of helmet users in this study seems to correlate with the high prevalence of traumatic brain injuries.
- Furthermore, a few other studies analyzed similar metrics as the aforementioned ones.
- 19% of patients sustained a concussion (Mayhew & Bergin, 2019), study population was 63 patients within a two-month period. Only four patients wore a helmet when the injury was sustained (Mayhew & Bergin, 2019) which could explain the near 1/5 prevalence of concussions among e-scooter injuries
- Similarly, a smaller study with only 36 patients, analyzed e-scooter related injuries. The study found that 38.9% of e-scooter riders loss balance or control. The argument of e-scooter riders' inexperience arises again. 72% of injuries were recorded as being external injuries (Liew, Wee, & Pek, 2020) and only 2% of injured patients wore a helmet or other PPE. PPE could have been

effective at preventing or mitigating the injuries of some patients since 72% of injuries that were analyzed were external injuries.

- Also, a multi-institutional case series analyzed admitted patients for injuries sustained due to e-scooter operation. This study analyzed drug and alcohol use, helmet use and injuries among many other metrics. It was found that alcohol and drugs were commonly found in the blood and urine of injured patients. Alarmingly only 2% of the 103 patients, in the retrospective case series, wore helmets when they sustained their injury and 18%, nearly 1/5, of patients had intracranial hemorrhage (ICH). While 17% of patients were diagnosed with a concussion without ICH (Kobayashi, et al., 2019). The low rate of individuals wearing a helmet when injured with the rather high number of ICHs and concussions are probably correlated.
- It appears e-scooter inexperience is relevant in the context of injuries. Across the various studies the data seems to indicate that inexperience, which is usually the case when falling or losing control of an e-scooter, is a direct contributor to injuries.
- To add in the Washington DC area, 12% of injured patients, treated at an ED, had alcohol use prior to operating an e-scooter or seemed impaired when treated at the ED (Cicchino, Kulie, & McCarthy, 2020)
- During a 19 week surveillance of ED visits in Auckland, 2019, about 14% reported to have alcohol in their system and 9.4% had a BAL > 1 (blood alcohol level) when they presented themselves to an ED (Brownson, Fagan, Dickson, & Civil, 2019).
- In Austin Texas, 29% of interviewed riders, that sustained an injury, reported they consumed an alcoholic beverage 12 hours before their injury (Austin Public Health, 2019).
- 7% of riders in the Austin, Texas, study sustained a traumatic injury which “include concussions and other forms of altered mental status or bleeding such as subarachnoid hemorrhage and subdural hematoma” (Austin Public Health, 2019).
- A furthermore, 17.8% of patients in a Dallas Texas ED had consumed alcohol and alcohol consumption was reported in all the 16 cases that occurred in the first seven months of e-scooter injuries in the city of ED visits related to e-scooters.
- In Salt Lake City, Utah, 16% of injured riders that visited an ED reported they were intoxicated at the time of their injury (Badeau, DO, Newman, Carlson, & Madsen, 2019)
- Moreover, 103 patients admitted for injuries related to the operation of e-scooter during a study period. Of those 103, 79% of patients were tested for alcohol and 48 & of those tested

had a blood alcohol level >80 mg/dL. Also 60% of patients had urine toxicology screen done and 52% came back positive, of those that were tested (Kobayashi, et al., 2019)

- Furthermore, another study in Auckland where there was 246 hospital presentations, out of 770 total injured patients, 26.8% of injuries were related to alcohol use when operating an e-scooter (Bekhit, Le Fevre, & Bergin, 2020)

## 2.4 CONCLUSIONS

- Another aspect that was highlighted often was the lack of e-scooter riders wearing any sort of personal protective equipment (PPE), most notably a helmet. Helmets and other PPE can help mitigate external body injuries.
- Nevertheless, head, and facial injuries were relatively quite common, which is alarming. Head injuries, e.g. concussion, are quite severe and have chronic effects on young adults' developing brains.
- Using a helmet can lessen the impact of an object with the e-scooter rider's head and possibly avoid severe head injuries.
- The implementation of helmets on every e-scooter, something Neuron has been doing so far, will give the choice to riders to wear a helmet or not. This makes the decision more convenient than ordering a helmet through the app and paying the shipping fee, something that Bird and Lime are doing.
- To add, more strict zero alcohol policies regarding the operation of an e-scooter could be put in place in tangent to better resources for e-scooter beginners on how to safely operate an e-scooter, would surely increase the overall safety of e-scooters in the City of Ottawa and other cities where e-scooters are quite popular.



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